वार्षिक प्रतिवेदन

ANNUAL REPORT 2019-20

अखिल भारतीय समन्वित कृषि प्रणाली अनुसंधान परियोजना

AICRP on Integrated Farming Systems

ICAR-Indian Institute of Farming Systems Research
Modipuram, Meerut-250110 (UP)

ICAR-IIFSR

ICAR Indian Institute of Farming Systems Research (IIFSR) formerly Project Directorate for Farming Systems Research (PDFSR) was established by Indian Council of Agricultural Research New Delhi in April 1989 at Modipuram Meerut Uttar Pradesh.

Vision

Management of natural source of holistic improvement of small and marginal farmers through Integrated Farming Systems

Mission

Improve food, nutrition, livelihood and financial security of small and marginal households through climate smart Integrated Farming Systems (to make marginal and small households as bountiful)

Mandate

- Research in integrated farming Systems on production technologies for improving productivity and resource use efficiencies
- Develop efficient, economically viable and environmentally sustainable integrated farming system models for different farming situations.
- On-farm testing, verification and refinement of system-based farm production technologies.
- Co-ordinate and monitor integrated farming system research in the country

All India Coordinating Coordinated Research Project on Integrated Farming System (AICRP on IFS) is an integral part of ICAR-IIFSR with 74 centres to undertake on-station main (25 no's.) on-station sub (11 no's.) on-station voluntary (6 no's) and on-farm research (32 no's) spread across length and breadth of the country. The institute is also leading an All India Network Programme on Organic Farming (AI-NPOF) with 20 centres

ALL INDIA CO-ORDINATED RESEARCH PROJECT ON INTEGRATED FARMING SYSTEMS

ANNUAL REPORT
2019-20

ICAR-Indian Institute of Farming System Research

Modipuram, Meerut - 250110, INDIA

Correct Citation: AICRP on IFS. 2020. Annual Report 2019-20. ICAR-Indian Institute of Farming Systems Research (Indian Council of Agricultural Research), Modipuram, Meerut- 250 110, pp. 1-.

Compiled and Edited by: Dr N. Ravisankar Project Coordinator (Acting)

Dr A.K. Prusty, Sr. Scientist (Coordination Unit)

Dr Mohammad Shamim, Senior Scientist (Coordination Unit)

Dr. Meraj Alam Ansari, Sr. Scientist (Coordination Unit)

Dr. Raghuveer Singh, Scientist (Coordination Unit) & PI On Farm Research

Dr Raghavendra K J,Scientist (Coordination Unit)

Mr Dhananjay Tripathi, Chief Technical. Officer (Coordination Unit)

Dr Vipin Kumar,Chief Technical. Officer (Coordination Unit)

Administrative/Typing Assistance: Mrs Jailata Sharma, Personal Assistant, (Coordination Unit)

Data Processing at IASRI, New Delhi by: Dr Anil Kumar, Principal Scientist & PI, AICRP-IFS

Dr (Mrs) Cini Varghese, Principal Scientist, OFR, AICRP-IFS

Dr Arpan Bhowmick, Scientist

Dr Sukanta Dash, Scientist

Dr Sunil Kumar Sarkar, Scientist Mr Gyan Singh, Chief Tech. Officer

Mr Naresh Kumar, Assit. Chief Tech. Officer

Mr Devender Kumar, Assist. Chief Tech. Officer

Published by: Dr A.S. Panwar, Director

ICAR-Indian Institute of Farming Systems Research,

Modipuram, Meerut-250110, India

Important Notes:

- This compilation is a joint contribution of all the associated scientists and technical staff of 74 AICRP-IFS centers (data generation), ICAR-IASRI New Delhi (statistical analysis) and ICAR-IIFSR, Modipuram (report writing, compilation, editing and printing).
- The report is based on experimental data generated during, kharif, rabi and summer seasons of 2018-19 (period ending June 2019), under 'on-station' and 'on-farm' research programmes of AICRP on Integrated Farming Systems. The other details are relevant to 31st March 2020.
- The report includes both processed and semi- processed data, generated in different sub-projects under AICRP on Integrated Farming Systems, and as such no material / data should be reproduced in any form without prior written permission of the Director, ICAR- Indian Institute of Farming Systems Research and due credit to the concerned scientists.

ACKNOWLEDGEMENT

All India Coordinated Research Project on Integrated Farming Systems (AICRP-IFS) initiated in 2010-11 is operating with 25 main, 11 sub, 6 ICAR institute-based and 32 on-farm centres in 25 States/Union territory. The results of experiments conducted during 2018 -19 by all the co-operating centres are processed and compiled in the Annual Report 2019-20. I take this opportunity to record my sincere thanks to **Dr.Trilochan Mohapatra,** Former Secretary, Department of Agricultural Research and Education and Director General, Indian Council of Agricultural Research, New Delhi and **Dr Himanshu Pathak,** Secretary (DARE) and Director General (ICAR) for their critical remarks and guidance during the review. I extend my gratitude to **Dr S K Chaudhari,** Deputy Director General (Natural Resource Management) for his constant support extended to the scheme. The time-to-time guidance received from **Dr. S. Bhaskar,** Assistant Director General (Agronomy, Agroforestry and Climate Change) for improving the performance and output of the scheme is also duly acknowledged. Scientific inputs received from Quinquennial Review Team (QRT), Research Advisory Committee (RAC) and Institute Management Committee(IMC) are thankfully acknowledged as those inputs provided immense help in taking new initiatives, shaping and improvement of the programme for practical utility. I am highly thankful to each and every scientist and research fellows involved in the scheme at the all the centres for putting the meticulous effort to conduct a field experiments, lab analysis and generating data. The sincere efforts put forth by **Dr. N. Ravisankar,** Principal Scientist and Project Coordinator (Acting) deserves appreciation for compilation of the report. I also extend my appreciation to **Dr. A. K. Prusty,** Senior Scientist, **Dr. M. Shamim,** Senior Scientist, **Dr Meraj Alam Ansari,** Senior Scientist, **Dr. Raghuveer Singh,** Scientist, **Dr.Raghavendra K.J,** Scientist **Mr. Dhananjay Tripathi,** Chief Technical Officer, **Dr Vipin Kumar,** Chief Technical Officer and **Mrs. Jailata Sharma,** Personal Assistant for their Cooperation in compilation of the data, its statistical analysis, drafting and proof corrections and administration of the scheme. The contributions of all the other scientific, technical, administrative, and skilled supporting staff either directly or indirectly at various levels during preparation of this report also acknowledged. I am sure; the significant findings obtained from the experiments of cropping and farming systems and its validation in the farmers field will be highly useful for the planners.

(A.S. Panwar)

CONTENTS

सारांश

अखिल भारतीय समन्वित एकीकृत कृषि प्रणाली अनुसंधान परियोजना 25 मुख्य केन्द्रो 11 उपकेन्द्रो 32 फार्म प्रक्षेत्र अनुसंधान एवं 6 भारतीय कृषि अनुसंधान परिषद संस्थानो के तत्वाधान में देश के 25 राज्यों 1 केन्द्र शासित प्रदेश में संचालित होती है, तथा सभी 15 कृषि जलवायु क्षेत्रों को सम्मिलित करती है। आन स्टेशन एवं आन फार्म पर 2019-20 में किये गये अनुसंधान कार्यक्रम की प्रमुख उपलब्धियाँ निम्न है।

सतत संसाधन प्रबंधन, जलवायु के अनुकूल एकीकृत कृषि प्रणाली माडल।

वर्ष 2019-20 के दौरान 15 कृषि जलवायु के क्षेत्र में जलवायु के अनुकूल एकीकृत कृषि प्रणाली के अध्ययन में निम्नलिखित तथ्य प्राप्त हूए।

2019-20 के दौरान एग्रोक्लाइमेट जोन में दावा करने वाले स्मार्ट IFS के अध्ययन में यह दर्शाया गया है;-

- श्रम को छोडकर बाजार इनपुट लागत(एलजीपी में 15% से टीजीपी में 58%)
- पारिवारिक श्रम को छोडकर पुनर्चकरण का मूल्य(सीपीएच में 13.4% से 35.7% एलजीपी)
- किराये पर लिया गया श्रमिक (द्वीप समूह में 0% से सीपीएच में 68%)
- पारिवारिक श्रम द्वारा लागत बचत (ईपीएच में 49% इसके बाद द्वीप में 46% और एमजीपी, सीपीएच और जीपीएच में सबसे कम 0)
- श्रम को छोड़कर बाजार इनपुट के हिस्से के रूप में बाजार से पशु आहार की खरीद (द्वीप में एमजीपी में 28% से 86.9% तक)
- एलजीपी में प्रति रूपये शुद्ध रिटर्न 0.74% से लेकर टीजीपी में 2.5 तक भिन्न होता है।
- एसवीआई में 0.4 से 0.8 के बीच भिन्नता है, जो द्वीपों में सबसे अधिक है।
- 3% (सीपीएच) से 51% (डब्ल्यूसीपीएच) की सीमा में प्रारंभिक स्थिति में मिट्टी ओसी में सुधार

प्रयोग-1: फार्म प्रक्षेत्र पर पोषण तत्वो के प्रति फसल प्रतिक्रिया

विभिन्न एनएआरपी में लागू पोषक तत्वो के लिए प्रचलित फसल प्रणाली की प्रतिक्रिया पर परिणामो का सारांशः

- विभिन्न एनएआरपी क्षेत्रों में किए गए ऑन-फार्म पोषक तत्व प्रतिक्रिया परीक्षणों (552 संख्या) आयोजित किए गए,जो स्थानों और प्रणालियों में, 22, 34,54 और 100% के पोषक तत्व अनुप्रयोग अंतर का संकेत दिया गया है। N, P205, K20 सूक्ष्म पोषक तत्व किसानों के अभ्यास और अनुशंसित पोषक पैकेज के बीच मौजूद हैं। यह प्रमुख फसल प्रणालियों की प्रणाली उपज में भी परिलक्षित होता है।
- चावल-चावल, चावल-गेहूं में 8, 9, 8, 7 (अनाज उपज/किग्रा एन) से एन की कृषि दक्षता (एई) को 29, 21, 19 और 28 किग्रा (अनाज उपज/किलोग्राम एन) तक बढ़ाया जा सकता है। अकेले N के बजाय P और K के साथ N की अनुशंसित खुराक के आवेदन द्वारा क्रमशः गेहूँ, मक्का-गेहूं और चावल-सरसों की प्रणालियाँ।
- लागू पोषक तत्वों के लिए फसल प्रणालियों की औसत आर्थिक प्रतिक्रिया क्रमशः N, P205 और K20 पर निवेश किए गए प्रति रुपये 5.2, 2.5 और 3.4 रुपये की वापसी का संकेत देती है।
- N P205 K20 की अनुशंसित खुराक और किसान के पैकेज के बीच ऑन-फार्म सिस्टम उपज अंतर चावल-चावल, चावल-गेहूं, मक्का-गेहूं और चावल-सरसों में 333, 1582, 1964, 1822 और 1014 किलोग्राम ha-1 पाया गया। सूक्ष्म पोषक तत्वों के प्रयोग से 1036, 2066, 2449 और 2206 किग्रा हेक्टेयर-1 तक बढ़ाया जा सकता है।

- चिक्कबल्लापुरा (कर्नाटक) जैसे कुछ केंद्रों में रागी-टमाटर किसान प्रथाओं में आरडीएफ की तुलना में अधिक उपज दर्ज की गई क्योंकि किसान उर्वरकों की उच्च खुराक का उपयोग कर रहे हैं लेकिन असंतुलन तरीके से। किसानों को सूक्ष्म पोषक तत्वों के साथ उर्वरकों की संतुलित मात्रा के प्रयोग को प्रोत्साहित करना चाहिए।

प्रयोग 2: मौजूदा कृषि प्रणालियों का विविधीकरण

विभिन्न स्थानों पर परिणाम नीचे संक्षेप में दिए गए हैः

- विभिन्न जिलों में कृषि प्रणालियों की संख्या 1 से 5 तक भिन्न है। मेडक (तेलंगाना) हिंगोली में अधिकतम 5 कृषि प्रणालियों की उपस्थिति देखी गई और मिर्जापुर (उत्तर प्रदेश) में एकल कृषि प्रणालियों का अस्तित्व देखा गया।).
- सीमांत परिवारो में सभी स्थानो पर खेत की फसले+डेयरी सामान्य कृषि प्रणाली पाई गई और यह प्रणाली का अभ्यास करने वाले परिवारों की संख्या के आधार पर 8 जिलों मे प्रचलित प्रणाली (37%परिवार)है।
- दो घटक प्रणालियां (डेयरी या सेरीकल्चर या बकरी या बैल या पोल्ट्री और बागवानी के साथ या तो पोल्ट्री या डेयरी के साथ खेतों की फसले) का अभ्यास 49% परिवारो द्वारा किया जाता है, जिनका औसत लाभ बेंचमार्क मे 46,140 रूपये पाया गया था। फसल प्रणाली पशुधन में विविधीकरण के हस्तक्षेप के कारण, और दूसरे वर्ष में क्षमता निर्माण के कारण, लाभ को 107973 रूपये तक बढ़ाया जा सकता है जो औसतन 2.3 गुना है।
- संख्यिकीय विक्लेषण के आधार पर, प्रत्येक जिले के लिए सबसे अच्छा प्रदर्शन करने वाली कृषि प्रणाली की पहचान की गई है, जिसे सीमांत कृषि परिवारो की आजीविका में सुधार के लिए सभी संभावित हस्तक्षेपो और विविधीकरण दृष्टिकोण के साथ बढ़ाया जा सकता है।

प्रयोग 3: फार्म प्रषिक्षण कृषि प्रणाली मॉडयूल का मूल्यांकन

विभिन्न स्थानों पर परिणाम नीचे संक्षेप में दिए गए हैः

- विभिन्न जिलों मे कृषि प्रणालियो की संख्या 1 (पटियाला) से 3 (कांकोर, क्योंझर, हिंगोली और नागपूर) के बीच है।
- 1.28 हेक्टेयर के औसत क्षेत्रफल वाले 15 जिलों (कुल घरों का 40%) में घरो की संख्या के आधार पर सभी कृषि प्रणालियों में , खेत की फसल+डेयरी को प्रमुख कृषि प्रणाली के रूप में पाया गया।विविधीकरण के कारण समतुल्य आधार पर उत्पादन में 6.9% का सुधार हुआ जबकि विपणन योग्य अधिशेष में 4.7% का सुधार हूआ।
- दो घटक प्रणालियाँ जैसे कि फिल्ड क्रॉप+डेयरी, फील्ड क्रॉप+पोल्ट्री, फील्ड क्रॉप+ सेरीकल्चर, फील्ड क्रॉप+बैल और हॉर्टिकल्चर+ पोल्ट्री का अभ्यास 52% अध्ययन परिवारो द्वारा 0.99 हेक्टेयर के औसत आकार के साथ किया गया था, जिनके उत्पादन और विपणन योग्य अधिशेष में 83 और 80% सुधार हुआ।

1. INTRODUCTION

The Genesis of the" All India Coordinated Research Project on Integrated Farming Systems " may be traced back to all visit of Dr. A.B Stewart of Macaulay Institute of Soil Research,Aberdeen U.K., somewhere in mid forties. He was invited by to the then ' Imperial Council of Agricultural Research' to (i) review the position in respect of soil fertility investigations, in general and manuring in particular, and (ii) suggest steps which might be taken in order to obtain, in shortest possible time, adequate information under different conditions of soil and climate to enable agricultural departments to give some advice to cultivators for increasing crop yield. His review reports, published in 1947, significantly affected philosophy and practices of fertilizers experimentation in the country, He stressed upon the need of conducting simple fertilizer trials on cultivators' fields and complex experiments at selected research centres. Prompted by these suggestions, a "Simple Fertilizer Trails at cultivators' fields" scheme was initiated in 1953 under the Indo American Technology Cooperation Agreement under "Soil Fertility and Fertilizer Use Project" with the following objectives.

i. To study crop responses to nitrogen, phosphorus and potassium when applied separately and in different combinations under the cultivators field conditions.

ii. To investigate the relative response of different fertilizers in various broad soil groups and to work out the optimum fertilizer combinations for different Agro climatic regions.

iii. To study the relative performance of different nitrogen and phosphatic fertilizers for indigenous production.

iv. To demonstrate to the farmers the value of fertilizers use for the production of crops.

Subsequently in 1956 experiments on carefully selected centres called 'Model Agronomic Experiments 'were added to the project and started as All India Coordinated Agronomic Experiment Scheme(AICAES). The objectives of Model Agronomic Experiments were;

i. To study the interaction of amounts of fertilizer application with intensity and frequency of irrigation, sowing date and plant density.

ii. To work out the manure requirement of important crop rotations,and their effect on soil fertility.

iii. To evaluate the relative efficiency of various sources of nitrogen and phosphorus for different crops and areas, and of different methods of application of nitrogenous and phosphatic fertilizers.

As knowledge progressed, new technology developed and the rate of growth in agriculture increased,the scheme went through various stages of evolution during which its scope expanded and its focus sharpened in accordance with newly required scientific knowledge. The scope of experimentation was, therefore, expanded to include agronomic research ,embracing cultural practices, irrigation and nutritional requirements, chemical weed control and multiple cropping But the emphasis continued on soil fertility and fertilizer use as influenced by soil and climatic factors and management.

In 1968 to 1969,the scheme was sanctioned as All India Coordinated Agronomic Research Project (AICARP) with two components,viz.; Model Agronomic Experiments' and Simple Fertilizer Trials. The main objectives of the experiments conducted at the research centres under the scheme were

i. To obtain information of the response of high yielding varieties of cereal to different economic factors such as fertilizers (including micronutrients), irrigation, weed control,liming etc.

ii. To study the menu requirements of important crop rotation and their effect on soil fertility.

iii. To evaluate various sources of Nitrogen and phosphorus for different crops and areas.

iv. To work out the production potential per unit area per unit time for different Agro climatic condition of the country and.

v. To determine the most suitable cropping patterns and fertilizer responses under rainfed condition.

Under the revised scheme with the main objectives of the simple fertilizer trial were.

i. To study the responsiveness of introduced high yielding and local Delhi improved varieties to nitrogen and phosphorus applied alone in the combination and to potassium in the presence of nitrogen and phosphorus and educated as well as dry and land location.

ii. To compare different methods of application of Nitrogen on series under dry farming conditions.

iii. To study the contribution of package of soil and moisture conservation practices to increase crop production in dry farming areas.

iv. To study the relationship between crop response to Fertilizer and soil test values and.

v. To formulate fertilizer recommendations for different soil and Agro climatic regions of the country.

But, during 1979 aforementioned objectives were further reviewed and redefined as under:

i. To develop, continuously update and test on cultivators' fields the technology for various crop based farming systems. For this patterns best suited for different agro-climatic zones may be identified, evolved for various emerging farming situations and package of practices developed to realize their production potential.

ii. To define/delineate all aspects of the use of fertilizers (recognizing that fertilizer is an important component of modern agricultural technology), including choice of materials maximize its use through recycling of agricultural wastes or employment of microbial aids,

iii. To provide facilities for testing new varieties at their pre-release stage, In mid-eighties, the policy planners duly recognized the importance of cropping systems approach of research to enhance resource use efficiencies for improved and sustainable crop productivity. Therefore, to strengthen all aspects of cropping systems research the 'Project Directorate for Cropping Systems Research' was established at Modipuram (Meerut) with effect from March 1989, with 'AICRP on Cropping Systems' as one of the constituent schemes of the Directorate with both the components, namely; 'On- Station Research' and 'On – Farm Research' remaining intact. However, within two decades of existence of PDCSR, the mandate of the Directorate was broadened during 2009-10 to undertake research in integrated farming system mode and the Directorate was renamed as 'Project Directorate for Farming Systems Research (PDFSR)' and mandate redefined as:

i. To characterize existing farming systems to know the productivity, viability and constraints.
ii. To develop resource efficient, economically viable and sustainable integrated farming system modules and models for different farming situations.
iii. To undertake basic and strategic research on production technologies for improving agricultural resource use efficiencies in farming system mode.
iv. To develop and standardize package of production practices for emerging cropping/ farming concepts and evaluate their long-term sustainability.
v. To act as repository of information on all aspects of farming systems by creating appropriate databases.
vi. To develop on-farm agro-processing and value addition techniques to enhance farm income and quality of fini9shed products.
vii. To undertake on-farm production technologies.
viii. To develop capacity building of stakeholders in integrated Farming Systems through training.

The name and mandate of AICRP on Cropping Systems were also changed accordingly, with major emphasis on farming systems research and objectives modified as hereunder. The Project Directorate for Farming Systems Research was renamed as ICAR-Indian Institute of Farming Systems Research (IIFSR) during November 2014 and the mandate was redefined further as given below.

- Research in integrated farming systems on production technologies for improving productivity and resource use efficiencies.
- Develop efficient, economically viable and environmentally sustainable integrated farming system models for different farming situations.
- On-farm testing, verification and refinement of system-based farm production technologies.
- Coordinate and monitor integrated farming systems research in the country.

All India Coordinated Research project on Integrated Farming Systems (AICRP on IFS) is an integral part of IIFSR with 75 centres to undertake on-station and on-farm research across length and breadth of the country. The institute is also leading a Network Project on Organic Farming (NPOF) with 20 centres.

2. OBJECTIVES

On-Station Research

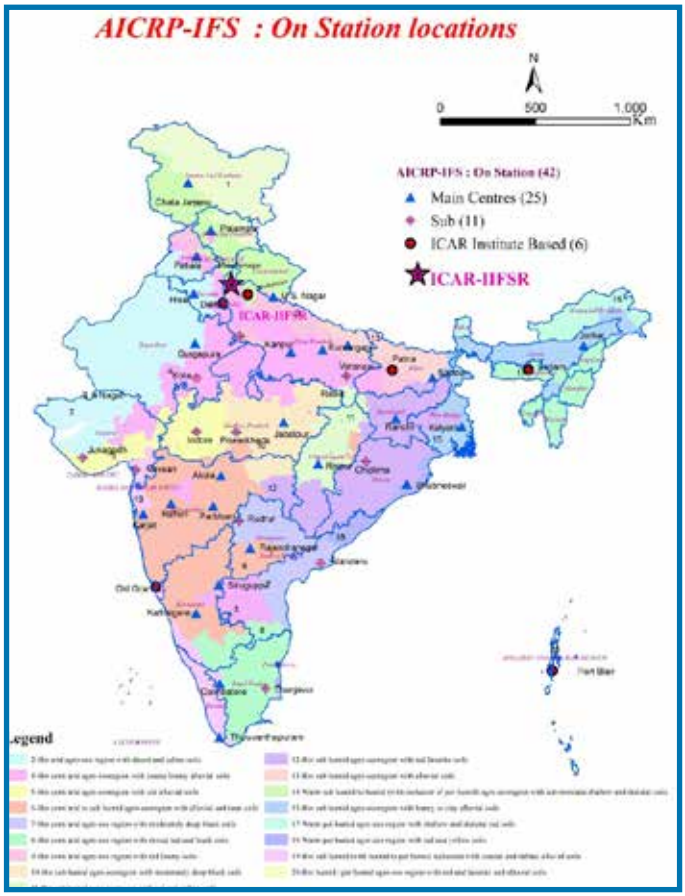
- To undertake applied and adaptive research in integrated farming systems (IFS), especially on production technologies for improving system productivity and resource use efficiencies.
- To develop efficient, economically viable and environmentally sustainable IFS models for different zones.
- To undertake capacity building and human resource development in IFS.

On-Farm Research

- To undertake characterization of existing farming systems for identification of production constraints and problem prioritization.
- To undertake on-farm testing and refinement of system-based farm production technologies.
- To optimize on-farm integration of farm enterprises for enhanced farm incomes, resource/input use efficiencies, and employment opportunities.

3. LOCATION

Under the aegis of AICRP –IFS there are 25 main centers, 11 sub centers, 32 on-farm research centres and 5 voluntary centres. All main and sub centres are engaged in basic and applied research and are necessarily located at SAUs or their Regional Research Stations or Agricultural colleges of those general universities, where strong agricultural research base is available . Whereas, on-farm research centres (earlier known as Experiments on Cultivators' Field /ECF centres) are engaged in farmers participatory research and are located in different agro climatic zones. These OFR centres remain shifted from one zone /farming situation to another, every 4-5 years. The voluntary centres are situated in ICAR institutes and are taking up only IFS model development activity. The location of different AICRP- IFS centres during the year under report (2018-19) is depicted in Map - 1 &2 ,and details are given in table 3.



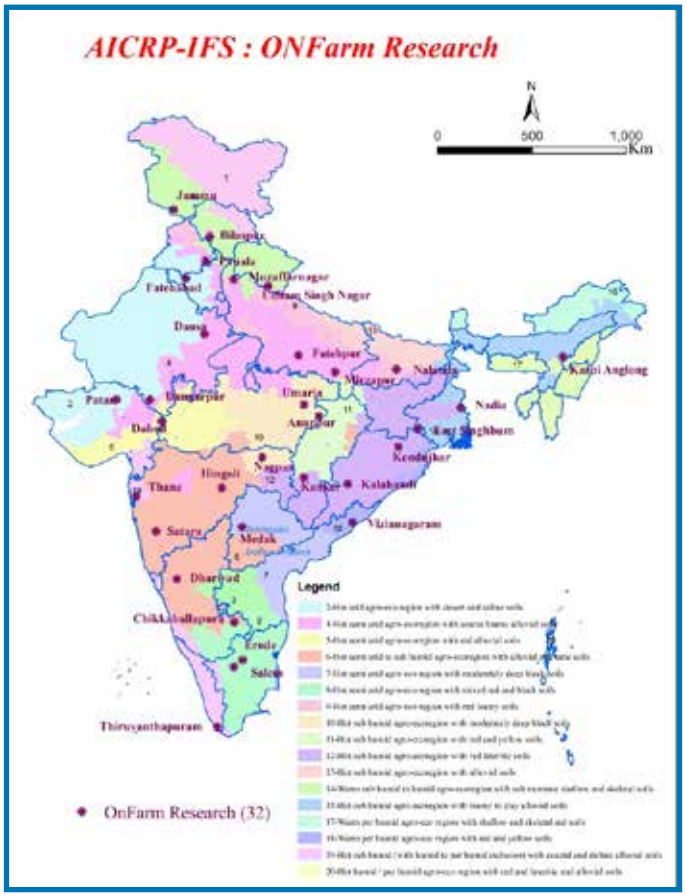


Table-3/1: Location of Different AICRP-IFS centres during the year under report (2018-19)

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/Sub-Region of Planning	NARP Zone
1.	A&N	CIARI,, Portblair	Voluntary	Island	Island region	Northern Zone AN-1
2	Assam	Jorhat	Main Centre	Humid	Eastern Himalayan Region/ Upper Brahmaputra Valley Sub-Region	Upper Brahmaputra Valley Zone (AS-2)
3.		Goalpara	OFR Centre	Humid	Eastern Himalayan Region	Central Brahmaputra Valley (AS-3)
4.	Andhra Pradesh	Maruteru (Dist. W. Godavari)	Sub Centre	Coastal	East Coast Plains and Hills Region/ South Coastal Andhra Sub-Region	Krishna Godavari Delta Zone (AP-1)
5.		Vizianagaram	OFR Centre	Sub-Humid	East Coast Plains and Hills Region	Andhra Pradesh- (AP-7)
6.	Bihar	Sabour (Dist. Bhagalpur)	Main Centre	Sub-Humid	Middle Gangetic Plains Region/ South Bihar Plains Sub-Region	South Bihar Alluvial Plain Zone (B1-3)
7.		Nalanda	OFR Centre	Sub-Humid	Middle Gangetic Plains Region	South Bihar Alluvial Plain Zone (BI-3)
8.		Patna	Vol. Centre	Sub-Humid	Middle Gangetic Plains Region	South Bihar Alluvial Plain Zone (B1-3)
9.	Chhattisgarh	Raipur	Main Centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	Chhattisgarh Plain Zone (CG-1)
10.		Kanker	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	Chhattisgarh Plain Zone (CG-1)
11.	Delhi	New Delhi	Vol. Centre	Semi-Arid	Trans Gangetic Plains region	Western Semi Arid (ND1)
12	Goa	Old Goa	Vol. Centre	Coastal	West Coast Plains &Hills Region	South Konkan Coastal
13.	Gujarat	S.K. Nagar (Dist. Banaskantha	Main Centre	Arid	Gujarat Plains and Hills Region/North Gujarat Sub-Region	North Gujarat Zone (GJ-4)
14.		Junagadh	Sub-Centre	Semi-Arid	Gujarat Plains and Hills Region/ South Saurashtra Sub-Region	South Saurashtra Zone (GJ-7)
15.		Navsari	Sub-Centre	Coastal	Gujarat Plains and Hills Region/ Southern Hills Sub-Region	South Gujarat Heavy Rainfall Zone (GJ-1)
16.		Dahod, Devgadh	OFR Centre	Semi-Arid	Gujarat Plains and Hills Region/ North Gujarat Sub-Region	Middle Gujarat Zone (GJ-3)
17.		Adiya, Patan	OFR Centre	Arid	Gujarat Plains and Hills Region/North west Sub-Region	North West Agroclimatic zone (GJ-5)
18.	Haryana	Hisar	Main Centre	Arid	Trans –Gangetic Plains Region/ Arid Sub-Region	Western Zone (HR-2)
19.		Fatehabad	OFR Centre	Semi-Arid	Trans –Gangetic Plains Region	Western (HR-2)
20.	Himachal Pradesh	Palampur (Dist. Kangra)	Main Centre	Humid	Western Himalayan Region/ High Altitude Temperature Sub-Region	Mid-Hill Sub-Humid Zone (HP-2)
21.		Bilaspur	OFR Centre	Humid	Western Himalayan Region	Sub-Montane and Low Hills Sub-Tropical (HP-1)
22.	J & K	Chatha (Jammu)	Main Centre	Humid	Western Himalayan Region/ High Altitude Temperature Sub-Region	Mid to High Altitude Plain Zone
23.		Jammu	OFR Centre	Humid	Western Himalayan Region/ High Altitude Temperature Sub-Region	Mid to High Altitude Plain Zone

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/Sub-Region of Planning	NARP Zone
24.	Jharkhand	Kanke (Ranchi)	Main Centre	Sub-Humid	Eastern Plateau & Hills Region/Chhota Nagpur, South and West Bengal Hills & Plateau Sub-Region	Western Plateau Zone (B1-5)
25.		East Singhbhum	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	South-eastern Plateau Zone
26.	Karnataka	Kathalgere (Dist. Davangere)	Main Centre	Semi-Arid	Southern Plateau and Hills Region	Southern Transition Zone (KA-7)
27.		Chikkaballapura	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	Central Dry Zone (KA-4)
28.		Siruguppa (Dist. Bellary)	Main Centre	Arid	Southern Plateau and Hills Region/Northern Dry Region of Karnataka	Northern Dry Zone (KA-3)
29.		Dharwad	OFR Centre	Semi-arid & arid	Southern Plateau and Hills Region	Northern Transition Zone -KA-8
30.	Kerala	Karamana(Dist. Thiruvanthapuram)	Main Centre	Coastal	West Coast Plains and Ghats / Mid land Sub-Region	Coastal Southern Zone (KE-2)
31.		Thiruvananthapuram	OFR Centre	Coastal	West Coast Plains and Ghats / Mid land Sub-Region	Coastal Southern Zone (KE-2)
32.	Madhya Pradesh	Jabalpur	Main Centre	Sub-Humid	Central Plateau & Hills Region/ Kymore Plateau and Satpura Hills Sub-Region	Kymore Plateau and Satpura Hills Zone (MP-4)
33.		Indore	Sub-Centre	Semi-Arid	Western Plateau &Hills Region/ Central Plateau Sub-Region	Malwa Plateau Zone (MP-10)
34.		Powarkheda (Dist. Hoshangabad)	Sub-Centre	Sub-Humid	Central Plateau & Hills Region/ Central Narmada Valley Sub-Region	Central Narmada Valley Zone (MP-6)
35.		Rewa	Sub-Centre	Sub-Humid	Central Plateau & Hills Region/ Kymore Plateau and Satpura Hills Sub-Region	Kymore Plateau and Satpura Hills Zone (MP-4)
36.		Anuppur	OFR Centre	Semi-Arid	Eastern Plateau and Hills	Northern hill zone of Chattisgarh (CG-3)
37.		Umaria	OFR Centre	Semi-Arid	Central Plateau & Hills Region	Kymore Plateau and Satpura Hills (MP-1)
38.	Maharashtra	Akola	Main Centre	Semi-Arid	Western Plateau &Hills Region/ Central Plateau Sub-Region	Western Vidarbha Zone(MH-8)
39.		Katol, Nagpur	OFR Centre	Semi-Arid	Western Plateau and Hills	Central Vidarbha Zone
40.		Karjat (Dist. Raigad)	Main Centre	Coastal	Western Plains & Ghat Regions/ Coastal Hilly Sub-Region	North Konkan Coastal Zone (MH-2)
41.		Thane	OFR Centre	Coastal	West Coast Plains and Ghats	North Konkan Coastal Zone (MH-2)
42.		Parbhani	Main Centre	Semi-Arid	Western Plateau &Hills Region/ Central Plateau Sub-Region	Central Maharashtra Plateau Zone (MH-7)
43.		Hingoli	OFR Centre	Semi-Arid	Western Plateau &Hills Region	Central Vidarbha Zone
44.		Rahuri (Dist. Ahemadnagar)	Main Centre	Semi-Arid	Western Plateau & Hills Region/ Scarcity Sub-Region	Scarcity Zone (MH-6)
45.		Padegaon, Satara	OFR Centre	Semi-Arid	Western Plateau & Hills Region	Western Maharashtra Plain Zone
46	Meghlaya	Umiam	Vol. Centre	Sub-humid To Humid	Eastern Himalayan Region	Sub-Tropical Hill Zone

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/Sub-Region of Planning	NARP Zone
47.	Odisha	Bhubaneswar	Main Centre	Sub-Humid	East Coast Plains and Hills Region/ Orissa Coastal Sub-Region	East and South –Eastern Coastal Plain Zone (OR-4)
48.		Chiplima (Dist. Sambalpur)	Sub-Centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	West-Central Table Land Zone (OR-9)
49.		Kendujhar	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	North-central Plateau Zone
50.		Kalahandi	OFR Centre	Coastal	East Coast Plains and Hills Region/ Orissa Coastal Sub-Region	Western Undulating Zone
51.	Punjab	Ludhiana	Main Centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Central Plain Zone (PB-3)
52.		Patiala	OFR Centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Western Plain Zone
53.	Rajasthan	Durgapura (Jaipur)	Main Centre	Semi-Arid	Central Plateau & Hills Region/ Eastern Plains of Rajasthan	Semi-Arid Eastern Plain Zone (RJ-5)
54.		Dausa	OFR Centre	Semi-Arid	Western Dry Region	Eastern Plain Zone
55.		Kota	Sub Centre	Semi-Arid	Central Plateau & Hills Region/ Eastern Plains of Rajasthan	Humid South –Eastern Plain Zone (South-Eastern Humid Plain Zone (RJ-9)
56.		Dungarpur	OFR centre	Semi-Arid	Central Plateau & Hills Region/ Southern Plains of Rajasthan	Sub-Humid Southern Plain & Aravali Hills Zone (RJ-7)
57.	Tamil Nadu	Coimbatore	Main Centre	Semi-Arid	Southern Plateau and Hills Region/ Central Plateau of Tamil Nadu Sub-Region	Western Zone (TN-3)
58.		Thanjavur	Sub Centre	Coastal	East Coast Plains and Hills Region/ Thanjavur Sub-Region	Cauvery Delta Zone (TN-4)
59.		Yethapur	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	North western Zone (TN-2)
60.		Bhavanisagar	OFR Centre	Semi-Arid	East Coast Plains and Hills Region	Sothern Zone (TN-5)
61	Telangana	Rajenderaanagar	Main centre	Semi-Arid	Southern Plateau and Hills Region/ South Telangana Sub-Region	Southern Telangana Zone (AP-5)
62		Rudrur (Dist. Nizamabad)	Sub Centre	Semi-Arid	Southern Plateau and Hills Region/ North Telangana Sub-Region	Northern Telangana Zone (AP-4)
63		Medak	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	Southern Telangana (AP-5)
64.	Uttar Pradesh	Kanpur	Main Centre	Semi-Arid	Upper Gangetic Plains Region/ South Western Plains Sub-Region	Central Plain Zone (UP-6)
65.		Fatehpur	OFR Centre	Semi-Arid	Upper Gangetic Plains Region/ South Western Plains Sub-Region	Central Plain Zone (UP-4)
66.		Faizabad	Main Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains Sub-Region	Eastern Plain Zone (UP-9)
67.		Mirzapur	OFR Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains Sub-Region	Eastern Plain Zone (UP-7)
68.		Varanasi	Sub Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains	Eastern Plain Zone (UP-9)
69.		Modipuram	Vol. Centre	Sub-Humid	Upper Gangetic Plains Region	Western Plain Zoan(UP-3)

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/Sub-Region of Planning	NARP Zone
70.		Muzaffarnagar	OFR Centre	Sub-Humid	Upper Gangetic Plains Region	Western Plain Zoan Dry sub-humid to semi-arid / (UP-3)
71.	Uttarakhand	Pantnagar (Dist. US Nagar)	Main Centre	Sub-Humid	Western Himalayan Region/ Valley Temperate Sub-Region	Bhawar and Tarai Zone (UP-2)
72.		Udam Singh Nagar	OFR Centre	Sub-Humid	Western Himalayan Region/ High hill Temperate Sub-Region	Hill Zone (UK-1)
73.	West Bengal	Kalyani (Dist. Nadia)	Main Centre	Humid	Lower Gangetic Plains Region/ Central Alluvial Plains Sub-Region	New Alluvial Zone (WB-3)
74.		Nadia	OFR Centre	Humid	Lower Gangetic Plains Region/ Central Alluvial Plains Sub-Region	New Alluvial Zone (WB-3)

4. SOIL AND CLIMATE

The major group of soil (centre-wise)on which on-station expertment of CSR/FSR were conducted during the year 2018-19 and geographical coordinates (Latitude and longitude) of the different research location are given in table 4.1. The general climate conditions for the experimental location are described in brief.

Table:4.1 Soil type of geographical coordinates of different on-station FSR centres.

S.No.	Centre	Soil Type	Latitude	Longitude
1.	Rajendranagar	Udic Ustochrepts, black soils	18˚ 59' N	78˚ 55' E
2.	Maruteru	Chromusterts clayey, medium black soils	16˚ 38' N	81˚ 44' E
3.	Rudrur	Chromusterts clayey, deep (90 cm depth), deep black soils	18˚ 30' N	77˚ 51' E
4.	Jorhat	Fluaquents/ Udicaquents association, very deep (90 cm depth), alluvial sandy clay loam soils	26˚ 47' N	94˚ 12' E
5.	Sabour	Eutrocherpts (Very deep), low and clay soils	25˚ 23' N	87˚ 07' E
6.	Raipur	Ochraquals association, deep black soils	21˚ 16' N	81˚ 36' E
7.	S K Nagar	Haplaquals, deep medium black soils	24˚ 90' N	72˚ 19' E
8.	junagadh	Ustochrepts, deep medium black soils	21˚ 30' N	70˚ 30' E
9.	Hisar	Vertic Ustochrepts deep medium black soils	20˚ 57' N	72˚ 54' E
10.	Palampur	Ustochrepts, very deep silty alluvial soils	29˚ 08' 55" N	74˚ 41' 16" E
11.	Navsari	Udic Haplustalfs, red soils	32˚ 06' N	76˚ 03' E
12.	Chatha (Jammu)	Eutrochrepts very deep clay soils	32˚ 05' N	74˚ 04' E
13.	Ranchi	Ultic Palustaifs very deep (90 cm) red soils	23˚ 79' N	85˚ 19' E
14.	Kathalagere	Aificols, dark reddish brown sandy clay loam	13˚ 02' N	76˚ 15' E
15.	Siruguppa	Type Chromusterts, very deep (90 cm) black soils	15˚ 38' N	76˚ 54' E
16.	Karamana	Typic Tropoflivents, very deep (90 cm depth)	11˚ N	77˚ E
17.	Jabalpur	Chromusterts, very deep (90 cm depth), medium to deep black	23˚ 10' N	79˚ 57' E
18.	Indore	-	22˚ 04' N	79˚ 57' E
19.	Powarkheda	-	23˚ 25' N	73˚ 98' E
20.	Rewa	Ustochrepts-Vertic Ustochrepts association, fine loamy soils	24˚ 41' N	81˚ 15' E
21.	Akola	Medium deep black clayey soil	20˚ 42' N	77˚ 02' E
22.	Karjat	Haplustults Udic-Fluvents, red soils	18˚ 33' N	75˚ 03' E
23.	Parbhani	Chromusterts,deep (90 cm depts.), deep black soils	19˚ 08' N	76˚ 05' E
24.	Rahuri	Chromusterts, fine clayey soils	19˚ 47' N	74˚ 18' E

S.No.	Centre	Soil Type	Latitude	Longitude
25.	Bhubaneshwar	Haplustaifs very deep (90 cm depth), mediumtextured lateritic soils	20˚ 15' N	85˚ 52' E
26.	Chiplima	Haplaquents, very deep (90 cm depth) clay, ill-drained soils	20˚ 21' N	80˚ 55' E
27.	Ludhiana	Ustochrepts-Ustic Psamments Assciation, very deep (90 cm depth), alluvial sandy and sandy-loam soils	30˚ 56' N	75˚ 52' E
28.	Durgapura (Jaipur)	Torrid-Psamments/ Torrid-Fluvents Association, sandy loam soils	26˚ 55' N	75˚ 49' E
29.	Kota	Chromsterts-Paleusterts association, very deep (90 cm depth) clay loam soils	25˚ 26' N	75˚ 30' E
30.	Coimbatore	Udic Rhodustalts, fine loamy red sandy soils	11˚ 59' N	78˚ 55' E
31.	Thanjavur	Typic Pellusterts, clayey very deep (90 cm depth)/ deep black soils of deltaic origin	10˚ 47' N	79˚ 10' E
32.	Kanpur	Udic Ustochrepts, alluvial soils	26˚ 28' N	80˚ 21' E
33.	Faizabad	Udic fluvents-Fluaquents Association, loqland clayey soils	26˚ 47' N	82˚ 12' E
34.	Varanasi	Aeric Chroquals very deep (90 cm depth) alluvial clayey soils	25˚ 18' N	83˚ 03' E
35.	Pantnagar	Hapludolls, very deep (90 cm depth) alluvium coarse loam soils	29˚ 08' N	79˚ 05' E
36.	Kalyani	Fluventic Eutrochrepts, very deep (90 cm depth) alluvial soils	23˚ 40' N	88˚ 52' E
37.	ICAR-IIFSR,Modipuram	Ustochrept	29.4' N	77.46' E
38.	ICAR-RC, Patna	Alluvial soil	25˚ 50' N	84˚ 45' E
39.	ICAR-RC, Umiam	Slfisols, Entisols, Inceptisols	25˚ 59' N	85˚ 08' E
40.	ICAR-RC, Goa	Lithic dystropepts karmali soils series	15˚ 13' N	75˚ 55' E
41.	ICAR-RC, Port Blair	Costal alluvial soil	11˚ 38' N	92˚ 39' E

Weather condition at different farming system research centres during 2018-19

The weather conditions including important parameters such as rainfall and air temperature (maximum and minimum) prevailed during the reporting period (June 2018 to May 2019) at the various Integrated Farming Systems Research Centers of the AICRP on IFS were analyzed. The rainfall data was categorized in to 4 seasons such as winter season (January-February), pre-monsoon season (March-May), southwest monsoon (June-September) and post-monsoon (October-December) and depicted in fig.1. The contribution of the southwest monsoon rainfall was described in percentage of annual rainfall for each center (fig.2). Centre-wise per cent departure of the annual rainfall was calculated. Air temperature data was collected at all the centers and analyzed. Annual temperature range (lowest to highest) of maximum and minimum temperature are depicted in figures 3-4. Compiled results revealed that centers like Akola, Bhubaneswar, Chiplima, Coimbatore, Goa, Indore, Junagarh, Kota, Ludhianan, Maruteru, Navsari, Parbhani Powarkheda, Rahuri, Rudrur, Siruguppa and Thanjavur did not receive winter season rainfall during the reporting period. However, Goa, Indore, Junagarh, Maruteru, Navsari, Rahuri, Rudrur and Thanjavur were the centers that were remained deprived of rainfall in subsequent season (Pre-monsoon). During the southwest monsoon season, Goa and Rahuri were the centres that received the highest (2497.8 mm) and lowest (99.2 mm) rainfall while during post-monsoon season,

Port Blair received the highest rainfall of 871.0 mm. Ayodhya, Chiplima, Durgapura, Hisar, Jabalpur, Junagarh, Kanpur, Kota, Navsari, Parbhani, Patna, Rahuri, Rewa, SK Nagar, and Varanasi were found to be dry centres. In terms of annual rainfall, the highest rainfall of 3132.6 mm was received at Port Blair and lowest (101.2 mm) at Rahuri centre. Centres like Junagarh, Navsari and Parbhani received 100 per cent precipitation from the southwest monsoon. Out of 40 (nos.) centtres of the AICRP on IFS, 12 (nos.) centres such as Akola, Bhubaneswar, Durgapura,Hisar, Jorhat, Kalyani, Kanpur, Ludhiana, Modipuram, Pantnagar, Port Blair and Raipur have received higher rainfall during the reporting period over the normal annual rainfall of the respective centres. However, the rest 28 (nos.) centres received lower rainfall than the normal annual raionfall during the reporting period.

Powarkheda was found to be hottest among the AICRP-IFS centre with maximum temperature of 46.0°C whereas the Umiam centre recorded the lowest temperature of 28.9 °C during reporting period. Palampur was found to be coldest centre with minimum temperature of 6.4°C. The center wise brief of the prevailing weather condition is described below.

Akola: During the reporting period, with (+)3.5% departure of annual rainfall, 835.4 mm rainfall was received at the centre. No rainy day was recorded during two consecutive seasons i.e. winter season and pre-monsoon season. Southwest monsoon contributed 88.0% to the total annual rainfall where June month was found to be the wettest month at this center with 185.3 mm rainfall. The monthly average maximum temperature ranged between 28.3°C to 42.5 °C.

Ayodhya: No rainfall was received during post-monsoon season at the centre. With contribution of 815.8 mm rainfall by southwest monsoon, centre recorded annual rainfall of 863.8 mm, which was 16.0% lower than the normal rainfall of the centre. August month was found to be the wettest month with 349.4 mm rainfall during the reporting period. Monthly average maximum and minimum temperature ranges for the reporting period were 21.8 to 40.9°C and 6.3 to 27.4°C respectively.

Bhubaneswar: Total rainfall received during the reporting period was 1519.5 mm which was 3.5% higher over the annual rainfall. Winter season did not receive any rain and pre-monsoon and post-monsoon season received 215 and 253 respectively. Southwest monsoon contributed about 69.0% rain to the total amount of rain. With 585.4 mm of rainfall, August was found to be wettest month for the reporting period. The monthly average maximum temperature was found in the range of 27.2°C to 38.0°C while minimum temperature ranged between 5.5 °C to 23.2°C.

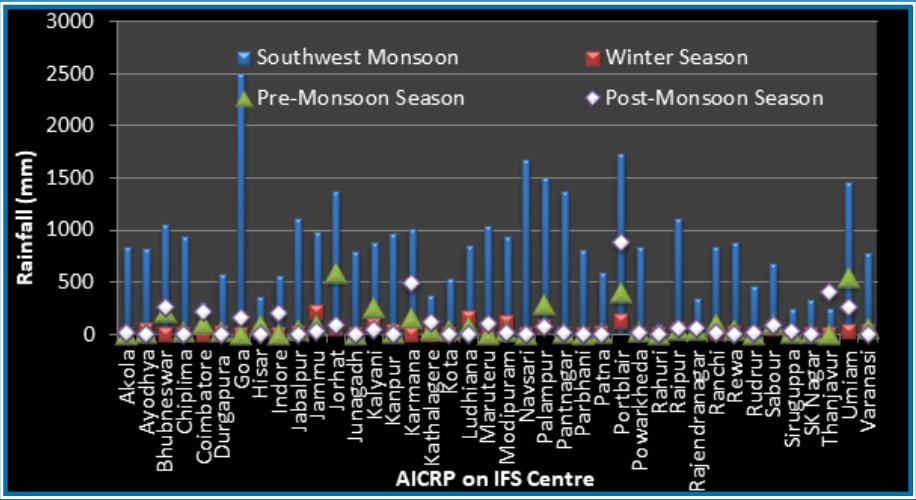


Fig. 1 Season-wise rainfall received at centres of AICRP on IFS during 2018-19

Chiplima: Centre did not receive rainfall during winter and post-monsoon seasons while pre-monsoon season received a very meager amount of rainfall i.e., 21.5 mm. Southwest monsoon

contributed 98.0% to the total rain received during the reporting period. Total rain recorded at the centre was 955.4 mm, which was 35.0% lower than the annual rainfall of the centre (1470.5 mm). The average monthly maximum and minimum temperature ranges were 28.6 to 40.2°C and 5.5 to 23.2°C respectively.

Coimbatore: with no any rainy-day during winter season, centre received 621.6 mm rainfall during the reporting period, which was 53.0% lower than the normal rainfall. Southwest monsoon contributed about 304 mm rainfall which was 48% of the total rain received during the reporting period. Monthly average maximum and minimum temperature ranges for the reporting period were 29.1 to 36.7°C and 17.9 to 24.9°C respectively.

Durgapura: Centre did not observe any rainy day in the post-monsoon season however, a very meager amount of rainfall (7.6 mm) was recorded during winter season. With (+) 8.33% departure of annual rainfall, centre received 606.6 mm of rain. Here, southwest monsoon contributed 95.0% to the total rains poured during the whole season. 22.1 to 40.1°C was the range of maximum temperature and 5.8 to 28.0°C was the range of minimum temperature for the reporting period.

Goa: Total contribution by winter season, pre-monsoon and post-monsoon season to the total rainfall received during the reporting period was 156.2 mm whereas southwest monsoon contributed 94.0%. There was (-) 21.3% departure of annual rainfall was calculated for the center with 2654. mm rainfall. With 35.2°C monthly average maximum temperature, November was recorded as the warmest month while mercury dropped down to 17.6°C during nighttime of January.

Hisar: Cumulative rain during the winter season, pre-monsoon and post-monsonn season was only 103.9 mm while southwest monsoon contributed 357.0 mm rain to the total. Centre received 20.68% higher rainfall than the normal rainfall (381.9). As usual, summer was very hot, monthly maximum temperature (39.6°C) was reported highest during the June, and winter was severe during which average monthly minimum temperature dropped below 4.9°C in December.

Indore: Winter season and pre-monsoon season did not receive any rain during the reporting period while post-monsoon season received 205.1 mm of rainfall. The southwest monsoon contributed 73.0% of rainfall to the total rainfall (757.7 mm) received during the reporting year.

Jabalpur: No rainfall was recorded during post-monsoon season at the centre. Winter season and post monsoon season received 52.2 mm of rainfall whereas southwest monsoon season contributed 1115.1 mm (3.6% lower than the normal annual rainfall) of rainfall which was 96% of the total rain received during the reporting year. The highest average monthly maximum temperature (40.9°C) was recorded during May whereas lowest minimum temperature (6.7°C) was recorded during December.

Jammu: Centre received rain during all the four seasons with maximum contribution from southwest monsoon season (983.1 mm). The reporting year received almost equal rainfall to the normal annual rain (1325.6). The range of monthly average maximum temperature was 17.4°C to 38.1°C. December month was fond to be coldest where night temperature was dropped to 4.4°C.

Jorhat: With the highest contribution from the southwest monsoon (1375.7 mm), center received rain during all other three seasons (715.5 mm). Received rainfall during the reporting period was 5.3% higher over the normal rainfall of the centre. The highest monthly mean maximum temperature was observed between 24.6 to 33.6°C while monthly mean minimum temperature was recorded between 9.2 to 25.9°C.

Junagarh: Winter season, pre-monsoon and post-monsoon season did not received rainfall. Total

876.8 mm rainfall was recorded at the centre, which was 11.0% lower than the normal rainfall of the centre. The highest monthly average maximum temperature (40.3°C) was observed during April whereas, lowest minimum temperature (12.6°C) was recorded during January.

Kalyani: Southwest monsoon season contributed 70.0% to the total rain (1252.2 mm) received at the centre during the reporting period. The range of monthly average maximum temperature was 24.5 to 36.1°C. Lowest monthly average minimum temperature (10.1°C) was recorded during January.

Kanpur: Total contribution by winter season, pre-monsoon and post-monsoon season to the total rainfall received during the reporting period was 41.8 mm whereas southwest monsoon contributed 96.0%. There was 34.37.6% higher rainfall over the normal annual rainfall was calculated for the center with 1000.3 mm rainfall. With 41.3°C monthly average maximum temperature, May was recorded as the warmest month while mercury dropped down to 6.9°C during nighttime of December.

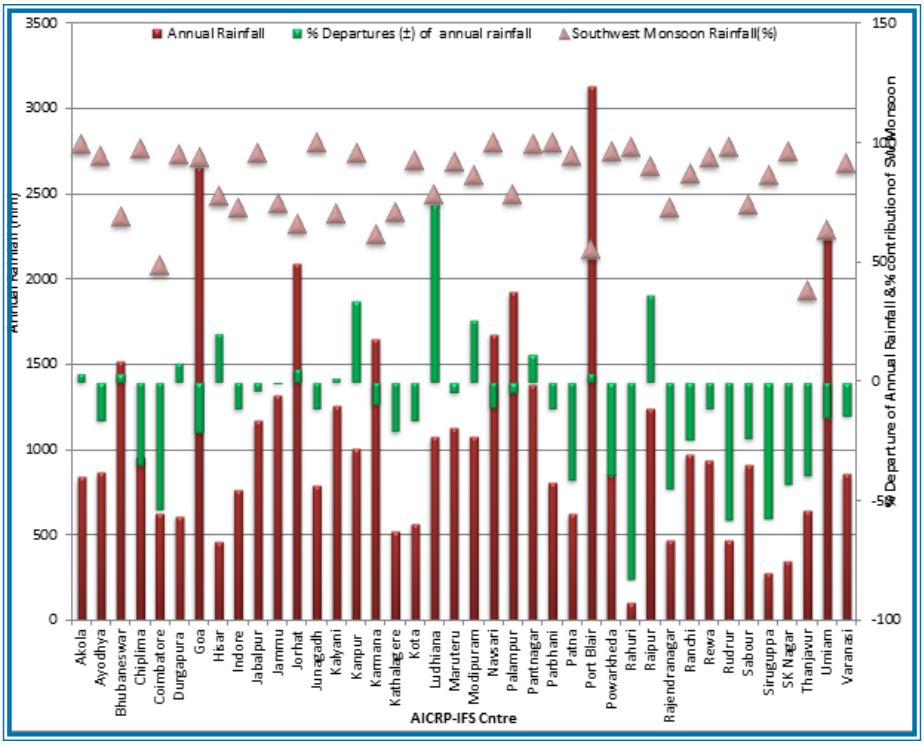


Fig. 2 Annual rainfall with percentage departure and contribution of southwest monsoon season at centres of AICRP on IFS during 2018-19

Karamana: During the reporting period, the total rainfall received was 1646.69 mm which was 9.1% lower than the normal rainfall received at the centre. Here, all the season received rain in between 149.0 mm (pre-monsoon season) to 1011.0 mm (Southwest monsoon season) except winter season. With the rainfall amount of 320.0 mm, October month was recorded as the wettest month of the season whereas, January and February did not observe any rainy day. The range of monthly average maximum temperature was 29.5 to 33.7°C. Night temperature remained above 21.1°C during the reporting period.

Kathalagere: Total rainfall received during the reporting period was 520.0 mm (20.74% lower than the normal yearly rainfall) where South-west monsoon contributed 50.0%. September month was recorded as the wettest month of the season where 122.0 mm rainfall was received. The range of

monthly average maximum temperature was 28.3 to 38.8°C. Night temperature remained above 17.0 °C during the reporting period.

Kota: No rainfall was recorded during winter season and post-monsoon season at the centre. Pret-monsoon season received a very meager amount of rainfall i.e., 41.2 mm. Southwest monsoon season contributed 93.0% rain to the total rainfall received at the centre. Here, 15.8% lower rain than the normal rainfall was received during the reporting period. The highest average monthly maximum temperature (42.8°C) was recorded during May whereas lowest minimum temperature (5.1°C) was recorded during December.

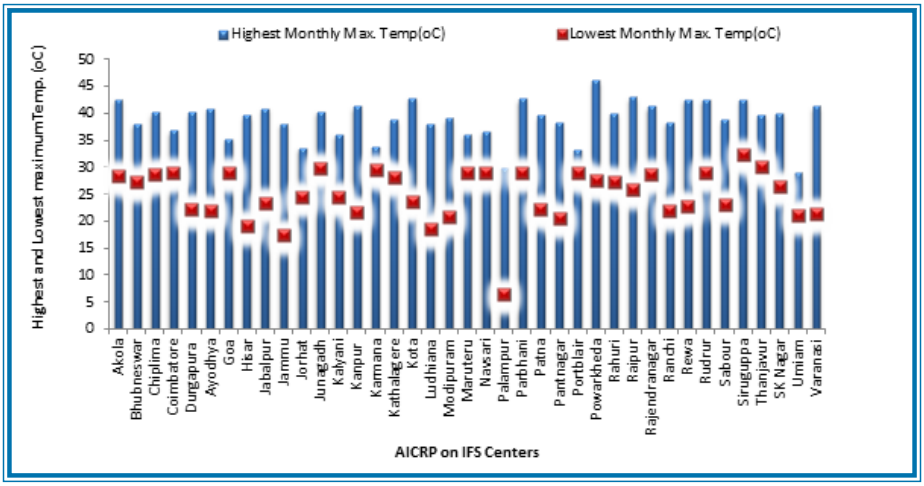


Fig. 3 Highest and lowest monthly average maximum (oC) temperature at centers of the AICRP on IFS during 2018-19

Ludhiana: The total annual rainfall received during the reporting period was 1072.4 mm which 74.25% higher over the normal rainfall of the centre. Here, all the seasons received some rainy days. The highest range of monthly mean maximum temperature (18.5 to 38.0°C) was observed at this centre and lowest minimum temperature (5.5°C) was recorded during December.

Maruteru: Winter and pre-monsoon season did not receive any rain during the reporting year whereas post-monsoon season received 91.8 mm of rainfall. The total rain occurred during the year was 1127.1 mm which was 4.4% lower than the normal rainfall of the centre. Southwest monsoon season recorded 92.0% of the total rainfall. The ranges of monthly average maximum and minimum temperature were 28.8 to 36.1°C and 20.4 to 27.5°C respectively.

Modipuram: Winter season, pre-monsoon and post-monsoon season received only 144.2 mm of rainfall whereas southwest monsoon received which was 87.0% of the total rainfall (1077.1 mm). Here, 26.0% higher rains were received during the reporting period than the normal rainfall of the centre. The average monthly maximum and minimum temperature ranges were 20.9 to 39.0°C and 5.1 to 25.8°C respectively.

Navsari: The reporting period received 1675.0 mm rainfall, which was 10.75% lower than the normal rainfall of the centre. Distribution of the rain during the reporting period was much skewed and there were no rainy-day during winter season and pre-monsoon season and post monsoon season. Southwest monsoon contributed 100% rain to the total rainfall received at the centre. The average monthly maximum and minimum temperature recorded at the centre were 32.8°C and 18.9°C.

Palampur: All the four seasons have received the rain between 67.8 mm to 1501.2 mm. Total rainfall received at centre was 1922.8 mm with (-) 4.6% departure to normal rainfall. Southwest monsoon contributed 78.0% to the total rainfall. The ranges of monthly average maximum and minimum temperature were 6.4 to 29.9°C and 3.7 to 19.8°C respectively.

Pantnagar: Rain received during southwest monsoon was 1363.2 mm which was 99.0 % of the total rainfall received during the reporting period however rest three seasons contributed only 10.8 mm of rain where October, November, January and March did not observe any rainy day. During the season, 11.7% higher rain was poured at the centre. The highest monthly average maximum temperature (38.2°C) was recorded in the month of June however, average minimum temperature (4.2°C) was observed during the month of January.

Parbhani: Centre did not record any rainy-day during winter season while pre-monsoon and post-monsoon jointly received only 9.22 mm of rainfall during the reporting period. With 99.0% contribution to the total rainfall, 1363.2 mm of rainfall collected from southwest monsoon season. In the reporting period 11.1%, lower rainfall was received than the normal rain. The highest monthly mean maximum temperature (42.7°C) was observed during May whereas; lowest minimum temperature (9.9°C) was recorded during January.

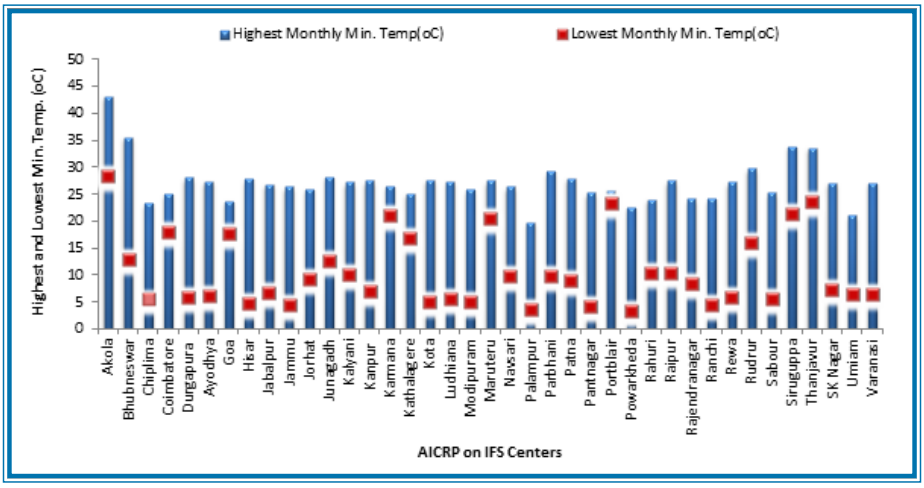


Fig. 3 Highest and lowest monthly average minimum (oC) temperature at centers of the AICRP on IFS during 2018-19

Patna: During the reporting period, the total rainfall received was 621.1 mm. with 587.5 mm rainfall from south-west monsoon (95.0% to the total rain). Distribution of rainfall across the season was not found good and the total rain received during the other season was only 33.6 mm. The ranges of monthly average maximum and minimum temperature were 22.3 to 39.6°C to 9.1 to 27.9°C respectively.

Port Blair: During the reporting period, only February month did not receive any rainy day while all four seasons received some rainfall from 125.8 mm (Winter season) to 1730.5 mm (Southwest monsoon). During the reporting period, southwest monsoon contributed 55.0% to the total rainfall. In this period about (+) 3.48% rain was received than the normal rainfall of the centre. Post-monsoon season also contributed sizable amount of rainfall (871.0 mm). The highest monthly average maximum and minimum temperature recorded during the reporting period was 33.1°C and 25.6°C respectively during the reporting period.

Powarkheda: The total annual rainfall received during the reporting period was 858.7 mm which was almost 40.0% lower than the normal rainfall of the centre. There was no any rainy day was

observed during November to May except March and April. Southwest monsoon received 828.2 mm of rain which was 96.0% of the total rainfall received during the reporting period. The highest monthly mean maximum temperature (46.0°C) was observed in April whereas; lowest minimum temperature (3.5°C) was recorded during December.

Rahuri: During the reporting period, the total rainfall received was 101.2 mm which was 98.0% from the south-west monsoon season. Distribution of rainfall across the season was not found satisfactory and October to May except November, no any rainy day was observed at the centre. The highest monthly average maximum and minimum temperature recorded during the reporting period was 40.0°C and 24.0°C respectively during the reporting period.

Raipur: Centre received a total rainfall of 1239.7 mm during the reporting period whereas, southwest monsoon contributed about 90.0%. Almost all the months except October and November received some amount of rain in the reporting year. During the reporting period, the total rainfall received was 36.85% higher over the normal annual rainfall of the year. The ranges of monthly average maximum and minimum temperature were 25.9 to 42.9°C to 10.3 to 27.5°C respectively.

Rajendranagar: No any rainy day was observed during March and November month s of the reporting year at the centre while all seasons received some amount of rainfall such winter season (27.0 mm), pre-monsoon (43.0 mm), southwest monsoon (342.0 mm) and post-monsoon (57.0 mm). During the reporting year center received almost 44.53% lesser amount of rain than the normal annual rainfall. The range of average monthly maximum temperature was 28.7 to 41.2°C whereas January has recorded as the coldest month with 8.3°C night temperature.

Ranchi: During the reporting period, the total rainfall received was 967.5 mm. with 841.2 mm rainfall from south-west monsoon (87% to the total rain). Distribution of rainfall across the season was not good and the range of rainfall received during four seasons was 12.0 -841.0 mm. The ranges of average monthly maximum and minimum temperature were 21.8-38.3 9.6°C and 4.5-24.1°C.

Rewa: Center did not observe any rainy-day during October to February except January month. Southwest monsoon contributed 94.0% of rain to the total rainfall (931.8 mm) recorded during the reporting period. In this period, (-) 11.2% departure of rainfall was calculated. The range of average monthly maximum temperature was 22.7 to 42.5°C whereas January was recorded as the coldest month with 6.0°C night temperature.

Rudrur: Winter and pre-monsoon did not receive any rain during the reporting period while post-monsoon season collected 10.0 mm of rainfall. With 98.0% contribution to the total rainfall occurred during the reporting period, southwest monsoon season recorded 455.0 mm of rainfall which was 57.6% lower than the normal annual rainfall of the centre. The ranges of monthly average maximum and minimum temperature were 29.0 to 42.5°C and 16.1 to 29.7°C respectively.

Sabour: The total annual rainfall received during the reporting period was 907.6 mm which was 23.8% lower than the normal rainfall of the centre. Distribution of the rainy days was quite good and only November month was deprived of it. Southwest monsoon received 673.4 mm of rain which was 74.0% of the total rainfall received during the reporting period. The highest monthly mean maximum temperature (38.8°C) was observed in May whereas; lowest minimum temperature (5.6°C) was recorded during January.

Siruguppa: Rainfall received during all the four seasons except winter season and it was to the tune of 273.5 mm. With 236.3 mm of rainfall, southwest monsoon contributed 86.0% rain to the total. The range of average monthly maximum temperature was 32.3 to 42.5°C whereas January was recorded as the coldest month with 21.3°C night temperature.

SK Nagar: During reporting period, winter season and post-monsoon season did not observe any rainy day however pre-monsoon season received 12.0mm of rainfall. Southwest monsoon contributed 96.0% to the total rainfall received at the centre. In this period, 42.5% lower rain was received over the normal rainfall of the centre. The ranges of average monthly maximum and minimum temperature recorded at the centre were 26.3°C to 40.0°C and 7.4°C to 27.1°C respectively.

Thanjavur: During the reporting period, winter season and pre-monsoon season did not receive any rainy days at the centre where as southwest monsoon contributed 38.0% to the total rainfall. In this period about (-) 39.3% lower rain was received than the normal rainfall of the centre. Post-monsoon season also contributed sizable amount of rainfall (399.0 mm). The highest monthly average maximum and minimum temperature recorded during the reporting period was 39.7°C and 33.6°C respectively.

Umiam: Total rainfall recorded during the reporting period was 2291.0 mm which was 14.6% lower to the normal rainfall of the centre. Here, southwest monsoon season contributed 64.0% rain to the total rainfall whereas, 24.0% was contributed by pre-monsoon season. The ranges of average monthly maximum and minimum temperature were 21.2-28.9°C and 6.6-21.0°C respectively.

Varanasi: Centre received a total rainfall of 855.1 mm during the reporting period whereas, southwest monsoon contributed about 91.0%. No any rainy day was observed at the center during the months of October to December. During the reporting period, the total rainfall received was 14.2% lower than the normal annual rainfall of the year. The ranges of monthly average maximum and minimum temperature were 21.4-41.3°C to 6.3 to 27.1°C respectively.

5. STAFF POSITION

Out of 327 total staff sanctioned for different centres, 237 staff were actually in position as on 31st March 2020,suggesting that 27.5 percent total post were vacant. (Table 5.1 and Appendix-III)

Table -5:Staff position under AICRP-IFS (University –wise) as on 31.3.2020

S.N.	Name of the University	Scientific		Technical	
		Sanctioned	Filled	Sanctioned	Filled
1	ANGRAU,Guntur	2	2	6	3
2	PJTSAU, Hyderabad	6	6	7	6
3	AAU, Jorhat	5	5	6	6
4	BAU , Sabour	5	4	6	0
5	BAU, Ranchi	4	4	6	5
6	IGKV, Raipur	4	4	6	1
7	CSKHPKVV, Palampur	4	4	6	6
8	CSAUA & T, Kanpur	4	2	6	5
9	NDUA & T, Ayodhya	4	1	6	2
10	BHU, Varanasi	1	1	1	0
11	GBPUA&T,Pantnagar	5	4	6	5
12	PAU, Ludhiana	4	4	6	2
13	CCSHAU, Hisar	5	3	6	4
14	SKNAU, Jobner	4	4	6	2
15	SDAU, S.K. Nagar	5	5	6	4
16	NAU, Navsari	1	1	1	1
17	JAU, Junagarh	1	1	1	1
18	AAU, Anand	1	1	5	5
19	JNKVV, Jabalpur	7	6	13	3
20	RVSKVV, Gwalior	1	1	1	1
21	BCKVV, Kalyani	5	4	6	4
22	OUAT, Bhubaneswar	7	5	12	3
23	PDKV, Akola	4	3	6	3
24	MAU, Parbhani	4	3	6	4
25	MPKU, Rahuri	5	4	6	4

S.N.	Name of the University	Scientific		Technical	
		Sanctioned	Filled	Sanctioned	Filled
26	KKV, Dapoli	4	4	6	6
27	UAS, Raichur	3	3	1	1
28	UAS, Dharwad	1	1	5	5
29	UAS, Banglore	2	2	5	5
30	UAHS, Shimoga	3	3	1	1
31	TNAU, Coimbtore	7	6	12	12
32	SKUAST, Jammu	4	4	6	5
33	KAU, Thrissur	5	5	6	3
34	MPUAT, Udaipur	2	2	5	5
35	AU, Kota	1	1	1	1
36	ICAR-IIFSR, Modipuram	1	0	5	0
	Total	131	113	196	124

6. BUDGET

Revised Estimate (R.E.) for the year 2019-20 in the scheme of AICRP on Integrated Farming Systems ICAR share (Rs. in lakhs)

Sl. No.	Name of University/ Institute	Other than NEH & STC (TSP)											STC (TSP)			SCSP							NEH										
		Grant-in-Aid 'Salaries'	Grant-in-Aid 'General'			Grant-in -Aid 'Capital'						Sub-Total Other than NEH & STC(TSP)										Sub-Total SCSP	Grant-in-Aid 'Salaries'	Grant-in-Aid General			Grant-in-Aid 'Capital'					Sub-Total 'NEH'	GRAND TOTAL
			Domestic T.A.	Operational Charges	Research Expenses	Equipments (1)	Works (2)	Information Technology (3)	Livestock (4)	Furniture & Fixture (5)	Vehicle (6)		Operational Charges	Research Expenses	Total STC(TSP)	Equipment(7)	Livestock (8)	Works (9)	Information Technology (10)	Research Expenses	Operatonal Charges			Domestic T.A.	Operational Charges	Research Expenses	Equipments (11)	Works (12)	Livestock	Furniture& Fixtures	Information Technology (13)		
1	ANGRAU, Guntur	49.00	1.00	0.50	1.02	0.00	0.00	0.00	0.00	0.00	0.00	51.52	1.00	0.50	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.02
2	PJTSAU, Hyderabad	80.10	1.00	4.00	3.73	0.00	0.00	0.00	0.00	0.00	6.00	94.83	0.00	0.00	0.00	0.00	0.00	0.00	0.35	4.00	3.50	7.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.68
3	HPKVV, Palampur	114.50	0.90	2.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	118.40	0.00	0.00	0.00	0.00	0.00	0.00	0.35	2.50	3.00	5.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.25
4	GBPUA&T, Pantnagar	80.00	1.00	2.25	1.50	0.00	0.00	0.35	0.00	0.00	0.00	85.10	0.00	1.70	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.80
5	CSAU&T, Kanpur	62.50	0.50	2.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	66.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.00
6	NDUA&T, Faizabad	67.50	0.32	1.00	1.20	0.00	0.00	0.00	0.00	0.00	0.00	70.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.02
7	BHU, Varanasi	27.00	0.45	1.75	1.25	0.00	0.00	0.00	0.00	0.00	0.00	30.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.45
8	BAU, Ranchi	60.00	0.45	1.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00	62.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15
9	BAU, Sabour	25.00	0.70	2.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	28.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.35
10	BCKVV, Kalyani	57.00	1.00	2.25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	61.25	0.37	0.38	0.75	0.00	0.00	2.00	0.35	3.00	3.50	8.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.85
11	AAU, Jorhat	30.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	6.00	4.86	4.30	2.00	0.00	0.00	1.25	19.41	50.01
12	PAU, Ludhiana	47.00	1.00	2.75	1.43	0.00	0.00	0.00	0.00	0.00	0.00	52.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.18
13	HAU, Hisar	50.00	1.00	2.75	1.51	0.00	0.00	0.00	0.95	0.00	0.00	56.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.21
14	SKNAU, Jobner	25.38	1.00	2.25	0.55	0.00	0.00	0.00	0.00	0.00	0.00	29.18	0.00	0.00	0.00	0.00	0.00	0.00	0.35	1.50	2.25	4.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.28
15	SDAU, S.K. Nagar	56.00	1.00	4.00	1.23	0.00	0.00	0.00	0.00	0.00	6.00	68.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68.23
16	NAU, Navsari	15.00	0.27	1.50	0.19	0.00	0.00	0.00	0.00	0.00	0.00	16.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.96
17	JAU, Junagadh	14.00	0.27	1.50	0.19	0.00	0.00	0.00	0.00	0.00	0.00	15.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.96
18	AAU, Anand	19.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	25.50	1.00	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.50
19	JNKVV,Jabalpur	110.00	1.00	3.42	2.37	0.00	0.00	0.00	0.00	0.00	0.00	116.79	0.40	0.38	0.78	1.00	0.50	0.00	0.00	1.50	0.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	121.07
20	RVSKVV, Gwalior	37.46	0.50	2.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00	40.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.80
21	IGKV, Raipur	53.00	1.00	2.00	0.85	0.00	0.00	0.00	0.00	0.00	6.00	62.85	1.00	1.00	2.00	2.00	2.50	1.00	0.00	1.00	0.50	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.85
22	OUAT, Bhubaneswar	38.00	0.53	2.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	41.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.53
23	PDKV, Akola	57.50	1.00	3.50	1.03	0.00	0.00	0.00	0.00	0.00	0.00	63.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.03
24	MAU, Parbhani	25.50	0.60	2.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	28.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.76
25	MPKV, Rahuri	49.00	1.00	3.50	1.41	0.00	0.00	0.00	0.00	0.00	0.00	54.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.91
26	KKV, Dapoli	41.50	1.00	3.50	1.41	0.00	0.00	0.00	0.00	0.00	0.00	47.41	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.41
27	UAS, Raichur	29.00	0.50	2.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	32.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.54
28	UAS, Dharwad	38.00	0.50	2.00	0.99	0.00	0.00	0.35	0.00	0.00	0.00	41.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.84
29	UAS, Bangalore	31.92	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	0.00	0.00	0.00	2.00	2.00	0.93	0.35	4.00	4.50	13.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.20
30	UAHS, Shimoga	24.30	0.70	2.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00	27.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.93
31	TNAU, Coimbatore	135.89	1.21	6.25	3.25	1.00	1.00	0.35	0.00	0.00	12.00	160.95	0.00	0.01	0.01	0.00	0.00	2.00	0.35	5.00	4.55	11.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	172.86
32	SKUAST, Jammu	97.50	1.00	7.07	1.99	0.00	0.00	0.00	0.00	0.00	6.00	113.56	0.00	0.00	0.00	1.00	2.00	6.00	0.00	3.00	1.20	13.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	126.76
33	KAU, Thrissur	76.30	1.00	4.00	1.41	0.00	0.00	0.35	0.00	0.00	0.00	83.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83.06
34	MPUAT, Udaipur	23.16	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.56	1.50	1.00	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.06
35	AU, Kota (*)	17.36	0.55	2.70	1.23	0.00	0.00	0.00	0.00	0.00	0.00	21.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.84
36	RBS College, Bichpuri	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sl. No.	Name of University/ Institute	Other than NEH & STC (TSP)										Sub-Total Other than NEH & STC(TSP)	STC (TSP)			SCSP						Sub-Total SCSP	NEH									Sub-Total 'NEH'	GRAND TOTAL
		Grant-in-Aid 'Salaries'	Grant-in-Aid 'General'			Grant-in -Aid 'Capital'							Operational Charges	Research Expenses	Total STC(TSP)	Equipment(7)	Livestock (8)	Works (9)	Information Technology (10)	Research Expenses	Operatonal Charges		Grant-in-Aid 'Salaries'	Grant-in-Aid General			Grant-in-Aid 'Capital'						
			Domestic T.A.	Operational Charges	Research Expenses	Equipments (1)	Works (2)	Information Technology (3)	Livestock (4)	Furniture & Fixture (5)	Vehicle (6)													Domestic T.A.	Operational Charges	Research Expenses	Equipments (11)	Works (12)	Livestock	Furniture& Fixtures	Information Technology (13)		
37	ICAR-IIFSR, Modipuram	0.00	1.42	14.00	3.14	0.00	0.00	0.35	0.00	0.00	0.00	18.91	1.50	2.12	3.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.53
38	P.C.Unit,IIFSR, Modipuram	0.00	1.63	7.60	1.75	0.40	0.00	0.50	0.00	0.24	0.00	12.12	1.50	3.50	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.15	25.15	42.27
39	ICAR Res. Comp., Patna (*)	0.00	0.20	0.70	0.33	0.00	0.00	0.00	0.00	0.00	0.00	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.23
40	ICAR Res. Comp., Umiam (*)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	7.00	3.00	2.30	2.00	0.00	0.00	3.00	18.30	18.30
41	ICAR -CCARI, Old Goa	0.00	0.40	3.00	1.74	0.00	0.00	0.00	0.00	0.00	0.00	5.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.14
42	ICAR-CIARI- Port Blair	0.00	0.75	3.75	0.99	0.00	0.00	0.00	0.00	0.00	0.00	5.49	0.50	1.50	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.49
43	ICAR-IASRI, New Delhi	0.00	0.60	4.00	1.12	0.00	0.00	0.00	0.00	0.00	0.00	5.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.72
	Total	1764.97	30.35	114.82	47.30	1.40	1.00	2.25	0.95	0.24	42.00	2005.28	9.27	13.59	22.86	6.00	7.00	11.93	2.10	25.50	23.50	76.03	0.00	2.00	13.00	7.86	6.60	4.00	0.00	0.00	29.40	62.86	2167.03

Note: (1) Rs. 0.40 lakhs for Air conditioner with accessories for PC Unit and Rs. 1.00 lakh to OFR centre, Yethapur under TNAU,Coimbatore for purchase of Miscellaneous/ petty equipment's and implements; (2) Rs.1.00 lakh for TNAU, Coimbatore for Goat based farming systems under OFR centre, Yethapur; (3) Rs. 0.35 lakhs each for purchase of Tablet/ Notebook MAPI software for OFR centres (Nainital, Dharwad, Bhavanisagar, Thiruvananthapuram and Modipuram) and 0.50 lakhs to PC, Unit, ICAR-IIFSR, Modipuram for purchase of Multi-function Machine(copy/ print/scan/fax); (4) Rs 0.95 lakhs for livestock including indigenous/improved breeds (cow/buffalo/goats/pig/poultry) to Hisar on-station centre; (5) Rs 0.24 lakhs for furniture and fixtures to PC Unit, ICAR-IIFSR; (6) Rs 6 lakhs each to OFR centres Medak, Patan, Dahod, Kanker, Bhavanisagar, Yethapur and Jammu for replacement of old vehicle; (7) Rs. 6.00 lakhs is released under Equipments out of which Rs. 2.00 lakh each to Raipur and Bengaluru and Rs. 1.00 each to Jabalpur and Jammu for OFR centre for purchase of Miscellaneous and implements (8) Rs. 7 lakhs is released under Livestock out which Rs. 2.50 lakhs Kenkar,Raipur, Rs. 0.50 lakh Dindori Jabalpur,Rs. 2.00 lakhs Jammu and Rs. 2.00 lakhs Bengaluru for livestock including indigenous/ improved breeds for OFR centre (9) Rs. 11.93 lakhs out which Rs 2.00 lakhs each to OFR centres Nadia and Yethapur and 0.93 lakhs to OFR centre Bengaluru,Rs.1.00 lakh ,Kenkar Raipur and Rs. 6.00 lakhs Jammu for livestock shed including poultry shed and alternation of existing livestock shed; (10) Rs. 0.35 lakhs each for purchase of Tablet/ Notebook MAPI software for OFR centres (Medak, Bilaspur, Nadia, Chikkaballapura, Dausa, Yethapur); (11) Rs 2.30 lakhs each to on-station centre of Jorhat and Umiam for Auto N Analyzer with accessories and Rs 2.00 lakhs to on-station centre, Jorhat for Roatry shaker; (12) Rs 2.00 each to on-station centres of Jorhat and Umiam for processing unit (threshing floors, storage godowns); (13) Rs 0.35 lakhs for Tablet/Notebook with MAPI software for on-farm centre of Goalpara and Rs 0.90 lakhs each for LED display unit for on-station centre of Jorhat and Umiam, Rs 2.10 lakhs for software for data management, processing and security to Umiam, Rs. 25.15 lakhs to NEH to P.C. Unit Unit, ICAR-IIFSR, Modipuram for purchase of software (Krishi Pranali and Jaivk Kheti apps),

7

RESEARCH RESULT

7.1 INTEGRATED FARMING SYSTEMS

Title of the experiment: Sustainable resource management for climate smart IFS

Under All Indian Coordinated Research Project (AICRP) on Integrated Farming Systems (IFS) on station experimentation Sustainable resource management for climate smart IFS were implemented starting from 2017-18 with revised objectives, across different agro-climatic zones, and continued through reporting period of 2019-20 which are as follows:

- To identify ecologically and economically viable enterprises for different regions under climate change scenario
- To undertake resource budgeting in systems perspective with special reference to soil, water, nutrients and energy.
- To evaluate the low carbon production modules in the system
- To identify and evaluate secondary agriculture avenues in farming systems perspective for attracting rural youth

Year of Starts: 2017-18

Location:

Agro-climatic region	Locations (State)	Number of IFS models
Western Himalaya	Chatha (J&K), Palampur (HP). Pantnagar (UK)	3
Eastern Himalaya	Umiam (Meghalaya), Jorhat (Assam)	2
Trans Gangetic Plains	Hisar (Haryana), Ludhiana (Punjab)	2
Upper Gangetic Plains	Modipuram (UP), Kanpur (UP)	2
Middle Gangetic Plains	Varanasi (UP), Faizabad (UP), Patna (Bihar), Sabour (Bihar)	5
Lower Gangetic Plains	Kalyani (WB)	1
Eastern Plateau and Hills	Raipur (Chhattisgarh) Ranchi (Jharkhand)	2
Central Plateau and Hills	Jabalpur (MP)	1
Western Plateau and Hills	Akola (MS), Parbhani (MS), Rahuri (Maharashtra)	3
Southern Plateau and Hills	Rajenderanagar (Telangana), Coimbatore (TN), Kathalgere (Karnataka), Sriguppa (Karnataka) Thanjavur (TN)	5
East Coast Plains and Hills	Bhubaneswar (Odisha)	1
West Coast Plains and Hills	Goa, Karjat (MS). Karamana (Kerala)	7
Western dry	Durgapura (Rajasthan), Kota (Rajasthan)	2
Gujarat Plains and Hills	SK Nagar (Gujarat)	1
Islands	Portblair (A&N)	2
Total		39

1.WESTERN HIMALAYAN REGION (WHR)

In this Agro Climatic Region three on-station Integrated Farming Systems (IFS) models namely Jammu (J&K), Palampur (Himachal Pradesh) and Pantnagar (Uttarakhand) with objectives of climate smart IFS initiated during 2017. The results obtained from these IFS models during the reporting period of 2019-20 revealed that mean gross income of Rs. 527145 while the mean net return excluding family labour was found to be Rs.429114. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 394389 from IFS models with mean area of 1.0 ha. Details of IFS model components and cost is presented in Table 7.1.1. which indicated mean total cost for the IFS models was Rs. 250864 while it varied from Rs 169519 at Palampur to Rs 338839 at Jammu.

Table 7.1.1 Details of IFS model along with total cost per model in WHR

Location	IFS model	Area (ha)	Total cost (Rs)
Jammu	Cropping Systems +Fodder+Livestock+ Vermicompost+ Biogas+Horticulture + Fish cum poultry + Mushroom	1.0	338839
Palampur	Crops + Dairy + Horticulture + Fodder + Vermi-compost + Boundary Plantations + Kitchen Gardening	1.0	169519
Pantnagar	Crops + Dairy + Horticulture/Agroforestry + Fisheries	1.0	244504
Mean		1.0	250864

The models could generate mean employment generation of 457 mandays through different modules while the IFS models were also found to be carbon negative in terms of GHG emission at -6603 CO2 equivalent. Further, study of different fractions of cost revealed about 39% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was to the tune of 23% of the cost. The cost incurred towards hired labour was 14%. These models revealed mean REY of 24.9 tonnes besides soil health improvement to the tune of 21.19 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.25.

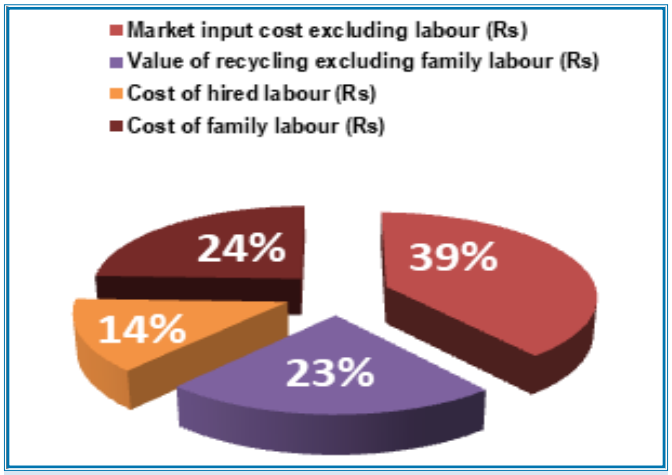


Fig 1. Different fraction of total cost

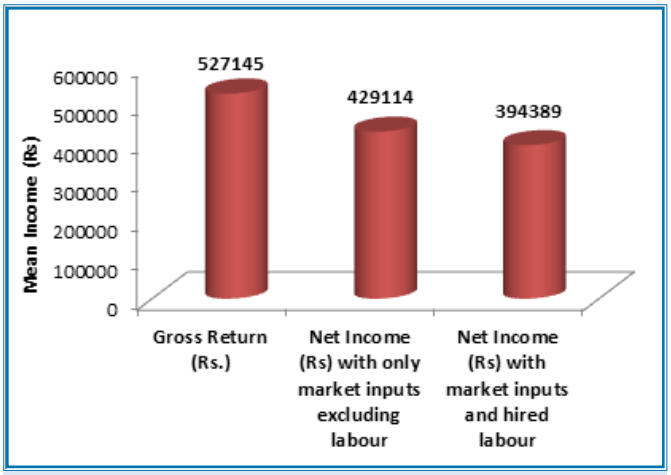


Fig 2. Economics of IFS models of WHR

2. EASTERN HIMALAYAN REGION (EHR)

In this Agro Climatic Region two AICRP-IFS centers Umiam (Meghalaya) and Jorhat (Assam) are located and climate smart IFS model studies initiated during 2017. The results obtained from these IFS models during the reporting period of 2019-20 revealed that mean gross income of Rs.

563530 while the mean net return excluding family labour was found to be Rs.458806. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 395864. Details of IFS model components and cost is presented in Table 7.1.2 which indicated mean total cost for the IFS models was Rs. 263405 while it varied from Rs 185870 at Umiam to Rs 331073 at Jorhat for 1.0 ha IFS models.

Table 7.1.2 Details of IFS model along with total cost per model in EHR

Location	IFS model	Area (ha)	Total cost (Rs)
Jorhat	Crops + Dairy + Horticulture + Fishery + Poultry + Duckery + Goatery + Apiary + Vermi-compost + Biogas + Liquid Manure + FYM production	1.0	331073
Umiam	Crops + Livestock + Horticulture + Fishery	1.0	185870
Mean		1.0	263405

The models could generate mean employment generation of 462 mandays through different modules. Further, study of different fractions of cost revealed about 2% share of recycled inputs in total cost of the IFS which could be further enhanced whereas cost of outside purchase was to the tune of 40% of the cost. The cost incurred towards hired labour was 24%. These models revealed mean REY of 29.1 tonnes besides soil health improvement to the tune of 22.7 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.20. The mean sustainable value index (SVI) for these models was found to be 0.7.

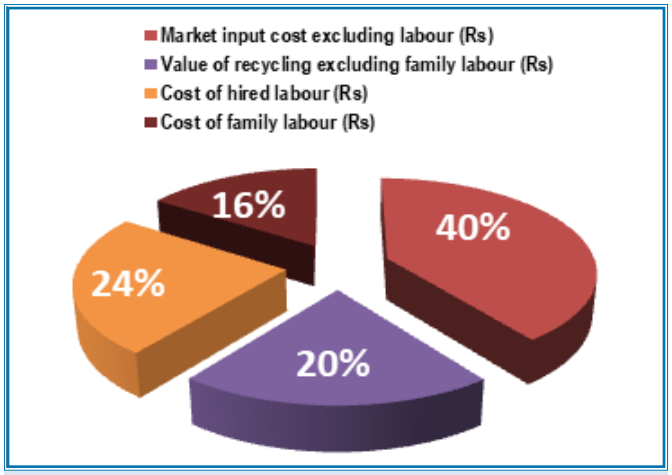


Fig 3. Different fraction of total cost

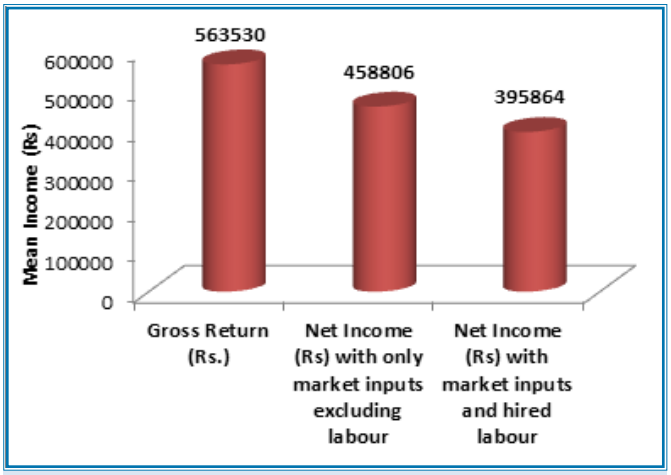


Fig 4. Economics of IFS models of EHR

3. TRANS GANGETIC PLAINS REGION (TGP)

Trans Gangetic Plains Region is represented by the states of Punjab and Haryana. Under AICRP-IFS, two independent centers one at PAU, Ludhiana (Punjab) and another one in CCHAU, Hisar are given the responsibility of development of "Climate smart IFS models" at respective centers. The results obtained from these IFS models during the reporting period of 2019-20 revealed that mean gross income of Rs. 688097 while the mean net return excluding family labour was found to be Rs.520814. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 473214. Details of IFS model components and cost is presented in Table 7.1.3. which indicated mean total cost for the IFS models was Rs. 287549 while it varied from Rs 127270 at Hisar to Rs 447828 at Ludhiana for 1.0 ha IFS models.

Table 7.1.3 Details of IFS model along with total cost per model in TGP

Location	IFS model	Area (ha)	Total cost (Rs)
Hisar	Crops+Dairy+Hort.+Vermicompost+Boundary Plantations + Mushroom+ Biogas	1.0	127270
Ludhiana	Crop + Dairy +Horticulture (fruits and vegetables)+ Fisheries + vermicomposting + agroforestry	1.0	447828
Mean		1.0	287549

The models could generate mean employment generation of 498 mandays through different modules while the IFS models were found to be carbon negative in terms of GHG emission at -6055.8 CO2 equivalent. Further, study of different fractions of cost revealed about 20% share of recycled inputs in total cost of the IFS which could be further enhanced whereas cost of outside purchase was to the tune of 58% of the cost. The cost incurred towards hired labour was 17%. These models revealed mean REY of 33.5 tonnes besides soil health improvement to the tune of 19.2 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 2.5. The mean sustainable value index (SVI) for these models was found to be 0.4 with energy input – output ratio being 1.09.

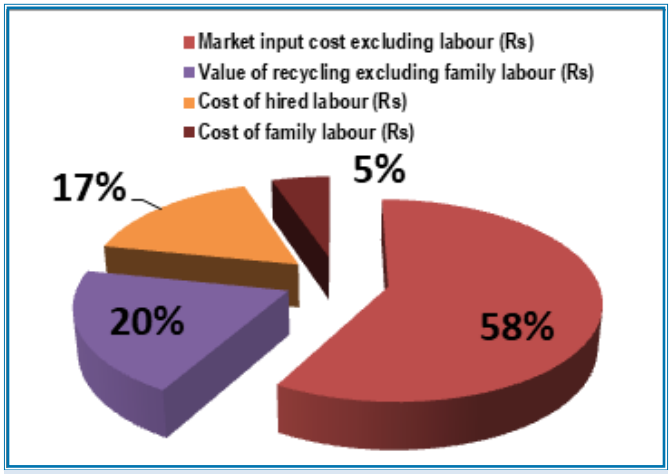


Fig 5. Different fraction of total cost

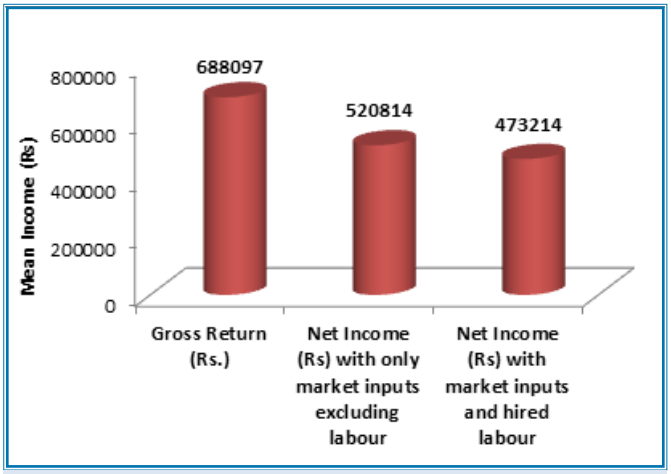


Fig 6. Economics of IFS models of TGP

4. UPPER GANGETIC PLAINS REGION (UGP)

In this Agro Climatic Region two AICRP-IFS centers namely ICAR-IIFSR, Modipuram, Meerut a voluntary ICAR institute and ii) CSAUA&T, Kanpur, both in Uttar Pradesh are working on the aspect of "Development of Climate smart IFS Models". The IFS model at IIFSR, Modipuram was spread over 0.7 ha while the IFS model at Kanpur was having 1.0 ha area. The findings of IFS models from these centres during the reporting period of 2019-20 revealed that mean gross income of Rs. 381272 while the mean net return excluding family labour was found to be Rs.266466. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 238104. Details of IFS model components and cost is presented in Table 7.1.4. which indicated mean total cost for the IFS models was Rs. 187718 while it varied from Rs 163461 at Modipuram for 0.7 ha model to Rs 210775 at Kanpur for 1.0 ha IFS model.

Table 7.1.4 Details of IFS model along with total cost per model in UGP

Location	IFS model	Area (ha)	Total cost (Rs)
Kanpur	Crops + Dairy + Horticulture + Boundary Plantations	1.0	210775
Modipuram	Crops + Horticulture +Dairy+ fish pond+ Boundary Plantations + value addition	0.7	163461
Mean		0.86	187118

The models could generate mean employment generation of 573 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -23038 CO2 equivalent. Further, study of different fractions of cost revealed about 22% share of recycled inputs excluding family labour in total cost of the IFS which could be further enhanced whereas cost of outside purchase was to the tune of 30% of the cost excluding labour. These models revealed mean REY of 21.0 tonnes besides soil health improvement to the tune of 20.5 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.5.

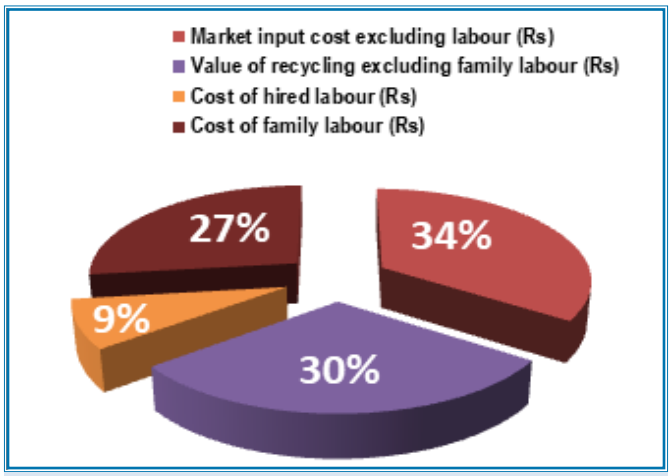


Fig 7. Different fraction of total cost

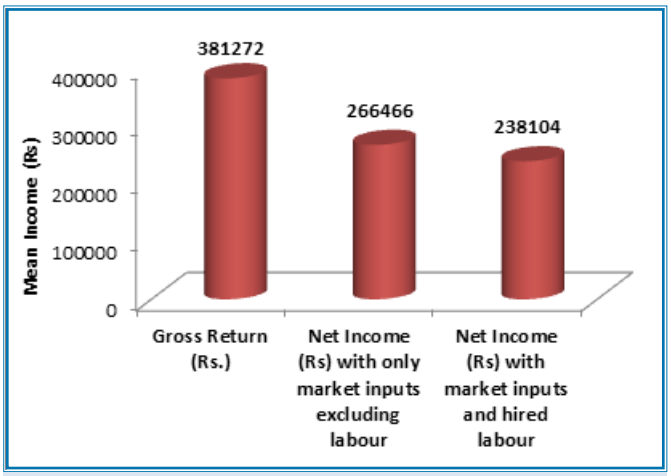


Fig 8. Economics of IFS models of UGP

5. MIDDLE GANGETIC PLAINS REGION (MGP)

Four AICRP –IFS Centers, two in eastern part of Uttar Pradesh namely i) IAS,BHU, Varanasi and NDUA&T, Kumarganj –Faizabad and two in Bihar i) ICAR Research Complex for eastern region, Patna., and BAU, Sabour-Bhagalpur (Bihar) are given responsibilities of developing climate smart IFS Models with revised objectives for respective states since 2017. Significance of IFS approach towards production, profitability and livelihood of small land holders in the regions as reflected form the results of study during 2019-20. Details of different components of IFS are presented in Table 7.1.5. The results revealed mean gross income of Rs. 523862 while the mean net return excluding family labour was found to be Rs.447886. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 381286. Details of IFS model cost components presented in Table 7.1.5 indicated mean total cost for the IFS models to be Rs. 282126 while it varied from Rs 134930 at Patna (0.4 ha model) to Rs 472785 at Varanasi for 1.0 ha IFS model.

Table 7.1.5 Details of IFS model along with total cost per model in MGP

Location	IFS model	Area (ha)	Total cost (Rs)
Ayodhya	Crop + Dairy + Horticulture + Fishery + Vermi-compost	1.01	212472
Patna	Main: Crop + Horticulture + Goatry + Poultry Allied: Mushroom /vermi-compost/B.P./ Agroforestry	0.4	134930
Patna	Main: Crop + Dairy+ Horticulture + Goatry + Poultry +Fish cum duckery, Allied: Mushroom /vermi-compost/B.P.	0.8	190270
Sabour	Crops + Dairy + Goatry + Fish+Duckery + Vermicompost + Boundary Plantations	1.0	400173
Varanasi	Crops + Dairy + Poultry + Horticulture+ Fish+Mushroom + Boundary Plantations	1.0	472785
Mean			282126

The models could generate mean employment generation of 449 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -1146.5 CO2 equivalent. Further, study of different fractions of cost revealed about 30% share of recycled inputs excluding family labour in total cost of the IFS whereas cost of outside purchase excluding labour was 30%. The cost incurred towards hired labour was 23% while cost of family labour was 20 % of the cost. These models revealed mean REY of 28.7 tonnes besides soil health improvement to the tune of 12.8 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.0 with mean SVI of 0.8.

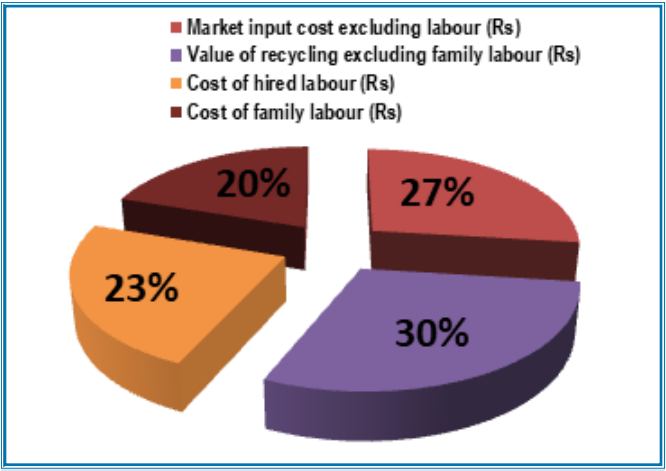


Fig 9. Different fraction of total cost

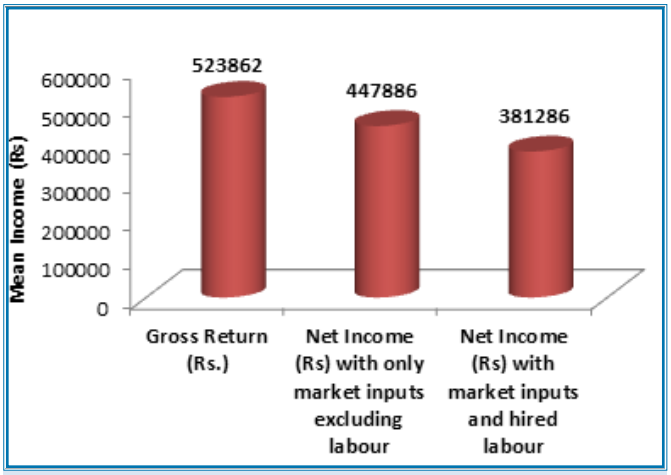


Fig 10. Economics of IFS models of MGP

6. LOWER GANGETIC PLAINS REGION (LGP)

To demonstrate the benefits of diversified climate smart farming a climate smart IFS Model was initiated in 2017 in order cater to the needs of six-member farm family so as to sustain their livelihood under irrigated ecosystem of New Alluvial zone of West Bengal. In order to meet the requirements of the farm families and livestock, the IFS Model has been synthesized for 0.66 ha land holding to support a family of small and marginal farmer having six family members. The model encompasses components like crop (0.42 ha), horticulture (0.11 ha), dairy, vermicomposting

and biogas unit (0.03 ha) and fishery (0.09 ha). Low lying area measuring 0.2 ha of the total crop area of 0.42 ha has been converted into five pairs of raised and sunken beds alternately, each bed measuring 200 m2 for paddy cum fish cultivation in the sunken beds and for cultivation of vegetables and arable field crops in the raised beds. Slope in the junction of raised and sunken beds has been utilized for fodder cultivation (hybrid napier). Some vegetable creepers (dolichos bean, bottle gourd etc.) are also grown above the sunken beds on netted scaffolds. The results of study during 2019-20 revealed gross income of only Rs. 205255 while the net return were found to be Rs. 188237 with only market inputs excluding labour and net return was Rs. 178406 with market inputs and hired labour. Details of IFS model cost components presented in Table 7.1.6 indicated total cost for the IFS models to be Rs. 112294.

Table 7.1.6 Details of IFS model along with total cost of model in LGP

Location	IFS model	Area (ha)	Total cost (Rs)
Kalyani	Crops + Dairy + Horticulture + Vermi-compost + Biogas + fishery	0.66	112294
Mean		0.66	112294

The models could generate employment generation of 252 mandays through different modules while the IFS model was found to be carbon negative in terms of mean GHG emission at -3248.3 CO2 equivalent. Further, study of different fractions of cost revealed about 37% share of recycled inputs excluding family labour in total cost of the IFS whereas cost of outside purchase excluding labour was 15%. These models revealed mean REY of 8.9 tonnes besides soil health improvement to the tune of 5.88 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 0.74 with mean SVI of 0.48.

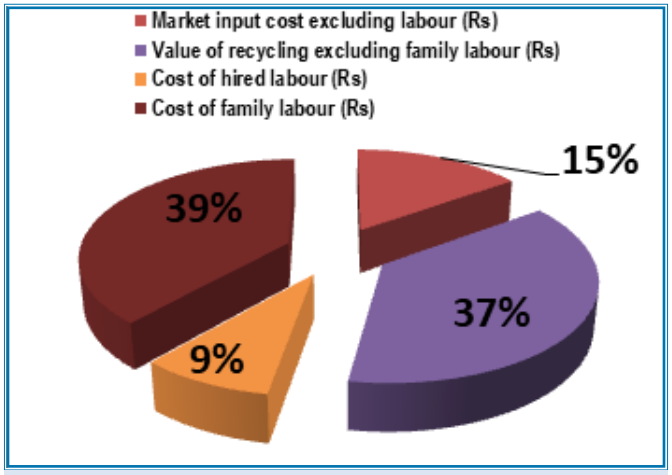


Fig 11. Different fraction of total cost

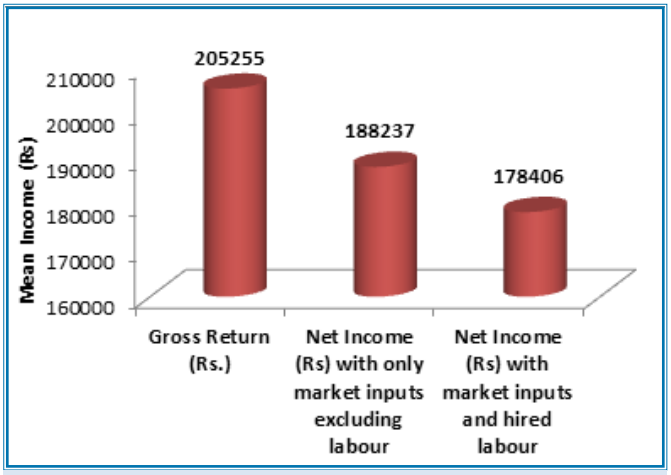


Fig 12. Economics of IFS model of LGP

7. EASTERN PLATEAU AND HILLS (EPH)

IGKV, Raipur (Chhatisgarh) and BAU, Kanke Ranchi (Jharkhand), the two AICRP-IFS centers representing Eastern Plateau and Hills Region were evaluated for development of climate smart IFS models for livelihood improvement of small and marginal farmers of the region. The IFS model at both the locations were spread over 1.0 ha area. The findings of IFS models from these centres during the reporting period of 2019-20 revealed that mean gross income of Rs. 408297 while the mean net return excluding labour was found to be Rs.373826. Details of IFS model components

and cost is presented in Table 7.1.7. which indicated mean total cost for the IFS models was Rs. 202025 while it varied from Rs 179083 at Ranchi to Rs 224967 at Raipur for 1.0 ha IFS models.

Table 7.1.7 Details of IFS model along with total cost per model in EPH

Location	IFS model	Area (ha)	Total cost (Rs)
Raipur	Crops + Dairy + Horticulture + poultry + fishery + Goatary + Mushroom + Vermicompost + Boundary Plantations + Kitchen Gardening	1.0	224967
Ranchi	Crops + Dairy + Vermi-compost + Mushroom + Apiary + Fishery	1.0	179083
Mean		1.0	202025

The models could generate mean employment generation of 253 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -8765 CO2 equivalent. Further, study of different fractions of cost revealed about 34% share of recycled inputs in total cost of the IFS which could be further enhanced whereas cost of outside purchase was to the tune of 17% of the cost. The cost incurred towards hired labour was nil while 49% of cost saved due to family labour. These models revealed mean REY of 23.1 tonnes besides soil health improvement to the tune of 26.3 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.5 with mean SVI of 0.50.

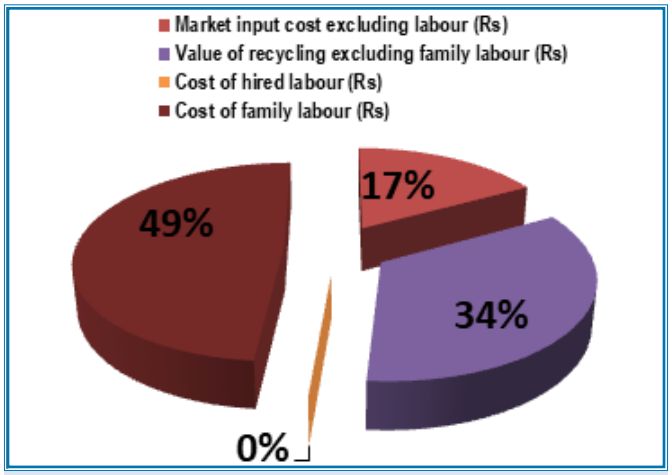


Fig 13. Different fraction of total cost

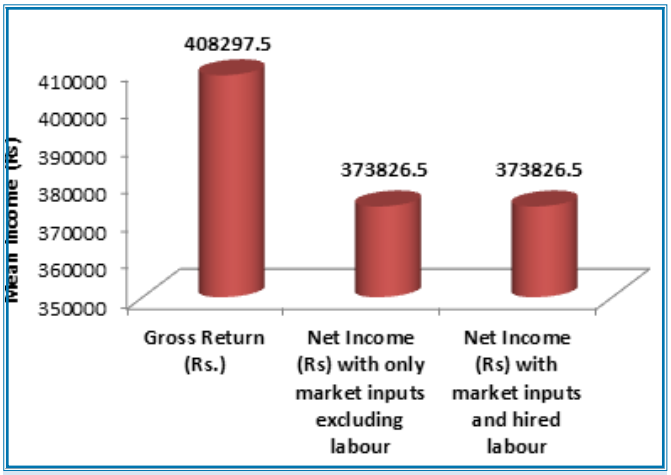


Fig 14. Economics of IFS models of EPH

8. CENTRAL PLATEAU AND HILLS (CPH)

AICRP-IFS Centre Jabalpur (MP) and Durgapura (Rajasthan) falls under Central Plateau and hills region of the country. The average family size of the region is 5 members (3 male + 2 female) with the holding size of 0.70 ha for marginal and 1.20 ha for the small farmers. IFS model of 1.0 ha was initiated at Jabalpur for climate smart farming systems study during 2017. In the IFS model cropping component covers 0.64 ha, dairy component covers 0.007 ha with 3 cow + 1 calf, fisheries component 0.06 ha (1800 m^3), poultry component 300 birds, vermicompost 0.0039 ha and mandatory other enterprises like kitchen garden, boundary plantation etc. The IFS model at Durgapura consisted of crops, diary, horticulture, goatary, poultry as well as other complementary and supplementary modules in 1.45 ha area. The results of study during 2019-20 revealed gross income of Rs. 634584 while the return excluding family labour was found to be Rs.579006.

However, when family labour was accounted for in the cost, the net return was found to be Rs. 356282. Details of IFS model cost components presented in Table 7.1.8 indicated mean total cost for the IFS models to be Rs. 313471.

Table 7.1.8 Details of IFS model along with total cost per model in CPH

Location	IFS model	Area (ha)	Total cost (Rs)
Jabalpur	Crop + Dairy + Poultry + Fishery + Horticulture	1.0	136496
Durgapura	Crops+ Dairy+ Horticulture + Goatry+ Poultry + Biocompost	1.45	490447
			313471.5

The models could generate employment generation of 789 mandays through different modules while the IFS model was found to be carbon emissive in terms of mean GHG emission at +61.9 CO2 equivalent, which can be made carbon neutral with suitable management strategies. Further, study of different fractions of cost revealed about 15% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was 17%. The cost incurred towards hired labour was to the tune of 68% requiring special attention for reduction of labour hiring cost. These models revealed mean REY of 36.3 tonnes besides soil health improvement of 3.3 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.5.

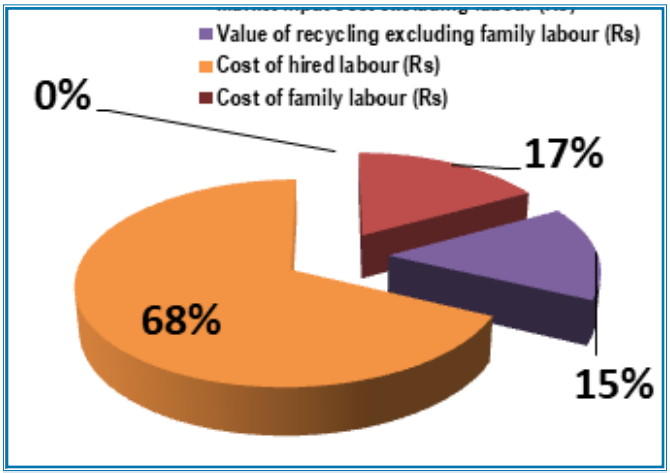


Fig 15. Different fraction of total cost

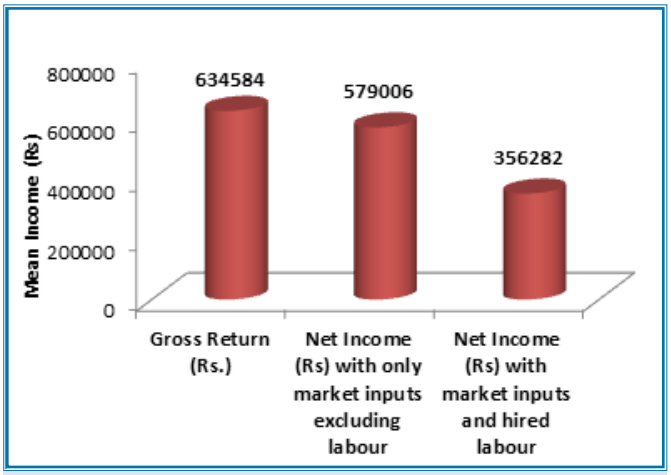


Fig 16. Economics of IFS models of CPH

9. WESTERN PLATEAU AND HILLS (WPH)

AICRP-IFS programme running in three representative districts of Western Plateau and Hill Region include i) AICRP-IFS Centre- Parbhani, ii) AICRP-IFS Centre – Akola and iii) AICRP-IFS center at Rahuri. Climate smart IFS models are being developed at all the three respective centers. The results of study during 2019-20 at 3 centres along with components of IFS is presented in Table 7.1.9. which revealed mean gross income of Rs. 646612 while the mean net return excluding family labour was found to be Rs.576244. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 499772. Details of IFS model cost components presented in Table 7.1.9 indicated mean total cost for the IFS models to be Rs. 258851 while it varied from Rs 162450 at Parbhani model to Rs 365086 at Rahuri for 1.0 ha IFS model.

Table 7.1.9 Details of IFS model along with total cost per model in WPH

Location	IFS model	Area (ha)	Total cost (Rs)
Akola	Crops + Fruit & Vegetables + Goat+ Cow + Poultry+ Compost + Kitchen Garden + Apiary + Boundary plantations	1.0	249018
Parbhani	Crops+ Dairy+ Horticulture + Vermicompost + Boundary Plantation	1.0	162450
Rahuri	Crops + Dairy + Horticulture + Poultry + Goat + Vermicompost	1.0	365086
Mean		1.0	258851

The models could generate mean employment generation of 608 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -2450 CO2 equivalent. Further, study of different fractions of cost revealed about 21% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was to the tune of 27%. The cost incurred towards hiring labour was 30%. These models revealed mean REY of 35.0 tonnes besides soil health improvement to the tune of 8.37 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.87 with mean SVI of 0.69.

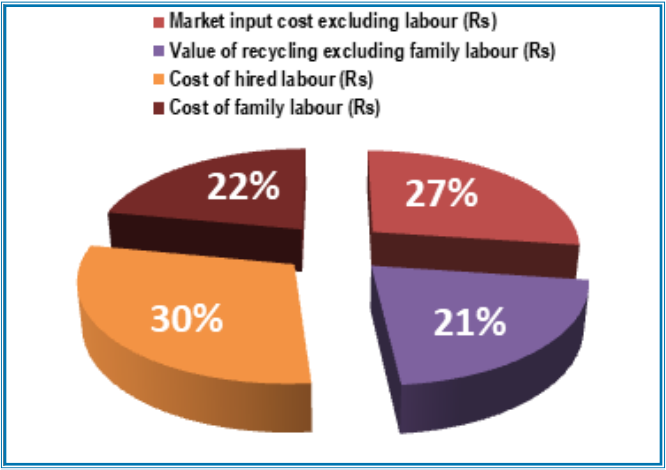


Fig 17. Different fraction of total cost

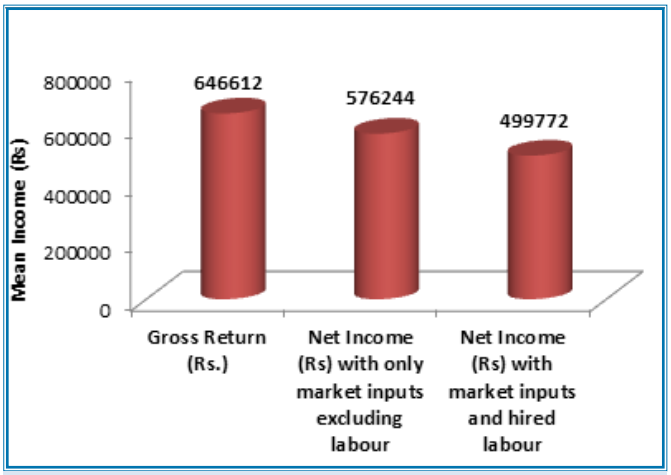


Fig 18. Economics of IFS models of WPH

10. SOUTHERN PLATEAU AND HILLS (SPH)

Four AICRP-IFS centers namely, TNAU, Coimbatore (Tamilnadu), ARS, Kathalgere (Karnataka), ANGRAU, Rajendra Nagar, Hyderabad (A.P.) and ARS, Sirriguppa (Karnataka) are located in different NARP zones of Southern Plateau and Hill ACZ of the country. A new sub centre is also being established at Maruteru, A.P. The results of study during 2019-20 at these centres along with components of IFS is presented in Table 7.1.10 which revealed mean gross income of Rs. 406707 while the mean net return excluding family labour was found to be Rs.329337. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 282435. Details of IFS model cost components presented in Table 7.1.10 indicated mean total cost for the IFS models to be Rs. 264426 while it varied from Rs 161523 at Kathalgere model to Rs 414828 at Coimbatore for 1.0 ha IFS model.

Table 7.1.10 Details of IFS model along with total cost per model in SPH

Location	IFS model	Area (ha)	Total cost (Rs)
Coimbatore	Crop + Horticulture + Dairy+ Goat Rearing + Poultry + Vermicompost unit + Compost yard + Kitchen garden & Border planting	1.0	414828
Kathalgere	Crops + Horticulture +Plantation+ Dairy + Sheep + Vermicompost + Agroforestry + Boundary plantation	1.0	161523
Siruguppa	Crops + Dairy + Horticulture + Goatary + Vermicompost +Azolla +Boundary Plantations + Kitchen Gardening	1.0	200846
Rajendranagar	Crops + Dairy + Horticulture-Pasture + Compost + Boundary Plantations	1.0	288582
Maruteru_sub	Cropping systems + Dairy (2 Desi cows) + Fishery + Poultry + Horticulture + Compost /others	0.5	
Mean			264426

The models could generate mean employment generation of 504 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -3958 CO2 equivalent. Further, study of different fractions of cost revealed about 25% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was to the tune of 29%. The cost incurred towards hiring labour was 18%. These models revealed mean REY of 28.2 tonnes besides soil health improvement to the tune of 42,2 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.6 with mean SVI of 0.71.

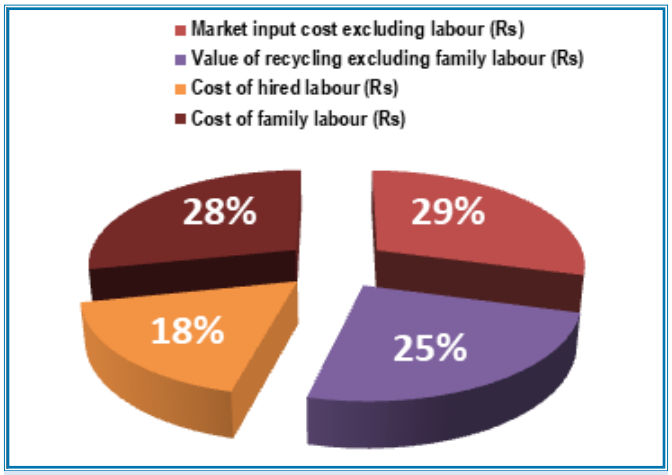


Fig 19. Different fraction of total cost

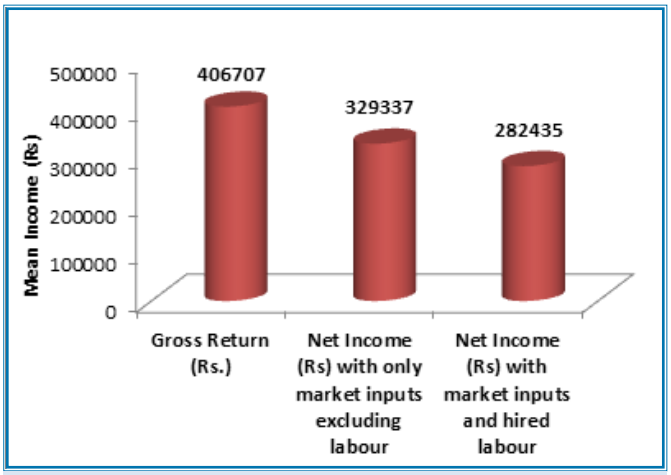


Fig 20. Economics of IFS models of SPH

11. EAST COAST PLAIN & HILLS (ECPH)

Two climate smart IFS models namely one at Bhubaneswar (Odisha) and another at Thanjavur (Tamil Nadu) represented the east coast plains and hills region. The IFS model at AICRP-IFS center at Bhubaneshwar (Odisha) representing East Coast Plain & Hill region is developed for small farming household with 1.25 ha area under irrigated ecosystem. The present system consists of cropping system, horticultural system, dairy, poultry, fishery, boundary plantation, kitchen garden and apiary. The IFS model at Thanjavur consisted of crops, dairy, poultry, horticulture and other supplementary enterprises in 0.8 ha. The results obtained from these IFS models during the reporting period of 2019-20 revealed that mean gross income of Rs. 628812 while the mean

net return excluding family labour was found to be Rs.400950. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 315573. Details of IFS model components and cost is presented in Table 7.1.11 which indicated mean total cost for the IFS models was Rs. 401547 while it varied from Rs 391554 at Thanjavur for 0.8 ha model to Rs 411540 at Bhubaneswar for 1.25 ha IFS models.

Table 7.1.11 Details of IFS model along with total cost per model in ECPH

Location	IFS model	Area (ha)	Total cost (Rs)
Bhubaneswar	Crops + Dairy + Horticulture +Fishery + Poultry	1.3	411540
Thanjavur	Crops + Dairy + Poultry +Horticulture + Fishery + Vermicompost + Boundary Plantations	0.8	391554
Mean		1.0	401547

The models could generate mean employment generation of 414 mandays through different modules while the IFS models were found to be carbon negative in terms of GHG emission at -869.4 CO2 equivalent. Further, study of different fractions of cost revealed about 17% share of recycled inputs in total cost of the IFS which could be further enhanced whereas cost of outside purchase was to the tune of 57% of the cost. The cost incurred towards hired labour was 21%. These models revealed mean REY of 28.6 tonnes besides soil health improvement to the tune of 10.7 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.7 with mean SVI of 0.56.

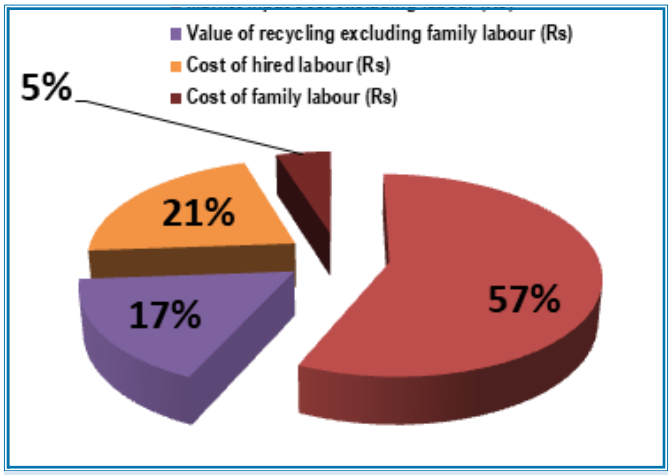


Fig 21. Different fraction of total cost

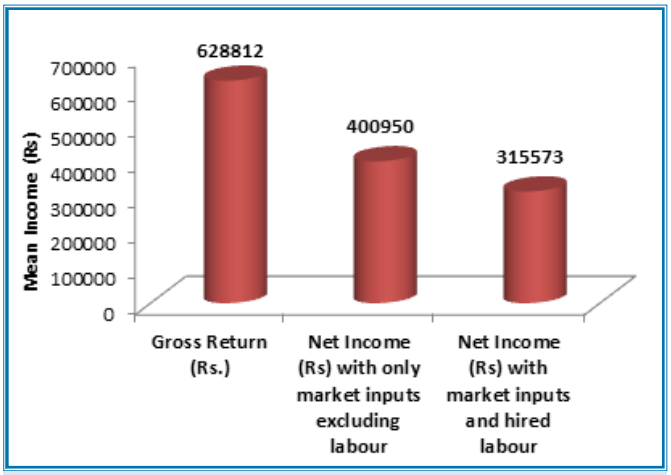


Fig 22. Economics of IFS model of ECPH

12. WEST COAST PLAINS & HILLS (WCPH)

In this Agro Climatic Region three AICRP-IFS centers in the states of Goa (ICAR- Central Coastal Agricultural Research Institute,Goa), Maharashtra (Karjat) and Kerala (Karmana) represented the climate smart IFS Models for respective states. The results of study during 2019-20 at these centres revealed mean gross income to be Rs. 354061 while the mean net return excluding family labour was found to be Rs.235422. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 149498. Details of IFS model cost components presented in Table 7.1.12 indicated mean total cost for the IFS models to be Rs. 271086.

Table 7.1.12 Details of IFS model along with total cost per model in WCPH

Location	IFS model	Area (ha)	Total cost (Rs)
Goa	Rice based lowland	0.5	194757
	Plantation crop based	0.8	184590
Karjat	Crops + Horticulture (Fruit crops + Nursery) + Livestock (Dairy + Goatary + Poultry) + Vermicompost + Boundary Plantations + Kitchen garden	1.0	622372
Karmana	Homestead based	0.2	222191
	Coconut based	0.2	213375
	Rice based	0.2	269007
	Banana based	0.2	191313
Mean		0.43	271086

The models could generate mean employment generation of 280 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -14066 CO2 equivalent. Further, study of different fractions of cost revealed about 19% share of recycled inputs in total cost of the IFS which could be further improved whereas cost of outside purchase was 44% of the model cost. The cost incurred towards hired labour was 32%. These models revealed mean REY of 13.0 tonnes besides soil health improvement to the tune of 51.9 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 0.8 with mean SVI of 0.69.

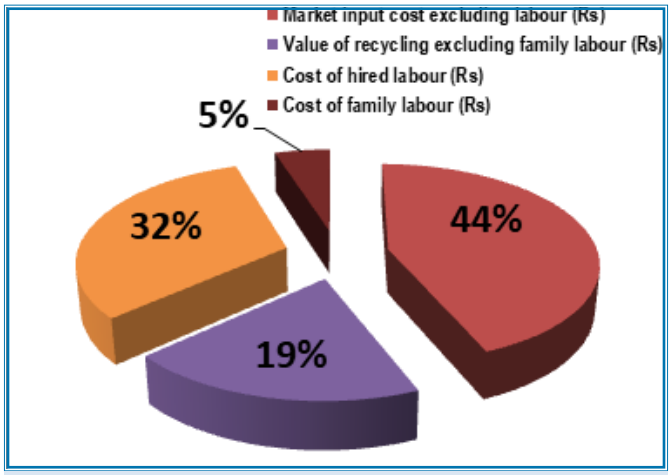


Fig 23. Different fraction of total cost

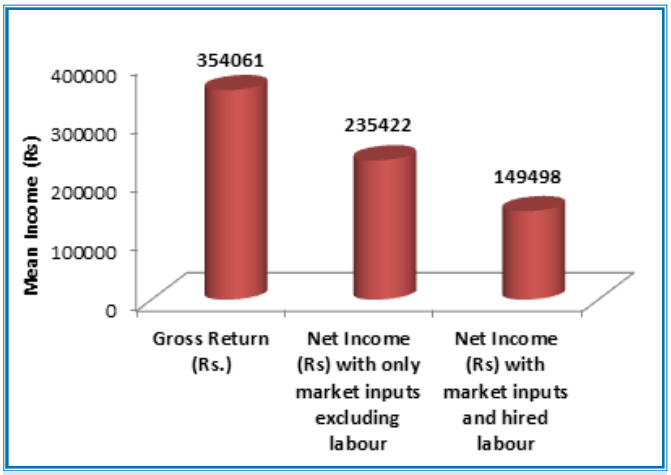


Fig 24. Economics of IFS models of WCPH

13. GUJARAT PLAINS AND HILLS (GPH)

This agroclimatic region was represented by climate smart IFS model established at Junagadh where a climate smart IFS model with crops, horticulture, dairy, fishery and supplementary component like boundary plantation in 1.0 ha area. Another IFS model having 1.0 ha area was established in SK Nagar, Gujarat. The results obtained during reporting period of 2019-20 from these models revealed the mean gross return to be Rs. 416682 while the net return excluding family labour was found to be Rs.345296. However, when family labour was accounted for in the cost, the mean net return was found to be Rs 267715. Details of IFS model cost components presented in Table 7.1.13 indicated total cost for the IFS models to be Rs. 211395 for 1.0 ha IFS model.

Table 7.1.13 Details of IFS model along with total cost of model in GPH

Location	IFS model	Area (ha)	Total cost (Rs)
Junagadh	Crops + Horticulture +Dairy+fish+ Boundary Plantations	1.0	232824
SK Nagar	Crops + Horticulture + Boundary plantation + Fisheries +Livestock+Nadep compost	1.0	189967
Mean		1.0	211395

The models could generate employment generation of 238 mandays through different modules. Further, study of different fractions of cost revealed about 29% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was 34% of the model cost. The cost incurred towards hired labour was 37%. These models revealed mean REY of 23.0 tonnes besides soil health improvement to the tune of 6.8 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.5 with mean SVI of 0.51.

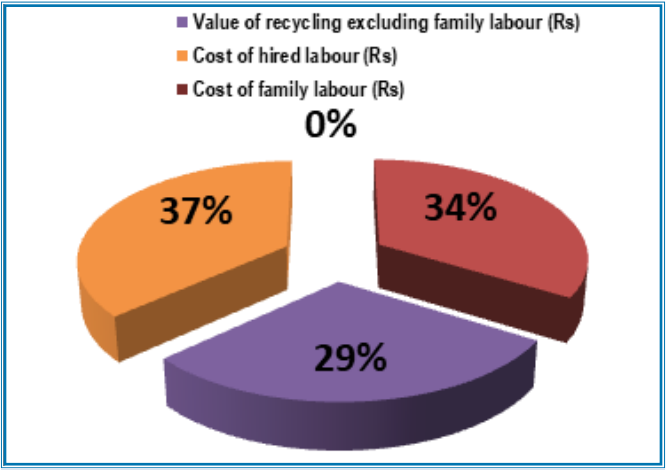


Fig 25. Different fraction of total cost

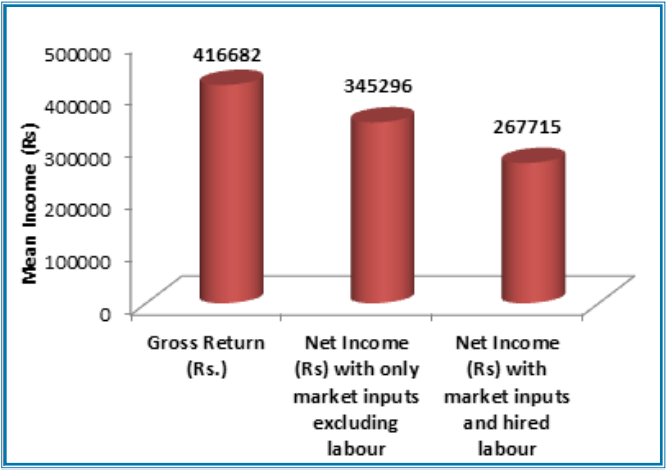


Fig 26. Economics of IFS models of GPH

15. ISLAND

The Andaman and Nicobar group of Islands lie in the Bay of Bengal 1200 km east of main land India between 6-140 N latitude and 92-940 E longitude. Plantation crops + Pig (50 %) followed by Crop + Dairy animal cows + Fish (45 %) are two equally important and prevalent farming systems of the region. Pigs are important animal of the region and symbol of social status too. The holding size ranged in between 0.39ha (marginal farmer) to 1.38 (small farmer) with an average of 7 members in a family. A climate smart IFS model involving crops, dairy and fisheries was developed in an area of 0.75ha for lowland or valley areas of Andamans. The results obtained during reporting period of 2019-20 revealed the gross return to be Rs. 392738 while the net return excluding family labour was found to be Rs.344325. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 344325. Details of IFS model cost components presented in Table 7.1.14 indicated mean cost for the IFS models to be Rs212942 for IFS model.

Table 7.1.14 Details of IFS model along with total cost of model in Island ecosystem

Location	IFS model	Area (ha)	Total cost (Rs)
Port Blair	Rice-fish + dairy + orchard for low land	0.75	246075
	Horticulture + Pig +Fishery for hilly upland	0.9	179810
Mean		0.83	212942

The models could generate mean employment generation of 301 mandays through different modules while the IFS models were found to be carbon emissive in terms of mean GHG emission at +1300 CO2 equivalent. Further, study of different fractions of cost revealed about 31% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was 23% of the model cost. The cost incurred towards labour was 48% which needs further reduction through small scale farm mechanization. These models revealed mean REY of 21.9 tonnes besides soil health improvement to the tune of 26.4 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.4 with mean SVI of 0.8.

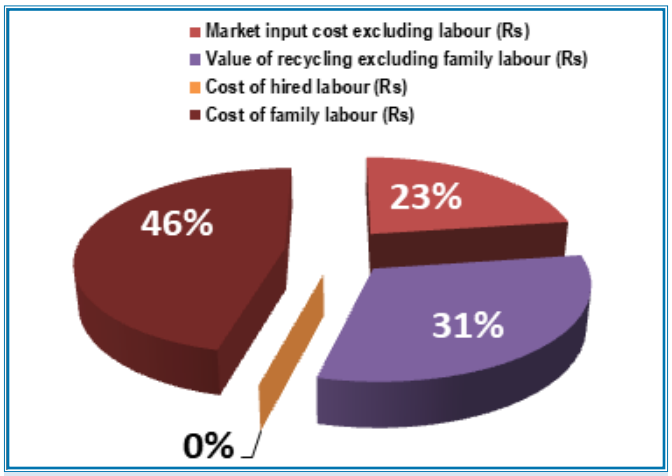


Fig 27. Different fraction of total cost

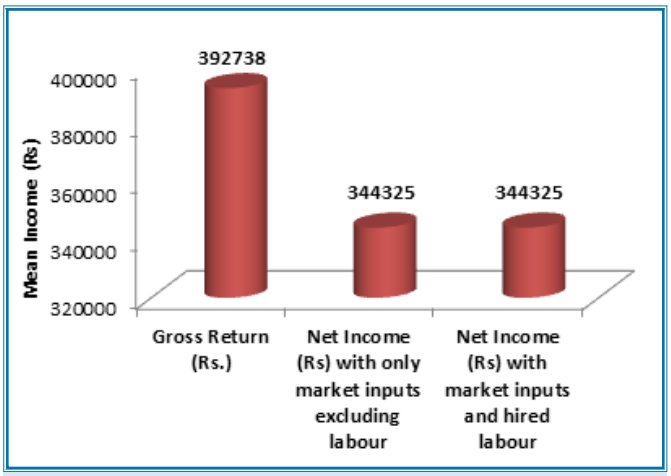


Fig 28. Economics of IFS model at Pot Blair (A & N)

Area allocation for different components across IFS models is presented in following table.

Table 7.1.15 Mean area share of different components across IFS

Components	Number of models in which integrated	Mean area share (%)
Cropping Systems • Soil health • Family nutrition • Income generation • Livestock nutrition	36	67
Fruits/plantation crops/Spices	29	19
Livestock	28	3
Fishery	18	6
Other activities	31	6

The study of climate smart IFS across agroclimatic zones during 2019-20 depicted that;-

- Market input cost excluding labour (15 % in LGP to 58 % in TGP)
- Value of recycling excluding family labour 13.4 % in CPH to 35.7 % LGP)

- Cost of hired labour (0 % in Islands to 68 % in CPH)
- Cost saving by family labour (49% in EPH followed by 46 % in Island and lowest in MGP, CPH and GPH i.e. 0)
- Purchase of animal feed from market as share of market input excluding labour (28 % in MGP to 86.9 % in Island)
- Net return per rupee invested varied from 0.74 in LGP to 2.5 in TGP
- SVI varied between 0.4 to 0.8, highest being in Islands.
- Improvement in soil OC over initial status in range of 3 % (CPH) to 51 % (WCPH)

Details of Projects being executed under AICRP-IFS at National Level

Project title	Duration	Principal Investigator	Co-PIs	Source of fund	Budget
National Level					
All India Network Programme on Organic Farming (National)	April 2017-March 2026	N. Ravisankar	M. Shamim Raghuveer Singh M.A. Ansari Raghavendra K.J.	NRM Division, ICAR	251.42 Lakh/ year (2021-22)
AICRP on Integrated Farming Systems (On-station National)	2020-2026	A.K. Prusty	R.P. Mishra M. Shamim Debashis Dutta N. Ravisankar Raghuveer Singh	NRM Division, ICAR	1682.70 Lakh/ year (2021-22)
AICRP on Integrated Farming Systems: On-Farm Research (National)	2020-2026	Raghuveer Singh	N. Ravisankar M.A. Ansari Raghavendra K.J.	NRM Division, ICAR	1121.80 Lakh/ year (2021-22)
Coordination Unit, Modipuram					
Sustainable resource management for climate smart IFS under AICRP on Integrated Farming Systems (Modipuram centre)	April 2017-March 2026	N. Ravisankar	P.C. Ghasal Debashis Dutta Suresh Malik Amit Nath A.K. Prusty Poonam Kashyap M. Shamim Chandra Bhanu	ICAR-IIFSR, Modipuram	18.01 Lakh/ year (2021-22)
On-farm Participatory Research in Farming Systems Perspective under Tribal Sub Plan in Haridwar (TSP)	May 2018-March 2022	Chandra Bhanu	R.P. Mishra Debashis Dutta A.L. Meena Jairam Choudhary	ICAR-IIFSR, Modipuram	6.37 Lakh/ year (2021-22)
On Farm Research (OFR), AICRP-IFS, Modipuram Centre	2020- 2025	P.C. Jat	P.C. Ghasal	ICAR-IIFSR, Modipuram	12.01 Lakh/ year (2021-22)
Cluster based on farm participatory research in farming systems perspective under tribal sub plan in Uttrakhand (TSP)	2017-2022	Nisha Verma	V.P. Chaudhary Amit Nath Vipin Kumar Chaudhary	ICAR-IIFSR, Modipuram	0.84 Lakh/ year (2021-22)

7.2 CROPPING SYSTEM MANAGEMENT

Title of the Experiment: Identification of cropping systems module for different farming systems

Objectives

- To evaluate the cropping systems in ecological, nutritional, feed and economic perspective
- To identify the cropping system module for specific farming systems
- To assess the resource dynamics of identified cropping system module

Year of start: 2017-18

Treatments

Ten different cropping systems were evaluated across 36 locations for meeting the various purposes of farming systems such as family nutrition, soil health improvement, livestock nutrition as well as income enhancement across different ecosystems (arid, semi-arid, sub-humid, humid and coastal) of the country. A brief description design and objective of cropping system and location wise findings and summarized results are presented below.

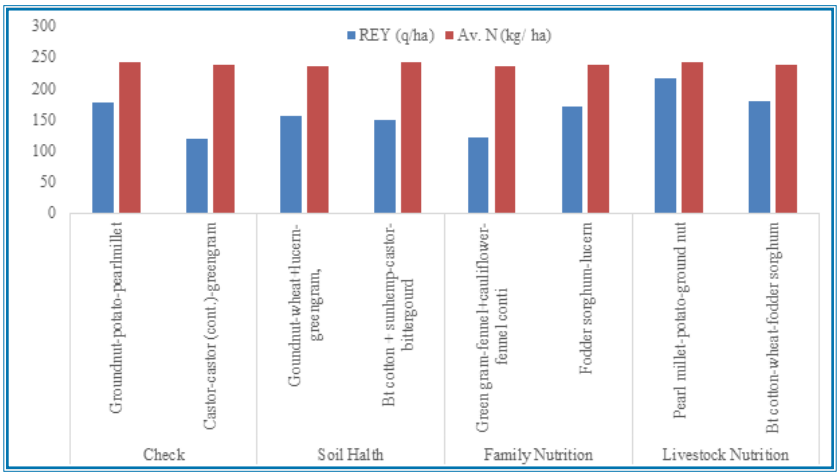
Treatment notation	Cropping system	Remarks
T_1	Pre-dominant cropping system of the region	Check
T_2	Pre-dominant cropping system of the region	
T_3	Ecological cropping system involving pulses/green manures and other crops for improving soil health	Soil health
T_4	Ecological cropping system involving pulses/green manures and other crops for improving soil health	
T_5	Cropping system involving cereals/pulses/oilseeds to meet the household nutritional security	Family nutrition
T_6	Cropping system involving cereals/pulses/oilseeds to meet the household nutritional security	
T_7	Cropping system for round the year green/dry fodder production	Livestock nutrition
T_8	Cropping system for round the year green/dry fodder production	
T_9	Cropping systems involving vegetables and other high value crops for income enhancement	Income enhancement
T_{10}	Cropping systems involving vegetables and other high value crops for income enhancement	

Results

Arid ecosystem

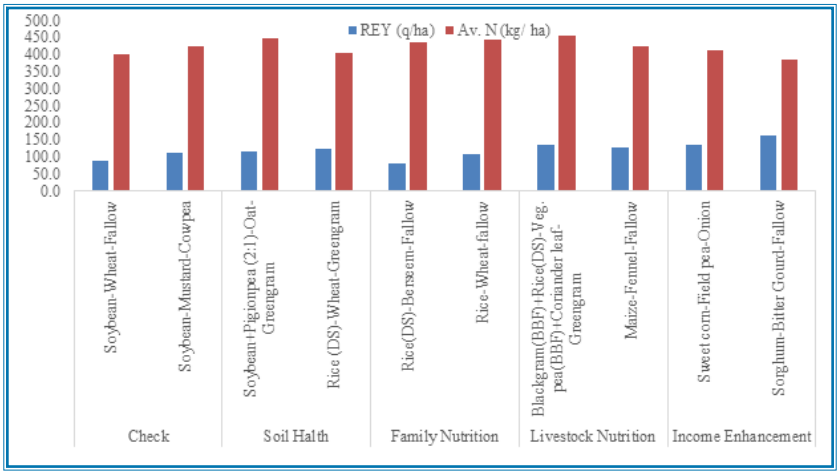
S K Nagar (Gujarat): At S K Nagar, eight different cropping systems evaluated were groundnut-potato-pearlmillet, castor-castor (cont.)-greengram, groundnut-wheat+lucern-greengram, bt cotton

+ sunhemp-castor-bittergourd, green gram-fennel+cauliflower-fennel conti., fodder sorghum-lucern, pearl millet-potato-ground nut, and bt cotton-wheat-fodder sorghum. On the basis of diversification of cropping systems, crop sequence (Pearl millet - Potato - Groundnut) recorded maximum rice equivalent yield (217 q/ha), gross return (3,83,602 Rs./ha) and net return (2,28,402 Rs./ha) while, net return per rupees invested (2.27) was highest in F. Sorghum - Lucerne for fodder/ seed cropping system whereas, system profitability (625.8 R/day) and system productivity (26.3 kg/ ha/day) were recorded higher under the treatment of crop sequence Pearlmillet-potato-groundnut. The highest available N (242.78 kg/ha), available P (31.72 kg/ha) and available K (217.60 kg/ha) was noted in Groundnut - Potato - Pearl millet cropping sequence whereas, organic carbon (3.83 g/kg) were recorded highest in crop sequence of Bt Cotton (HDP) - Wheat - F. Sorghum.



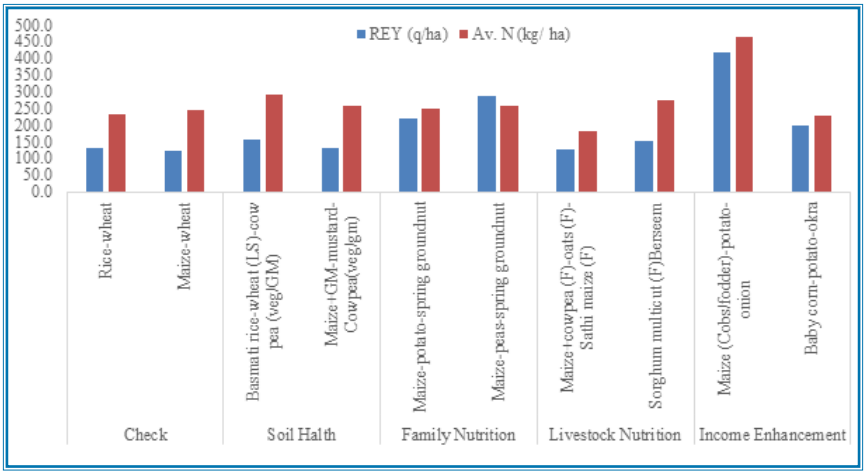
Semi-arid ecosystem

Kota (Rajasthan): At Kota, ten cropping systems such as soybean-wheat-fallow, soybean-mustard-cowpea, soybean+pigeon pea-oat-summer mungbean, direct seeded rice-wheat-summer mung bean, direct seeded rice-berseem, transplanted rice-wheat (ZT), urdbean+direct seeded rice-veg. pea+coriander, QPM maize-fennel, sweet corn-field pea-onion, sorghum-bitter gourd-fallow. were taken for the study. Investigation highlighted that sorghum-bitter gourd-fallow system recorded the highest REY of 162.68 q/ha (Fig.) as compared to other cropping systems. Black gram (BBF)+rice (DS)-veg.pea (BBF)+coriander leaf-green gram recorded higher value of available soil N (455.98 kg/ha) at the end of three ears of cropping system. For available N point of view, suitable cropping system among other tested systems was soybean+red gram-oat-summer mungbean which recorded available N status of 446.182 kg/ha (fig. 1) and this cropping systems also registered the highest net return of Rs. 166907 Rs/ha however Rice (DS)-berseem-fallow recorded the lowest net return of Rs. 84281/ ha. Thus, the above systems can be used for soil quality maintenance in farming systems of the region on crop rotation basis.



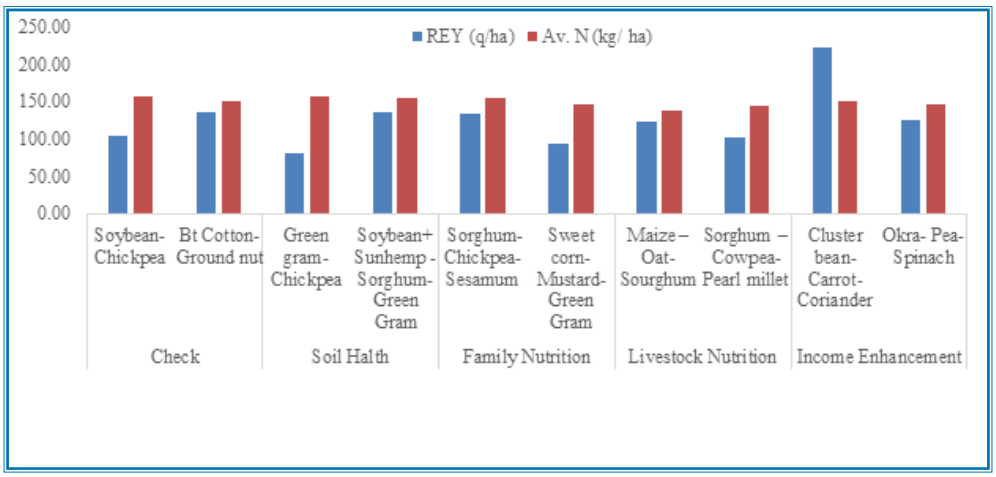
Ludhiana (Punjab): At Ludhiana, ten cropping systems with purposes like family nutrition (maize-potato-spring groundnut, maize-pea-spring groundnut), livestock nutrition (maize +cowpea (F)-oats (F)-sathi maize (F), sorghum multicut (F)-berseem (F), maintaining soil health (basmati rice-wheat-cowpea, maize + GM/mustard-cowpea) and income enhancement for family (maize (cobs/fodder)-potato-onion and baby corn-potato-okra) were compared with predominant cropping systems. The highest REY of 419.52 q/ha was noticed with maize (cobs+fodder)-potato-onion at Ludhiana centre fig. Post three years of completion of cropping system, available soil N was higher (462.56 kg/ha) under maize (cobs/fodder)-potato-onion system (Fig. 1).

The net returns were maximum in sorghum multicut (F)-berseem (F) cropping system (Rs 402034/ ha) which was closely followed by maize - peas - spring groundnut (Rs 334311/ha) it was 2.26 and 1.88 times more over rice-wheat system, respectively. The net returns in the other cropping systems like maize (cobs/fodder)-potato-onion, maize+cowpea (F)-maize (F)-oats (F)-sathi maize (F), maize-potato-spring groundnut, maize+GM/mustard-cowpea(vegetables/GM) and maize-wheat were Rs 276296, Rs 250249, Rs 197978, Rs 183658 and Rs 177476 per ha/annum respectively.

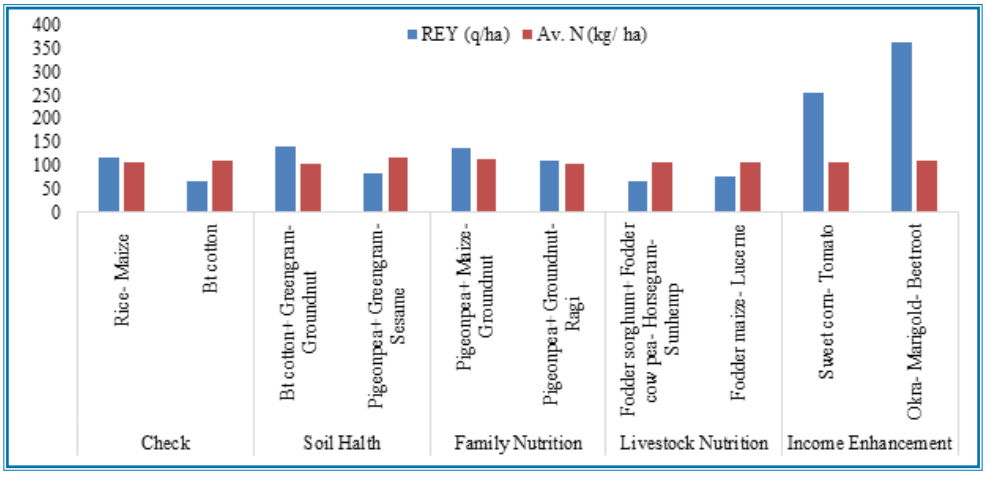


Parbhani (Maharashtra): At Parbhani, ten cropping systems with purposes like family nutrition (sorghum-chick pea-sesamum, sweet corn-mustard-green gram), livestock nutrition (maize-oat-sorghum, sorghum-cowpea-pearl millet), maintaining soil health (green gram-chickpea, soybean+ sunhemp (GM)-Sorghum-green gram) and income enhancement for family (cluster bean-carrot-coriander, okra-pea-spinach) were compared with predominant cropping systems. Among different cropping systems tested, the highest productivity in terms of REY was found in cluster bean-carrot-

coriander (REY 223.16 q/ha) followed by Okra-pea-spinach (REY 223.16 q/ha) as depicted in Fig no. Therefore, these systems can be used in place of existing pre-dominant cropping system in the zone for enhancing productivity from which only 105 to 135 q/ha REY can be obtained. Green gram-chickpea cropping system recorded higher value (157.10 kg/ha) of available N content thereby can be suggested as soil improver system for region Fig. In this region highest total net return Rs.225035/ha) and B:C ratio of 6.9 recorded in Cluster bean-carrot-coriander.

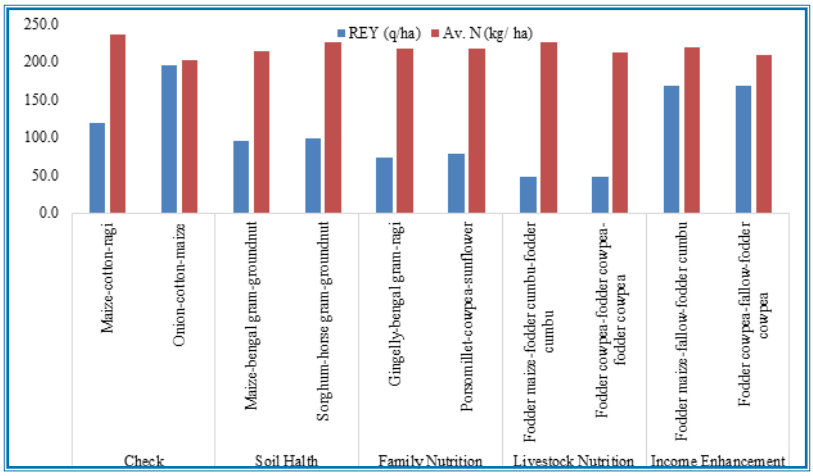


Rajendernagar (Telangana): Ten cropping systems with diverse purposes such as family nutrition (Pigeon pea+maize-ground nut, pigeon pea+ground nut-ragi), livestock nutrition (fodder sorghum+cowpea-horsegram-sunhemp, fodder maize-lucerne), maintaining soil health (Bt cotton + green gram-ground nut, pigeon pea+green gram-sesame) and income enhancement for family (Sweet corn-tomato, okra-marigold-beetroot) were compared with predominant cropping systems like Rice-maize and Bt. Cotton at Rajendranagar. Cropping system designed and evaluated for income enhancement with okra-marigold-beetroot and sweet corn-tomato registered significantly higher rice equivalent yield (363.54 and 254.39 q/ha, respectively) thus indicating their suitability over the existing systems (Fig.). Among different systems, pigeon pea + green gram-sesame recorded highest soil available N (115.20 kg/ha) as compared to other systems thus this system could be best system for intermittent rotation with income enhancing systems to maintain soil health Fig. Out of the two fodder crops, fodder sorghum + fodder Cow pea (1:2) (66.18 q/ha REY) and fodder maize (76.58 q/ha REY) systems were on par with each other.

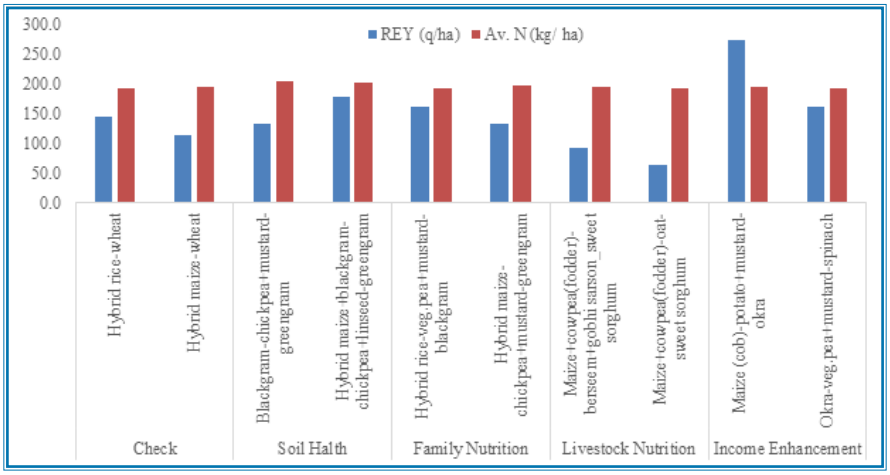


Coimbatore (Tamil Nadu): At Coimbatore, cropping systems with purposes such as family nutrition (gingelly-bengal gram-ragi, prosomillet+cowpea+sunflower), livestock nutrition (fodder

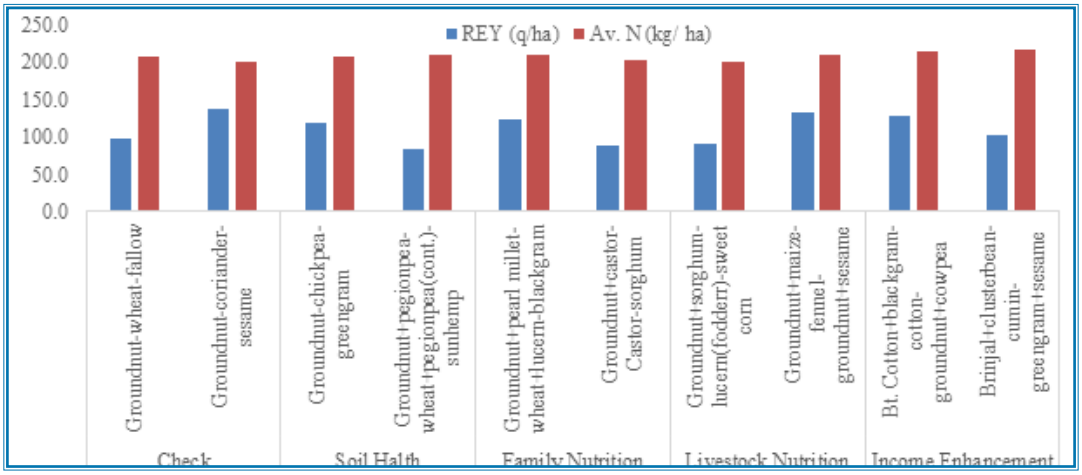
maize+cowpea (F), bajra napier hybrid + desmanathus in all seasons), maintaining soil health (maize-bengal gram-cowpea, sorghum-horse gram-groundnut) and income enhancement for family (beet root-cotton-maize, maize-chillies-radish) were compared with predominant cropping systems. Among different cropping systems, Onion-cotton-maize system recorded highest REY (195 q/ha) thus was found promising for productivity enhancement (Fig.). Post 3 years of completion of cropping system, available soil N was higher (236 kg/ha) under maize-cotton-ragi (Fig.). Considering the economics of cropping sequence, Maize – Chillies - Radish cropping systems recorded the highest annual net returns of Rs. 4,31,197 per ha with the B-C ratio of 3.65. The next best system was Beet root - Cotton - Maize cropping sequence which registered an annual net return of Rs. 3,43,532 per ha and B-C ratio of 3.16. This is due to the inclusion of vegetable crops which resulted in higher economic value whereas Gingelly-Bengalgram-Fingermillet cropping system registered Rs. 60,764 per ha as annual net return with the B-C ratio of 1.62.



Kanpur (Uttar Pradesh): At Kanpur, ten cropping systems with purposes like family nutrition (hybrid rice-chickpea+mustard-greengram, hybrid maize-chickpea+mustard-green gram), livestock nutrition (maize+cowpea (F)-berseem+gobhisarson-sweet sorghum, maize+cowpea (F)-boat-sweet sorghum), maintaining soil health (black gram-chickpea+mustard-green gram, hybrid maize+blackgram-chickpea+linseed-green gram) and income enhancement for family (maize (Cob)-potato+mustard-okra, okra-veg. pea+mustard-spinach) were compared with predominant cropping systems. The results indicated that maize (cob)-potato+mustard-okra system was found most productive, and it has recorded the REY of 274.75 q/ha (Fig). The soil was also analyzed for available soil N, and it was found the Black gram-chickpea+mustard-green gram system showed the highest available soil N (206.10 kg/ha) as compared to other systems (Fig.). Hence said system can be used as soil planner system in the farming system and may be taken up in rotation with the other cropping systems. Maize + Cowpea(fodder) – Berseem + Gobhi sarso/Velvet grass – Sweet Sorghum (Multi-cut) cropping system was evaluated keeping in view the requirements of green fodder round the year gave lowest REY (93.22 q ha-1). Maize (cob)-Potato + Mustard-Okra crop sequence excelled all the cropping systems in respect of Net monetary return (Rs 3, 63, 556 ha-1) and B:C ratio (3.96). Hy. Maize + Black gram - Chickpea + Linseed-Green Gram (G+R) with net return of Rs 2, 28, 889 ha-1.

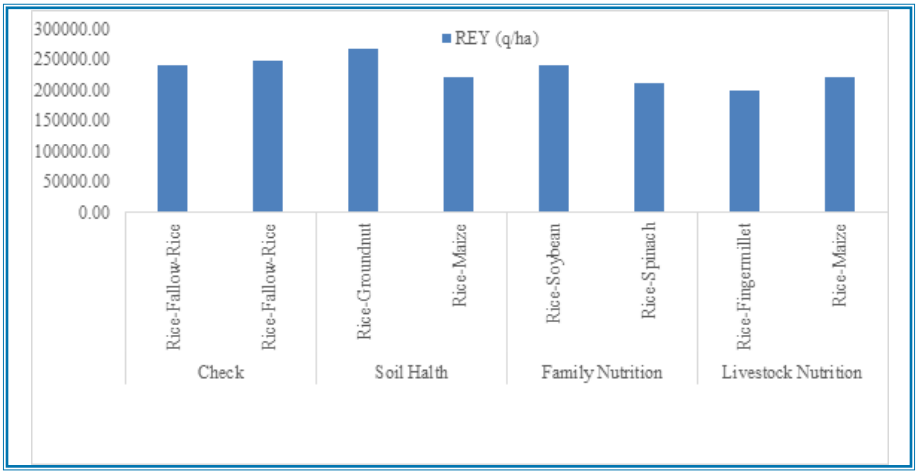


Junagadh (Gujrat): At Junagadh, ten cropping systems having objectives like family nutrition requirement, cropping systems such as groundnut+pearlmillet-wheat+lucern-black gram, groundnut + castor-castor conti.-sorghum), livestock nutrition (groundnut+sorghum-lucern-sweet corn, groundnut+maize-fennel-groundnut+sesame), maintaining soil health (groundnut-chickpea-green gram, groundnut+pigeon pea-pigeon pea cont.-sumhemp) and income enhancement for family (Bt. cotton+blackgram-cottonconti-groundnut+cowpea, brinjal+cluster bean-cumin-green gram+sesame) were compared with predominant cropping systems like groundnut-wheat-fallow and groundnut-coriander-sesame. Among different cropping systems of soil health, family nutrition, livestock nutrition and income enhancement, groundnut-coriander-sesame recorded highest REY of 137.80 q/ha thus was found superior to other systems in terms of improvement in the productivity Fig. Significantly lowest REY of 83.96 q/ha was recorded under cropping sequence groundnut + pigeon pea (Kharif-rabi) –wheat+ pigeon pea sunbeamp (summer)-sunhemp as green manure. The highest available nitrogen 217.95 kg/ha was recorded in brinjal+cluster bean-cumin-greengram+sesame cropping systems where 102.97 q/ha of REY was recorded.



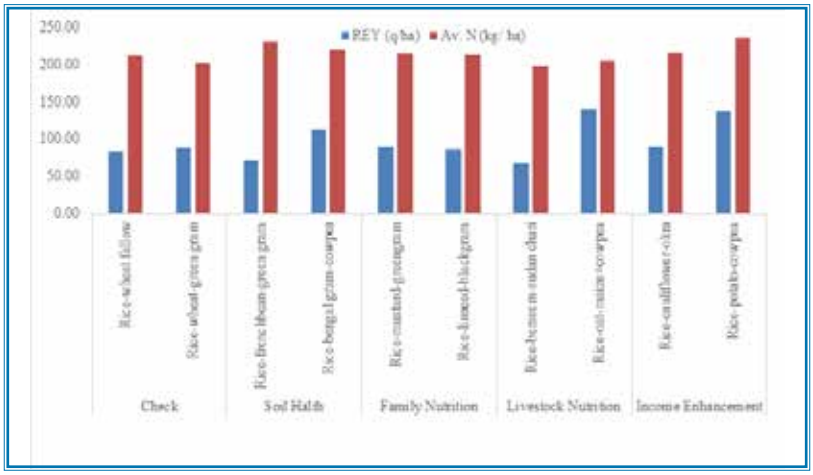
Kathalagera (Karnataka): Various rice-based cropping systems such as rice-fallow-rice, rice-groundnut, rice-maize, rice-soybean, rice-palak, rice-finger millet, rice-maize were tested at Kathalagera. Among different systems, highest productivity in terms of REY was found in rice-groundnut (REY 150 q/ha) as depicted in Fig no. The next best systems for productivity improvement perspective were rice-rice (139.8 q/ha) and rice-soybean (136.4 q/ha). Therefore, these systems can be used in place of existing pre-dominant cropping system in the zone for enhancing the productivity. Results of the present investigation indicated that growing of different diversified

crops after rice did not show any significant improvement in the soil properties including nitrogen availability.



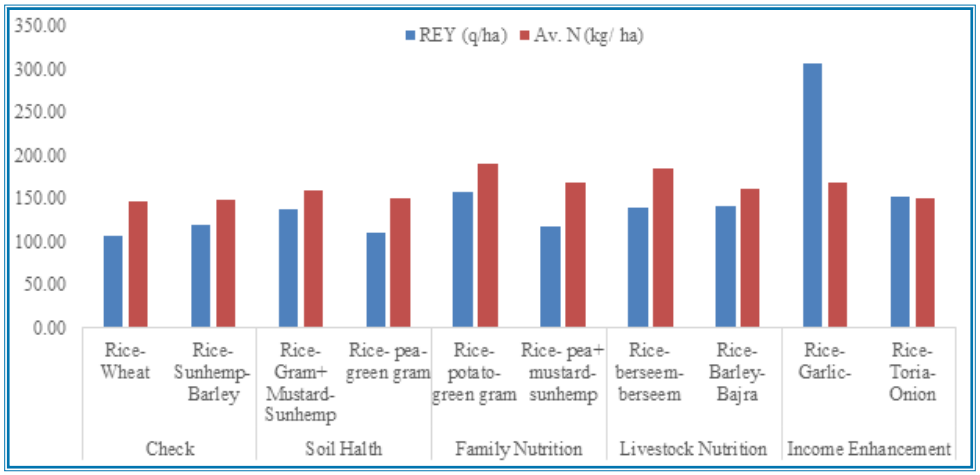
Sub-humid ecosystem

Faizabad (Uttar Pradesh): **T**en cropping systems with different purposes such as family nutrition (rice-mustard-green gram, rice-linseed-blackgram), livestock nutrition (rice-beseem-sudan chari chari, rice-oat-maize + cowpea), maintaining soil health (rice-french bean-green gram, rice -bengal gram-cowpea) and income enhancement for family (rice-cauliflower-cauliflower-okra, rice-potato-cowpea) were compared with predominant cropping systems. Among different cropping systems tested at Faizabad Centre, the highest productivity in terms of REY was found with rice-oat-maize+cowpea system (REY 139.92 q/ha) followed by rice-potato-cowpea system (REY 135.63 q/ha) as depicted in Fig no. So, both the systems can be used as an alternative to existing predominant cropping system in the zone for enhancing productivity from which 81.9 to 87.4 q/ha REY can be obtained. The highest available nitrogen in the soil was registered about 235 kg/ha from rice-potato-cowpea cropping systems and the least one was recorded with rice-berseem-sudan chari (198.0 kg/ha).

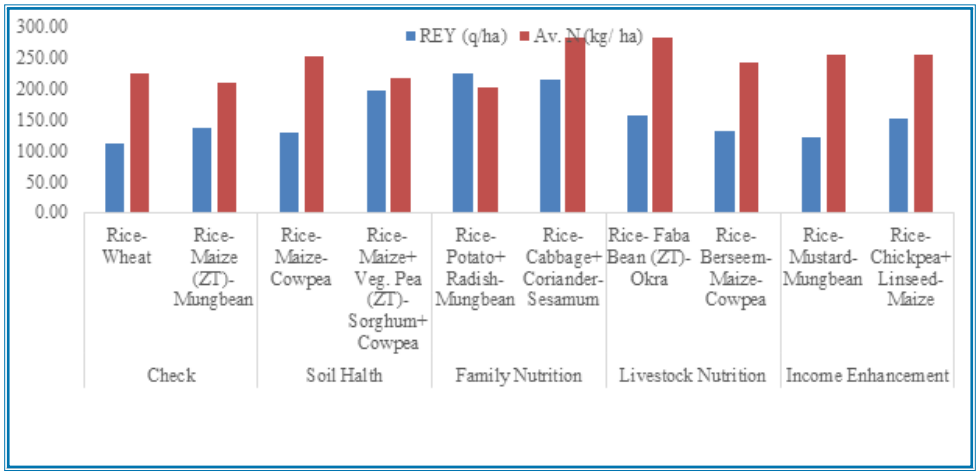


Rewa (Madhya Pradesh): At Rewa, ten cropping systems with various purposes such as family nutrition (Rice-potato-green gram, rice-pea + mustard-sunhemp), livestock nutrition (rice-berseem-berseem (seed), rice-barley-bajra), maintaining soil health (rice-gram+mustard-sunhemp, rice-pea-green gram) and income enhancement for family (Rice-garlic, rice-toria-onion) were compared with predominant cropping systems. At present Centre, the highest productive cropping system in

term of REY was notice with rice-garlic system, which recorded REY of 306.38 q/ha (Fig.). About 190.00 kg/ha available nitrogen was registered from rice- potato- green gram cropping system whereas rice-wheat (predominant cropping system) recorded the lowest available nitrogen (146.0 kg/ha).

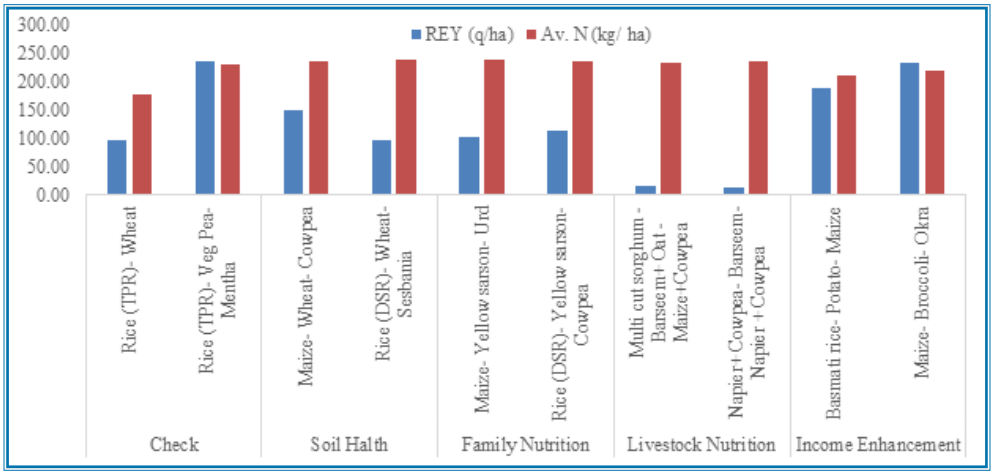


Sabour (Bihar): At Sabour, various cropping system such as rice-wheat, rice-maize (ZT)-mung bean, rice-maize-cowpea, rice-maize+veg. pea (ZT)-sorghum+cowpea, rice-potato+radish-mungbean, rice-cabbage+coriander-sesamum, rice-faba bean (ZT)-okra, rice-bereem-maize+cowpea, rice-mustard-mung bean, and rice-chickpea+linseed-maize have been examined. The findings revealed that rice-potato+radish-mungbean (REY 224.0 q/ha) closely followed by rice-cabbage+coriander-sesamum (REY 215.63 q/ha) were found most productive amongst all the evaluated system Fig. Thus these systems can be used for productivity enhancement in the region. Among different treatments used for soil health improvement rice-maize-cowpea was found suitable and reported higher soil available N (253 kg/ha) however the highest available nitrogen of 282 kg/ha was registered with rice-faba bean(ZT)-okra.

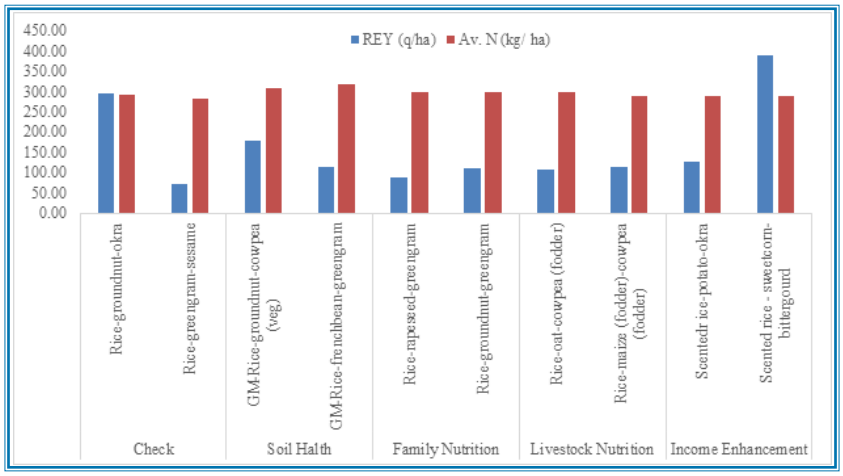


Pantnagar (Uttarakhand): In Pantnagar, ten diverse cropping systems with various purposes like family nutrition (maize-toria-urd, rice (DSR)-yellow sarson-cowpea), livestock nutrition (multi cut sorghum-berseem+oat-maize+cowpea, napier +cowpea-berseem-maize+cowpea), maintaining soil health (maize-wheat-cowpea, rice (DSR)-wheat-sesbania) and income enhancement for family (basamati rice-potato-maize, maize-broccoli-okra) and were compared with predominant cropping systems. The highest REY of 232 q/ha was noticed with maize-broccoli-okra from diversified cropping system(fig); therefore, this can be used as productivity enhance system. Rice (DSR)-

wheat- sesbania cropping system registered the highest available nitrogen 240 kg/ha whereas the lowest available nitrogen was recorded from rice (TPR)- wheat (Pre-dominant cropping system).

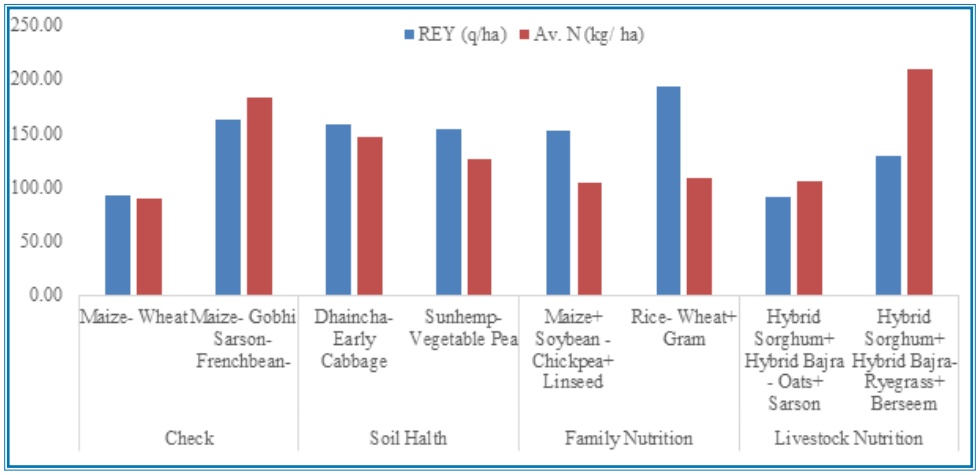


Chiplima (Odisha): Ten cropping systems with various purposes such as family nutrition (rice-rapeseed-greengram, rice-groundnut-green gram), livestock nutrition (rice-oat (fodder)-cowpea (fodder), rice-maize (F)-cowpea (F), maintaining soil health (green manure-rice-groundnut-cowpea (veg.), green manure-rice-frenchbean-greengram) and income enhancement for family (scented rice-potato-okra and scented rice-sweet corn-bitter gourd) were compared with predominant cropping systems at Chiplima.. The results revealed that cropping system scented rice-sweet corn-bitter gourd recorded highest REY of 389.0 q/ha thus was most productive one in terms of rice equivalent yield (Fig.). After three years of cropping system, available soil N was higher (319 kg/ha) under GM-Rice-frenchbean-greengram (Fig. 1). Hence said system may be used as soil builder system in the farming system and may be taken up in rotation with the other cropping systems.

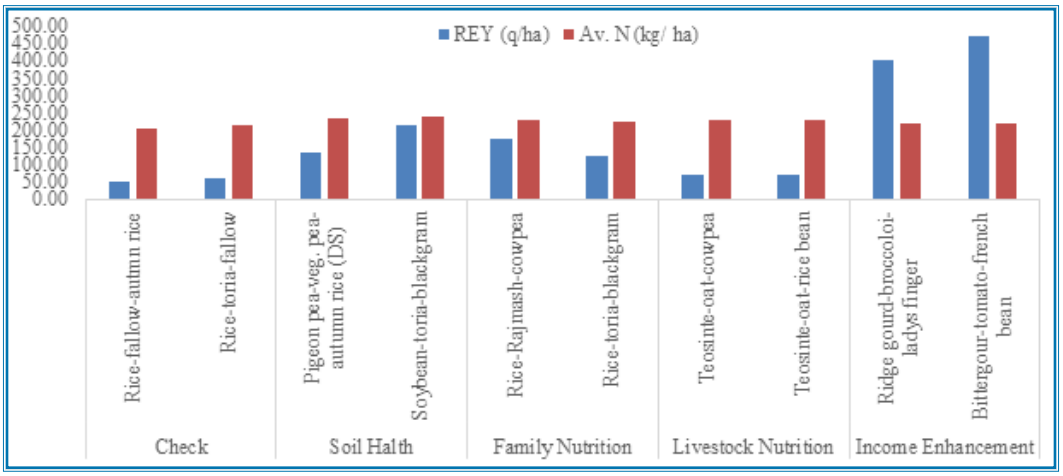


Humid ecosystem

Palampur (Himachal Pradesh): Ten cropping systems *viz.*, maize-wheat, Maize- gobhi sarson-frenchbean, Sunhemp-early cabbage, SUnhemp-vegetable pea, Maize+soybean-chickpea+linseed, Rice-wheat+Bengal gram, Hybrid sorghum+hybrid bajra-oats+sarson and Hybrid sorghum+hybrid bajra-ryegrass+berseem was tested at Palampur. Out of different evaluated systems, highest REY of 193.0 q/ha was noticed with rice-wheat+bengal gram fig. Therefore, this system can be used as a replacement of existing systems. The system Hybrid sorghum+hybrid bajra-ryegrass+berseem was found superior in term of soil available N content (209 kg/ha) hence its might improve the N status in the soil (Fig.).

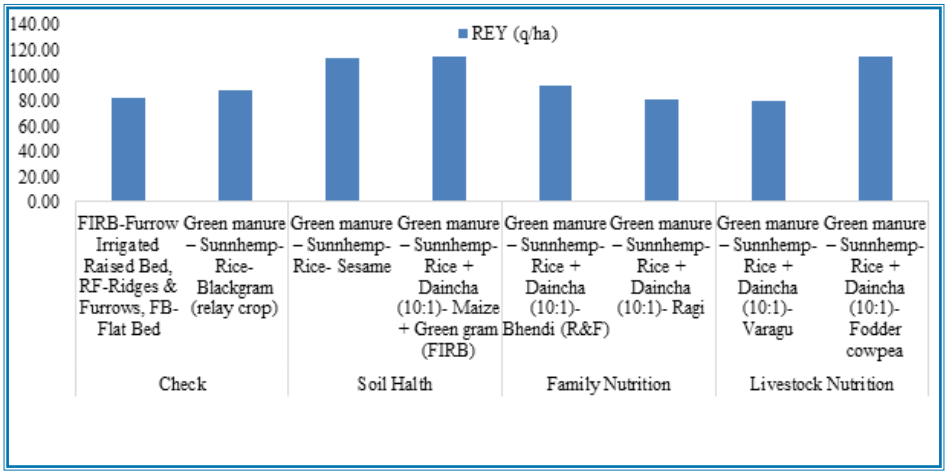


Jorhat (Assam): Ten cropping systems such as rice-fallow-autumn rice, rice-toria-fallow, pigeonpea-veg. pea-autumn rice (DS), soybean-toria-black gram, rice-rajmash-cowpea, rice-toria-black gram, Teosinte-oat-cowpea, Teosinte-oat-rice bean, Ridge gourd-broccoli-ladys finger and Bitter gourd-tomato-french bean were evaluated at Jorhat. The highest REY of 472.0 q/ha was observed with Bitter gourd-tomato-french bean system over other systems (Fig.). After three years of completion of cropping system, available soil N was higher (238 kg/ha) under Soybean-toria-black gram system (Fig.). Therefore, above system can be used as soil quality enhancer system and may be taken up in rotation with other systems.

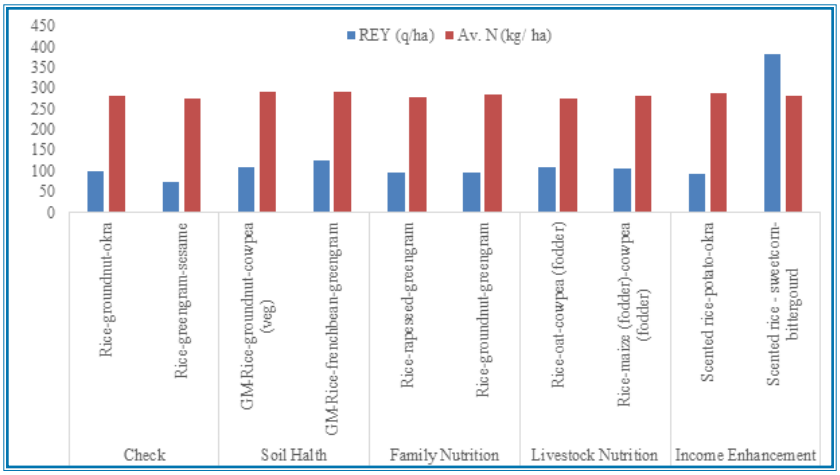


Coastal ecosystem

Thanjavour (Tamil Nadu): At Thanjavour, eight diverse cropping systems *viz.*, FIRB-Furrow Irrigated Raised Bed, RF-Ridges & Furrows, FB-Flat Bed, Green manure – Sunnhemp- Rice- Blackgram (relay crop), Green manure – Sunnhemp- Rice- Sesame, Green manure – Sunnhemp- Rice + Daincha (10:1)- Maize + Green gram (FIRB), Green manure – Sunnhemp- Rice + Daincha (10:1)- Bhendi (R&F), Green manure – Sunnhemp- Rice + Daincha (10:1)- Ragi, Green manure – Sunnhemp- Rice + Daincha (10:1)- Varagu and Green manure – Sunnhemp- Rice + Daincha (10:1)- Varagu were evaluated . Out of different systems, highest REY of 114 q/ha was observed with Green manure – Sunnhemp- Rice + Daincha (10:1)- Maize + Green gram (FIRB) system fig. Owing to its higher yield potential it can be suggested over existing system for yield enhancement in region.

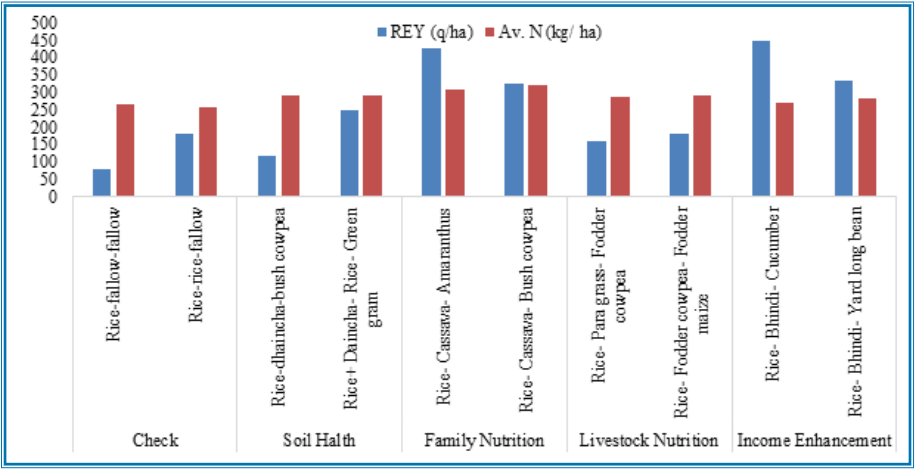


Bhubaneswar (Odisha): At Bhubaneswar, ten cropping systems with specific purposes, such as family nutrition (rice-rapeseed-greengram, rice-groundnut-green gram), livestock nutrition (rice-oat (fodder)-cowpea (fodder), rice-maize (F)-cowpea (F), maintaining soil health (green manure-rice-groundnut-cowpea (veg.), green manure-rice-frenchbean-greengram) and income enhancement for family (scented rice-potato-okra, scented rice-sweet corn-bitter gourd) and were compared with predominant cropping systems. Cropping system designed and evaluated for income enhancement with scented rice-sweetcorn-bitter gourd registered significantly higher rice equivalent yield (REY) of 382 q/ha thus indicating the suitability of this system for adding into existing pre-dominant cropping system in the zone for enhancing the income from the existing systems (Fig.). At the end of 3 years of study, available soil N was higher (293 kg/ha) under green manure-rice-groundnut-cowpea (Fig.) indicating this system could be the best cropping system for intermittent rotation with income enhancement systems to maintain the soil health.

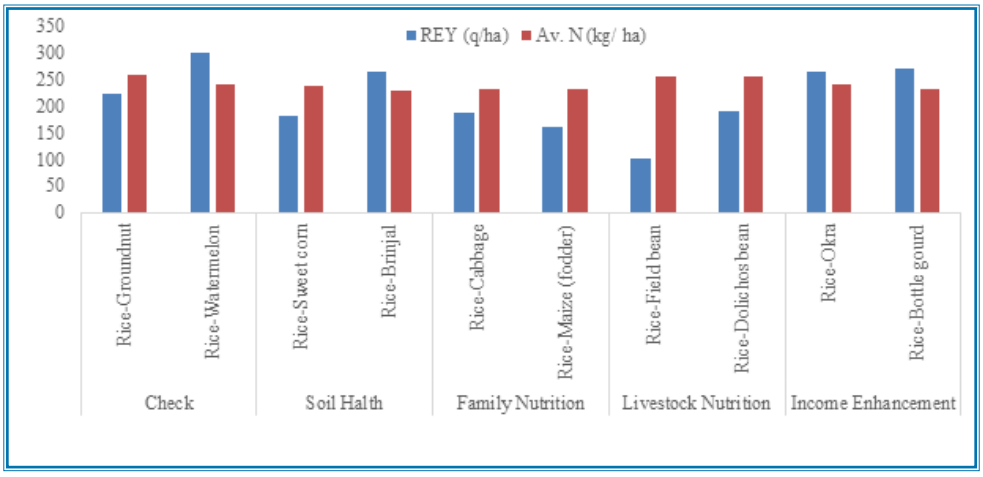


Karamana (Kerala): Cropping systems like rice-fallow-fallow, Rice-rice-fallow as check, Rice-sunhemp-bush cowpea and Rice-sunhemp-rice-greengram as as soil health improver, rice-cassava-amaranthus and rice-cassava-bush cowpea for family nutrition, rice-paragrass-fodder cowpea and rice-fodder cowpea-fodder maize as source of green fodder, and rice-bhindi-cucumber and rice-bhindi-yard long bean for improvement of farm income were evaluated at Karamana. Out of different systems tested, rice-bhindi-cucumbet registered highest productivity as compared to the remaining cropping systems. The system recorded REY of 450 q/ha (Fig). As far as productivity is concerned, rice-bhindi-yard long bean (REY 333.0 q/ha) and rice-cassava-bush cowpea (REY 327.0 q/ha) were found next best alternative as compared to the previous one. In this experiment,

available soil N status after completion of three years of study was found higher (322 kg/ha) under rice-cassava-bush cowpea system as against other systems (Fig.). So, this system can be used as soil builder system in the farming system.



Karjat (Maharashtra): The cropping system rice-ground nut, rice-water melon, rice-sweet corn, rice-brinjal, rice-cabbage, rice-maize (F), rice-field bean, rice-dolichos bean, rice-okra, rice-bottle gourd and rice-rice were tested at Karjat. Out of examined systems, rice-water melon and rice-bottle gourd recorded highest REY (300 and 271.0 q/ha, respectively) as compared to other cropping systems Fig. Therefore, these systems can be added or replaced with existing pre-dominant cropping system in the zone for enhancing productivity. At the end of 3 years of study, available soil N was higher (258.0 kg/ha) under rice-ground nut system (Fig.) indicating that this system could be the best cropping system for intermittent rotation with income enhancement systems to maintain the soil health.



7.3 Organic Agriculture and weed management

Title of the experiment: Evaluation of weed management practices under organic production system

Objectives

- To evaluate the cultural and mechanical weed management practices under organic production system.
- To study the efficacy of non-conventional approaches of weed management using oil cakes under organic production system.
- To find out the economically viable and practically applicable alternative to hand weeding for organic weed management in different cropping systems.

Year of start: 2016-17

Treatments

T_1: Hand Weeding

T_2: One mechanical weeding + One hand weeding

T_3: Intercropping with pulses/green manure (location and crop specific intercropping)

T_4: Stale seed bed + reduced spacing (up to 25%) + mulching with previous crop residues + one hand weeding

T_5: Locally available weed mulch (water hyacinth/lantana etc.) + one hand pulling

T_6:Incorporation of any one of castor/mahua/mustard seed meal/neem cake/karanj/tumbha cake/ sal de oil cake 15 days before planting/sowing @ 5 t/ha + one hand weeding

T_7: Soil solarization with 8-25 microns polythene mulch during summer + one HW (optional to centres)

T_8: ITK treatment on weed control practiced by farmers (like mulching with leaf of mango/ jackfruit etc.)

Ayodhya

Highest rice equivalent yield (148.93 q/ha) was obtained with treatment i.e. incorporation of neem cake @ 15 days before sowing of crops in sequences and received one hand weeding at 25 days after sowing / planting of each crop which was followed by T4,state seed bed preparation + reduced spacing upto 25 %+ mulching with one hand weeding at 50 DAS, and T1 ,hand weeding twice at 25 and 50 DAS in each crop sequence. However, treatment T 4 state seed bed preparation + reduced spacing upto 25 % + mulching with one hand weeding at 50 DAS recorded the highest net income Rs 70658/ha and benefit : cost ratio 0.40 followed by T1 with net profit Rs 54877/ha and benefit : cost ratio 0.30.

Table 7.3.1 Effect of organic weed management treatments on yield of rice-potato-okra cropping systems

Treatment	Yield (kg/ha)			REY(kg/ha / year)	Net return (Rs/ha /years)	B:C ratio
	Rice	Potato	Okra			
T_1 Hand weeding – 25 & 50 DAT	3110	17510	5820	13467	54877	0.30
T_2 Cono weeder -25DAT + one hand weeding -50 DAT,Rabiand summer, Hand hoe -25DAT + one hand weeding -50 DAT,Summer,	2780	16540	5560	12587	36877	0.20
T_3 Intercropping with dhaincha,Rabi, Intercropping with lentil,Summer, Intercropping with moong	2515	13025	4030	10904	21489	0.13
T_4 Stale seed bed + reduced spacing (up to 25%) + one hand weeding at 50 DAT,Rabi Stale seed bed + reduced spacing (up to 25%) + mulching with rice straw + one hand weeding at 50 DAS,Summer, Stale seed bed + reduced spacing (up to 25%) + mulching with potato haulm+ one hand weeding at 50 DAS	3220	18260	6150	14070	70658	0.40
T_5 Locally available weed mulch - water hyacinth + one hand pulling,Rabi and Summer, Locally available weed mulch - *kanss* + one hand pulling	2625	16030	5115	11937	33319	0.19
T_6 Incorporation of neem cake 15 days before sowing @ 2 t/ ha + one hand weeding (Kharif,Rabi and Summer)	3410	19520	6410	14893	25050	0.11
T_7 ITK treatment on weed control practiced by farmers as mulching with leaf of mango,Rabi, ITK treatment on weed control practiced by farmers as mulching with *Casia tora* ,Summer, ITK treatment on weed control practiced by farmers as mulching with rice straw	2305	14515	4810	10847	14243	0.08
T_8 Without weed control	2630	13310	4180	10366	10838	0.06

Maruteru

Mulching with locally available weed mulch (Eichhornia) + one hand weeding treatment recorded significantly higher yield of 5220 kg/ha which is on par with hand weeding twice treatment (5083 kg/ha) as well as location specific green leaf manure incorporation treatment (5030 kg/ha) which is superior over rest of the treatments. Whereas reduced spacing (up to 25%) + mulching with previous crop residue + one hand weeding treatment recorded least grain yield of 3877 kg/ha among all the treatment combinations of organic weed control methods. The data pertaining to rabi, 2018-19 season shows that highest number of green cobs of 88333 were realized with locally available weed mulch (Eichhornia) + one hand weeding treatment. But the results are insignificant. Rice Equivalent yields were also non-significant. System productivity was also calculated and highest system yield of 40553 kg/ha was realized with locally available weed mulch (Eichhornia) + one hand weeding treatment followed by Neem cake incorporation + one hand weeding with 37830 kg/ha.

Table 7.3.2: Effect of organic weed management treatments on yield of rice-sweet corn cropping systems.

Treatment details		Grain Yield of Rice (Kg/ha)	Green cob yield kg/ha	REY (kg/ha)	System Yield (Kg/ha)
T1	Hand weeding (Twice)	5083	26133	31216	5083
T2	One mechanical weeding + one hand weeding	4400	16733	21133	4400
T3	Location specific green leaf manure incorporation	5030	32667	37697	5030
T4	Reduced spacing (up to 25%) + mulching with previous crop residue + one hand weeding	3877	23467	27344	3877
T5	Locally available weed mulch + One hand weeding	5220	35333	40553	5220
T6	Incorporation of neem cake 15 days before planting @ 5 t/ha + one hand weeding	4363	33467	37830	4363
T7	Soil solarization with polythene mulch during summer + One hand weeding	4200	32267	36467	4200
T8	ITK treatment on weed control practiced by farmers (like mulching with leaf of mango/jack fruit etc.,)	4160	31333	35493	4160
	CD (0.05)	450.5	NS	NS	

Kalyani

The grain yield of scented rice (Gobindabhog) was found highest (3044 kg/ha) in T_5 treatment (Locally available weed mulch - water hyacinth + one hand pulling at 42 DAT) followed by T_2 (Cono weeder -25DAT + one hand weeding 42 DAT) and T_4 (Intercropping with green manuring crop) treatments. The lowest yield was obtained in treatment T_7 (stale seed bed + reduced spacing (up to 25%) + mulching with previous crop residue (okra stalk) + one hand weeding at 42 DAT).The

highest tuber yield of potato (8917 kg/ha) was also obtained in T_5 treatment (Locally available weed mulch (water hyacinth/lantana etc.) + one hand pulling) followed by T_1 treatment (Hand weeding – 25 & 45 DAP). However, the highest yield of okra (2651 kg/ha) was obtained in T_6 (Incorporation of neem cake 15 days before sowing @ 5 t/ha + one hand weeding at 25 DAP). Yields to the tune of 2565 and 525 kg were obtained from coriander and greengram as intercrops in potato and okra, respectively from T_3 treatment.Different treatments were found to have influenced SREY, however, T_3 treatment recorded the highest SREY (7440.07 kg/ha) [Intercropping with green manuring crop in rice, Coriander in potato and greengram in okra]. The results clearly indicated that intercrops such as coriander in potato and greengram in okra had more influence in achieving higher SREY than other treatments.

Table 7.3.3 Effect of organic weed management treatments on yield of Rice (aromatic) - Potato - Okra cropping systems

Treatments	Yield kg/ha			System Rice equivalent yield (kg/ha)
	Rice (aromatic	Potato	Okra	
T1: Hand weeding – 21 & 42 DAT,Rabi: Hand weeding – 25 & 45 DAP,Summer: Hand weeding – 25 & 45 DAS	2098	8555	2051	4344.32
T2: Cono weeder -25DAT + one hand weeding -42 DAT Rabi: Hand hoe -25DAT +one hand weeding -45 DAP Summer: Hand hoe -25DAS + one hand weeding -45 DAS	2847	7988	1981	4614.35
T3: Intercropping with green manuring crop,Rabi: Intercropping with Coriander,Summer: Intercropping with greengram	2764	6535+2565	1016+525	4690.07+ 2750
T4: Stale seed bed + reduced spacing (up to 25%) + mulching with previous crop residue (okra stalk) + one hand weeding at 42 DAT Rabi: Stale seed bed + reduced spacing (up to 25%) + mulching with rice straw + one handweeding at 45DAP Summer: Stale seed bed + reduced spacing (up to 25%) + mulching with available CR one hand weeding at 45 DAS	1915	4511	1724	4107.533
T5: Locally available weed mulch - water hyacinth + one hand pulling at 42 DATRabi: Locally available weed mulch (water hyacinth/lantana etc.)+ one hand pulling Summer: Locally available weed mulch (water hyacinth/ lantana etc.) + one hand pulling	3044	8917	1709	4425.217
T6: Incorporation of neem cake 15 days before sowing @ 5 t/ha + one hand weeding at 21 DAT Rabi: Incorporation of neem cake 15 days before sowing @ 5 t/ha + one hand weeding at 25 DAP Summer: Incorporation of neem cake 15 days before sowing @ 5 t/ha + one hand weeding at 25 DAP	2231	8680	2661	4250.917
T7: ITK treatment on weed control practiced by farmers as mulching with leaf of mango Rabi: ITK treatment on weed control practiced by farmers as mulching with water hyacinth/lantana /banana leaves Summer: ITK treatment on weed control practiced by farmers as mulching with rice straw	2581	6872	2257	4022.817

Rewa

Grain yield of rice 5963 kg/ha was maximum under two hand weeding at 25 and 50 DAT followed by 5378 kg/ha in incorporation of mustard oil cake 5t/ha along with one hand weeding at 50 DAT. These treatments also gave higher garlic bulb yield but maximum garlic yield 14376 kg/ha was noted in incorporation of mustard oil cake 5t/ha + one HW. Net profit of Rs. 225471/ha was maximum under two hand weeding at 25 and 50 DAT followed by Rs. 168472/ha in incorporation of mustard oil cake 5 t/ha +1 HW. B:C ratio 2.22 was maximum under two hand weeding given at 25 and 50 DAT followed by 2.07 in T_3 in which inter cropping of Dhaincha in rice and mustard in garlic in3:1 row system were taken. Incorporation of mustard oil cake 5t/ha + 1 HW gave B:C ratio 1.53 which was lowest among all the treatment of weed control under organic production system. Weed control efficiency in Kharif and Rabi was maximum under incorporation of mustard oil cake 5t/ha +1 Hand weeding.

Table 7.3.4 Effect of organic weed management treatments on yield of rice-garlic cropping systems

Treatment	Yield kg/ha		REY kg/ha	Gross return Rs/ha	Net return Rs/ha	B.C Ratio
	Rice	Garlic				
T_1 Two hand weeding 25 and 50 DAT	5963	10980	20490	409802	225471	2.22
T_2 Cono weeder 25 DAT + one HW at 50 DAT	4852	7390	14745	294900	135493	1.84
T_3 Inter cropping with Dhaincha	3854 + 11250(GM)	4323 + 1520 M)*	12672	253455	131340	2.07
T_4 State seed bed + reduced spacing upto (25%) + mulching with wheat straw + one hand weeding	4443	5637	12089	241798	85815	1.55
T_5 Locally available weed mulch + 1 hand pulling	4735	6160	13099	261985	118805	1.82
T_6 Incorporation of mustard oil cake 15 days before sowing @ 5t/ha + 1HW	5378	14376	24056	481123	168472	1.53
T_7 ITK treatment on weed control practices by farmers as mulching with leaf on mango	3420	5930	11380	227624	90516	1.66
CD at 5%	660	1052	-	-	-	-

- Mustard crop as inter crop

Parbhani

Highest soybean equivalent yield of 6021 kg/ha and total GMR of sequence Rs. 204662/- obtained due to T_4 treatment i.e. stale seed bed + reduced spacing + 2 tonne of wheat straw + one hand weeding at 25 DAS in both the crops. But highest total NMR (Rs. 124666/ha) and Total B:C ratio of 2.75 recorded in T_3 i.e. soybean + sunnhemp incorporation after 35-40 DAS and chickpea + safflower (2:1).

Table 7.3.5 Effect of organic weed management treatments on yield of soybean-chickpea cropping systems

Treatments	Soybean	Chickpea	Yield		Soybean equivalent yield (kg/ ha)	Total GMR Rs/ha	Total NMR Rs/ha	Total B:C Ratio
			Soybean	Chickpea				
T_1	(Two) Hand weeding at 20-25 and 45-50 DAS	(Two) Hand weeding at 20-25 and 45-50 DAS	2561	2274	5652	192107	98418	2.05
T_2	One hoeing 20-25 DAS + One hand weeding at 45-50 DAS	One hoeing 20-25 DAS + One hand weeding at 45-50 DAS	2133	2128	5025	170815	89160	2.09
T_3	Soybean + Sunnhemp incorporation after 35-40 DAS	Chickpea + Safflower (2:1)	2406	2471	5765	195940	124666	2.75
T_4	Stale seed bed + reduced spacing + 2 tonne of Wheat straw + One hand weeding at 25 DAS	Stale seed bed + reduced spacing + 2 tonne of Wheat straw + One hand weeding at 25 DAS	2770	2392	6021	204662	113388	2.24
T_5	Soil mulch at the time sowing + One hand pulling at 25 DAS	Soil mulch at the time sowing + One hand pulling at 25 DAS	1522	2091	4364	148337	70268	1.90
T_6	Incorporation of Neem cake/ Karanj cake 1.5 tonne/ha 15 days before sowing + One hand weeding at 25 DAS	Incorporation of Neem cake/Karanj cake 1.5 tonne/ ha 15 days before sowing + One hand weeding at 25 DAS	2332	2414	5613	190791	61628	1.48
T_7	Soil solarization with 8 – 25 µ polythene mulch during summer + One hand weeding at 25 DAS	Soil solarization with 8 – 25 µ polythene mulch + One hand weeding at 25 DAS	2368	2429	5669	192708	77774	1.68

Treatments	Soybean	Chickpea	Yield		Soybean equivalent yield (kg/ ha)	Total GMR Rs/ha	Total NMR Rs/ha	Total B:C Ratio
			Soybean	Chickpea				
T_8	Mulching with Glyricidia / Karanj leaves or Straw	Mulching with Glyricidia /Karanj leaves or Straw	1383	1209	3026	102864	30303	1.42
CD at 5%			353	291	353	291	19651	--

Rahuri

Application of various weed management practices under organic production systems significantly increased the yields of soybean, wheat and soybean grain equivalent yield over control. Grain yield of soybean and wheat increased significantly with the treatment T_7 The maximum grain yield of soybean and wheat and that of the system in terms of soybean grain equivalent yield was recorded under T_7 (Solarization+1 hand weeding) (3066 kg ha) which was at par with T_4 (SSB+RS+HW+Prv. Crop mulch) (2929 kg ha) and T_1 (Two hand weeding) at 20 DAS,2702 kg ha.

Table 7.3.6 Effect of organic weed management treatments on yield of soybean-wheat cropping systems

Treatment	Yield Kg/ha		SEY	System Productivity (kg ha)
	Soybean	Wheat		
T_1 - 2 H.W	2419	3820	2702	5121
T_2 -1 M.W. + 1 H.W.	2113	3446	2437	4550
T_3 - Intercropping with Sunnhemp	1706	3267	2311	4017
T_4 -SSB+RS+HW+Prv. Crop mulch	2631	4141	2929	5560
T_5 -Weed mulch + H.P	1973	3333	2357	4330
T_6 - INC+1 H.W.	2303	3754	2655	4958
T_7 -Solarization+1 H.W.	2858	4334	3066	5924
T_8 - ITK	1813	3333	2358	4170
C.D. at 5%	341.0	412	292	397

7.4 ON FARM RESEARCH

7.4.1 On-farm crop response to application of nutrient

Title of the experiment: On-farm crop response to application of major plant nutrients in predominant cropping system

Objective: To assess the response of major crops to application of N, P and K at recommended rates in predominat cropping systems in different agro-ecosystem under farmers field condition.

Year of start: 1999-2000, Treatments are modified in 2010-211.

Treatments: There are five common treatments at various locations. They are ($N_0P_0k_0$), N, N+P, N+K and N+P+K and all the nutrients are applied as per the recommended rates of crops/cropping systems evaluated at particular location. Two treatments namely, N+P+K+ Supplement of deficient micronutrient based on soil test and farmer's practice were added during 2010-2011.

Locations:

Cropping system	OFR Centre (State)	No. of trials
Rice-Rice	Vellyani (Kerala), Medak (Telangana)	48
Rice-Wheat	Udham singh nagar (Uttarakhand), East singh bhum (Jharkhand), Fatehpur (U.P.), Samba (J.K.), Fethabad (Haryana), Nalnda (Bihar), Umaria (Madhy Pradesh)	168
Rice-Gram	Kanker (C.G.) and Karjat (M.H.)	48
Rice-Mustard	Nadia (W. B.), Golpara (Assam)	48
Rice-Maize	Vizianagaram (A.P.)	24
Maize-Wheat	Dungarpur (Rajasthan), Bilashpur (H.P.)	48
Maize-Gram	Devgadh (Gujarat)	24
Maize-Field pea	Chikkaballapura (K.A.)	12
Finger millet-Tomato (S)	Chikkaballapura (K.A.)	12
Soybean-Wheat	Katol (M.H.)	6
Soybean-Chickpea	Katol (M.H.)	6
Cotton-Fallow	Katol (M.H.)	12
Pearmillet-wheat	Dausa (R. J.)	24
Pearmillet-Mustard	Padegaon (M.H.)	24
F Sorghum-wheat	Adiya (Gujarat)	24
Soybean-Sorghum	Hingoli (M.H.)	24
Total		552

Results: The centre-wise details of varities, nutrients used, crop yield and crop response to NPK application in terms yield difference, and are presented in table 7.3.1. Brief descriptions of centre-wise result are given below.

Rice rice: A total 48 trial conducted at 2 locations compromising of two NARP zones and it covers Kerala and Telngana. Application of micronutrient show very positive response both at Medak (Telgana) and vellyani centre (Kerala). However, application of recommended dose of fertilizer recorded higher yield over the control at both centre range of 135% to 214% and yield gap ranges from 2713 to 3299 kg ha^{-1}. Zinc application recorded good response at both centre and it helps in additional yield 5-10% over the RDF. It was found that in rice-rice system mean yield gap of 333 kg ha^{-1} exists between farmers and recommended nutrient practice. Additional yield of 704 kg ha^{-1} is possible through application of required quantity of zinc to the system in addition to recommended level of NPK nutrient.

Rice-wheat: A total 168 trial conducted at 7 locations compromising of 7 NARP zones. Under this total 7 states covered which are Uttarakhand, Jharkhand, Madhya Pradesh, Uttar Pradesh, Jammu Kashmir, Haryana and Bihar.

Increase in yield was recorded by the application of micronutrient (Zn) in both crop and highest percentage increase in yield over Recommended Fertilizer (NPK only) were recorded at (Fatehabad) in rice it was 8.9% and in case of wheat 10.3% other centre also observed 3-8% increase in yield with the application of micronutrients. Similar trend was observed in case of recommended dose of fertilizer it recorded higher yield over the control at all the 7 locations within range of 87 to 219% in case of rice and 86 to 288% in case of wheat. Highest yield gap 3434 kg ha^{-1} in rice recorded at Central Plain Zone – (Kanpur) Uttar Pradesh and 3601 kg ha^{-1} in wheat were recorded at (Nalnda) of Bihar and highest percentage increase in yield 219 in case of rice and 288% in case of wheat were recorded at Umaria and East Singh Bhoom centre respectively. There were huge yield gap recorded in recommended NPK application and farmer practices under both crop at Umaria of Madhya Pradesh, In case of rice application of 120:60:40 Kg NPK ha^{-1} gave additional yield of 1617 kg ha^{-1} over farmer practice and in wheat application of 120:60:40 Kg NPK ha^{-1} gave additional yield of (1110 kg ha^{-1}). Application of 25 kg ha^{-1} of ZnSO4 in both seasons gave additional yield 340 kg and 268 kg ha^{-1} in case or rice and wheat at Umaria. Total additional yield of 1957 and 1378 kg ha^{-1} can be obtained from rice and wheat by application of RF along with micronutrient which were contribute 63.5 and 50.4% higher in yield over the farmers practice at Umaria. It was observed that in Uttar Pradesh at Kanpur significantly higher system yield recorded (2110 kg and 2834 kg ha^{-1}) over famer practices with application of recommended dose of NPK and NPK+MN. In rice-wheat system, across the NARP zones, it was found that mean yield gap of 1582 kg ha^{-1} exists between farmers and recommended nutrient practice. Additional yield of 484 kg ha^{-1} is possible through application of required quantity of zinc to the system in addition to recommended level of NPK nutrient.

Rice- gram: A total 48 trials were conducted in 2 NARP zones Chhattisgarh plain zone (Kanker) of Chhattisgarh and North Konkan Coastal Zone of Karjat Maharashtra. At kanker it was found that significantly higher additional yield of 974 kg ha^{-1} can be obtained from rice through application of 100:60:40 Kg NPK + 20 kg zinc ha^{-1}. In gram, the additional yield over farmer practice was found to be 223 kg ha^{-1} due to application of 20:50:20: Kg NPK ha^{-1}. Application of zinc as micronutrient in rice gave 2.7 per cent additional yield than recommended NPK. At Karjat it was found that significantly higher additional yield of 1088 kg ha^{-1} can be obtained from rice through application of 120:50:50 Kg NPK + 6 kg zinc ha^{-1}. Application of zinc as micronutrient in rice gave 17.3 per cent

additional yield than recommended NPK.

Rice- mustard: A total 48 trials were conducted in 2 NARP zones. In New Alluvial Zone (Mohanpur) of West Bengal, 24 trials were conducted and it was found that significantly higher additional yield of 331 kg ha^{-1} can be obtained from rice through application of 80:40:40 Kg NPK + 20 kg zinc ha^{-1}. In mustard, the additional yield over farmer practice was found to be 149 kg ha^{-1} due to application of 80:40:40: Kg NPK ha^{-1}. At Golpara of Assam 2758 & 222 kg ha^{-1} yield increase was recorded over farmer's practices with RDF which can be further increase to 2955 & 332 kg ha^{-1} by addition of micronutrient. In rice-mustard system, across the NARP zones, it was found that mean yield gap of 1822 kg ha^{-1} exists between farmers and recommended nutrient practice. Additional yield of 384 kg ha^{-1} is possible through application of required quantity of micronutrient to the system in addition to recommended level of NPK nutrient.

Rice-Horsegram: A total of 24 trials were conducted in North Konkan Coastal Zone (Karjat) of Maharashtra. Recommended NPK (100:50:50: Kg ha^{-1}) to rice recorded significantly higher grain yield (428 kg ha^{-1}) than farmer practices, and in case of horse gram higher yield of 164 kg ha-1 recorded due to application of 25:50:50: Kg ha^{-1} NPK which was 12.6 and 37.7% higher than farmer practices, respectively.

Rice-maize: Total 24 trials were conducted in North Coastal Zone - Anakapalle of Andhra Pradesh. There were huge yield gap in recommended NPK application and farmer practices under both crop, In case of rice application of 80:60:50 Kg NPK ha^{-1} gave additional yield of 1810 kg ha^{-1} and 364 kg ha^{-1} over the control and farmer practice respectively which were 67 and 8% higher over the control and farmer practice respectively. In case of maize application of 200:80:80 Kg NPK ha^{-1} gave additional yield of 3713 kg ha^{-1} and 720 kg ha^{-1} over the control and farmer practice respectively which were 134 and 11% higher over the control and farmer practice respectively.

Maize-wheat: A total 48 trials were conducted in 2 NARP zones. Sub-mountain and low hills sub-tropical zone (Bilaspur) of Himachal Pradesh, application of 25 kg Zinc ha^{-1} recorded additional yield of 110 and 270 kg ha^{-1} in maize and wheat. It was recorded that application of 90:45:30: Kg NPK + 25 kg zinc ha^{-1} in maize and 80:40:40: Kg NPK + 25 kg zinc ha^{-1} in wheat gave significantly higher yield than farmer practices and it was observed 52.9 and 56.1% higher than farmer practices in maize and wheat respectively. At Sub-Humid Southern Plain and Aravalli Hill Zone (Udaipur) of Rajasthan application of 25 kg ha^{-1} of zinc in addition to recommended NPK in maize and wheat gave additional yield of 263 and 265 kg ha^{-1} which was 9.2 and 8.2% higher than NPK alone. It was observed that farmer's practices of nutrient management resulted in lower yield (1315 and 1067 kg ha^{-1}) of maize and wheat compared to application of recommended quantity of NPK and NPK+ Mn.

Maize-Field Pea: A total 12 trials were conducted in 1 NARP zones. In Eastern Dry Zone (Chikkaballapura) of Karnataka, yield difference of system between farmers and recommended NPK practices were found to be 250 kg ha^{-1} and 473 kg ha^{-1} in maize and field pea.

Maize-chickpea: A total 24 trials were conducted in Middle Gujarat Zone (Devgadh Baria) of Gujarat, yield difference between farmers and recommended NPK practices were found to be 513 kg ha^{-1} in Maize and 140 kg ha^{-1} in gram. Which can be further increased up to 1108 kg ha^{-1} in Maize and 208 kg ha^{-1} in Chickpea with application of micronutrients.

Soybean-maize: A total 12 trials were conducted in Central Vidarbha Zone (Katol) of Maharashtra, It was observed that farmer's practices of nutrient management resulted in lower yield (382 and

370 kg ha-1) of soybean and maize compared to application of recommended quantity of NPK. Application of zinc sulphate in addition to recommended NPK was resulted additional yield of 165 kg ha^{-1} in soybean and 405 kg ha^{-1} in maize.

Soybean-gram: A total 12 trials were conducted in Central Vidarbha Zone (Katol) of Maharashtra, It was observed that there was huge yield gap between farmer's practices and recommended nutrient application and which gave (additional yield of 376 and 260 kg ha^{-1}) in soybean and bengal gram respectively as compared to farmer practices. Which were 41.7 and 22.8% higher yield than farmer practices in soybean bengal gram respectively.

Soybean-jawar: A total 24 trials were conducted in Central Maharashtra plateau Zone & Central Viderbha Zone (Hingoli) of Maharashtra, It was observed that there was huge yield gap between farmer's practices and recommended nutrient application and which gave (additional yield of 301 and 163 kg ha^{-1}) in soybean and jawar respectively as compared to farmer practices. Which were 24.8 and 19.3% higher yield than farmer practices in soybean bengal gram respectively.

Pearl millet-mustard: In case of pearl millet-mustard system at Semi Arid Eastern Plain Zone (Dausa) Rajasthan there is slight improvement in yield was recorded with the application of RDF over the farmer practice in pear millet (26%) but huge improvement in case of mustard (35%) further application of micronutrient enhance the yield up to (33%) and (45%) respectively. It indicated the importance of balance application of nutrients in the field.

Pearl millet-wheat: In case of pearl millet-wheat system at Scarcity Zone-Satara (Padegaon) Maharashtra there is significant improvement in yield was recorded with the application of RDF over the farmer practice in pear millet (25%) and wheat (28%) further application of micronutrient enhance the yield up to (32%) and (33%) respectively.

Sorghum-wheat: In case of Sorghum-wheat system at North West Agro climatic Zone (Adiya) Gujarat a total 24 trials were conducted and like other arid or semi-arid climatic zones there is slight improvement in yield was recorded with the application of RDF over the farmer practice in Sorghum (7%) and wheat (14%) further application of micronutrient enhance the yield up to (12%) and (21%) respectively.

Finger Millet- Tomato: In case of Finger Millet- Tomato system at Eastern Dry Zone (Chikkaballapura) Karnatka a total 12 trials were conducted no improvement or slight negative yield increment recorded with the application of RDF over the farmer practice in Finger Millet (-0.7%) because farmer are using high amount of fertilizers (100:50:50) over the RDF (161:92:16) that's why they recorded lower yield in RDF over farmers practice in Finger millet, same trend observed in case of tomato negative yield recorded (-6.5%) over farmers practice. It was recorded that use of micronutrient and Trichoderma help enhance the yield over farmer practices (10.4% and 10.6%) in Finger millet and tomato respectively. So it is better that farmers should encourage for balance use of fertilizers along with pest management strategies.

Cotton-fallow: In case of Cotton-fallow system at Central Vidarbha Zone (Katol) Maharashtra a total 12 trials were conducted and huge improvement in yield was recorded with the application of RDF over the farmer practice in cotton (59%) further application of micronutrient enhance the yield up to (72%) over farmer practice.

Summary of results on response of prevalent cropping system to applied nutrient in various NARP zones are:

- On-farm nutrient response trials (552 no's) conducted in various NARP zones indicated, across the locations and systems, nutrient application gap of 22, 34, 54 and 100 % in N, P2O5, K2O and micro nutrient exists between farmers practice and recommended nutrient package. The same is also reflected in system yield of major cropping systems.
- Agronomic Efficiency (AE) of N can be enhanced to 29, 21, 19 and 28 kg (grain yield /kg of N) from 8, 9, 8, 7 (grain yield /kg of N) in rice-rice, rice-wheat, maize-wheat, and rice-mustard systems respectively by application of recommended dose of N with P and K instead of N alone.
- Mean economic response of cropping systems to applied nutrients indicates a return of Rs 5.2, 2.5 and 3.4 per rupee invested on N, P2O5 and K2O respectively.
- On-farm system yield gap between recommended dose of N P2O5 K2O and farmer's package was found to be 333, 1582, 1964, 1822 and 1014 kg ha-1 in rice- rice, rice- wheat, maize-wheat and rice-mustard which can enhanced up to 1036, 2066, 2449 and 2206 kg ha-1 with application of micronutrients.
- At few center like Chikkaballapura (Karnatka) in finger millet-tomato farmer practices recorded higher yield than RDF because farmers are applying high dose of fertilizers but in imbalance manner. Farmers should encourage applying balance dose of fertilizers along with micronutrient.

Table-7.4.1 : Yield potential of different cropping systems under researcher and farmer managed conditions - Year 2018
Report for Grain Yield - Year 2018

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Rice-rice																							
Kerala	Southern Zone - Vellayani/ Vellayani/ 24	Not Available	Uma/ 90- 45 -45 / ZnSO4(20) 140- 60-115	4.6	2	446	35	148	1302	1702	2548	2347	4015	4399	4000	0	0	0	0	2713	384	15	399
Kerala	Southern Zone - Vellayani/ Vellayani/ 24	Not Available	Uma/ 90- 45 -45 / 0 144- 70-115	--	--	--	--	-	1538	2411	3330	3097	4838	5092	4652	0	0	0	0	3299	254	185	439
Telangana	Southern Zone Medak/ 24	Not Available	MTU1010 120-60-40- / ZnSO4(50)						2542	3589	4043	4585	5664	6057	5384					3121	393	280	673
Telangana	Southern Zone Medak/ 24	Not Available	MTU1010 120-60-40 / 50	--	--	--	--	-	2292	3329	3773	4335	5384	5787	5184					3091	403	200	603
							Rice-Wheat																

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Uttara-khand	Bhabar and Tarai Zone - Pantnagar/ Udham singh nagar/ 24	Alluvial	HKR 27 150- 60-40/	6.3	0.7	275	18	170	3068	3692	5014	4520	5727	5888	4941					2659	161	786	947
Uttara-khand	Bhabar and Tarai Zone - Pantnagar/ Udham singh nagar/ 24	Alluvial	HD 2967/ 150- 60-40/	6.3	0.7	275	18	170	2711	3461	4299	3961	5058	5280	4476					2346.7	221.9	581.6	803.5
Uttar Pradesh	Central Plain Zone - Kanpur/ Daleep Nagar (Kanpur Dehat)/ 24	Not Avail-able	PHB - 71 150- 60 -40 / ZnSO4(25) 199- 64-0	7.9	0.4	188	13	142	2819	4108	5343	4930	6253	6755	5018	–	--	–	–	3434	502	1236	1738
Uttar Pradesh	Central Plain Zone - Kanpur/ Daleep Nagar (Kanpur Dehat)/ 24	Not Avail-able	HD 2967 120- 60 -40 / ZnSO4(0) 143- 61-0	7.9	0.4	188	13	142	2045	2920	3820	3505	4542	4763	3667	–	--	–	–	2497.0	221.3	874.7	1096.0

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recommended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Bihar	Nalnda 24	Not Available	Super Moti 100- 40 -20 / ZnSO4(25) 50- 23-0 (0)	--	–	–	--	-	2411	3185	3828	3413	4791	4920	4097	–	–	–	–	2380	129	694	823
Bihar	Nalnda 24	Not Available	Lok-1 120- 60 -40 / ZnSO4(25) 60- 23-0 (0)	--	–	–	--	-	1690	2609	3592	3217	4192	4365	3568	–	–	–	–	2502.6	172.7	624.4	797.1
Jharkhand	Central and North Eastern Plateau Zone East Singhbhum 24	Not Available	Naveen 100- 50 -25 / ZnSO4(5) 60- 30-0 (0)	--	–	–	--	-	1285	2254	2616	2442	3346	3542	2460	–	–	–	–	2061	196	886	1082
Jharkhand	Central and North Eastern Plateau Zone East Singhbhum 24	Not Available	K-9107 ZnSO4(5) 60- 30-0 (0)	--	–	–	--	-	802	1836	2406	2305	3110	3225	2273	–	–	–	–	2308.5	114.8	837.5	952.3
Jammu & Kashmir	Subtropical low altitude Samba 24	Not Available	B-370 30- 20 -10 / ZnSO4(10) 24- 14-0 (0)	7.2	3.0	229.0	14.6	122.2	1399	1862	2407	2165	2819	2918	2223	–	–	--	--	1420	99	596	695

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Jammu & Kashmir	Subtropical low altitude	Not Avail-able	WH1105	7.2	3.0	229.0	14.6	122.2	1441	1962	2538	2298	2930	3019	2321	--	--	--	--	1488.5	89.7	608.5	698.2
	Samba		100- 50 -25 /																				
	24		ZnSO4(0)																				
			56- 26-0 (0)																				
Haryana		Not Avail-able	PB-1121						1955	4176	4458	4289	4719	5140	4623	--	--	--	--	2764	422	95	517
	Fatehabad		150- 60 -60 /																				
	24		ZnSO4(5)																				
			150-60-0 (0)																				
Haryana		Not Avail-able	WH-2967						2621	3561	4669	4457	5060	5579	4927	--	--	--	--	2438.8	519.6	132.9	652.5
	Fatehabad		150- 60 -30/																				
	24		ZnSO4(0)																				
			150-0-0 (0)																				
Madhy Pradesh	Central Highland, Hot Sub humid	Not Avail-able	JRH-19						1471	2832	3500	3127	4698	5038	3081	--	--	--	--	3226	340	1617	1957
	Umaria		120- 60 -40 /																				
	24		ZnSO4(25)																				
Madhy Pradesh	Central Highland, Hot Sub humid	Not Avail-able	JW3211						1516	2467	3222	3029	3844	4113	2734	--	--	--	--	2328.2	268.2	1110.0	1378.2
	Umaria		120- 60 -40/																				
	24		ZnSO4(25)																				

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Rice- Gram																							
Chhattis-garh	Chhattis-garh plain zone	Not Avail-able	IGKVR-1	7.3	0.6	251.9	12.5	306.5	2579	3555	4111	3796	4971	5103	4129	-	-	-	-	2393	132	842	974
	Kanker		100- 60-40/																				
	24		ZnSO4(20)																				
			60- 40-30																				
Chhattis-garh	Chhattis-garh plain zone	Not Avail-able	JAKI-9218	7.3	0.6	251.9	12.5	306.5	725	895	1102	1019	1259	1334	1111	-	-	-	-	534	75	148	223
	Kanker		20- 50-20/																				
	24																						
Maharash-tra	North Konk-an Coastal Zone	Not Avail-able	Karjat	0	0	0	0	0	2214	2845	3135	3109	3826	4487	3398	33	23	45	3.47	1612	661	428	1088
	Karjat		120- 50-50-6																				
	24		control																				
			70- 15.4																				
Maharash-tra	North Konk-an Coastal Zone	Not Avail-able	Karjat	--	--	--	--	-	256	428	509	466	599	630	435	5	4	8	3.65	343	30	164	195
	Karjat		100-50-37.5/																				
	24																						
Rice-Mustard																							

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
West Bengal	New Alluvial Zone - Mohanpur/ Nadia 24	Alluvial	Pratikshya/ 80- 40-40/ ZnSO4(20) 35 - 26.25-65	0	0	0	0	0	3192	3695	4287	4095	4743	4924	4593	30	21	41	2.49	1551	182	149	331
West Bengal	New Alluvial Zone - Mohanpur/ Nadia 24	Alluvial	Pusa Bullet/ 80- 40-40/ Sulphar 50- 35 -65	--	--	--	--	-	1066	1303	1497	1444	1653	1714	1566	7	5	10	1.67	587	62	87	149
Assam	Assam Golpara 24	Not Available	Ranjit 20-20-5/ ZnSO4(20) 60- 40-30	--	--	--	--	-	3459	3919	4469	4937	5921	6118	3163	-	-	-	-	2462	197	2758	2955
Assam	Assam Golapara 24	Not Available	TS-67 40-35-15/	--	--	--	--	-	695	769	804	831	936	1046	714	-	-	-	-	242	110	222	332
Rice-Maize																							

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ ha)	Yield gap 2(kg/ ha)	Yield gap 3(kg/ ha)	Yieldgap 3(kg/ha) gap 4(kg/ ha)
				pH	OC (%)	N (kg/ ha)	P (kg/ha)	K (kg/ ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Andhra Pradesh	North Coastal Zone - Anakapalle/ Vizianaga-ram 24	Red Sandy	MTU1001/ 80- 60-50/ ZnSO4(25) 70-44-37	6.8	2.1	214	17	271	2705	3524	3887	4149	4514	4878	4306					1810	364	209	572
Andhra Pradesh	North Coastal Zone - Anakapalle/ Vizianaga-ram 24	Red Sandy	NK 6607/ 200 - 80-80/ control 172-71-54	--	--	--	--	-	2769	4131	4850	5516	6481	7202	6004					3713	720	477	1197
Maize-wheat																							
Rajasthan	Humid Southern Plain / Dungarpur/ 24	Clay	DHM-117/ 90- 35 -30 / ZnSO4(25) 70- 20 -0	6.8	0.6	303	19	214	758	1785	2396	2221	2848	3110	1796	0	0	0	0	2090	263	1052	1315
Rajasthan	Humid Southern Plain / Dungarpur/ 24	Clay	Raj-4079/ 120- 40-30 / control 70- 15-0	6.8	0.6	303	19	214	1260	2248	2921	2698	3208	3473	2406	0	0	0	0	1948	265	802	1067

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Himachal Pradesh	Sub-mountain and low hills sub-tropical zone / Bilaspur (H.P.)/ 24	Submonta-neous	Hybrid;Kan-chan/ 90- 45 -30 / ZnSO4(25 Kg) 76.7-0-0	0	0	0	0	0	1603	2112	2598	2437	3121	3231	2114	0	0	0	0	1518	110	1007	1117
Himachal Pradesh	Sub-mountain and low hills sub-tropical zone / Bilaspur (H.P.)/ 24	Submonta-neous	HPW-368/ 80- 40-40/ ZnSO4(25 Kg) 72.6-5-2.5	--	--	--	--	-	1617	2132	2675	2451	3059	3329	2132	0	0	0	0	1442	270	927	1197
Maize-Chick Pea																							
Gujarat	Middle Gujarat Zone - Anand/ Devgadh Baria / 24	Sandy Loam	GM-6/ 100- 50-50/ ZnSO4(20) 60-23.9-0	6.9	0.8	198	20	244	1354	1661	2122	1961	2604	3118	2010	0	0	0	0	1251	513	594	1108
Gujarat	Middle Gujarat Zone - Anand/ Devgadh Baria / 24	Sandy Loam	GJG-3/ 20 - 40-20 / ZnSO4(20) 14-11.7-0	--	--	--	--	-	851	984	1123	1058	1169	1308	1100	0	0	0	0	317	140	69	208

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ ha)	Yield gap 2(kg/ ha)	Yield gap 3(kg/ ha)	Yieldgap 3(kg/ha) gap 4(kg/ ha)
				pH	OC (%)	N (kg/ ha)	P (kg/ha)	K (kg/ ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Maize-field pea																							
Karnataka	AEZ 8.2/ Chikka-ballapura 12	Red Sandy	Hema 150- 75-40/ 153-55-26	6.6	0.4	146	24	30	3083	3850	4400	4200	4958	5208	4792					1875	250	167	417
Karnataka	AEZ 8.2/ Chikka-ballapura 12	Red Sandy	Hebbal avare 25-50-25 35-38-20	–	–	--	--	-	1444	2369	3265	2783	3727	4200	3729					2283	473	-2	471
Soyabean-Wheat																							
Mharshtra	Central Vidarbha Zone Katol 12		JS-9305	0	0	0	0	0	446	596	891	770	1140	1302	758	0	0	0	0	694	162	382	544
Mharshtra	Central Vidarbha Zone Katol 12		Lok-1	–	–	--	--	-	897	1071	1499	1227	1638	2043	1267	0	0	0	0	741	405	370	775
Soyabean-Chick Pea																							

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ ha)	Yield gap 2(kg/ ha)	Yield gap 3(kg/ ha)	Yieldgap 3(kg/ha) gap 4(kg/ ha)
				pH	OC (%)	N (kg/ ha)	P (kg/ha)	K (kg/ ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Mharshtra	Central Vidarbha Zone Katol 12		JS-9305	0	0	0	0	0	567	696	1111	1111	1279	1464	903	0	0	0	0	712	185	376	561
Mharshtra	Central Vidarbha Zone Katol 12		JAKI-9218	–	–	–	–	-	694	909	1250	1059	1400	1655	1140	0	0	0	0	706	255	260	515
Soyabean-Jawar																							
Mharshtra	Central Maharash-tra plateau Zone & Central Viderbha Zone Hingoli 24		MAUS 71 30-60-30-5	0	0	0	0	0	781	1058	1366	1173	1512	1600	1211	0	0	0	0	731	88	301	388
Mharshtra	Central Maharash-tra plateau Zone & Central Viderbha Zone Hingoli 24		Parbhani Shakti 80-40-40 24-45-11	–	–	–	–	-	651.3	756.8	915.5	864.3	1005.2	1016.5	842.5	0	0	0	0	354	11	163	174

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Pearlmillet-mustard																							
Rajasthan	Semi Arid Eastern Plain Zone Dausa, Rajasthan/ 24	Alluvial	Rasi-1827 90-30-30/ ZnSO4(25) 54-17	7.4	0.5	222.4	22.4	226.6	933	1028	1157	1181	1212	1280	959	0	0	0	0	279	68	253	321
Rajasthan	Semi Arid Eastern Plain Zone Dausa, Rajasthan/ 24	Alluvial	DRMRIJ-31 (Giriraj) 60-40-30/ ZnSO4(30) 61-15-0	7.4	0.5	222.4	22.4	226.6	1309	1295	1366	1457	1597	1711	1183	0	0	0	0	288	113	414	528
Pearl Millet-Wheat																							
Maharash-tra	Scarcity Zone-Sa-tara/ Padegaon/ 24	Sandy Clay	Adishakti/ 50- 25-25/ NP-K+Zn(25) 25- 15-10	8.3	0.6	170	14	332	1526	1953	2144	2377	2536	2681	2027	0	0	0	0	1010	145	509	654
Maharash-tra	Scarcity Zone-Sa-tara/ Padegaon/ 24	Sandy Clay	NIAW-1994/ 120- 60-40/ NP-K+Zn(25) 80- 50-30	--	--	--	--	-	2339	2940	3249	3359	3503	3627	2729	0	0	0	0	1164	124	774	898
Sorghum-wheat																							

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Gujarat	North West Agro climat-ic Zone/ Adiya/ 24	Alluvial	GFS-5 / 100- 50-25/ ZnSO4(20) 73- 21 -0	7.7	0.3	118	25	303	9083	10440	11659	11472	12321	12813	11480	0	0	0	0	3238	492	841	1333
Gujarat	North West Agro climat-ic Zone/ Adiya/ 24	Alluvial	GW-496/ 120- 60-30 / Znso4(15) 96-28-0	--	--	--	--	-	2016	3302	3607	3417	3897	4151	3425	90	64	125	10.59	1881	254	472	726
Finger Millet- Tomato																							
Karnataka	AEZ 8.2/ Chikka-ballapu-ra-KAR/ 12	Red Sandy	MR-1/ 100- 50-50/ Zinc(10) 161-92-16	7.1	0.4	152	25	29	2200	2958	3613	3596	4488	4992	4521					2288	504	-33	471
Karnataka	AEZ 8.2/ Chikka-ballapu-ra-KAR/ 12	Red Sandy	US 440/ 250 - 250 -250 / Trichoder-ma 174-253-133	--	--	--	--	-	10167	18260	23813	26292	29375	35604	32188					19209	6229	-2812	3416
Cotton-fallow																							

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recom-mended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status					Yield(kg/ha)											Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yieldgap 3(kg/ha) gap 4(kg/ha)
				pH	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Control	N	NP	NK	NPK	NPK + M.Nut.	F. Pract.	SE (d)	SE (M)	CD -5%	CV	RF vs Control	RF + Mic. Nut. vs RF	RF vs FP	RF + Mic. Nut. vs FP
Mharshtra	Central Vidarbha Zone Katol 12		Ajit 155						718	917	1571	1337	1745	1889	1097					1027	145	648	793

7.4.2 Diversification of existing farming systems

Title of the experiment: Diversification of existing farming systems under marginal household conditions

Objectives

- To enhance the productivity and profitability of marginal farmers households through IFS approach
- To improve the livelihood and nutritional security through diversification approach
- To estimate the impact of capacity building in diversification of crop + livestock system

Year of start: 2013-14 (Implemented in new districts from 2017-18)

The experiment in farming systems perspective entitled "Diversification of existing farming systems under marginal households" was initiated with the background that 68 % households in India are in marginal category with average land holding size of 0.38 ha. Due to their size of holding, marginal farm households do not have sufficient marketable surplus for getting the decent livelihood and are most vulnerable to climate related risks. The assumptions made are marginal households are having family members of 5 with crop + livestock as the dominant farming systems and if these system is diversified, sufficient marketable surplus can be generated for sustainable livelihood.

Modules: The experiment was designed with innovative approach in which changes are made compulsorily in all components of farming systems by way of introducing new crops, livestock species and product or processing techniques in marginal households aiming to increase the marketable surplus and income of the family from a less land resource. The major strength of marginal household is having sufficient manpower (due to family size) for farm operations. After benchmarking, modules comprising of cropping system diversification (most efficient cropping systems was synthesized keeping in view of the farmers resources, perception, willingness, market and requirement other components in the system), livestock diversification [(Mineral mixture + deworming+ round the year fodder supply for existing components) + introduction of location specific low cost livestock components viz., BYP, duckery, piggery, goat etc)], product diversification (Preparation of mineral mixture/value addition of market surplus products/Kitchen /roof gardening) and capacity building (Training of farm households on farming systems including post-harvest and value addition and assessing its impact) were implemented in randomly selected 24 marginal farm households in each district. The general guidelines used for designing the modules are given below

Farming System	Notation	Module name	Details
Existing	M0	Bench mark	Recording of bench mark data on crop, livestock, other components and household as a whole
Improved	M1	Cropping system diversification	Most efficient cropping systems was introduced keeping in view of the farmers resources, perception, willingness, market and requirement of other components in the system besides improving the practices of existing systems
	M2	Livestock diversification	Mineral mixture + deworming+ round the year fodder production + introduction of location specific low cost livestock components *viz.*, Backyard poultry, duckery, piggery & goat
	M3	Product diversification	Preparation of mineral mixture/value addition of market surplus products/kitchen /roof gardens
	M4	Capacity building	Training of farm households on farming systems especially on newly added practices & components and assessing its impact

Households: Twenty four marginal households were selected for experiment in all the locations. The average holding size of marginal households in the study locations ranged from 0.34 to 2.36 ha in various farming systems. During 2018-19, study involved 254 households with mean holding size of 0.80 ha. At very few locations and farming systems, the size of holding of farming system was higher than 1 ha due to non-availability of marginal households for diversification.

Locations: During 2018-19, 11 districts in 10 agro climatic implemented the modules in various farming systems. The details of locations, farming systems, size of holding, number of households in each farming system and module wise interventions made are given in Table 7.2.1.

Data analysis methodology: Based on the benchmark data, farming systems practiced by the households were identified and grouped in to different farming system categories such as field crops+ dairy, field crops + dairy+ goat *etc* as given in Table 7.2.1. Five parameters namely production (on equivalent basis of base pre-dominant crop), marketable surplus (calculated by deducting the family consumption for food, feed, seed *etc* from the total production), cost (total cost of the system including all components and diversification), returns (calculated by deducting the total cost from gross returns of the system) and profit (calculated by deducting the cost of the system from the gross income obtained from marketable surplus) were used for comparison of existing with improved (diversified) system and also different farming systems. Farming system with more than one household was subjected to ANOVA and paired t-test analysis. Paired t-test has been carried out for comparing existing and diversified systems with respect to production, marketable surplus, cost, return and profit. Similarly, one-way ANOVA has been carried out to identify the best farming system with respect to production, marketable surplus, cost, return and profit for the district. Standard error of mean values is also presented in parenthesis in Table 7.2.2.

Results

The components of existing and diversified farming systems in marginal farm households are given in Table 7.2.1, while the production, marketable surplus and economics of different farming systems are given in 7.2.2. Location wise and summary of results is explained briefly below.

Lower Gangetic Plains

Nadia (West Bengal): Four farming systems *viz;* field crop + dairy, field crop + dairy + fishery, field crop + dairy + horticulture and field crop + poultry + fishery were found among which field crops + dairy + horticulture system is practiced by 42 % households having mean area of 0.51 ha followed by field crops + dairy by 33 % households having mean area of 0.63 ha. Diversification resulted in significant improvement in profit from field crop + dairy+horticulture (Rs 29,560 from 0.51 ha) and field crop + dairy (Rs 28,063 from 0.63 ha).

Middle Gangetic Plain

Mirzapur (Uttar Pradesh): Only one farming systems field crops + dairy observed at Mirzapur. Diversification of existing systems resulted in significantly higher profit Rs 38,869 from 0.48 ha was obtained in field crop + dairy system.

Upper Gangetic Plain

Fathepur (Uttar Pradesh): Two farming systems *viz;* field crops + dairy, field crops + dairy + horticulture were found, and both the farming systems were found dominant and equal number of farmers shared 50% by both system. Diversification of existing systems resulted in significantly higher profit in both the systems. Among the farming systems, significantly higher profit of Rs 48,235 from 0.65 ha was obtained in field crop + dairy + horticulture system.

Eastern plateau and hills

Annupur (Madhya Pradesh): Only one farming systems field crops + dairy observed at Annupur. Diversification of existing systems resulted in significantly higher profit Rs 6,170 from 0.86 ha was obtained in field crop + dairy system.

Western Plateau and hills

Hingoli (Maharashtra): Four farming systems namely field crops + sericulture, field crops + horticulture, field crops + goat and field crops + dairy were found among which 37.5 % households were having field crops + goat with mean area of 0.86 ha. Significantly higher production, marketable surplus and profit were recorded in field crops + horticulture and field crops + dairy farming systems after diversification. Among the farming systems, field crops + dairy resulted in higher profit of Rs 20,430 from 0.86 ha after the interventions.

Southern Plateau and hills

Medak (Telangana): Three farming systems *viz;,* field crops + dairy + sheep/goat, field crop + dairy + sheep/goat + horticulture and field crop + dairy + horticulture were found and the spread of farming systems among study households was found to be equal (20 % each). Diversification in field crop +dairy + sheep/goat+horticulture resulted in higher profit of Rs 80,119 from 2.00 ha.

Chikkaballapura (Karnataka): Five farming systems namely field crops + dairy + sheep/goat, field crops + dairy, field crops + dairy + poultry, field crops + dairy + horticulture + sheep/goat + poultry and field crops + dairy + horticulture were observed with mean area ranging from 0.52 to 0.84 ha. Diversification in field crop + dairy resulted in higher profit (Rs 4,33,974) from 0.65 ha and performed better over other systems.

Salem (Tamil Nadu): Three farming systems namely field crops + dairy + goat + poultry, field crops + dairy + goat and field crop + dairy + poultry were found among which 50% households were having field crops + dairy + goat + poultry system with mean area of 0.86 ha. Among the farming systems, field crop + dairy + goat + poultry recorded higher profit of Rs 61,033 from 0.86 ha after diversification.

East coast plains and hills

Erode (Tamil Nadu): Two farming systems namely field crop + dairy + poultry and field crops + dairy + poultry + goat was found with mean area of 0.91 and 0.89 ha respectively and both the systems were found dominant. Diversification made in field crop + dairy + poultry resulted in significant improvement in profit (Rs 1,95,334 from 0.91 ha) due to diversification.

West coast plains and ghats

Thiruvananthapuram (Kerala): Three farming systems namely field crops + dairy + horticulture, horticulture + poultry and horticulture + dairy was found among which 50% households were having horticulture + poultry. Diversification resulted in significant improvement in production, marketable surplus, return and profit Rs (1,00,436) from 0.34 ha due to diversification.

Gujarat plains and hills

Dahod (Gujarat): Three farming systems *viz,* field crop + dairy + goat, field crop + dairy and field crop + dairy + goat + poultry were found among which field crop + dairy + goat was found in 58% of households having mean area of 0.93 ha respectively. Interventions made in field crops + dairy resulted in higher improvement in profit (Rs 55,789 from 0.88 ha) compared to other systems.

The results across the locations are summarized below

- The number of farming systems in different districts varied from 1 to 5. Presence of maximum of 5 farming systems was observed in Medak (Telangana) Hingoli and Existence of single farming systems was observed in Mirzapur (Uttar Pradesh).
- Field crops + dairy was found to be the common farming system at all locations in marginal households and it is the dominant system (37 % of households) practiced in 8 districts based on number of households practicing the system.
- Two component systems (Field crops with either of dairy or sericulture or goat or bullock or poultry and horticulture with either poultry or dairy) is practiced by 49 % households whose mean profit was found to be Rs 46,140 in the benchmark. Due to the diversification interventions in cropping systems, livestock, and capacity building in the second year, profit could be enhanced to Rs 107973 which is 2.3 times on an average.
- Based on the statistical analysis, best performing farming system has been identified for each district which can be scaled along with all possible interventions and diversification approach for improving the livelihood of marginal farm households.

Table 7.4.2.1. Components of existing and diversified farming systems in marginal farm households at different locations

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Live-stock / household (including fisheries if any)	Product diversifi-cation	Crop (s)/Cropping system (s)			Livestock / household (including fisheries)	Product diversifi-cation	Capacity building
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
						I. Lower Gangetic Plains								
Nadia (West Bengal)/ lower gang etic plains/ 79 rainy days /1634 mm rain	Field crops + dairy (2)	0.63	8	Rice	Mustard / lentil	Rice/ Banana/ sesame	Cow (2)	-	Rice	Mustard / len-til / Lathyrus	Seasame/ boro rice/ Colocasia	Cow (2) + fishery	Mustard seed	Train-ing on Improved methodh of kharif rice culti-vation
	Field crops + dairy (2) + fishery	0.67	3	Rice	Rice / mus-tard / lentil	Rice / jute	Cow (2) + fishery		Rice	Lathyrus/ mustard	Seasame/ boro rice/ jute	Cow (2) + fishery	-Do-	-Do-
	Field crops + horticulture + dairy (1-2)	0.51	10	Rice / banana/ okra	Mustard / gram/ banana/ Co-riender /pea	Rice / jute / sesame/ okra/ green gram	Cow (1-2)		Rice / banana	Mustard / marigold/ pea/lentil	Rice / marigold/ okra/jutel/ blackgram	Cow (2) +fishery	-Do-	-Do-
	Field crops + poultry (6) + fishery	0.53	3	Rice	Mustard	Rice / jute	Poultry (6)+ fishery		Rice	Mustard	Rice / jute	Cow (0-1)+ fishery	-Do-	-Do-
						II. Middle Gangetic plains								
Mirzapur (Uttar Pradesh)/ Vindhyan Zone / Per humid to humid/ 22 rainy days/ 399 mm rain	Field crops + dairy (1-2)	0.48	16	Rice	Wheat/mus-tard/berseem	Pea	Cow (1) + Buffalo (2)	-	Rice	Wheat/ber-seem		Cow (1) + Buffalo (2) + Goat (2-3)	-	-
III. **Upper Gangetic plains**														
Fathepur (Uttar Pradesh)/ Central Plain Zone/ Dry sub-humid to semi arid / 979 mm rain	Field crops + dairy (1-2)	0.72	12	Rice/ Pearl Millet/ Sesame/ Arhar/ black-gram	Wheat/mus-tard/gram	Green Gram	Cow (0-1) + buffalo (1-2)	-	Rice/Pearl Millet/Arhar/ blackgram/ sorghum	Wheat / mustard	-	Cow (0-1) + buffalo (1-2)	-	-,
	Field crops + dairy (1-2)+ horticulture	0.85	12	Rice/cau-liflower/ sesame	Wheat/toma-to/gram/pea/ potato	Green Gram	Cow (0-1) + Buffalo (1-2)	-	Rice/Pearl Millet/Arhar/ cauliflower/ sorghum/ sasamum	Wheat/toma-to/mustard/ potato	-	Cow (0-1) + Buffalo (1-2)	-	-

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Live-stock / household (including fisheries if any)	Product diversi-fication	Crop (s)/Cropping system (s)			Livestock / household (including fisheries)	Product diversi-fication	Capacity building
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
IV. Eastern Plateau and Hills														
Anupur (Madhy Pradesh)	Field crop + Dairy	0 .86	19	Rice	Wheat	-	Cow (0-3) + Buffalo (0)	-	Rice/Soy-bean/Kodo	Wheat/Gram/ Lentil	-	Green fodder MP chari	-	
	Field crop + Goatry + Poultry	0.92	5	Rice	Wheat	-	Goat (0-6)+ Poultry (0-5)	-	Rice/Soy-bean/Kodo	Wheat/Gram/ Lentil	-	Green fodder MP chari, Poul-try feed	-	
V. Western Plateau and Hills														
Hingoli(Maharashtra)/ Central Vidarbha Zone / Semi-arid / 45 rainy days /886 mm rain	Field crops + dairy (1-2)	0.86	7	Soy-abean/ cotton/ pigeon pea / turmeric / green-gram	Wheat/chick-pea/sorghum	-	Buffalo (1-2)	-	Cotton/sug-arcane/soy-abean.napier/ blackgram / greengram / turmeric	Chickpea / sorghum	-	Buffalo (2)	-	Dry spelt strees-mange-ment and integrated pest maneg-ment& pink bolwarm-manag-ment
	Field crops + goat(6-7)	0.86	9	Soy-abean/ cotton/ pigeon pea / turmeric / maize/ green-gram	Wheat/chick-pea/sorghum	-	Goat (6-7)	-	Soyabean/ cotton/ pigeon pea / turmeric / maize/ greengram / blackgram	Wheat/ chickpea/ sorghum/ Napier	-	Goat (6-7)	-do-	-do-
	Field crop + horticulture	0.83	4	Soy-abean/ turmeric	Wheat / sorghum	-	Cow (1) + poultry (4-5)	-	Soyabean/ turmeric / chilli / Lime orchids	Chickpea / sorghum / vegetable	-	-	-do-	-do-
	Field crop + sericulture	0.65	4	Soy-abean/ cotton / turmeric	Chickpea / sorghum	-	Goat (4-5)	-	Cotton / mulberry / greengram / sorghum/Na-pier / maize fodder	Wheat / sorghum / Cauliflower / lucern	-	-	-do-	-do-

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Live-stock / household (including fisheries if any)	Product diversifi-cation	Crop (s)/Cropping system (s)			Livestock / household (including fisheries)	Product diversifi-cation	Capacity building
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
VI. Southern Plateau and Hills														
Medak (Telangana)/ Northern Telanga-na Zone/Semi-arid (wetter half)/ 49 rainy days/ 616 mm rain	Field crops + dairy (3-4)	1.60	5	Rice/ maize	Rice/maize	Rice	Buffalo (3-4) + poultry (2-3)	-	Rice/maize	Rice/maize	-	Buffalo (1-2) + poultry (10)	-	livestock mange-ment for higher income & crop diver-sification
	Field crop + diary (2)+ poultry (18-19)	1.30	5	Rice / maize	Rice/maize	Tomato	Buffalo (2) + poultry (18-19)		Rice /maize	Rice/maize	Tomato	Buffalo (1-2) + poultry (28)	-	-do-
	Field crop + diary (2-3)+ goat /sheep (35-36)	2.36	5	Rice/ maize	Rice/maize	-	Buffalo (2-3)+ Goat/ sheep (35-36)	-	Rice/maize	Rice/maize	-	Buffalo (1-2)+ goat / sheep (48)+ Poultry (10)	--	-do-
	Field crop + vegetable+ diary (2-3)+ goat /sheep (30-31)	2.0	4	Rice/ maize/ cotton	Rice/maize / tomato	-	Buffalo (2-3)+ Goat/ sheep (30-31)	-	Rice / maize	Rice /tomato	-	Buffalo (1-2)+ goat / sheep (36-37)+ Poultry (10)	--	-do-
	Field crop + vegetable+ diary (2-3)	1.32	5	Rice/ maize	Rice/ tomato		Cow (0-1) +buffalo (2-3)		Rice/maize	Rice/ tomato		Buffalo (1-2) + poultry (10)	--	-do-

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Live-stock / household (including fisheries if any)	Product diversifi-cation	Crop (s)/Cropping system (s)			Livestock / household (including fisheries)	Product diversifi-cation	Capacity building
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
Chikkaballapura (Karnataka)/ KA-4/ Central Dry Zone / Semi-arid / 39 rainy days/ 803 mm rain	Field crops + dairy (2-3)	0.65	4	Finger-millet/ mulber-ry/finger-millet/ maize	Ragi / sericul-ture	-	Cow (2-3)	-	Fingermillet/ mulberry/ fingermillet/ maize/ Beet-root/rice/ chilli	Potato / knoll knol	-	Cow (3) + buffalo (1) +goat (1) + poultry (4)	-	Soil Health Manage-ment & Honey Produc-tion
	Field crop + dairy (4)+ horticulture	0.88	6	Finger millet// maize / tomato / finger millet / ridge guard / sericul-ture	Finger millet / cucumber/ bitter guard / ridge guard / tomato	-	Cow (4)	-	Fingermillet/ Fenugreek / Sericulture/ Guava/Man-go	-	Guava/ Mango/ tomato/ chilli	Cow (2-3)	-	Soil Health Manage-ment & Honey Produc-tion
	Field crop + dairy (2-3)+ horticulture + goat / sheep (6-7)+ poultry (10)	0.76	6	Finger-millet/ maize / mulber-ry/Ridge-gourd / Guava / mango / Beetroot / pump-kin	Rice / ragi / chilli/ maize / sericulture	Tomato/ mango/ mulberry	Cow (2-3) + Buffalo (0-1) + goat / sheep (6-7)+ Poultry (10)	-	Fingermil-let/ maize / redgram / fingermillet / sericulture / groundnut	Beans	Tomato/ finger mil-let / potato	Cow (3-4)+ Poultry (2-3)	-	do
	Field crops + dairy (2-3) + poultry (8-9)	0.83	3	Finger-millet / maize / tomato / sericul-ture / ridge-guard	Sericulture	-	Cow (2-3) + Buffalo (1-2) + Poultry (8-9)	-	Bottleguard / Finger Millet / chilli / tomato / brinjal	Pearl Millet / beans / cucumber / chilli	Tomato	Cow (1-2) + Poultry (3-4)	-	do
	Field crop + dairy (2)+ goat /sheep (9-10)	0.52	5	Finger-millet / tomato / sericul-ture / beans	Sericulture		Cow (2) + goat / sheep (9-10) + poultry (1-2)		Jasmine / rose / Bottleguard/ Ridgeguard / tomato / maize	Maize / coriander / Pole Beans / Gharkin / Cauliflower / Marigold / Tomato	Mulberry / tomato / fingermillet /Cauliflow-er	Cow (3) + poultry (1)	-	do

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Live-stock / household (including fisheries if any)	Product diversifi-cation	Crop (s)/Cropping system (s)			Livestock / household (including fisheries)	Product diversifi-cation	Capacity building
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
Yethpur(TamilNadu)/ TN-2 /North-western Zone/ Semi-arid /35 rainy days / 722 mm rain	Field crop + dairy (4) + goat (5-6)	0.70	6	Rice/ Tapioca /cotton/ maize/ sorghum	Rice/Tapioca / sorghum/ coriander / turmeric	Coconut / Tapioca / turmeric	Cow (4) + goat (5-6)	-	Rice/ Tapioca /cotton/ maize/ sorghum / Coconut	Maize / groundnut / sorghum/ Chrysan-themum / gingelly	-	Cow (3-4) + buffalo (1-2) + goat (3-4)	Kitchen garden	Oil seeds produc-tion Tech-nology & balance nutrition
	Field crop + dairy (2-3) + goat/sheep (7) + poultry (14-15)	0.86	12	Rice/ Tapioca /maize/ sorghum /sug-arcane / ragi / green gram / kh. vege-table	Sugarcane / maize / sesa-me /Tapioca / sorghum/ rabi vegetable	Coconut / Tapioca	Cow (2-3) + goat (7) + poultry (14-15)	-	Rice/Currey leaf/ sugar-cane/ /Chry-santhemum/ sorghum / lab lab/Coconut / Finger millet / tomato / cotton / groundnut	Finger millet / groundnut / sorghum/ maize / gingelly	-	Cow (3-4) + goat (7-8) + poultry (11-12)	Kitchen garden	Oil seeds produc-tion Tech-nology & balance nutrition
	Field crop + dairy (2-3)+ poultry (8-9)	0.83	6	Maize Tapioca /cotton/ maize/ Ridge-gourd / chickpea / beans	Tapioca / sorghum/ sesame	Coconut	Cow (2-3) + goat (1) + poultry (8-9)	-	Maize/ sorghum / Coconut / Tapioca / White gingely	Gherkin/ gingelly / Sorghum	-	Cow (3-4) + goat (7) + poultry (14-15)	Kitchen garden	Oil seeds produc-tion Tech-nology & balance nutrition
XI. East Coast Plains and Hills														
Bhavanisagar(Tamil-Nadu) / TN-3 /West-ern Zone / Semi-ar-id /36 rainy days/ 775 mm rain	Field crop + dairy (4)+ poultry (14)	0.92	12	Rice / turmeric / Sugar-cane / maize/ Coconut	Sugarcane / banana/ rice		Cow (2-3) + buffalo (2) + poul-try (14)		Sugarcane / maize / fod-der grass	Rice / banana /gingelly/F. sorghum	Water mil-lon / maize / cotton	Cow (2-3) + buffalo (2-3) + goat (0-1)+ poultry (11-12)		Turmeric and rice & INM and IPDM
	Field crop + dairy (4-5) + poultry (9-10) + goat/ sheep (4-5)	0.90	12	Rice / tur-meric / topioca/ Coconut	Maize / ba-nana/ rice		Cow (2-3) + buffalo (2) + goat (4-5) + poultry (9-10)		Sugarcane / F. sorghum	Rice / maize / gingelly / Groundnut / F. sorghum	Cotton /F. sorghum	Cow (2-3) + buffalo (2) + goat (8-9) + poultry (10)		do

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Live-stock / household (including fisheries if any)	Product diversifi-cation	Crop (s)/Cropping system (s)			Livestock / household (including fisheries)	Product diversifi-cation	Capacity building
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
XI. Gujarat Plains and Hills														
Dahod (Gujarat)/ GJ-3/ Middle Gujarat Zone / Semi-arid /23 rainy days /1086 mm rain	Field crops + dairy (2-3)	0.93	6	Rice/ maize/ pigeon pea	Maize/wheat / chickpea	-	Cow (1-2) + Buffalo (1)	-	Maize/ pigeonpea// soyabean	Maize/ Wheat/chick-pea	-	Cow (0-1) + Buffalo (1-2)+ goat (4)	-	Modern Farming Technol-ogy Of Soybean
	Field crops + dairy (1-2)+ goat (3-4)	0.88	14	Rice/ maize/ pigeon pea	Maize/wheat / chickpea	-	Cow (0-1)+ Buffalo (1-2) +Goat (3-4)	-	Soyabean / maize/pigeon pea	Maize/wheat / chickpea	-	Cow (1-2)+ Buffalo (1-2) +Goat (4)	-	-do-
	Field crops + dairy (2-3) + goat (6)+ Poultry (4)	0.93	4	Rice/ maize/ pigeon pea	Maize/wheat / chickpea	-	Cow (2) + Buffalo (1-2)+ Goat (6)+Poul-try (4)		Soyabean / maize/pigeon pea	Maize/wheat / chickpea	-	Cow (1) + Buffalo (1-2)+ Goat (4-5)+Poul-try (0-1)	-	-do-

Table 7.4.2.2 Production (on equivalent basis of base crop), marketable surplus and economics of existing and improved farming systems in marginal households (For 2018-19)

Farming System	Area (ha)	No. of House-holds	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
Nadia																	
FC+D+F	0.63	4	2266 (705)	1657 (556)	22675 (10874)	11315 (4888)	2175 (6284)	5824 (1366)	3939 (1233)	49209 (9412)	38151 (11917)	9870 (10771)	0.250	0.250	0.125	0.250	0.375
FC+D	0.63	8	1861 (498)	1227 (393)	27906 (7689)	11 (3456)	-9506 (4443)	8072 (966)	5762 (872)	67866 (6656)	53215 (8427)	18557 (7616)	0.008***	0.008***	0.023	0.008***	0.023**
FC+Po+F	0.53	2	3951 (997)	2844 (787)	47353 (15378)	11910 (6912)	-4691 (8887)	4725 (1932)	2309 (1744)	47420 (13312)	23450 (16853)	-12790 (15232)	0.500	1.000	1.000	1.000	1.000
FC+D+H	0.51	10	52 (446)	23 (352)	600 (6877)	180 (3091)	-251 (3974)	10082 (864)	7649 (780)	85430 (5953)	65793 (7537)	29309 (6812)	0.002***	0.002***	0.002***	0.002***	0.004***
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
CD [P = 0.05] **FS1 vs FS2**			1800	1421	27780	12487	16054	3490	3150	24047	30445	27517					
CD [P = 0.05] **FS1 vs FS3**			2546	2010	39287	17659	22703	4935	4455	34008	43056	38915					
CD [P = 0.05] **FS1 vs FS4**			1739	1373	26838	12063	15509	3371	3044	23232	29413	26584					
CD [P = 0.05] **FS2 vs FS3**			2324	1835	35864	16120	20725	4505	4067	31045	39304	35525					
CD [P = 0.05] **FS2 vs FS4**			1395	1101	21518	9672	12435	2703	2440	18627	23583	21315					
CD [P = 0.05] **FS3 vs FS4**			2277	1798	35139	15795	20306	4414	3985	30418	38510	34807					
Mirzapur																	
FC+D	0.48	16	6801 (348)	352 (347)	39745 (726)	28262 (3195)	-36225 (3693)	6524 (337)	3669 (310)	34042 (2439)	31203 (1965)	2644 (2767)	-	-	-	-	-
Overall FS			**P value Significance - Existing vs Improved**										0.468	<0.001***	0.027**	0.305	<0.001***
Fathepur																	
FC+D	0.72	12	2128 (1297)	2055 (1115)	7442 (6686)	18095 (9456)	17213 (7744)	12791 (1013)	9150 (1007)	65490 (3822)	80000 (9379)	44306 (9553)	<0.001***	<0.001***	<0.001***	<0.001***	0.007***
FC +D+H	0.65	12	3447 (1297)	2843 (1115)	20216 (6686)	21149 (9456)	13901 (7744)	14985 (1013)	11159 (1007)	71769 (3822)	108048 (9379)	62136 (9553)	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
Overall FS			**P value Significance - Existing vs Improved**										<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
CD [P = 0.05] **FS1 vs FS2**			3804	3271	19610	27734	22713	2972	2954	11210	27507	28018					
Annupur																	
FC+D	0.86	19	4768 (259)	3351 (265)	43316 (1029)	37747 (3919)	13657 (4162)	5601 (206)	3731 (158)	43607 (1541)	51614 (2403)	19827 (2032)	0.001***	0.113	0.984	0.002***	0.080*
FC+G +Po	0.92	05	5193 (505)	3987 (516)	45019 (2005)	43258 (7639)	22766 (8113)	6978 (401)	5175 (308)	45770 (3003)	72863 (4685)	42205 (3961)	0.062*	0.062*	0.813	0.063*	0.125
Overall FS			**P value Significance - Existing vs Improved**										<0.0001***	0.018**	0.771	<0.0001***	0.037**

Farming System	Area (ha)	No. of House-holds	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
CD [P = 0.05] **FS1 vs FS2**			1176	1203	4674	17805	18910	936	718	7000	10920	9233					
Bhawanisagar (Erode)																	
FC+D+Po	0.91	12	9191 (1232)	7756 (1201)	92878 (11380)	90941 (17735)	62247 (17170)	20243 (2699)	18674 (2621)	115895 (11127)	288962 (48446)	257581 (46796)	0.007***	0.007***	0.270	0.002***	0.003***
FC+D+Po+G	0.89	12	11779 (1232)	10637 (1201)	121547 (11380)	114034 (17735)	91203 (17170)	16366 (2699)	13495 (2621)	85795 (11127)	241521 (48446)	184115 (46796)	0.129	0.339	0.064*	0.009***	0.064*
Overall FS			**P value Significance - Existing vs Improved**										0.001***	0.004***	0.600	<0.0001***	0.001***
CD [P = 0.05] **FS1 vs FS2**			3612	3522	33375	52016	50357	7915	7687	32635	142087	137249					
Hingoli																	
FC+Se	0.65	4	1188 (398)	1188 (398)	17463 (4775)	12243 (6378)	12243 (6378)	2884 (927)	2776 (1007)	41477 (4327)	30634 (20391)	27924 (22594)	0.375	0.375	0.125	0.375	0.375
FC+H	0.82	4	2641 (398)	2641 (398)	44014 (4775)	22001 (6378)	22001 (6378)	3938 (927)	3193 (1007)	41980 (4327)	56467 (20391)	3783 (22594)	0.125	0.125	0.125	0.125	0.125
FC+G	0.86	9	1534 (265)	1534 (265)	19463 (3183)	18894 (4252)	18894 (4252)	3492 (618)	2747 (672)	44657 (2885)	42633 (13594)	24020 (15063)	1.000	0.652	0.570	0.910	0.496
FC+D	0.86	7	1207 (301)	1207 (301)	18900 (3609)	11265 (4821)	11265 (4821)	4021 (701)	2917 (762)	41236 (3271)	59299 (15414)	31695 (17079)	0.047**	0.109	0.469	0.297	0.469
Overall FS			**P value Significance - Existing vs Improved**										0.897	0.765	0.013**	0.719	0.599
CD [P = 0.05] **FS1 vs FS2**			1173	1173	14086	18815	18815	2736	2972	12765	60154	66652					
CD [P = 0.05] **FS1 vs FS3**			997	997	11970	15989	15989	2325	2526	10848	51121	56643					
CD [P = 0.05] **FS1 vs FS4**			1039	1039	12486	16677	16677	2425	2634	11315	53321	59080					
CD [P = 0.05] **FS2 vs FS3**			997	997	11970	15989	15989	2325	2526	10848	51121	56643					
CD [P = 0.05] **FS2 vs FS4**			1039	1039	12486	16677	16677	2425	2634	11315	53321	59080					
CD [P = 0.05] **FS3 vs FS4**			836	836	10039	13409	13409	1950	2118	9097	42872	47502					
Medak																	
FC+D+Po	1.30	5	21432 6356)	20173(6229)	156436 (17572)	165037 (87360)	146165 (85326)	9464 (2216)	9219 (1902)	64523 (13952)	77443 (22620)	73755 (18265)	0.063*	0.063*	0.063*	0.063*	0.063*
FC+D+Sh	2.36	5	12188 6356)	10925(6229)	64269 (17572)	118551 (87360)	99612 (85326)	23470 (2216)	20450 (1902)	175244 (13952)	176801 (22620)	131505 (18265)	0.188	0.188	0.063*	0.625	0.625
FC+D+Sh+H	2.00	4	9171 (7106)	8150 (6965)	79158 (19647)	58400 (97672)	43093 (95397)	19305 (2477)	18168 (2126)	149313 (15599)	140267 (25290)	123212 (20421)	0.125	0.125	0.125	0.250	0.250
FC+D	1.60	5	22427 (6356)	20646(6229)	106393 (17572)	230008 (87360)	203305 (85326)	10713 (2216)	10429 (1902)	61613 (13952)	99078 (22620)	94820 (18265)	0.438	1.000	0.188	0.813	0.813
FC+D+H	1.32	5	7966 (6356)	6717 (6229)	94930 (17572)	24560 (87360)	5829 (85326)	7777 (2216)	7943 (1902)	49777 (13952)	66880 (22620)	69366 (18265)	1.000	0.625	0.188	0.188	0.125
Overall FS			**P value Significance - Existing vs Improved**										0.782	0.872	0.873	0.783	0.904
CD [P = 0.05] **FS1 vs FS2**			18813	18439	52014	258584	252562	6558	5630	41298	66955	54064					

Farming System	Area (ha)	No. of House-holds	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
CD [P = 0.05] **FS1 vs FS3**			19954	19558	55169	274270	267883	6956	5971	43804	71017	57343					
CD [P = 0.05] **FS1 vs FS4**			18813	18439	52014	258584	252562	6558	5630	41298	66955	54064					
CD [P = 0.05] **FS1 vs FS5**			18813	18439	52014	258584	252562	6558	5630	41298	66955	54064					
CD [P = 0.05] **FS2 vs FS3**			19954	19558	55169	274270	267883	6956	5971	43804	71017	57343					
CD [P = 0.05] **FS2 vs FS4**			18813	18439	52014	258584	252562	6558	5630	41298	66955	54064					
CD [P = 0.05] **FS2 vs FS5**			18813	18439	52014	258584	252562	6558	5630	41298	66955	54064					
CD [P = 0.05] **FS3 vs FS4**			19954	19558	55169	274270	267883	6956	5971	43804	71017	57343					
CD [P = 0.05] **FS3 vs FS5**			19954	19558	55169	274270	267883	6956	5971	43804	71017	57343					
CD [P = 0.05] **FS4 vs FS5**			18813	18439	52014	258584	252562	6558	5630	41298	66955	54064					
Chikkaballapura																	
FC+D+Sh	0.52	5	16574 (10017)	16009 (10038)	104534 (1780)	127508 (128820)	119590 (129139)	27789 (450658)	24821 (450605)	83277 (19815)	305767 (6308002)	264215 (6307259)	0.063*	0.063*	0.188	0.063*	0.063*
FC+D	0.65	4	11345 (11199)	11118 (11223)	98934 (19910)	59901 (144025)	56716 (144381)	48616 (503851)	43481 (503792)	118043 (22154)	562583 (7052561)	490690 (7051730)	0.250	0.250	0.625	0.125	0.125
FC+D+Po	0.83	3	9938 (12931)	9566 (12959)	131647 (22990)	7484 (166306)	2281 (166717)	32104 (581797)	31728 (581729)	98873 (25581)	350579 (8143596)	345324 (8142637)	0.250	0.250	0.500	0.250	0.250
FC+D+H+Sh+Po	0.76	6	21613 (9144)	21438 (9163)	145033 (16256)	157551 (117596)	155098 (117887)	833169 (411393)	833420 (411344)	103637 (18089)	11560725 (5758392)	11564249 (5757714)	0.313	0.313	0.156	0.219	0.219
FC+D+H	0.84	6	33868 (9144)	33203 (9163)	144782 (16256)	329370 (117596)	320064 (117887)	18279 (411393)	17457 (411344)	64846 (18089)	191060 (5758392)	179554 (5757714)	0.219	0.219	0.031**	1.000	1.000
Overall FS						**P value Significance - Existing vs Improved**							0.306	0.309	0.008***	0.300	0.303
CD [P = 0.05] **FS1vs FS2**			31447	31515	55908	404436	405436	1414858	1414691	62210	19804200	19801868					
CD [P = 0.05] **FS1vs FS3**			34236	34309	60865	440294	441382	1540302	1540121	67726	21560082	21557543					
CD [P = 0.05] **FS1 vs FS4**			28387	28448	50467	365073	365975	1277151	1277001	56155	17876676	17874570					
CD [P = 0.05] **FS1 vs FS5**			28387	28448	50467	365073	365975	1277151	1277001	56155	17876676	17874570					
CD [P = 0.05] **FS2vs FS3**			35804	35881	63654	460471	461609	1610887	1610697	70830	22548074	22545418					
CD [P = 0.05] **FS2 vs FS4**			30260	30325	53798	389169	390131	1361448	1361287	59862	19056600	19054356					
CD [P = 0.05] **FS2vs FS5**			30260	30325	53798	389169	390131	1361448	1361287	59862	19056600	19054356					
CD [P = 0.05] **FS3 vs FS4**			33148	33220	58932	426313	427367	1491391	1491216	65575	20875460	20873001					
CD [P = 0.05] **FS3vs FS5**			33148	33220	58932	426313	427367	1491391	1491216	65575	20875460	20873001					
CD [P = 0.05] **FS4vs FS5**			27066	27124	48118	348083	348943	1217716	1217572	53542	17044742	17042734					
Salem																	
FC+D+G+Po	0.86	12	11722 (2688)	11073 (2683)	75598 (9870)	100227 (34901)	90499 (34780)	21770 (3606)	18754 (3493)	129784 (20553)	196769 (35638)	151532 (34065)	0.003**	0.012**	0.009***	0.012**	0.043**

Farming System	Area (ha)	No. of House-holds	Existing System					Improved (Diversified System)					P value Significance - Existing vs Improved				
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)
FC+D+G	0.70	6	18598 (3802)	17981 (3794)	96754 (13959)	182213 (49357)	172964 (49186)	18150 (5100)	16561 (4940)	131944 (29066)	140300 (50400)	116473 (48175)	1.000	0.688	0.844	0.563	0.563
FC+D+Po	0.83	6	13924 (3802)	13392 (3794)	81239 (13959)	127629 (49357)	119636 (49186)	12211 (5100)	11011 (4940)	87425 (29066)	95739 (50400)	77740 (48175)	1.000	0.688	0.438	1.000	0.688
Overall FS								**P value Significance - Existing vs Improved**					0.084*	0.215	0.017**	0.322	0.828
CD [P = 0.05] **FS1 vs FS2**			9684	9663	35552	125712	125276	12990	12583	74032	128369	122703					
CD [P = 0.05] **FS1 vs FS3**			9684	9663	35552	125712	125276	12990	12583	74032	128369	122703					
CD [P = 0.05] **FS2 vs FS3**			11182	11158	41052	145160	144656	15000	14529	85485	148228	141685					
Thiruvananthapuram																	
FC+D+H	0.49	8	25426 (7354)	24595 (7350)	112882 (16775)	268506 (96794)	256047 (96675)	44519 (6795)	43468 (6805)	304345 (21740)	363441 (91063)	347680 (91263)	0.008***	0.008***	0.008***	0.008***	0.008***
H+Po	0.34	12	9512 (6005)	9192 (6001)	46104 (13697)	96576 (79032)	91778 (78935)	25898 (5548)	25484 (5556)	190042 (17751)	198430 (74353)	192214 (74516)	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
H+D	0.35	4	32024 (10401)	31134 (10394)	102071 (23724)	378287 (136887)	364946 (136719)	49133 (9609)	47866 (9624)	280846 (30745)	456147 (128783)	437141 (129065)	0.125	0.125	0.125	0.125	0.125
Overall FS								**P value Significance - Existing vs Improved**					<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
CD [P = 0.05] **FS1 vs FS2**			19745	19733	45038	259869	259550	18242	18271	58367	244484	245019					
CD [P = 0.05] **FS1 vs FS3**			26490	26474	60424	348651	348224	24474	24513	78307	328010	328727					
CD [P = 0.05] **FS2 vs FS3**			24975	24960	56969	328711	328308	23075	23111	73829	309251	309927					
Dahod																	
FC+D+G	0.93	14	7419 (1241)	5896 (1216)	39531 (3737)	64330 (14939)	43020 (14669)	7731 (589)	5768 (516)	35899 (1555)	72340 (6924)	44846 (5999)	0.268	0.542	0.049**	0.194	0.426
FC+D	0.88	6	7056 (1895)	5579 (1857)	53448 (5709)	45341 (22819)	24663 (22407)	10616 (899)	8571 (788)	39535 (2375)	109094 (10577)	80452 (9164)	0.031**	0.031**	0.063*	0.031**	0.031**
FC+D+G+Po	0.93	4	12888 (2321)	11091 (2274)	63854 (6992)	116581 (27948)	91416 (27443)	11631 (1102)	9128 (965)	41930 (2909)	120901 (12954)	85861 (11224)	0.375	0.250	0.125	1.000	0.875
Overall FS								**P value Significance - Existing vs Improved**					0.292	0.682	0.002***	0.058*	0.218
CD [P = 0.05] **FS1 vs FS2**			4711	4616	14189	56720	55695	2236	1958	5903	26290	22779					
CD [P = 0.05] **FS1 vs FS3**			5474	5363	16487	65902	64712	2598	2275	6859	30546	26467					
CD [P = 0.05] **FS2 vs FS3**			6232	6106	18771	75033	73678	2957	2590	7809	34779	30134					

7.4.3 On-Farm evaluation of farming system modules

Title of the experiment: On-Farm evaluation of farming system modules for improving profitability and livelihood of small and marginal farmers

Objectives

- To address critical constraints of small and marginal farm holders for overall improvement of productivity
- To increase the profitability of small and marginal households and ensure livelihood

Year of start: 2011-12 (Implemented in new districts from 2017-18)

Modules: The experiment was designed with holistic approach where in improvement of productivity of existing components of the farming system was concentrated by appropriate interventions besides farmer opinion-based introduction of new components in optional module. Benchmarking of all components was done before making interventions in different modules. Four modules comprising of **crop** (low cost interventions in existing cropping systems based constraint analysis), **Livestock** (low cost interventions in existing livestock components based on constraint analysis), **On farm processing & value addition** (on farm agro processing and value addition of marketable surplus produces) and **optional** (Introduction of additional components based on households perception) were implemented in 2 farm households in each village comprising of 1 marginal and small household. The experiment was implemented in randomly selected 12 marginal farm households in each district. The general guidelines used for designing the modules are given below

Farming System	Notation	Module name	Details
Existing	M0	Bench mark	Recording of bench mark data on crop, livestock, other components and household as a whole
Improved	M1	Crop	Low cost interventions in existing cropping systems based constraint analysis
	M2	Livestock	Low cost interventions in existing livestock components based on constraint analysis
	M3	On farm processing & value addition	On farm agro processing and value addition for marketable surplus
	M4	Optional	Introduction of additional components based on households perception

Households: Twelve households consisting of 6 each in small and marginal categories was selected for experiment in all the locations. A total of 120 farm households were covered during the year. The average holding size of households in the study locations ranged from 0.05 to 2.00 ha for small households kanker having large holding size.

Locations: During 2017-18, a total of 10 districts in 6 agro climatic regions where in programme was implemented with the interventions in different modules. The details of locations, number of households covered and farming systems are given in Table 7.3.1.

Data analysis methodology: Based on the benchmark data, farming systems practiced by the households were identified and grouped in to different farming system categories such as field crops+ dairy, field crops + dairy+ goat *etc* as given in Table 7.3.1. Four parameters namely production (on equivalent basis of base pre-dominant crop), marketable surplus (calculated by deducting the

family consumption for food, feed, seed *etc* from the total production), cost (total cost of the system including all components and diversification) and profit (calculated by deducting the cost of the system from the gross income obtained from marketable surplus) were used for comparison of existing with improved system and also different farming systems. Farming system with more than one household was subjected to ANOVA and paired t-test analysis. Paired t-test has been carried out for comparing existing and diversified systems with respect to production, marketable surplus, cost and profit. Similarly, one-way ANOVA has been carried out to identify the best farming system with respect to production, marketable surplus, cost and profit for the district. Standard error of mean values is also presented in parenthesis in Table 7.3.2.

Results

The interventions made in different modules are given in Table 7.3.1, while the production, marketable surplus and economics of different farming systems are given in 7.3.2. Location wise and summary of results is explained briefly below.

Lower Gangetic plains

Nadia (West Bengal): Two farming systems namely field crop + dairy + fishery and field crop + dairy + horticulture were found with mean area of 1.16 and 1.07 ha respectively. Interventions made in crop, livestock, processing and optional modules resulted in significant improvement in production, marketable surplus and profit in both the farming systems. Among the farming systems, field crop + dairy + fishery resulted in higher profit of Rs 49,288 from 1.16 ha after the interventions.

Trans Gangetic plains

Patiala (Punjab): All the households were having only one farming system of field crops + dairy with mean area of 1.73 ha. Interventions in existing systems in different modules such as crop, livestock, processing and optional modules resulted in significant change in production and marketable surplus. Intervention in different modules helps to increase in profit (Rs 1,66,933/ha) compared to benchmark system.

Eastern plateau and hills

Kanker (Chhattisgarh): Three farming systems namely field crops + dairy + piggery + fishery + poultry + vegetables, field crops + dairy + goat + poultry and field crops + poultry was found among which 41% households were having field crops + poultry with mean area of 1.14 ha area. Interventions in crop, livestock, processing and optional resulted in significantly higher production, marketable surplus and profit in all the systems. Among the farming systems, field crops + dairy + piggery + fishery + poultry + vegetables resulted in higher profit of Rs 1,59,454 from 1.92 ha.

Annupur (Madhy Pradesh): Two farming systems namely field crop + dairy and field crops + goatry + Poultry was found with mean area of 1.16 and 1.2 ha respectively and both the systems were found dominant. Diversification made in field crop + dairy resulted in significant improvement in profit (Rs 15,787 from 1.2 ha) due to diversification.

Western Plateau and hills

Hingoli (Maharashtra): Three farming systems namely field crop + horticulture, field crop + goat and field crops + dairy was practiced with mean holding size of 1.13, 0.92 and 1.13 ha respectively.

Diversification made in field Crop+Sericulture resulted in significant improvement in profit (Rs 15658 from 1.13 ha) due to diversification.

Southern Plateau and hills

Salem (Tamil Nadu): Two farming systems namely field crops + dairy and field crops + horticulture + goat/sheep + poultry was found among which 66 % households were practicing field crops + horticulture + goat/sheep + poultry system with mean area of 1.20 ha. Interventions made in field field crops + horticulture + goat/sheep + poultry resulted in significant improvement in production, marketable surplus and profit (Rs 1,09,482/ha) compared to benchmark system.

Erode (Tamil Nadu): Two farming systems namely field crops + dairy + poultry and field crops + dairy + goat/sheep + poultry was found among which 75 % households were practicing field crops + dairy + poultry system with mean area of 1.15 ha. Interventions made in both the systems resulted in significant improvement in profit. Among the systems, field crop + dairy + goat/sheep + poultry recorded higher profit of Rs 1,32,098 from 1.34 ha.

West Coast Plains and ghats

Ratnagiri (Maharashtra): Two farming systems namely field crop + dairy and field crop + poultry were found with mean holding size of 0.60 and 0.50 ha respectively. Interventions in crop, livestock and optional modules resulted in significant improvement in production (12621 kg), marketable surplus (10345 kg) and profit (Rs 1,01,558) of field crop + poultry system in 0.50 ha.

Thiruvananthapuram (Kerala): Two farming systems namely field crops + dairy + horticulture and horticulture + poultry were found with mean area of 0.99 and 0.95 ha respectively. Among the systems, field crop + dairy + goat/sheep + poultry recorded higher profit of Rs 3,87,236 from 0.95 ha.

The results across the locations are summarized as below:

- The number of farming systems in different districts ranged between 1 (Patiala) to 3 (Kanker, Keonjhar, Hingoli and Nagpur).
- Among all the farming systems, field crops + dairy was found to be the dominant farming system based on number of households in 15 districts (40 % of total households) with mean area of 1.28 ha. Due to diversification, the production on equivalent basis improved by 6.9 % while marketable surplus by 4.7 %.
- Two component systems such as field crop + dairy, field crop + poultry, field crop + sericulture, field crop + goat, field crops + bullock and horticulture + poultry were practiced by 52 % of study households with mean holding size of 0.99 ha whose production and marketable surplus improved by 83 and 80 % respectively.
- Based on the statistical analysis, best performing farming system has been identified for each district which can be scaled along with all possible interventions and diversification approach for improving the livelihood of marginal farm households.

Table 7.4.3.1. Components of existing and diversified farming systems in marginal farm households at different locations

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Livestock / household (including fish-eries if any)	Product diversifi-cation	Crop (s)/Cropping system (s)			Livestock / house-hold (including fisheries)	Processing module	Optional module
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
I. Lower Gangetic Plains														
Nadia (West Bengal)/ lower gang etic plains// 79 rainy days /1634 mm rain	Field crops + Dairy (1.6) + Fishery	01.17	6	Rice	Mustard / cauliflower/ sesame	Rice/jute/ pumpkin/ sesame	Cow (1.6)+ fishery	-	Rice	Mustard / lentil / Lathyrus/ Spinach/ Cauliflower	Gourd Chaiti/boro rice/ jute	Cow (2) + fishery	Mustard seedOil extraction	NKG
	Field crops + dairy (3) + horticulture	1.01	6	Rice	Rice / mustard / Coriender/ banana/ onion	Rice / jute/ okra/ sesame/ banan	Cow (3) + fishery		Rice / banana	Coriander / mustard / banana/pea	Seasame/ boro rice/ jute/okra	Cow (3) + fishery	-Do-	-Do-
II. Trans Gangetic Plains														
Patiala (Punjab)/ PB-4 /Western Plain Zone/ Semi-arid to Dry sub-humid/ 14 rainy days/ 105 mm rain	Field crops + dairy (11-12)	1.73	12	Rice	Wheat	-	Cow (9-10) + Buffalo (2-3)	-	Rice	Wheat	-	Cow (14-15) + Buffalo (3))	-	NKG
III. Eastern Plateau and Hills														
Annupur (Madhya Pradesh)/ Eastern Plateau And Hills Region (VII)/ North Hill Zone of Chattisgarh (MP-3)/ 1226 mm rain	Crop + Dairy + Pigs + Fishery + Poultry + Veg.	1.92	4	Rice/ Soyabean/ Maize	Wheat /Gram	-	Cow (1-2) + Buffalo (1)	-						Musroom/ Fruit plant
	Crop + Dairy + Goatry + Poultry	1.29	3											Musroom/ Fruit plant
	Crop + Poultry	1.14	5											Musroom/ Fruit plant
IV. Western Plateau and Hills														

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Livestock / household (including fish-eries if any)	Product diversifi-cation	Crop (s)/Cropping system (s)			Livestock / house-hold (including fisheries)	Processing module	Optional module
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
Hingoli (Maharashtra)/ MH-7/ Central Maharasthra Plateau Zone, Semi-arid (wetter region) /32 rainy days / 709 mm rain	Field crops + dairy (2)	1.13	3	Soyabean/ cotton/ pigeon pea / turmeric / greengram	Wheat/ chickpea/ sorghum	-	Buffalo (2)	-	Cotton/ soyabean/ blackgram / greengram / turmeric	Chickpea /wheat / sorghum	-	Buffalo (2)	Milk processing	-
	Field crops + goat(7)	0.92	5	Soyabean/ cotton/ pigeon pea / greengram	Chickpea/ sorghum	-	Goat (7)	-	Cotton/ soyabean/ blackgram / greengram	Chickpea / sorghum	-	Goat (6-7)	-	-
	Field crop + sericulture	1.13	4	Soyabean/ cotton / turmeric	Wheat / sorghum	-	Cow (1)	-	Cotton / mulberry / greengram / sorghum/ sugarcane/ termuric	Wheat / sorghum / chickpea	-	-	-	-
Katol (Maharahtra)/ MH-8/ Central Vidarbha Zone / Semi-arid / 45 rainy days /886 mm rain	Field crop + bullock	0.93	3	Soybean/ cotton	Wheat	-	-	-	Soybean/ Soybean +Pigeon pea	Chickpea/ wheat	-	Bullock (2)	fortification of wheat flour.	NKG
	Field crop + bullock + dairy (1-2) + horticulture	1.36	6	Soyabean / cotton	Chickpea/ wheat	-	Cow (1-2)	-	Soybean/ pigeonpea	wheat/ chickpea	-	Cow (1-2)	fortification of wheat flour.	NKG
	Field crop + dairy (1-2)	1.07	3	Soyabean / cotton	Chickpea / wheat	-	Cow (1-2)	-	Soybean/ Soybean +Pigeon pea	Chickpea / wheat	-	Cow (1-2)	fortification of wheat flour.	NKG
V. Southern Plateau and Hills														
Yethpur (TamilNadu)/ NWZ/Bimodal rainfall/ Start of deccan plateau/50 rainy days/869 mm rain	Field crop + dairy (2-3)	1.08	4	Rice/banana /cotton/ maize/ groundnut	Tapioca	Coconut	Cow (3) + buffalo (0-1)	-	Rice/banana / cotton/maize/ sorghum / cowpea	Rice / horsegram/ sorghum/ / gingelly	Coconut	Cow (3-4) + buffalo (0-1) + goat (1)+ poultry (4)	-	NKG
	Field crop + dairy (2-3) + goat/sheep (10-11) + poultry (22-23)	1.16	8	Rice/ banana / cotton/ maize/ sugarcane / ragi / groundnut /tapioca / turmeric / blackgram / beans	Rice / chickpea / sorghum / coriander / beans	Coconut	Cow (2-3) + goat / sheep (10-11)+ poultry (22-23)	-	Rice /cotton/ maize/ Finger millet/ Chrysanthemum / Mulberry/ Fodder grass/ groundnut / Lab Lab	Sugarcane/ /Finger millet/ sorghum/ /gingelly/ groundnut/ cowpea / tapoica	Coconut	Cow (2-3) + goat (8-9)+ poultry (17-18)	-	NKG

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm house-holds	Existing components (As per benchmark, 2017)					Improved /diversified model					
				Crop (s)/Cropping system (s)			Livestock / household (including fish-eries if any)	Product diversifi-cation	Crop (s)/Cropping system (s)			Livestock / house-hold (including fisheries)	Processing module	Optional module
				Kharif	Rabi	Summer			Kharif	Rabi	Summer			
VI. East Coast Plains and Hills														
Bhavanisagar (TamilNadu) / TN-3 / Western Zone / Semi-arid /36 rainy days/ 775 mm rain	Field Field crop + dairy (4-5) + goat/ sheep (8-9) + poultry (7)	1.34	3	Turmeric / Sugarcane / /Coconut	Maize / banana		Cow (2) + buffalo (3-4) + goat / sheep (8-9) + poultry (7)		fodder sorghum	Rice / sugarcane / turmeric / groundnut/ fodder grass	Coconut	Cow (1-2) + buffalo (3-4) + goat (11)+ poultry (12-13)	Graded seed	NKG
	Field Field crop + dairy (4-5) + poultry (16-17)	1.15	9	Sugarcane / turmeric / topioca/ Coconut	Rrice/ brinjal	Cotton	Cow (3-4) + buffalo (1) + poultry (16-17)		Sugarcane / turmeric / F. sorghum	Rice / gingelly // F. sorghum	Cotton / coconut	Cow (4) + buffalo (1-2) + poultry (14)	Graded seed	NKG
VII. West Coast Plains and Ghats														
Ratnagiri(Maharashtra)/ MH-1 / South Konkan Coastal Zone/ Dry sub-humid & per humid /93 rainy days/3868 mm rain	Field crop + poultry (3-4)	0.50	6	Rice	Cowpea / okra	-	Cow (1-2) + poultry (3-4)	-	Rice	Cowpea / cucumber	-	Cow (0-1) + Buffalo (0-1)	Making poha from Rice	NKG
	Field Crop+ Dairy (1-2)	0.60	6	Rice	Cowpea		Cow (1-2) + Poultry (4-5)	-	Rice	Horsegram		Cow (0-1) + Poultry (1-2)	Making poha from Rice	NKG
Vallayani(Kerala)/ KE-2 / Southern Zone / Dry sub-humid & per humid,/ 84 rainy days /1538 mm rain	Field Crop + horticultur + dairy (3)	0.99	6	Rice / coconut	Rice / banana	-	Cow (3)	-	Rice / coconut	Rice / banana	-	Cow (3)	-	NKG
	Horticulture + poultry (26-27)	0.95	6	Coconut	Banana	-	Poultry (26-27)		Coconut	Banana	-	Poultry (56-57)	De-husking, grading and sale of coconut	NKG

Table 7.4.3.2 Production (on equivalent basis of base crop), marketable surplus and economics of existing and improved farming systems in marginal households (For 2018-19)

Farming System	Area (ha)	No. of House-holds	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
Nadia (West Bengal)														
Crop + Dairy + Fishery	1.165	6	13063 (2096)	10526 (2158)	116837 (16515)	66049 (21575)	15741 (1753)	16178 (3163)	105035 (10500)	115337 (17907)	0.156	0.094	0.844	0.031*
Crop + Dairy + Horticulture	1.07	6	15278 (2096)	13823 (2158)	136561 (16515)	77335 (21575)	20602 (1753)	16922 (3163)	166924 (10500)	121508 (17907)	0.156	0.313	0.219	0.156
Overall FS							P value Significance - Existing vs Improved				0.023*	0.034*	0.525	0.005**
CD [P = 0.05]	FS1 Vs FS2		6606	6799	52039	67984	5525	9965	33087	56426				
Patiala (Punjab)														
Crop + Dairy	1.73	12	10344 (741)	8770 (719)	29800 (-)	134668 (11786)	23757 (10281)	21900 (10043)	76128 (-)	301601 (163468)	-	-	-	-
Overall FS							P value Significance - Existing vs Improved				0.232	0.231	<0.001**	0.344
Kanker (Chhatisgarh)														
Crop + Dairy + Pigs + Fishery + Poultry + Veg.	1.925	4	13379 (1782)	10863 (1584)	104495 (9585)	96192 (18351)	24537 (5585)	17268 (4904)	112409 (40823)	255646 (45384)	0.125	0.875	0.875	0.125
Crop + Dairy + Goatry + Poultry	1.286	3	10994 (2058)	9065 (1829)	71229 (11068)	93680 (21190)	22397 (6449)	14780 (5663)	107883 (47138)	228065 (52404)	0.250	0.250	0.750	0.250
Crop + Poultry	1.14	5	5626 (1594)	3971 (1416)	45632 (8573)	38751 (16413)	7684 (4996)	4619 (4386)	29446 (36513)	85817 (40592)	0.313	0.625	0.125	0.125
Overall FS							P value Significance - Existing vs Improved				0.028*	0.181	0.808	0.002**
CD [P = 0.05]	FS1 Vs FS2		6158	5472	33120	63411	19300	16947	141064	156823				
CD [P = 0.05]	FS1 Vs FS3		5409	4806	29090	55695	16951	14884	123898	137739				
CD [P = 0.05]	FS2 Vs FS3		5888	5232	31669	60633	18454	16204	134883	149951				
Annupur (Madhya Pradesh)														
Crop+Dairy	1.16	5	13267 (2704)	12865 (2695)	79454 (10540)	146080 (35990)	10202 (1300)	8285 (1189)	85445 (10463)	87988 (11918)	0.219	0.078	0.016*	0.219
Crop + Goatry + Poultry	1.20	7	5410 (3199)	5228 (3189)	41411 (12471)	50553 (42584)	6797 (1538)	4853 (1407)	49209 (12380)	66340 (14102)	0.063	0.438	0.063	0.063
Overall FS							P value Significance - Existing vs Improved				0.366	0.058	<0.001**	0.234
CD [P = 0.05]	FS1 Vs FS2		9333	9302	36383	124231	4487	4106	36117	41139				
Hingoli (Maharashtra)														
Crop + Sericul-ture	1.13	4	2189 (487)	2189 (487)	24728 (2644)	29995 (11171)	3307 (303)	2814 (311)	37011 (2398)	45653 (5487)	0.125	0.250	0.125	0.250
Crop + Goatry	0.92	5	3630 (436)	3630 (436)	15826 (2365)	74924 (9992)	2712 (271)	2081 (278)	28496 (2144)	39296 (4908)	0.188	0.063	0.063	0.125
Crop + Dairy	1.13	3	3734 (562)	3734 (562)	28483 (3053)	64872 (12899)	3632 (350)	2853 (360)	29737 (2769)	61053 (6336)	1.000	0.250	1.000	0.750

Farming System	Area (ha)	No. of House-holds	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
Overall FS						P value Significance - Existing vs Improved					0.923	0.104	0.001**	0.242
CD [P = 0.05]	FS1 Vs FS2		1478	1478	8023	33904	920	945	7277	16654				
CD [P = 0.05]	FS1 Vs FS3		1683	1683	9135	38601	1048	1076	8285	18961				
CD [P = 0.05]	FS2 Vs FS3		1609	1609	8735	36910	1002	1029	7922	18131				
Nagpur (Maharashtra)														
Crop + Dairy	1.06	3	2816 (1091)	1209 (792)	71767 (19528)	-15447 (30468)	3058 (103)	2658 (227)	17733 (3191)	43429 (4524)	1.000	0.250	0.250	0.250
Crop+BP	0.93	3	1717 (1091)	1508 (792)	15108 (19528)	19225 (30468)	1348 (103)	1091 (227)	11157 (3191)	15795 (4524)	0.250	0.500	0.500	0.500
Crop + Dairy + Horticulture	1.35.	6	4995 (771)	2891 (560)	76613 (13808)	23285 (21544)	3024 (72)	2651 (161)	17239 (2257)	43242 (3199)	0.063	0.668	0.031*	0.313
Overall FS						P value Significance - Existing vs Improved					0.092	0.750	0.003**	0.131
CD [P = 0.05]	FS1 Vs FS2		3490	2535	62473	97472	328	728	10209	14473				
CD [P = 0.05]	FS1 Vs FS3		3023	2195	54103	84413	284	630	8842	12534				
CD [P = 0.05]	FS2 Vs FS3		3023	2195	54103	84413	284	630	8842	12534				
Salem (Tamil Nadu)														
Crop + Dairy	1.00	4	22090 (6952)	21095 (6910)	100585 (19067)	186584 (76287)	15234 (5935)	14524 (5903)	118069 (32022)	79970 (51481)	0.625	0.625	0.625	0.250
Crop + Hort. + Goatry + Sheep + Poultry	1.20	8	11503 (4916)	10693 (4886)	64059 (13482)	85479 (53943)	25363 (4197)	23883 (4174)	134761 (22643)	194961 (36402)	0.148	0.148	0.039*	0.195
Overall FS						P value Significance - Existing vs Improved					0.255	0.253	0.020*	0.540
CD [P = 0.05]	FS1 Vs FS2		18972	18857	52032	208181	16197	16110	87384	140486				
Erode														
Crop+Dairy+ Poultry	1.15	9	17841 (3522)	16632 (3496)	138119 (32492)	165186 (32836)	18262 (1933)	15984 (2224)	98543 (15522)	211904 (33377)	0.496	0.910	0.496	0.129
Crop + Dairy + Goat + Sheep + Poultry	1.34	3	18055 (6101)	17078 (6056)	159185 (56279)	147747 (56873)	25907 (3349)	22261 (3852)	160577 (26885)	279845 (57810)	0.500	0.500	1.000	0.250
Overall FS						P value Significance - Existing vs Improved					0.396	0.758	0.363	0.017*
CD [P = 0.05]	FS1 Vs FS2		15696	15580	144796	146325	8615	9910	69170	148736				
Ratnagiri (Maharashtra)														
Crop +Dairy	0.06	6	3924 (52)	3290 (52)	81689 (733)	36027 (1478)	4218 (131)	3173 (112)	82751 (1270)	43779 (4026)	0.031*	0.313	0.313	0.156
Crop+ Poultry	0.05	6	2043 (52)	1547 (52)	49533 (733)	11750 (1478)	2280 (131)	1211 (112)	52090 (1270)	16324 (4026)	0.219	0.031*	0.156	0.563

Farming System	Area (ha)	No. of House-holds	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Produc-tion (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)	Production (kg)	Market-able Sur-plus (kg)	Cost (Rs)	Profit (Rs)	Produc-tion (kg)	Marketable Surplus (kg)	Cost (Rs)	Profit (Rs)
Overall FS						P value Significance - Existing vs Improved					0.014*	0.022*	0.051	0.052
CD [P = 0.05]	FS1 Vs FS2		163	163	2466	4658	414	352	4001	12687				
Thiruvananthapuram (Kerala)														
Crop+ Hort. +Dairy	0.99	6	51507 (10006)	50475 (10059)	217861 (23077)	451728 (109477)	59765 (18262)	57833 (18147)	469840 (129589)	307102 (162280)	.313	0.313	0.031*	0.313
Hort.+Poultry	0.95	6	10720 (10006)	10519 (10059)	32697 (23077)	106663 (109477)	72915 (18262)	69175 (18147)	454002 (129589)	493899 (162280)	0.031*	0.031*	0.031*	0.031*
Overall FS						P value Significance - Existing vs Improved					0.028*	0.034*	0.002**	0.421
CD [P = 0.05]	FS1 Vs FS2		0.0276	31696	72717	344970	57543	57183	408343	511355				

7.4.4 Scheduled cast sub-plan (SCSP)

More than 80% of the world, as well as Indian farmers, fall under the small and marginal (less than 2 ha) holding. Census 2015-16 shows that around 87 percent of the operational holdings in the country are small and 2 marginal, i.e., holdings of less than 2 hectares each. India alone has one-fourth of the small and marginal farms of the total world. Smallholding does not support farmers to live with respect in society, and the condition of a small farm holder is not better than daily paid labor. Out of a total of 17.34 million operational holdings of Scheduled Castes in 2015-16, marginal holdings constituted (78.2 percent), small (14.1 percent), semi-medium (5.6 percent), medium (1.8 percent), and large (0.3 percent). It can be seen that the bulk of operational holdings under schedule caste belonged to marginal and small categories, i.e., 92.3 percent together. They obliged to impoverish to uplift their life as the farming system, so many scopes are keeping above fact in mind following project formulated.

Objective

- *To study the existing productivity and profitability of crops, livestock, and other components in farming system perspective and identify significant constraints*
- *To demonstrate the IFS modules and evaluate their impact on the livelihood of the underprivileged households*

Year of start: 2017-18

Households: As per the Scheduled cast sub-plan guidelines, Scheduled cast households have been selected for characterization, identification of constraints and technological interventions.

Locations: During 2018-19, the programme was undertaken in 7 districts in 5 states under SCSP. It includes 6 OFR centres namely, Bilashpur (Himachal Pradesh), Dausa (Rajasthan), Yethapur & Erode (Tamil Nadu), Medak (Telangana) and Chikkaballapura (Karnatka).

Number of beneficiaries under SCSP: Total 57 farmers covered in 2018-19 from 22 villages and 48 men and 9 women benefited in the project across the country

Benchmarking of Farming System

Details	2018-19
Number of crops grown (field crops/ fodder)	12
Dairy (breed)	Local, Holstein Friesian, Sahiwal
Other components	Poultry, sheep, goat, fish

Constraint specific interventions made

Modules	Interventions made
Crop	Improved varieties of all crops including fodder Intercropping Diversification with new crops Balanced nutrient application, INM IPM Mechanization with small farm tools & implements
Dairy	Cowmat, mineral mixture, Deworming, AI, balanced feeding, improved housing

Modules	Interventions made
Small ruminants /other component integration	Poultry (Kadaknath, Swarnadhara, NKL 1) Goat (Tellicherry) Sheep (Bandur) Pig (Yorkshire) Fishery (pond management and
Supplement / Complementary activities	Apiculture Azolla Recycling of wastes through vermicompost Mushroom, Kitchen garden

Recurring inputs distribution to SCSP beneficiaries

Inputs	2018-19	
	No. of SCSP farmers	Total quantity of input
Seeds (kg)	47	282
Vegetable kit (kg)	28	13
Horticulture plants (No's)	-	-
Small implements (No's)	6	42
Fertilizer (kg)	30	3465
Mineral Mixture (kg)	30	140
Concentrate feed (kg)	12	450
Poultry feed (kg)	12	350
Vermibed (No's)	12	12
Bio-pesticides (litres/kg)	24	129

Non-recurring inputs distribution to SCSP beneficiaries

Inputs	2018-19	
	No. of SCSP farmers	Total quantity of input
Sprayer	6	6
Dal mill (Medak)	12	1
Incubators	12	04
Power weeder	2	2
Chaff cutters	6	6
Sheep /goat	4	20
Poultry chicks	36	700
Yorkshires piglets	2	18
Cowmats	4	12
Apiculture Equipment	4	26
Livestock sheds (participatory / portable)	4	4

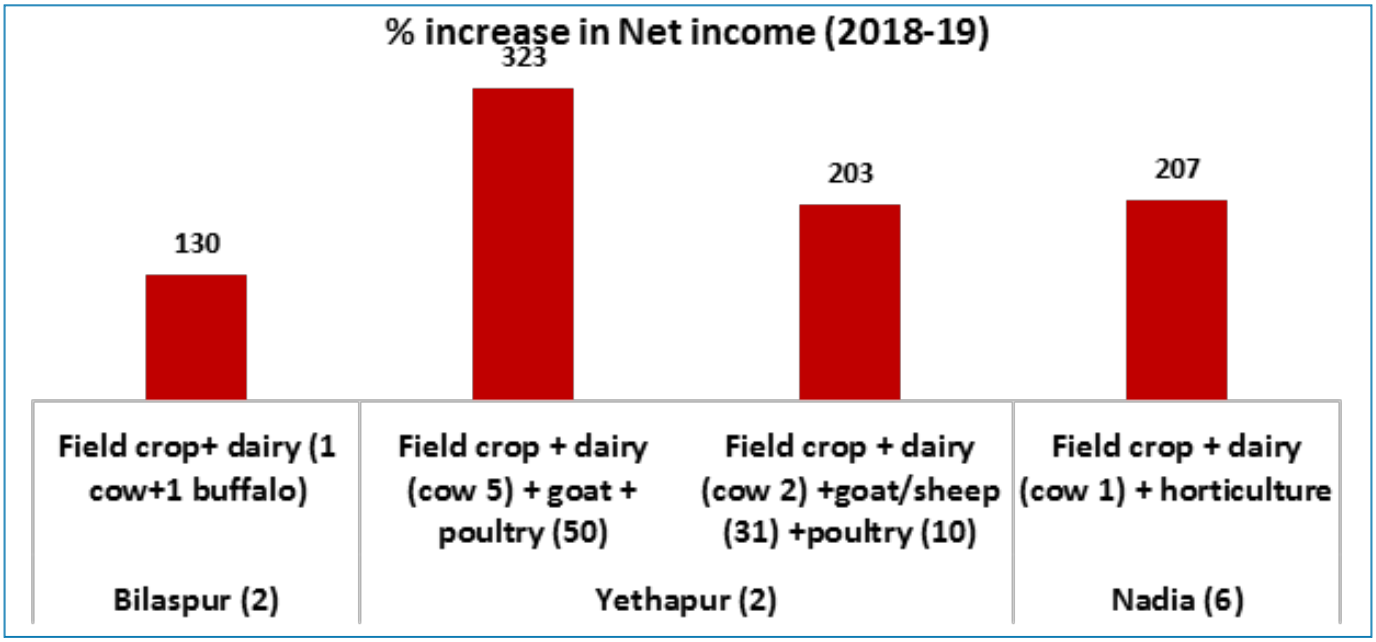
Details of items distributed under SCSP component by OFR centres

Sl. No.	OFR Centres	Name of the capital item (Equipment's / implements etc.)	Quantity (No's)	Rate (Rs/ each)	Total (Rs)
1	Chikkaballapura	Sheeps (Bandur breed)	20	6000	120000
		Poultry birds (Kadaknath / Swarnadhara)	120	180	21600
		Piglets (Yorkshire / Duram)	18	4500	81000
		Honey bee rearing boxes + colonies + stand and other equipment's	2 unit	70000	140000
		Cow mats	8	3000	24000
		Tarpaulins	4	3000	12000
		Miscellaneous items (fodder seeds, fertilizers, pp chemicals, spade, pix axe, bandli			190000
		Total			588600
2	Bilaspur	Farm Implements Kits	6	-	100000
		Knapsack sprayers	2	-	
		Knapsack sprayers batteey operated	3	-	
		Chaff cutters	4	-	
3	Dausa	Pear millet seed	90 Kg	-	-
		Mustard seed	90 kg	-	-
		kitchen gardens developed	15	-	-
		Trainings conducted	3 (74 b)	-	-
4	Medak	Dall mil	1 (12 b)	99000	99000
		Incubators	1 (12 b)	80000	80000
		Rajashri Chicks	400	10	39600
		Fodder seed, Poultry feed,Animal feed Plasic tarpaulins, Vermi bed, kitchen garden, Seed	60 ben.	-	200000
		Total			418600
5	Salem	High yielding Cassava (YTP 1)	-	-	-
		Hybrid Vegetables in Tomato and Chilies	-	-	-
		Introduction of new Green Fodder Grass CO.5 (CN Grass) Tree Fodder (Sesbania)	-	-	-
		Mineral Mixture@50g/animal/day	-	-	-
		New Poultry Breed (NKL 1)	-	-	-
		Goat Breed Telicheery	-	-	-
		Muticut fodder sorghum (Co.FS 29)	-	-	-
		Mineral Mixture@50g/animal/day	-	-	-

Output:-

SCSP programme run by different OFR centre and it help to increase the overall production of the system and also improve the livelihood of the farmers. Trough different intervention in 2018-19 increase in crop productivity was recorded 38% and income enhancement was 89 per cent. SC farmers having less resources control and small purchasing power so small contribution or

intervention reflect in the overall increase in the increase in the net income of the family under different system at different centre net income increase from 13 to 323% which is quite impressive



Capacity building: Trainings

During 2018-19 total 3 training was organised in which 85 men and 31 women total 116 farmers get benefited farmers trained about scientific vermicompost preparation trough vermin-bed and preparation of azolla and mushroom farming.

Distribution of Machineries under SCSP Component at Salem

Farming system activities at the Cluster based SCSP households at Dausa

Cow mat and kitchen garden kit distribution at Chikkaballapura centre under SCSP

8

GENERAL/ MISCELLANEOUS

8.1 LIST OF PUBLICATION

8.1.1 Research Papers

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
		A&N, Port blair		
Swarnam, T. P. Velmurugan,A., Subramani, T and Swain, S. (2019)	Effect of foliar application of Panchakavya on yield and quality of Okra (Abelmoschus esculentus L) under Island cocndition.	International Journal of Tropical Agriculture	37 (4): 537-541	
Swarnam, T.P. and Velmurugan, A. (2019)	Diversification of rice based cropping systems for higher production and productivity in rainfed lowlands of Andaman Islands	Journal of the Andaman Science Association	24(1):5-8	
Swarnam, T.P., Perumal, P., Velmurugan, A., Subramani, T. and Lakshmi, N.V. (2019)	The Potential of Integrated Farming System to Supply Feed and Fodder for Dairy Cattles and Evaluation of its Performance.	Journal of the Andaman Science Association	24(2):89-97	
Waman, A.A., Maheswarappa, H.P., Jerard, B.A., Velmurugan, A., Senthilkumar, S. and Chakraborty, G. (2019)	Evaluation of Intercrops in Arecanut Gardens of South Andaman Island.	Journal of the Andaman Science Association	24(1):1-4	
		Andhra Pradesh (Maruteru)		
Manukonda Srinivas, B. Anusha, C.V. Reddy, P.V. Satyanarayana and P. Munirathnam	Effect of weed management practices on productivity and economics of rice-rice crop sequence under organic production system	International Journal of Bio-resource and stress management	10 (2): 124-127	4.65
Manukonda Srinivas, Anusha B., C. Reddy Venkata and Munirathnam P.	Influence of organic weed management practices on growth and yield of Kharif Rice (Oryza sativa L.)	Progressive Research – An International Journal	14 (3): 194-197	3.84
Rao M M V Srinivasa, Prasad P V N, Murthy Ramana K V, Sreelatha T and Rao Mukunda CH	Direct and Residual Effect of Integrated nutrient management practices in groundnut-maize cropping system	The Andhra Agricultural Journal	66(1): 19-28	4.14

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Rao MMV Srinivasa, Prasad PVN, Murthy KV Ramana, Sreelatha T and Rao CH Mukunda	System productivity of groundnut-maize cropping system as affected by biofertilizers and crop residue incorporation	Journal of Pharmacognosy and Phytochemistry	8(4): 3269-3276	5.21
Rao MMV Srinivasa, Prasad PVN, Murthy KV Ramana, Sreelatha T and Rao CH Mukunda	Soil fertility dynamics in the groundnut-maize cropping system under integrated nutrient management	International Journal of Chemical Studies	7(5): 710-719	5.31
Rao K. Tejeswara, Rao M.M.V. Srinivasa and Nagarjuna D.	Response of rice-rice cropping system to different agronomic management practices	International Journal of Plant Sciences	14(2) 81-83	4.31
Rao K. Tejeswara, Rao M.M.V. Srinivasa and Nagarjuna D.	Crop + dairy + poultry farming system model for enhanced farm income in high altitude and tribal area of Andhra Pradesh	Agriculture update	14 (3): 253-256	4.39
Rao K. Tejeswara, Rao M.M.V. Srinivasa and Nagarjuna D.	Tribal farmer success story of integrated farming system in Andhra Pradesh	Rashtriya Krishi	14(1): 123-126	3.25
Rao K. Tejeswara, Rao M. M. V. Srinivasa and Patro T. S. S. K.	Integrated Farming Systems: A potential Tool for Doubling Farmer's Income	International Journal of Current Microbiology and Applied Sciences	8(9) 2629-2642	5.38
Rao M. M. V. Srinivasa and Naidu D. Chinnam	Drum Seeder Technology is Made Easy Paddy Cultivation and it is a Boon to Farmers of North Coastal Zone of Andhra Pradesh	International Journal of Current Microbiology and Applied Sciences	8(9) 1733-1739	5.38
	Assam (Jorhat)			
Deka K., Hazarika P.P., Medhi B.K., Borah R., Kandaliand G.G. Gogoi Bhabesh. (2019).	Characterization of Biochars and Their Application Rates on Soil Moisture Retention in Light Textured Soil of Assam.	International Research Journal of Pure & Applied Chemistry	19(2): 1-9, 2019.	5.4
Gogoi Bhabesh, Borah M., Hazarika J., Rajbongshi A., Borah A., Borah B., Sharma K.K. and Baishya A.. (2019)	Problems and prospects of farming systems in Upper Brahmaputra Valley Zone of Assam.	International Journal of Agriculture Sciences	11(17): 8958-8963, 2019.	4.2
Gogoi Bhabesh (2019)	Problem, prospect and role of agriculture in rural development in North-East India.	International Journal of Applied Social Science	6 (7): 1944-1951, 2019.	2.61

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Bora Sarat Sekhar, Sharma Karuna Kanta, Borah Karishma and Milan Konwer Jyoti (2019).	Effect of Nitrogen Levels and seed rate on growth and yield of Rye Grass (Loliummultiflorum) in Assam, India.	Int.J.Curr. Microbiol.App.Sci	8(9):2110-2114.	5.38
	Bihar (Sabour)			
Das, Anupam, Rakshit, Rajiv, Padbhushan, Rajeev, Kohli, Anshuman, Sushant and Kumar Sanjay (2019).	Effect of annual carbon input on soil carbon sequestration and sustainability under rice-wheat cropping system after the 28th crop cycle.	Journal of Soil and Water Conservation	18(3): 254-262.	8.21
Saiful Islama, Mahesh K. Gathalaa, Thakur P. Tiwari , Jagadish Timsina,k , Alison M Laing , Sofina Maharjan , Apurba K. Chowdhury, Prateek M Bhattacharya, Tapamay Dhar, Biplab Mitra, Sanjay Kumar, Pawan K Srivastwa, Swaraj K. Dutta, Renuka Shrestha, Sarita Manandha, Shukra Raj Sherestha, Prakash Paneru, Nur-E-Alam Siddquie, Akbar Hossain, Rashadul Islam, Anup Kumar Ghosh, Mohammad Atiqur Rahman, Ujjwal Kumar, Karnena Koteswara Rao, Bruno Gérard (2019)	Conservation agriculture based sustainable intensification: Increasing yields and water productivity for smallholders of the Eastern Gangeti SDAU Plains	Field Crop Research	238 (2019) 1–17	10.31
	Gujarat (S K Nagar)			
Desai, L. J., Patel, R. R., Patel, P. K., Patel, A. M., and Patel, K. M (2019)	Impact of intervention / diversification in farming system on profitability and sustainability of small farmers of Mehsana district.	GAU Research Journal	44(3): 162-166.	2.72
Desai, L. J., Patel, R. R., Patel, P. K., Patel, A. M., and Patel, K. M (2019)	Crop response to plants nutrients in predominant cropping system of Mehsana district of Gujarat.	GAU Research Journal	44(3): 156-161	2.72
Patel, K. M., Patel, P. K., Patel, K. N., Chaudhari, H. L. and Patel, S. A. (2019)	Influence of different cropping system on carbon sequestration and soil organic carbon stock after eight years in loamy sand.	International Journal of Chemical Studies.	7(4): 497-499	5.31

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Patel, K. M., Patel, P. K., Patel, K. N., Chaudhari, H. L. and Patel, S. A. (2019)	The impact of long-term integrated farming on soil derived greenhouse gas emissions	International Journal of Chemical Studies	7(6): 1177-1179	5.31
		Junagadh		
Solanki, R. M. Malam, K. V. Vasava, bM. S. and Chodavadiya, S. K.	Response of Bt. Cotton to high density planting and nitrogen levels through fertigation.	Journal of pharmacognosy and photochemistry	9(5): 1952-1958	5.21
Solanki, R. M. Malam, K. V. Vasava, bM. S. and Chodavadiya, S. K.	Influence of rabi onion (Allium cepa L.) to levels and application schedule of soluble fertilizer under drip fertigation.	The Pharma innovation journal.	9(9): 176-181	5.03
Damor N. N., Solanki R. M., Hadiyal J. G. and Dharaiya B. K.	Effect of drip irrigation schedule and fertigation levels on growth parameters and yield of wheat (Triticum aestivum L.)	Journal of pharmacognosy and photochemistry	10(2): 1546-1550	5.21
Palanjiya R. R., Solanki R. M. and Meena Arpita	Effect of spacing and nitrogen levels on growth and yield of rabi fodder sorghum (Sorghum bicolor L. Moench).	International Journal of Chemical Studies.	7(5):2366-69	5.30
Palanjiya R. R., Solanki R. M. and Meena Arpita	Fodder quality of rabi fodder sorghum (Sorghum bicolor L. Moench) as influenced by spacing and nitrogen levels.	International Journal of Chemical Studies.	7(6):592-594	5.30
Solanki R. M., Malam K. V., Vasava M. S., Chodavadiya Dr. S. K.	Response of Bt. Cotton to high density planting and nitrogen levels through fertigation.	Journal of pharmacognosy and phytochemistry,	9 (5): 1952-1958	5.21
Solanki R. M., Malam K. V., Vasava M. S. and Chhodavadiya S. K.	Influence of rabi onion (Allium cepa L.) to levels and application schedule of soluble fertilizer under drip fertigation	The Pharma innovation journal,	9(9): 176-181	5.03
Meena Arpita, Solanki R. M., and Palanjiya R. R	Effect of spacing and nitrogen levels on growth, yield attributes and yield of fodder maize	International Journal of Chemical Studies.	7(5):2355-2357	5.30
		Navsari		
Rod, N. K.., Gudadhe N. N., Mehta, P. V., Karmakar N. and Narwade,. A. V	Little dose of cobalt chloride enhances crop duration and increases production and productivity of chickpea	Journal of Plant Nutrition	42(1):40-57 (2019)	7.13

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
	Himanchal Pradesh (Palampur)			
Sharma S.K., Negi S.C., Pathania Pawan Soni Rajju Priya and Katoch Mittu 2019	Characterization and Economics of Farming Systems in Una District of H.P..	Himachal Journal of Agricultural Research	44 (1&2)	3.91
	Jammu&Kashmir (Jammu)			
Das Ruma, Mandal Biswapati, Sarkar Dibyendu, Kumar Amit Pradhan, Datta Ashim, Padhan Dhaneshwar, Seth Anindita, Kumar Rahul, Birmal De, Mishra V.N., Polara K.B., Sharma Sanjay, Thakur N.P., Kachroo Dileep, Ray M., Sharma Anil, Patel K.P., Mohan Lalit Narkhed Garnayak, W.N.	Boron availability in soils and its nutrition of crops under long-term fertility experiments in India	Geoderma	(351); 116-129	9.74
Gupta Meenakshi, Sharma B.C., Thakur N.P., Kour Sarabdeep and Bharat Rajeev	Effect of graded levels of NPK on growth, yield and quality of fine rice (Oryza sativa L.) Var. Pusa Basmati 1121	The Bioscan	14(2); 085-089	6.74
Kumar Parshotam, Thakur N.P., Gupta A.K., Sharma Rohit, Kour Manpreet, Bochalya Singh Archna, Ranjeet and Kumar Deepak	Conservation Agriculture practices in intensive cropping system and its effect on crop productivity and soil health under North-Western Himalaya	The Pharma Innovation	10 (8): 875-883	5.23
	Karnatka (Kathalagera)			
KUMARA, O., RAJINI, S.R., SANNATHIMMAPPA, H.G., VIJAY S. DANARADDI. AND UMESH, C.,2019	Integrated Farming system for doubling the farm income through sustainable resource management for ensuring livelihood security of resource poor farmers	International Journal of Agricultural Sciences	10(17): 7029-7032	4.20
	Bangalore			
Nagarjun, P., Dhanapal, G. N., Sanjay, M. T., Yogandra, S. B. And Muthuraju, R.,	Energy budgeting and economics of weed management in dry direct-seeded rice	Indian Journal of Weed Science	51(1): 1–5	5.84
Sanjay, M.T., Dhanapal, G.N., Nagarjun, P. AND Sandeep, A.	Response of mulching and weed management practices on weed control, yield and economics of garlic	Indian Journal of Weed Science	51(2): 1-3	5.84

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Kumar Anjan, M. J. AND Gundappa	Hyderabad Karnataka region building construction migrant labour migrated to Bangalore city: Study for socio economic work praxis.	International Journal for Research and Review	6 (2):922-926	8.0
		Sriguppa		
Mallareddy, Desai B.K, and Basavanneppa M.A. 2019	Sustainable intensification of rice-fallows with pulses and oilseeds in Tungabhadra command area.	International Journal of Chemical Studies	2019; 7(1): 2023-2026.	5.31
Prashant, R. N. Umesh, M. R., Basavanneppa, M. A. Ramesh, Y. M. and Manjunatha, B. 2019,	Effect of irrigation scheduling through surface drip on growth, yield and water savingin direct seeded rice (Oryza sativa L.).	Journal of Farm Sci.	32(1): 27-30	4.42
Sharanabasappa, H.C., Basavanneppa , M.A.,2019	Influence of plant population and fertilizer levels on growth, yield and quality parameters of quality protein maize (Zea mays L.) in irrigated ecosystem.	International Journal of Chemical Studies	7(2): 1425-1429	5.31
Adarsha, G. S. H. Veeresh, K. Narayana Rao, Ashok Kumar Gaddi and M. A. Basavanneppa, 2019,	Effect of foliar application of micronutrient mixture on growth and yield of maize (Zea mays L.),	J. Farm Sci.,	32(2): (162-166)	4.42
Amareshappa and Basavanneppa, M.A., 2019,	Real time nitrogen management through leaf colour chart in maize (Zea mays L.) under irrigated ecosystem.	International Journal of Chemical Studies,	7(3): 4942-4945.	5.31
Madhan Dhadoti, Amaresh, Y.S, Gururaj, S. Mallikarjun, K. Basavanneppa M.A., 2019.	Biochemical studies for host resistance against chickpea rust.	International Journal of Chemical Studies	7(5): 1388-1390	5.31
Maruthi, D. Krishnamurthy, Y.M. Ramesh, B.M. Chittapur and Ashok Kumar Gaddi, 2019,	Performance of Sugarcane under Different Establishment Techniques and Planting Geometries,.	Int. J. Curr. Microbiol. App. Sci.,	8(11): 293-301	5.38

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Maruthi, D. Krishnamurthy, Y.M. Ramesh, B.M. Chittapur and Ashok Kumar Gaddi, 2019,	Growth, Sugar Yield, Quality and Economics of Sugarcane under Different Establishment Techniques and Planting Geometries	Int. J. Curr. Microbiol. App. Sci.,	8(11): 485-493.	5.38
	Kerala (karamana)			
kumar Madan, M., John, J., Pillai,S.P. and Rani, B.	Weed dynamics in crop + fish farming systems in summer rice fallow of double cropped lowland rice fields	Journal of Tropical Agriculture	57(1): 97-103	4.75
John, J. and, Shirmila G.J.	Allelopathic effect of fresh leaf loppings of multipurpose trees	The Indian Forester	145(1): 70-75	4.38
Adarsh, S., John, J., and Thomas, G.	Role of pulses in cropping systems: A review	Agricultural Reviews	40(3): 185-191	4.37
Meera, A.V., John, J., Sudha, B., Sajeena, A., Jacob, D., and Bindhu, J. S.	Greenhouse gas emission from integrated farming system models: A comparative study	Green Farming	10(6): 696-701	3.85
Panwar, A.S., Shamim, M., Babu, S., Ravishankar, N., Prusty, A.K., Alam, N.M., Singh, D.K., Bindhu, J.S., Kaur, J., Dashora, L.N., Pasha, M.D.L., Chaterjee, S., Sanjay, M.T., Desai, L.J.	Enhancement in Productivity, Nutrients Use Efficiency, and Economics of Rice-Wheat Cropping Systems in India through Farmer's Participatory Approach	Sustainability	11(1), 122; https://doi.org/10.3390/su11010122	8.58
kumarJaya, Bindhu G., , Rakhi J. S., , R., Shajan, V. R. and Rini, C. R.	KAU UTHAMA: A short duration cassava variety for Upper Kuttanad region of Kerala	Journal of Root Crops	45(1):12-16	3.86
	Madhya Pradesh (Indore)			
Sinha, N.K.; Kushwah, H.S.; Paliwal, D.K.; Sharma, A.K. and Thakur, N.S. (2019).	Integrated Nutrient management in different types of maize (Zea mays L.) in the Malwa plateau of Madhya Pradesh	Trends in Bioscience :ISSN-0974 – 8431	879-886	NAAS-3.94
	Rewa			
Sirse S,Kurmavanshi S.M.,Muniya R,And Maurya B.M. 2019	Evaluatoin of different cropping system modelunder irrigated condition	International journal of current microbiologyand applied science	8(12):982-988	5.39
	Maharashtra (Akola)			
Korde K. S., B. V. Saoji, B. S. Morwal,R. D. Walke and P. H. Bansod	Yield and monetary returns of chickpea (Cicer arietinum L.)as influenced by organic fertilizers under irrigated condition.	PKV Res. Journal,	Vol. 43(1) Jan., 2019	2.74

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Korde K. S.,B. V. Saoji, B. S. Morwal,D. S. Kankal and P. H. Bansod	Effect of manures and fertilizers on nutrient uptake by chickpea (Cicer arietinumL.) and soil nutrient status under irrigated condition.	PKV Res. Journal	Vol. 43(1) Jan., 2019	2.74
	Parbhani			
Patil C. B., A. S. Karle and D. N. Gokhle. 2019.	Comparative productivity and profitability of safflower based intercropping systems under protective irrigation on vertisol.	Journal. of Pharmacognosy and Phytochemistry	8 (4) : 176-179.	
	Odisha (Bhubaneswar)			
Patra A K, Garnayak, L M. Mishra K N and Mohanty A K	Influence of diversification on productivity, profitability and efficiency of rice (Oryza sativa) based cropping systems under irrigated condition.	Indian Journal of Agronomy	64(1): 18-22 (2019)	5.55
Deb S, Kumar D, Chakraborty S, Weindorf D C, P Banik, Deb D, Choudhury P De, A, Saha S, Patra, A K Majhi M, Naskar P and Panda P	Comparative carbon stability in surface soils and subsoils under submerged rice and upland non-rice crop ecologies: A physical fractionation study.	Catena	175: 400-410 (2019)	10.33
Patra A K, Garnayak L M, Mishra K N, Paikaray R K and Bastia D K	Productivity, resource use efficiency and economics of rice (Oryza sativa)-based bio-intensive cropping systems in coastal Odisha.	Indian Journal of Agronomy	64(2): 165-171 (2019)	5.55
Patra A K, Garnayak L M, Mishra K N, Mohanty T R, Mohapatra B K and Swain S K	Influence of balanced fertilization on productivity, economics and nutrient use efficiency of rice (Oryza sativa)–groundnut (Arachis hypogaea) cropping system under on-farm situations.	Indian Journal of Agronomy	64(3): 293-297 (2019)	5.55
Mohanty A, Mishra K N, Garnayak L M and Patra A K	Impact of system of rice intensification (SRI) on the water holding capacity (WHC) of soil and water use efficiency (WUE) in a tropical rainfed agro-ecosystem of Odisha.	Journal of Pharmacognosy & Phytochemistry	8(4): 1576-1580 (2019)	5.21

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Mohanty A, Mishra K N, Garnaya L M k	Effect of mulching and integrated nutrient management on soil micronutrient status in an inceptisols under coastal agro-ecosystem of Odisha.	International Journal of Chemical Studies	7(4): 845-848 (2019)	5.31
		Punjab (Ludhiana)		
Das Ruma, Purakayastha TJ, Das Debarup, Ahmed Nayan, Kumar Rahul, Biswas Sunanda, Walia SS, Singh Rohitashav, Shukla VK, Yadava MS, Ravisankar N, Datta SC (2019)	Long-term fertilization and manuring with different organics alter stability of carbon in colloidal organo-mineral fraction in soils of varying clay mineralogy.	Science of The Total Environment	684: 682-693.	10.61
WaliaS S,Rajni and SinghSatpal(2019)	Energetics and productivity of rice based cropping systems of Punjab.	Agricultural Research Journal	56 (2): 332-335.	4.71
Kaur Jaspreet, Gosal S. K. ,Walia, S. S. and Kaur J. (2019).	Impact of green manure and consortium biofertilizer on amylolytic bacterial population and their activities in maize rhizospheric soil.	Chemical Science International Journal	24(4):1-7.	5.28
Singh Davinder, Kumar R., Walia S S and Brar A S (2019)	Correlation and regression studies of yield and yield components as influenced by organic and inorganic sources of nitrogen in turmeric.	Annals of Agricultural Research (NS)	39 (4) : 420-424	4.78
		Rajasthan (Durgapura)		
Sammauria, R. Balyan, J K and Bairwa P C. 2019	Time, intensity of detasseling rainfed maize (Zea mays) for improving productivity, economics and rainwater-use efficiency.	Indian Journal of Agricultural Sciences	89(12):2053-8	6.25
Bairwa, P C., Sammauria, R and Gupta, K C.2019	Direct and residual effect of PROM on productivity, nutrient uptake, soil properties and economics under clusterbean- wheat cropping system.	J. of Soil salinity and water quality	11 (1):84-89	4.94

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Kumar S, Sharma Yadav P K, Sexena M R, Gupta R, Garg K C, N K and Yadav H L. 2019	Impact of nutrient management practices and plant growth regulators on growth, productivity and profitability of wheat (Triticum aestivum).	Indian Journal of Agricultural Sciences	89(4):604-609	6.25
Kumar S, Sharma P K, Yadav M R, Sexena R, Gupta K C, Kumar R, Garg N K and Yadav H L. 2019	Effect of irrigation levels and moisture conserving polymers on growth, productivity and profitability of wheat.	Indian Journal of Agricultural Sciences	89(3):509-514	6.25
Yadav M R, Kumar Y, Pooniya V, Gupta K C, Saxena R and Garg N K. 2019	Performance of groundnut (Arachis hypogaea) under different phosphorus management options in semi-arid environment of Rajasthan.	Indian Journal of Agricultural Sciences	89(6):946-50	6.25
Gupta Shweta, Sharma P K, Kumar Sudesh, Sharma Seema, Singh Pratibha and Parashar Aabha. 2019	Study of chemical properties and growth parameters of Indian mustard influenced by application of herbicides and fertilizers.	International Journal of Chemical Studies	7 (3): 3804-3807	5.38
	Kota			
Tetarwal, J.P., Ram, Baldev., Nagar, R.K. and Choudhary, G.R.	Sustainable and intensive cropping systems for humid ecologies of South-Eastern Rajasthan.	Annals of Agricultural Research	2019. Vol 40(3): 333-337.	4.78
Tetarwal, J.P., Ram, Baldev., Bijarnia, Anju and Kumawat, Roshan	Efficasy of new herbicides in irrigated linseed (Linum utitatissimum L.) under vertisols of South-Eastern Rajasthan.	Annals of Agricultural Research	2019. Vol 40(4): 288-293.	4.78
Ram, Baldev., Punia, S.S., Tetarwal, J.P. and Narolia, R.S.	Effect of foliar nutrition and hydrogel on soil moisture, growth, yield and econonics of lentil under vertizols.	Journal of Food Legumes	2019. 32(2), 97-100	4.82
	Udaipur			
Singh, Hari., Jangid, M.K., Meena, G. L. and Sharma, S.	Enhancement of Productivity and Profitability through Integrated Farming Systems in Rajasthan.	Journal of Animal Research, 9(3):473-481	2019	5.68
Meena, G. L., Sharma, Latika, Burark, S. S. and Singh, Hari	Milk Production Function and Resource Use Efficiency in Rajasthan.	Journal of Animal Research, 9(4):521-526.	2019	5.68

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
	Tamilnaidu (Thanjavour)			
Yazhini G, Sathiya Bama K, Porpavai S, Chandra Sekaran N	Potential of Cropping Sequences on Soil Carbon Sequestration	International Journal of Advances in Agricultural Science and Technology	Vol.6 Issue.1, January- 2019, pg. 1-16.	
Jaypriya M and Porpavai S	Effect of crop establishment methods and irrigation scheduling on growth and yield of direct dry seeded rice	Journal of Pharmacognosy and Phytochemistry	8(3): 459-462. (2019)	
Nagarajan M, Porpavai S, Thiyagarajan G and Manikandan M	Performance Evaluation of Maize crop under different irrigation regimes and spacing	International Journal of Agricultural Sciences	Vol. 11, Issue 11, June 2019 , PP – 8572 – 8574	
Nagarajan M, Porpavai S, Thiyagarajan G and Manikandan M	Performance Evaluation of Maize with square spacing for maximizing the yield potential through subsurface drip fertigation.	International Journal of current Microbiology and Applied Sciences. 8 (06): 1808-1820. (2019)	8 (06): 1808-1820. (2019)	
Nalini R and S. Porpavai	Enhancing floral and habitat diversity for augmenting natural enemies in rice ecosystem of Thanjavur, Tamil Nadu, India.	ORYZA,	volume 56 (3) P.no.: 285-293 (2019)	
Nalini R and S. Porpavai	A bio intensive insect pest management module for samba organic rice cultivation in New CDZ.	Journal of Rice Research	Journal of Rice Research, Volume. 12, No.2 P.No.59-64. 2019.	
Porpavai S and D.Yogeswari	Alternate Wetting and Drying Irrigation in Direct Seeded Rice: A Review.	Agricultural Reviews.	10.18805/ ag.R-2043. Vol. 1 P.No.1-7.	
	Telangana (Rajendranagar)			
Ch Pragathi Kumari,., Sridevi,S , Goverdhan,M and Pasha, L. Md.	Enhancement of productivity and profitability of small farmers through bio-intensive complementary cropping systems	International journal of chemical studies	7(2): 334-338	5.31
Ch Pragathi Kumari,., Goverdhan,M., Sridevi,S., Reddy, G.K., Pasha, L. Md., Ramana, M.V and Rani, B.	Profitability of cropping systems module for different farming systems in Southern Telangana Zone of Telangana State	Journal of Pharmacognosy and Phytochemistry	8(3): 153-157	5.28

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
Ch Pragathi Kumari,., Suneetha Devi, K.B., Rekha, B.K., Sridevi, S. and Reddy, N.S.	Effect of in-situ moisture conservation practices and integrated nutrient management practices on growth and yield of Bt cotton	The Journal of Research, PJTSAU	47(1) : 17 – 23	3.35
Ch Pragathi Kumari,., Goverdhan,M., Sridevi,S., Ramana, M.V., Reddy, G.K and Pasha, L. Md	Studies on productivity, nutrient uptake and post harvest nutrient availability in different cropping systems module for different farming systems in Telangana state	International journal of chemical studies	7(5): 116 - 121	5.31
Reddy, G.K., Sharma, S.H.K and Srilatha, M.	Long term effect of organic and inorganic fertilizers on nutrient use efficiencies and nutrient balance in rice;rice cropping system.	International Journal of Chemical Studies	7(5): 2327-2330.	5.21
Reddy, G.K., Sharma, S.H.K, Ravi, P., Chandrashaker, K., Singh, M and Ravi, W.	Long term effect (17 years) of different nutrient management practices on crop yield trends, soil productivity and sustainability in rice-rice cropping system under semi-arid tropical climatic condition in an Inceptisol of India.	International research journal of pure and applied chemistry.	20(3): 1-14.	5.40
Ch.Pragathi Kumari., Goverdhan, M., Reddy, G.K., Sridevi, S., Alibaba, Md and Chiranjeevi, K.	Production potential and economics of different cropping systems for different farming systems in Telangana.	Chemical Science Review and Letters	8(32):315-322.	5.21
Renuka.S., kumari R. Vijaya, Md.Ali Baba and Meena A.	Economic Analysis of Red Gram Cultivation in Gulbarga District of Karnataka	The Journal of Research PJTSAU	Vol.No.XLVII. No.2PP 42-45	3.35
Renuka,R. Kumari, Vijaya Md. Ali Baba and Meena A.	Conceptual frame work,trend and constraints faced by each agent of value chain of red gram in Gulbarga district of Karnataka.	International Journal of Current Microbiology and Applied Sciences.	Vol 9 (08)2568-2578	5.38
P.Srikanth Reddy, Md.Ali Baba, Kumari R.Vijaya and Chary D.Srinivasa	Economic Analysis of BT Cotton Cultivation in Warangal District of Telangana State.	Multilogic In Science	VOL. X, ISSUE XXXV:1122-1127	5.20

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
K.Chiranjeevi, DeviK.B.Suneetha,K. Suresh,G.Jayasree,and eddy S.Narendar.2019	Assessment of nutrient management and omissions on yield of transplanted rice	Journal of Pharmacognosy and Phytochemistry	8(6):147-149	5.21
Shankar.M,Shivaprasad G, Naik Sumalini,Balazzii and KChiranjeevi.2019.	Bo –efficacy and phytotoxicity of novel insecticides against brown plant hopper on rice	Journal of Entomology and Zoology studies	7(5):860-865	5.53
	Uttar Pradesh (kanpur)			
Mishra Priyavart, Tiwari US, Pandey Hanuman Prasad, Pathak RK and Sachan AK.2019	Effect of INM on Physico-chemical properties of soil of maize (Zea mays) crop in Inceptisol of Central U.P.	International Journal of Chemical Studies,2019	7 (2): 631-635	5.31
Mishra Priyavart, Tiwari US, Pandey Hanuman Prasad, Pathak RK and Sachan AK.2019	Effect of INM on nutrient concentration and their uptake of maize (Zea mays) crop in central Uttar Pradesh.	International Journal of Chemical Studies,2019	7 (2) : 516-524	5.31
Tiwari US, Dubey SD, Pandey RK, Husain Karam and Singh Jitendra.2019	Effect of integrated nutrient management on productivity, profitability and quality of wheat (Triticum aestivum L.) in central plain zone of Uttar Pradesh, India.	International Journal of Chemical Studies,2019	7 (3) : 1825-1828	5.31
Khan Nausad, Kumar Ajay, Singh CB, Husain Karam and Dubey Vijay.2019	Weather based agro-met advisory for sustaining maize yield in central plain zone of Uttar Pradesh.	International Journal of Chemical Studies,2019	7 (4) : 263-268	5.31
Yadav AC, Husain Karam, Verma V K, Tiwari U S, Khan Naushad and Siddiqui M Z.	Effect of Land Configuration and nutrient management on growth and yield of hybrid maize.	Journal of Pharmacognosy and Phytochemisty, 2019	8 (4) : 602-606	5.21
Verma V K, Yadav Jitendra, Pyare Ram, Tiwari U S and Verma Mithlesh.2019	Superimposition of Sulphur and Boron on Production and Quality of Chickpea (Cicer arietirum L.).	International Journal of Current Microbiology and Applied Science,2019	8 (3) : 1740-1745	5.38
Mishra Priyavart, Tiwari U S, Pandey Hanuman Prasad, Pathak R K and Sachan A K.2019	Impact of INM on Growth and Yield Of Maize (Zea mays) Crop in Central Plain Zone of Uttar Pradesh, India" .	International Journal of Current Microbiology and Applied Science,2019	8 (4) : 138-150	5.38
Yadav AC, Husain Karam, Tiwari U S, Verma V K , Siddiqui M Z and Khan N..2019	"Effect of Land Configuration and nutrient management in Kharif Maize on Nutrient Uptake".	International Journal of Current Microbiology and Applied Science,2019	8 (7) :	5.38

Authors	Title of Paper	Journal	Volume, Number, Pages	NAAS Rating
	West Bengal (Kalyani)			
Panwar, A.S., Shamim, M., Babu, Subhash, Ravishankar, N., Prusty, Ashisa Kumar, Alam, N. M., Singh, D. K., Bindhu, J., Kaur, Jashanjot, Dashora, L. N., M. D. Pasha, Latheef, Chaterjee, Soumitra, Sanjay M. T. and Desai L. J.	Enhancement in Productivity, Nutrients Use Efficiency, and Economics of Rice-Wheat Cropping Systems in India through Farmer's Participatory Approach	Sustainability (2019)	Sustainability 2019, 11, 122pp. 1-26	8.08
Ray M., Haldar P., Chatterjee S., Saha Sushanta And Mukhopadhyay S.K.	Evaluation of balanced nutrient application for improving productivity and nutrient-use efficiency of rice (Oryza sativa)–green gram (Vigna radiata) cropping system in Coastal ecosystem	Indian Journal of Agronomy (2019)	64 (3): 304-309	5.55
Das Ruma, Mandal Biswapati, Sarkar Dibyendu, Kumar Amit Datta Pradhan, Ashim, Padhan Dhaneshwar, Seth Anindita, Kumar Rahul, DeNirmal, Mishra V.N., Polara K.B., Sharma Sanjay, .Thakur N.P, Kachroo Dileep, Ray M. , Sharma Anil, Patel K.P., Garnayak Lalit Mohan and Narkhede W.N.	Boron availability in soils and its nutrition of crops under long- term fertility experiments in India.	Geoderma (2019)	351: 116-129.	10.34
Saha Sushanta, Saha Bholanath, Seth Trisita, Shubhadip gupta Das, Ray Manabendra, Pal Biplab, Pati Sajal, Kumar Swapan Mukhopadhyay and Hazra Gorachand	Micronutrients Availability in Soil–Plant System in Response to Long-Term Integrated Nutrient Management Under Rice–Wheat Cropping System	Journal of Soil Science and Plant Nutrition (2019)	19:712–724	8.16

8.1.2 Paper presented in seminar/symposia

Author	Year	Date	Title of the Paper	Conference Name and vanue	Organized by
			AKola		
B. V. Saoji, B. S. Morwal, D. S. Kankal and P. H. Bansod	2019	March 15-16, 2019	Doubling farmers income through integrated farming systems approach	International Conference on "Entrepreneurship in Agriculture and Renewable Energy Sector" at PDKV, Akola (M.S.)	NAHEP & Deptt. of Unconventional Energy Sources and Electrical Engineering, Dr. PDKV, Akola
B. V. Saoji, B. S. Morwal, Y. D. Charjan, N. D. Parlawar D. S. Kankal K. J. Kubde and P. H. Bansod	2019	September 15-17, 2019	"Climate Smart Integrated Farming Systems Model for Resource Management and Rural Employment in Vidharbha Zone of Maharashtra"	Global Organic Convention - 2019 on "Natural Resource Management for Sustainable Agriculture, Soil Health & Quality Food" at Le Meridien Hotel, Wardha Road, Nagpur	Dr. PDKV, Akola
B. V. Saoji, B. S. Morwal, D. S. Kankal &P. H. Bansod	2019	Nov., 29-30, 2019	Studies on IFS model for generation of income and employment of small farmers of Akola didtrict	National conference on Agricultural Engineering : 50 years in service of farmers through Agro-Entrepreneurship " at Dr. PDKV, Akola	Dr. PDKV, Akola
			Coimbatore		
K.R.Laths and S.P.Sangeetha	2019		Integrated farming system for irrigated upland in western zone of Tamil Nadu	National Conference on "Agricultural Scientific Tamil"	Agricultural Science Tamil Society. New Delhi
S.P.Sangeetha.	2019		Effect of organic nutrient management on yield and soil fertility in rice-blackgram cropping system		Agricultural Science Tamil Society. New Delhi
S.P.Sangeetha, K.R.Latha and A.Renukadevi	2019	20 & 21.12.2019	Integrated farming system for irrigated dryland	National Conference on "Doubling farmers income through scientific approaches"	AEC&RI, Kumulur, Trichy in collaboration with MASU
Dr.A.Renukadevi	2019		Problem soil Management		DEE,TNAU & Ministry of Fisheries, Marine Resources and Agriculture, Maldives

Author	Year	Date	Title of the Paper	Conference Name and vanue	Organized by
			Jammu		
Attri Meenakshi, Gupta Meenakshi and Thakur N.P.	2019	14-16 October, 2019	Zinc fortification in Wheat crop pp 36	5th JK Agriculture Science Congress on Climate Change Management for Sustainable Agriculture, Livestock Farming and Ecological Development at SKUAST-J Chatha	SKUAST-Jammu
Kachroo Dileep, Thakur N.P. Khajuria Vijay, Gupta A.K., Kumar Parshotam, Singh Preeti and Kour Gaganpreet	2019	25-27 September, 2019	Sustainable agriculture through IFS- An approach for meeting the livelihood-food security and mitigating the agrarian crises in N-W Hill region of Jammu, J&K, India	International Conference on Sustainable Agriculture Production for food, nutrition and livelihood security at Pattaya, Thailand	Pragati International Scientific Research Foundation, Meerut, India
Kachroo Dileep, Kumar Parshotam, Thakur N.P., Gupta A.K. and Khajuria Vijay	2019	14-16 October, 2019	Productivity and Economics of different cropping system under diversification of rice based cropping system pp 34	5th JK Agriculture Science Congress on Climate Change Management for Sustainable Agriculture, Livestock Farming and Ecological Development at SKUAST-J Chatha	SKUAST-Jammu
Kumar Ravi, Khajuria Vijay, Kachroo Dileep, Thakur N.P. and Bharti Akhil	2019	14-16 October, 2019	Effect of dates of transplanting on yield and economic of Basmati Rice under irrigated condition of Jammu pp 55	5th JK Agriculture Science Congress on Climate Change Management for Sustainable Agriculture, Livestock Farming and Ecological Development at SKUAST-J Chatha	SKUAST-Jammu
Thakur N.P., Kachroo Dileep, Khajuria Vijay, Gupta A.K., Kumar Parshotam, Kour Gaganpreet, Singh Preeti, Sharma Rohit and Masud Sahar	2019	25-27 September, 2019	Carbon budgeting and emission of GHG in IFS model developed for doubling of farmer's income in Jammu region of North-Western Himalayas	International Conference on Sustainable Agriculture Production for food, nutrition and livelihood security at Pattaya, Thailand	Pragati International Scientific Research Foundation, Meerut, India
			Junagadh		

Author	Year	Date	Title of the Paper	Conference Name and vanue	Organized by
Solanki, R.M. and Dodiya	2019	7-9 April	Effect of Spacing and Fertility Levels on Rabi Castor.	National Conference on "Enhancing Productivity of Oilseeds in Changing Climate Scenario,	ICAR-DGR, Junagadh.
Solanki, R.M., Vasava, M.S. and Sagarka, B.K.	2019	16-18 January	Response of cumin (Cuminum cyminum L.) to drip irrigation and integrated nutrient management.	9th International Micro Irrigation	Indian National Committee on Surface Water, Aurangabad, Maharashtra
			Karamana		
Sajeena, A., John, J., Meenakumari, K. S., Sudha, B., and Meera, A. V.	2019	26- 29 February	Evaluation of liquid formulation of PGPR mix I for yield improvement and pest management in rice.	National Symposium on Recent challenges and Opportunities in sustainable plant health management, at Institute of Agricultural Sciences, Banaras Hindu University, Varanasi	Indian Phytopathological Society
Sajeena, A., John, J., Meenakumari, K. S., Sudha, B., and Meera, A. V.	2019	26- 29 February	Ecofriendly yield improvement and pest management in rice	National Symposium on Recent challenges and Opportunities in sustainable plant health management Institute of Agricultural Sciences, Banaras Hindu University, Varanasi	Indian Phytopathological Society
			Kota		
डॉ. बलदेव राम, डॉ. तेतरवाल जे.पी., डॉ. जैन एम.सी., डॉ. सिंह प्रताप, डॉ. असवाल सुभाष एवं डॉ. बेहड़ा सुनील	2019	27 व 28 जनवरी	समन्वित खरतवार प्रबंधन द्वारा आलू, प्याज एवं लहसुन फसलों की आय में वृद्धि।	राष्ट्रीय सेमीनार (परिर्वतित जलवायु में किसानों की आय को दुगुना करने हेतु लहसुन, प्याज व आलू उत्पादन और कटाई उपरान्त प्रबंधन)	कृषि विज्ञान केन्द्र, अन्ता (बांरा) पेज संख्या 63–65।
कुमार रविन्द्र नागर, गोविन्द राम चौधरी, डॉ. तेतरवाल जे.पी., चौधरी दिनेश कुमार	2019	27 व 28 जनवरी	उन्नत तकनीक अपनायें, लहसुन की उत्पादकता बढ़ायें।	राष्ट्रीय सेमीनार (परिर्वतित जलवायु में किसानों की आय को दुगुना करने हेतु लहसुन, प्याज व आलू उत्पादन और कटाई उपरान्त प्रबंधन)	कृषि विज्ञान केन्द्र, अन्ता (बांरा) पेज संख्या 32।

Author	Year	Date	Title of the Paper	Conference Name and vanue	Organized by
गोविन्द राम चौधरी, रविन्द्र कुमार नागर, डॉ तेतरवाल . जे.पी.	2019,	27 व 28 जनवरी	आलू में मूल्य संर्वधन एवं प्रसंस्करण कर बढ़ावे आमदनी।	राष्ट्रीय सेमीनार (परिर्वतित जलवायु में किसानों की आय को दुगुना करने हेतु लहसुन, प्याज व आलू उत्पादन और कटाई उपरान्त प्रबंधान)	कृषि विज्ञान केन्द्र, अन्ता (बांरा) पेज संख्या 76।
प्रसाद जगदीश तेतरवाल, बलदेव राम एवं चौधरी गोविन्द राम	2019	27 व 28 जनवरी	उत्पादन एवं आय में वृद्धि हेतु अपनायें फसल विविधीकरण।	राष्ट्रीय सेमीनार (परिर्वतित जलवायु में किसानों की आय को दुगुना करने हेतु लहसुन, प्याज व आलू उत्पादन और कटाई उपरान्त प्रबंधान)	कृषि विज्ञान केन्द्र, अन्ता (बांरा)।
Choudhary, G.R., Tetarwal, J.P. and Nagar, Vimal.	2019	Feb 18-19	Exotic Veggies: Opportunity and Challenge in India	National Seminar on Technology Advancement in Horticulture for 21st Century at CHF, Jhalawar (AU, Kota) Rajasthan	College of Horticulture & Forestry, Jhalawar
Ram, Baldev., Tetarwal, J.P., Nagar, B.L., Meena, D.S. Narolia, R.S. Jain, M.C. and Singh, Pratap	2019	Feb 18-19	Modern Weed management practices for enhancing resource use efficiency and productivity of horticultural crops	National Seminar on Technology Advancement in Horticulture for 21st Century at CHF, Jhalawar (AU, Kota) Rajasthan	College of Horticulture & Forestry, Jhalawar
Tetarwal, J.P. Ram, Baldev., Choudhary, G.R., Nagar, R.K. Jain, M.C. and Singh, Pratap	2019	Feb 18-19	Integrated Farming systems- A Boon for livelihood security of small households in south-eastern Rajasthan	National Seminar on Technology Advancement in Horticulture for 21st Century at CHF, Jhalawar (AU, Kota) Rajasthan	College of Horticulture & Forestry, Jhalawar
Tetarwal, J. P., Ram, Baldev., Prusty, A. K., Ravisankar, N., Panwar, A.S., Lopez-Ridaura, S., Groot, J., Adelhart, Roos., Akker, J.V.D. and Jat, M.L	2019	August, 18-21	Resource optimization using Farm design for addressing background science of farming systems prototype: A case of Rajasthan India.	6th Farming systems design conference held at Montevideo, Uruguay	Farming Systems Design Community and the Universidad de la Republica (Uruguay)
Prusty, A. K., Ravisankar, N., Panwar, A.S., Ghasal, P.C., Tetarwal, J.P., Jat, M.L	2019	August, 18-21	Model based assessment of integrated farming system prototypes using quantitative analysis tool Farm DESIGN: A case study from Indo Gangetic Plains (IGP) of India.	6th Farming systems design conference held at Montevideo, Uruguay	Farming Systems Design Community and the Universidad de la Republica (Uruguay)

Author	Year	Date	Title of the Paper	Conference Name and vanue	Organized by
Adelhart, Roos., Akker, J.V.D., Prusty, A.K., Tetarwal, J.P., Kaur, J., Lopez-Ridaura, S. Jat, M.L., Ravisankar, N. and Groot, J	2019	August, 18-21	Closing the gap between research and practice: Farm level explorations towards integrated farming systems in North West India.	6th Farming systems design conference held at Montevideo, Uruguay	Farming Systems Design Community and the Universidad de la Republica (Uruguay)
			Navsari		
Chauhan, N.G., . Arvadiya, L.K and Nimavat, B.J.	2019	25 & 26 Feb.	A review paper on “effects of pesticides in soil” Abstract, page 13	National workshop on "Pesticides residues: management and techniques for food safety and security"	NAHEP-CAST-NAU-Navsari
Jakkannagari, C., Arvadiya, L.K. and Pullaiahgari, S.	2019	25 & 26 Feb.	Effect of different processing techniques on pesticides in fruits and vegetable-A review paper Abstract, page 90	National workshop 2019 on “Pesticides residues: management and techniques for food safety and security”	NAHEP-CAST-NAU-Navsari
			Rajendranagar		
Dr M.Goverdhan	2019	25-09-2019 to 27-09-2019	Crop + livestock + Horticulture IFS for Livelihood and nutritional security of farmers of Telangana, India	International Conference on Sustainable Agriculture Production for Food, Nutritional and Livelihood Security: A Challenge for Asian Farmers, Pattaya, Thailand	
Reddy, G.K., Goverdhan, M., Pragathi Kumari, Ch., Alibaba, M.D., Chiranjeevi, K. and Rani,.B.	2019	20-10-19 to 22-10-19	Integrated farming system a promising approach for doubling the farmer income	International Conference on Global research initiatives for sustainable Agriculture and allied sectors., NAARM, Rajendranagar	NAARM, Hyderabad
Dr. Ch.Pragathi Kumari	2019	20-10-19 to 22-10-19	Effect of mulching and integrated nutrient management practices on growth and yield of Bt cotton	International Conference on Global research initiatives for sustainable Agriculture and allied sectors., NAARM, Rajendranagar	NAARM, Hyderabad

Author	Year	Date	Title of the Paper	Conference Name and vanue	Organized by
			Sabour		
Kumari, Mamta, Sushant, Chowdury, Arnab Roy and Tyagi Shashank	2019	June 16-18, 2019	(In:)Abstract :Nitrogen management in rice (Oryza sativa L.) under various crop establishment methods in south Bihar. Pp. 133-134.	3rd International conference on "Global initiatives in agricultural and applied sciences for eco-friendly environment (GIASE-2019)", at Conference Hall, Tribhuvan University, Kathmandu, Nepal.	Agricultural Technology Development Society (ATDS) Ghaziabad, Uttar Pradesh, India
			Udaipur		
Shailza, Yadav Anju, Chand Kailash Bairwa, S.S. Burark, Sharma Latika and Singh Hari	2019	27 April	Smart Cities: Digital Solutions for a more livable future.	International conference on Transformation of Business, Economy and Society in Digital Era	Pacific (University) Udaipur
Dr. Singh Hari	2019	16-18 June	Economic Empowerment of Tribal Farmers through Integrated Farming System Approaching Southern Rajasthan, India International Archive of Applied Sciences and Technology,	3rd International Conference on Global Initiatives in Agriculture & Applied Sciences for eco-friendly environment (GIASE, 2019) at Tribhuvan University, Kathmandu, Nepal.	Tribhuvan University, Kathmandu, Nepal.
Singh Hari, Jangid, M.K. Meena G.L., Sharma S.K. and Chhipa B.G.	2019	12-13 march	Income and Employment Generation through Various Interventions of Farming Systems in Southern Rajasthan	Souveniour of National Seminar on Entrepreneurship and Innovation in Agriculture for Socio-Economic Empowerment of Farmers	SKRAU, Bikaner
Shailza, Sharma Latika and Singh Hari	2019	26-27 April	Digitalization the Agriculture Market via e-NAM	Faculty of Management, Pacific Academy of Higher and Research University,	Pacific (University) Udaipur

Author	Year	Date	Title of the Paper	Conference Name and vanue	Organized by
			Kalyani		
S. Chatterjee, S. Biswas, A. Das, M. Ray, S. Saha and S. K. Mukhopadhyay	2019	15-16 November, 2019	Sessions Best Presentation Award for oral presentation entitled "A TEMPORAL ECONOMIC ANALYSIS OF PROTOTYPE FARMING SYSTEM OPTIONS IN WEST BENGAL INDIA"	"AGRO-CHEMICAL INPUTS AND IT'S EXTENSION APPROACHES TOWARDS FOOD AND BIO-SECURITY: PROSPECTS & CHALLENGES (AEFS-2019)" Ramkrishna Mission Ashram SAMETI, Narendrapur, 24-Parganas (S) West Bengal	SAMETI West Bengal IRDM RKMVU Narendrapur Sasya Shyamala Krishi Vigyan Kendra RKMVU Narendrapur

8.1.3 Popurlar Articles

Auther	Title of the Paper
Ludhiana	
Neeraj Rani, Walia S S and Aulakh C S (2018)	Farm yard manure: important source of nutrition. Jagbani/July1, 2019.
Walia S S, Kaur T and Singh P (2019)	Spring maize based cropping systems. Bhumantvikheti 2(1): 9-10.
Walia S S, Rani Neeraj and Kaur T (2019)	Adopt maize-wheat cropping system for remunerative returns. Progressive Farming 55(5): 12-13.
Maruteru	
Manukonda Srinivas, B. Anusha, C.V. Reddy, P.V. Satyanarayana and P. Munirathnam	Sarva Varilo Kalupu teetha, yeruvula vetha. Aug, 2019. Annadata. Pp: 12-14
Manukonda Srinivas, B. Anusha, Reddy C.V. and P.V. Satyanarayana	Rabi Vari sagulo adhika dugubadulaku suchanalu. Nov, 2019. Annadata. Pp: 60-61
Kathalagera	
Kumara, O. And Rajini, S. R.	1. Simple and easy methods of bio-mass production
	2. Alternative cropping system for late on-set of Kharif
	3. Importance of Boron in Agricultural crops
	4. Importance of Nano based technology in Agriculture
	5. Importance of Silicon in Agricultural crops
	6. Implication of integrated farming system for doubling the farm income of small and marginal farmers
Kumara, O. And Priya, Y. H.	Verticle Farming- Suitable technique for small scale holdings and water scares condition
Karamana	
John, J., Sudha.B., Meera, A.V. and Sajeena,A.	Rebuilding agriculture in Kerala through integrated farming system approaches. Kalpadhenu 39(2): 4-8
Sudha, B. and kumar Krishna, G.	Planting and aftercare of summer vegetables (Venalkkalapachakarikal- nadeelumparipalanavum). Janapadham. 5(8): 14-15.

Auther	Title of the Paper
Sudha, B. and kumar Krishna, G.	Agrotourism in Kerala: Idukki holds much prospects Krishiyankanam 2(5):14-16
kumar Jaya, G., Bindhu, J. S., Rakhi, R., Shajan, V. R., Rini, C. R., and Indira, M.	Kau Uthama. Kerala Karshakan : 38-39.
Junagadh	
Gohil, G. R., Solanki, R. M. and Sharma P. S.	Sankalit Khet Padhdhatee mate agatyni Mahitee" Krushi Prabhat
Rupareliya, V.V. and Solanki, R.M.	Addressing multi nutrient deficiency in crops through customized fertilizers.
Solanki, R.M.; Sagarka, B.K.; Mathukia, R.K. and Panara, D.M	Kheti nee Avak Bamani Karva ma Adachano ane Upayo (Gujarati)
Solanki, R.M. and Sagarka, B.K.	Integrated Farming Systems in Saurashtra Region (Gujarat): An Overview.
Kanpur	
Tiwari U.S., Husain Karam, Pandey Rakesh Kumar and Singh Jitendra	Mrida Swasthya evam Pravandhan, Krishak Bharti Rabi Visheshank-2019, Page 54-59
Rajendranagar	
Goverdhan, M.	Samagra Vyavasayamthone Raithuku niranthara adayam. Annadata Prathyeka sanchika 1969-2019 : PP 216-218
Pasha, Md. L., Sridevi, S., Goverdhan, M. and Ch Pragathi Kumari..	Bhusara abhivruddiki acharinchalsina shastriya paddathulu. vyavasayam -4:42
Reddy, G.K., Goverdhan, M. and Pasha, Md. L.	Saguneeti nanyatha parishna avashyakatha. Vyavasayam Padipantalu: PP-31.
Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari.., Pasha, Md. L and Rani. B.	Varmi compost tayari – Upayogalu. Vyavasayam Padipantalu: PP:39-40.
Reddy, G.K., Ch Pragathi Kumari.., Goverdhan, M. and Pasha, Md. L.	Rabi Verusenagalo sukshma poshaka lopalu mariyu vati savarana. Vyavasayam, March: 16.
Pasha, Md. L., Goverdhan, M., Sridevi, S. and Ch Pragathi Kumari..	Pattana shivaru samagra vyavasayam. Vyavasayam, March: 49.
Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari.., Pasha, Md. L. and Rani.B.	Sunnamtho kudina bhoomulu, gattipade chalka bhoomulu yajamanyam. Vyavasaya Padipantalu: PP-42
Ch Pragathi Kumari,., Goverdhan, M., Reddy, G.K., Pasha, Md. L., Rani, B and Ali baba .	Vesavilo pasuposhanaku azolla sagu. Vyavasayam, May: 22-23.
Ch Pragathi Kumari.., Reddy, G.K., Pasha, Md. L., Baba, Md.A. and Rani.B.	Vibinna sagu paristhitulalo chepatiina samagra kchetra sthayi pranalika. Vyavasaya Padipantalu (22-23), June.
Pasha, Md. L. and Goverdhan, M.	Kharif saguku Suchanalu. Raithe Raju – Eenadu. July.
Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari.., Pasha, Md. L., Baba, Md.A. and Rani.B.	Raithu Sthayilo kalthee eruvulanu gurthincedela. Vyavasaya Padipantal. 9(7):21.
Rani, B., Reddy, G.K., Goverdhan, M and Ch Pragathi Kumari..	Mokkalo sadaranamga kanipinche poshaka lopalu – vati savarana. Ritunestham (63-64), August
Rani, B., Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari.., Pasha, Md. L and Baba, Md.A	Udhajani suchika – poshakala labyatha. Vyavasayam (p. 33), August.

Auther	Title of the Paper
Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari.., Pasha, Md. L., Baba, Md.A. and Rani.B	Verusenaga lo upa mariyu susmaposakala samasya. Vyavasayam. (August) Pp. 28-29.
Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari.., Pasha, Md. L., Baba, Md.A. and Rani.B	Nela situlani bathi perulo radaga posaka lopalu. Vyavasaya Padipanthalu. (August) Pp. 28-29
Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari.., Pasha, Md. L., Baba, Md.A. and Rani.B.	Vari lo susma posakala savarana. Vyavasaya Padipanthalu. (September) Pp. 18-19.
Reddy, G.K.	Vivida pantalo samagra yuvula yajamayam. Ritunestham (September) Pp. 21-24
S K Nagar	
Dr. Patel A. M., Dr Patel. K. M., Dr. Saini A. K. and Shri Patel P. K. (2019)	Vadhu avak mervva mate sankalit khet paddhati (IFS) model. Krushi tajagnatao, SDAU. Pp. 2-6.
Dr. Patel K. N., Dr. Desai L. J., Dr. Patel K. M., Dr. Patel S. A. and Dr. Chaudhari H. L. (2019).	Sajivkhetima Sankalit Pak Vyavstapan. Sajiv kheti, Book Chapter (ISBN NO., 978-93-5382-551-5). Pp. 91-96.
Dr. Chaudhari H. L., Dr. Desai L. J., Dr. Patel K. M., Dr. Patel S. A. and Dr. Patel K. N. (2019).	Sendriy Khetina Dharadhorano ane pramanan angeni karya paddhati. Sajiv kheti, Book Chapter (ISBN NO., 978-93-5382-551-5). Pp. 136-144.
Dr. Desai L. J., Dr. Patel K. M., Dr. Patel S. A., Dr. Chaudhari H. L. and Dr. Patel K. N. (2019).	Sendriya Khetima Lila Padvashnu Mahatva. Sajiv kheti, Book Chapter (ISBN NO., 978-93-5382-551-5). Pp. 40-44.
Dr. Patel K. M., Dr. Desai L. J., Dr. Patel K. N., Dr. Patel S. A. and Dr. Chaudhari H. L. (2019).	Jaivik Khataronu Sajivkhetima Mahatva. Sajiv kheti, Book Chapter (ISBN NO., 978-93-5382-551-5). Pp. 45-55.
Navsari	
Arvadiya, L.K. Ardeshna, R.B. and Kalariya, G.B.	Havaman ferfar paristhiti ma sankalit kheti paddhati (Krushi jivan, Feb. 2019, Page16-18)
Port blair	
Velmurugan A.	Entrepreneurship development in Organic farming and water conservation need of the hour. The Echo of India dt. 3rd August 2019
Velmurugan A.	Entrepreneurship development in Organic farming in Andaman Islands, GKMS-News Letter, IMD, Pune, July - Sept 2019
	Importance of agromet advisories, G K M S - N e w s Letter, Azad Hind Mela 2019, Chouldhari
Bangalore	
Hatti Veeresh, Sanjay, M.T., Hebbal Narayan	A sustainable approach of sugarcane husbandry Agrobios Newsletter: XVIII(6):10-11
Hisar	
Dadarwal Kavita, R.S and Jat R.D	Samanvit Krishi Pranali – lagat kam munafa aadhik
Jat, R.D Dadarwal R.S and Kavita	Khaad Ak – laabh anek : kenchua khaad
Durgapura	
Singh Surendra, Singh Shailendra, Gupta Shweta and Singh Pratibha 2019	Cotton Production Scenario in World. Harit Kranti. 41(21): 05
Indore	
Sharma A.K. (2019)	रबी दलहनी फसलों पर हार्मोन्स का प्रयोग – कृषि लोक, 2019

Auther	Title of the Paper
Kota	
डॉ. जे.पी.तेतरवाल, डॉ. बलदेव राम, डॉ. बी.एल.ढाका, रविन्द्र कुमार नागर एवं गोविन्द कुमार चौधरी	समेकित कृषि प्रणाली का महत्व एवं आवश्यक्ता। *अभिनव कृषि,* वर्ष–1, अंक–1, पेज नं. 4–5 मार्च– 2019
डी.एस. गोस्वामी, जे.पी. तेतरवाल एवं एच.एल. बुगालिया	कैसे करें वर्षभर हरा चारा उत्पादन। *राजस्थान खेती प्रताप,* मार्च 2019, पेज संख्या 21–23
डॉ. बलदेव राम, डॉ. जे.पी.तेतरवाल	जायद में हरे चारे का उत्पादन। *अभिनव कृषि,* पेज संख्या 14–15, मार्च–2019.
रामधन घसवा, अरविंद सिंह तेतरवाल, मीना चौधरी एवं जगदीश प्रसाद तेतरवाल	ग्रीष्मकालीन जुताई का मृदा स्वास्थ्य में महत्व। *फसल क्रांति,* पेज नम्बरः 40–42, मई–2019
तेतरवाल, जे.पी., गोस्वामी, डी.एस., बिजारणियाँ, अंजूँ., चौधरी, गोविन्द राम एवं राम, बलदेव	शिशु मक्का (बेबी कॉर्न): उत्पादन तकनीक एवं मूल्य संवर्धन। *अभिनव कृषि,* वर्ष 01, अंक–2, जून, 2019 पेज नं. 19–22
बलदेव राम, डॉ. जे.पी.तेतरवाल, बी.एल. ढाका, आर.एस. नारोलिया, आर.के. मीणा, डी.एस. मीणा एवं एस.एल. यादव	खरीफ फसलों में समन्वित खरपतवार प्रबंधन, *अभिनव कृषि,* वर्ष 01, अंक–2, जून, 2019 पेज नं. 11–18
बलदेव राम, डॉ. जे.पी.तेतरवाल, बी.एल. ढाका, राजेश कुमार, आर.एस. नारोलिया एवं एस.एल. यादव।	रबी फसलों में समन्वित खरपतवार प्रबंधन से अधिक उत्पादन। *अभिनव कृषि, वर्ष 01, अंक–3, सितम्बर, 2019 पेज नं. 28–35*
संध्या कुलहारी, जे.पी. तेतरवाल, बलदेव राम, मनोज कुमार	विभिन्न परिस्थितियों के लिए अलसी की अनुमोदित उन्नत किस्में। *अभिनव कृषि,* वर्ष 01, अंक–3, सितम्बर, 2019 पेज नं. 25–27
राजेश कुमार, सेवा राम रूण्डला, संध्या कुलहारी एवं जे.पी. तेतरवाल	आधुनिक कृषि में सहजन की उपयोगिता। *हलधर टाईम्स,* अंक 7, 16–22 दिसम्बर 2019, पेज नं. 05
तेतरवाल जगदीश प्रसाद, राम बलदेव, बिजारणियां अंजू, चौधरी मोनिका, चौधरी गोविन्द राम, गोस्वामी एवं कुमावत रोशन	किनोवा–सुपर फूड़ से पोषण सुरक्षा। *तकनिकी फोल्डर, कृषि अनुसंधान केन्द्र,* (कृषि विश्वविद्यालय) उम्मेदगंज, कोटा। जनवरी, 2020, पेज संख्या 1–6।
जे.पी. तेतरवाल, बलदेव राम, अंजु बिजारणिया, मोनिका चौधरी, गोविन्द राम चौधरी, अंजु कनवाड़िया	चिया मूल्य सवंर्धन द्वारा पोषण सुरक्षा। *तकनिकी फोल्डर कृषि अनुसंधान केन्द्र* (कृषि विश्वविद्यालय, कोटा), उम्मेदगंज, कोटा। मार्च 2020, पेज 1–6।
बलदेव राम, जे. पी. तेतरवाल, बी. एल. ढ़ाका, आर. के. मीणा, राजेश कुमार एवं एस. एल. यादव.	खरपतवारनाशी दवाओं के प्रयोग के समय नोजल का चुनाव, छिड़काव से पूर्व एवं छिड़काव के बाद से सबंधित सावधानियां। *अभिनव कृषिः* जून 2020, पेज संख्या 28–35.
डी.एल. यादव, सी.बी. मीणा, जे.पी. तेतरवाल एवं प्रताप सिंह	ट्राइकोडर्मा फफूंदनाशक–जैविक खेती के लिए वरदान। *अभिनव कृषि,* वर्ष–02, अंक–02, जून 2020, पेज न. 29.
जगदीश प्रसाद तेतरवाल, बलदेव राम, अंजू बिजारनियां एवं अरविन्द सिंह	माइनर मिलेट्स की खेती को बढ़ावा देने की आवश्यकता। *खाद पत्रिका,* जुलाई 2020, 61(7½ i t u- 27&39-
अरविंद सिंह तेतरवाल, जगदीश प्रसाद तेतरवाल एवं रामधन घसवा	खरीफ मूंगफली में कैसे करें फसल सुरक्षा। *खाद पत्रिका,* जुलाई 2020, 61(7½ i t u- 18&22-

Auther	Title of the Paper
बलदेव राम, अर्जुन सिंह जाट, राकेश कुमार बैरवा, जे.पी. तेतरवाल, आर.एस. नारोलिया, हरफूल मीणा, इन्द्रनारायण माथुर, प्रताप सिंह एवं राजेन्द्र कुमार यादव	फसलों में जल का महत्व, जल उपयोग दक्षता एवं जल उत्पादकता बढ़ाने के उपाय। अभिनव कृषि। वर्ष 3, अंक 2, जून 2021, पेज नं 17–20
तेतरवाल, जगदीश प्रसाद., राम, बलदेव, बिजारणियां, अंजू, चौधरी, मोनिका.	पोषण से समृद्ध फसलें हैं किनोवा एवं चिया। *खेती* । अगस्त 2021, पेज संख्या 24–26।
Udaipur	
डॉ. सिंह हरि एवं डॉ. जांगिड एम.क	समन्वित कृषि प्रणाली में सूचना एवं सूचना प्रौद्योगिकी का महत्व राजस्थान खेतीप्रताप (फरवरी,2019) पृष्ठ सं. 17–19)

8.1.4 Book and Book Chaptor

Auther	Title of Book / Book Chaptor
Bhubaneswar	
A K Patra, L. M. Garnayak, K. N. Mishra, S. K. Swain and A. K. Mohanty.	Integrated Nutrient Management in Rice–Rice Cropping System. (In) 'Crop Plants: Issues and Management' (eds., P Kumar and P K Bharti). Discovery Publishing House Pvt. Ltd., New Delhi. pp. 152-174. (ISBN 978-93-88851-02-3) **(2019)**
A K Patra, P K Patra and R K Patra.	Climate Change and Indian Agriculture. (In) 'Climate Change and Agro-edaphic System'. (eds., A Chauhan and P K Bharti). Discovery Publishing House Pvt. Ltd., New Delhi. pp. 147-162. (ISBN 978-93-86841-98-8) (2019)
A K Patra and T K Raul	Poultry in Integrated Farming Systems. (In) 'Farming and Development: Technological Perspectives'. (eds., P K Bharti and J Ray). Discovery Publishing House Pvt. Ltd., New Delhi. pp. 46-83. (ISBN 978-93-88854-08-5) (2019)
A K Patra	Agroforestry for Watershed Management. (In) 'Water Management and Aquatic Ecosystem'. (eds., R Bhalla and P K Bharti). Discovery Publishing House Pvt. Ltd., New Delhi. pp. 44-67. (ISBN 978-93-86841-96-4) (2019)
Coimbatore	
K.R.Laths and S.P.Sangeetha	Integrated farming system for irrigated upland in western zone of Tamil Nadu
S.P.Sangeetha	Effect of organic nutrient management on yield and soil fertility in rice- blackgram cropping system
C.R.Chinnamuthu, K.R.Latha and S.P.Sangeetha	Integrated farming system suitable for salt affected soil
S.P.Sangeetha, K.R.Latha and A.Renukadevi	Integrated farming system for irrigated dryland
P. Santhy, D. Selvi and A. RenukaDevi	Microbial and enzyme activities in saline and sodic soils
Jorhat	
Bhabesh Gogoi	Book: Pollution in Soil, Water and Air. Kalyani Publishers, New Delhi, India, ISBN:978-93-5359-448-0

Auther	Title of Book / Book Chaptor
Bhabesh Gogoi	Book: Problematic Soils and Their Management. Bidya Bhawan, Jorhat, Assam, India, ISBN:978-93-85439-53-7
K.K.Sharma and S.BoraNeog	Book Chapter: Fodder and livestock Scenerio in Assam.Indian Fodder Scenerio: Redefining Statewise Status (2019), AICRP on Forage crops and Utilization,Jhansi-284003,India. pp 22-30.
K.K.Sharma,SaratSekhar Bora and S.B. Neog	Book Chapter: Rye grass-Suitable rabi forage for productivity and profitability in Assam.Souvenir,National Group Meet Rabi 2019-20,AICRP on Forage Crops and Utilization,ICAR-IGFRI,Jhansi,UP
Junagadh	
Arpita Meena.; Solanki, R.M. and Rupareliya, V.V	Effect of spacing and nitrogen levels on growth, yield and quality of fodder maize (Zea mays L.).
Der, Y.A.; Solanki, R.M. and Rupareliya, V.V.	Response of coriander (Coriandrum sativum L.) to irrigation schedule based on IW/CPE ratios and organic manures.
Dodiya, C.J.; Solanki, R.M. and Rupareliya, V.V.	Response of rabi castor (Ricinus communis L.) to plant geometry and fertility levels.
Kher Uday.; Solanki, R.M. and Malam K.V.	Response of summer green gram to irrigation based on IW/CPE and spacing.
Zala K.P.; Solanki, R.M. and Malam, K.V.	Response of Rajmah (Phaseolue vulgaris) to spacing and fertility levels.
Ludhiana	
Walia U S andWalia S S (2019)	Crop Management (Revised Second Edition). Scientific Publishers, Jodhpur
Walia S S, Panwar A S and Kaur T (2019).	Waste recycling in integrated farming systems under Punjab conditions. LAMBERT Academic Publishing
Maruteru	
Manukonda Srinivas, C. Venkata Reddy, B. Anusha, T. Usha Rani, P.V. Satyanarayana and N. Ravisankar	Sameekrutha Vyavasaya vidhanamtho rendankela susthira aadhayam. Published by AICRP on IFS Scheme, RARS, Maruteru. Pages: 1-8
Dr.M.M.V. Srinivasa Rao, Smt.U. Triveni, Sri.P. Joga Rao, Dr.N. Anuradha, Kum.B. Divya Sudha, Sri.S. Raja Kumar, Dr.T.S.S.K. Patro and Dr.P. Jamuna	Integrated farming systems for doubling of farmer income. Published by ARS, Vizianagaram
Pantnagar	
Singh, D.K., Singh, R., Shekhar, K.S. and Kwatra, J. 2019	Tilhan utpadan ki unnat krishi takniki. Do diwasiya prashikshn karyakram (14 evam 15 march, 2019) Sthan: Sasya Vigyan Vibhag (Sankalit lekh). 23 pages.
S K Nagar	
L. R. Dubey, S. K. Kulshreshtha, Mukesh Panchal and R. R. Patel (2019).	Ensuring Quality Produce through Contract Farming – A Way to Doubling the Farmers Income in India. Compendium Doubling the Farmers Income: Technology Interventions in Agriculture Summer School. MPUAT, Udaipur PP: 269-276.

8.2 PARTICIPATION OF SCIENTIST IN SYMPOSIA / SEMINOR/CONFERENCES/WORKSHOP/TRAINING

Akola

Dr. B. V. Saoji, Chief Agronomist and Dr.D. S. Kankal, Jr. Soil Scientist, International Conference on "Entrepreneurship in Agriculture and Renewable Energy Sector" at PDKV, Akola (M.S.) during March 15-16, 2019, NAHEP & Deptt. of Unconventional Energy Sources and Electrical Engineering, Dr. PDKV, Akola

Dr. B. V. Saoji, Chief Agronomist, "Quinquennial Review Team (QRT, 2012-17)" at Orissa University of Agriculture & Technology (OUAT), Bhubaneswar, Odisha during 2-3rd May, 2019, Director,ICAR-IIFSR, Modipuram, Meerut (UP)

Dr. B. V. Saoji, Chief Agronomist, Annual group meeting of "AICRP on Integrated Farming system" at Junagadh Agricultural University, Junagadh (Gujarat) during 27-29th November, 2019. Director, Indian Institute of Farming Systems Research (ICAR), Modipuram, Meerut (UP)

Bhubaneswar

A K Patra, Chief Agronomist,Annual Group Meeting of AICRP on Integrated Farming Systems, Junagadh, Junagadh Agricultural University, Junagadh, Gujarat, 27-29 November 2019 Director, Indian Institute of Farming Systems Research (ICAR), Modipuram, Meerut (UP)

Jammu

Dr. N.P. Thakur and Dr. A.K. Gupta, International Conference on Sustainable Agriculture Production for food, nutrition and livelihood security at Pattaya, Thailand Pragati International Scientific Research Foundation, Meerut, India

Jorhat

Bhabesh Gogoi, ICAR-sponsored Winter School on "Abiotic Stress: Advances, Impact and Prospects". Organized by Dept. of Crop Physiology, AAU, Jorhat at AAU, Jorhat during 6th to 26th February, 2019.

Karamana

Dr. Jacob John, Dr. Sudha B., Dr. Meera A. V., Dr Jacob D and Dr. Bindhu J S, Quinquennial Review Team (QRT) meeting of AICRP on IFS; 3 days; 10-12 Jan,2019; Thiruvananthapuram, ICAR- IIFSR, Modipuram.

Dr. Meera A. V. Soil resource utilization in Rebuilding Kerala Initiative;1 day; 22 Jan. 2019 Dept. of Soil Survey and Soil Conservation, Govt. of Kerala.

Dr Jacob D, Hands on training for On-farm Agronomists for online submission and analysis of OFR research data and discussion on preparation of NARP Zone wise

promising farming systems for scaling up; 3 days; 27-29 Aug 2019 ICAR-IIFSR, Modipuram, Meerut.

Dr. Jacob John, Organic Farming; 4 Nov-2019; Sreekaryam,ICAR- CTCRI, Thiruvananthapuram,

Dr. Sudha B., Agroforestry for Climate Change Mitigation, Biodiversity Conservation and Resilience in Agroecological Systems: Current Trends and Future Strategies; 21 days;3-23 Dec, 2019, ICAR - KAU ,College of Forestry, KAU

Dr. Jacob John, Agri Start Up Mission; 1 day; 19 Dec 2019; Thiruvananthapuram ,Institution of Co-operation Management

Dr. Jacob John, Agroforestry for Climate Change Mitigation; 1day;12 Dec 2019; College of Forestry, ICAR – KAU

Dr. Meera A V Kayaloram: Vellayani lake Restoration 27 Nov 2019, CoA, Vellayani, KAU

Dr. Jacob John International Coconut Expo; 2 days; 2-3 Nov 2019,Kozhikode Kerala State Planning Board

Dr. Jacob John, Dr Jacob D., Dr. Sudha B., Dr. Meera A. V., and Dr. Bindhu J S XXXVI Zonal Research Extension Advisory Council (Southern NARP Zone); 2 days; 29-30 Sept. 2019; CoA, Vellayani, KAU

Kota

Dr. J.P. Tetarwal National Seminar on "Technological Advancement in Horticulture for 21st Century" at Collage of Horticulture and Forestry, Jhalawar during February, 18-19, 2019. College of Horticulrure and Forestry, Jhalawar, Agriculture University, Kota

Dr. J.P. Tetarwal National Conference on Enhancing Farmers' Income Through Integrated Farming System (IFS) Approach at Birla Auditorium, Jaipur, Rajasthan during April, 10-11, 2019. ISAP

Dr. J.P. Tetarwal AICRP on Pigeaonpea Workshop cum Group Meet 2019 at University of Kota during May, 25-27 2019 Agriculture University Kota (Raj.) & ICAR-IIPR, Kanpur (U.P.)

Dr. J.P. Tetarwal 6th International Symposium for Farming Systems Design, Oral paper presentation on "Resource optimization using farm design for addressing background science of farming systems prototype: A case of Rajasthan India" at Montevideo, Uruguay on dated 18.08.2019 to 21.08.2019 ,Farming Systems Design Community and the Universidad de la Republica (Uruguay)

Dr. J.P. Tetarwal Annual Group Meet of AICRP-IFS at Junagarh Agriculture University, Junagarh (Gujrat) on dated 27.11.2019 to 29.11.2019 ICAR-IIFSR, Modipuram, Meerut

Ludhiana

S. S. Walia Writing lab for Farming System Typology analysis and FarmDesign to identify alternative efficient farming systems for different regions. 25 February to 01 March 2019 ,PAU, Ludhiana

Maruteru

Dr. MMV Srinivasa Rao, Agronomst, ARS, Vizianagaram Hands on Training for On Farm Agronomists for On-line submission and analysis of On Farm Farming Systems

Research Data"IASRI, New Delhi & IIFSR, Modipuram

Dr. Manukonda Srinivas, Senior Scientist (Agro) & Head 5th Review Meeting of QRT of ICAR-IIFSR, AICRP on IFS and NPOF Schemes held on 10-11 Jan, 2019 ICAR-IIFSR, Modipuram held at IFSRS, Karamana, Kerala Agril. University, Trivendrum, Kerala

Dr. Manukonda Srinivas, Senior Scientist (Agro) & Head

Dr. MMV Srinivasa Rao, Agronomist, ARS, VZM Annual Group Meeting of AICRP on IFS Scheme held on 27-29 Nov, 2019 ICAR-IIFSR, Modipuram held at Junagadh Agricultural University, Junagadh, Gujarat

Navsari

Dr. L.K.Arvadiya Online course "Resource management in rainfed drylands"agMOOCs, Indian Institute of Technology (IIT) Kanpur and Common Wealth of Learning (COL) 6 May 2019, a 5 weeks online course

Dr. L.K.Arvadiya Online course "Employment generation among rural youth through agripreneurship"agMOOCs, Indian Institute of Technology (IIT) Kanpur and Common Wealth of Learning (COL) 30 July 2019. A 6 weeks online course

Palampur

Dr. Suresh Kumar Sharma,Training Programme on Integrated Agriculture under SJVN, 05/02/2019. KVK Una

Dr. Suresh Kumar Sharma,Kisan Gosthi ATMA 20/02/2019 ATMA under Amb.

Dr. Suresh Kumar Sharma,Training Programme on Seed Production in Agricultural Crops, 14/03/19. RSS Akrot.

Dr. Suresh Kumar Sharma,Training under DAESI: Topic Topic;Weed management. 12/05/19,Project Director,ATMA at DDA Office Una

Dr. Suresh Kumar Sharma,Training under DAESI: Topic Prodution Technolgies for Oilseed Crops. 02/06/19 Project Director,ATMA at DDA Office Una

Dr. Suresh Kumar Sharma, Dr. Sanjay K.Sharma, Dr. Pawan Pathania Attended Annual Group Meeting of AICRP (Integerated Farming System) during 27.11.19 to 29.11.19 ,Junagarh Agricultural University Junagarh (Gujarat)

Dr. Suresh Kumar Sharma, Dr. Sanjay K.Sharma, Dr. Pawan Pathania Attended National Conference on Organic Agriculture & Natural Farming w e f 28-29 May, 2019.,Organic Agricultural Society of India (OASI) and Department of Organic Agriculture & Natural Farming at CSKHPKV, Palampur

Dr. Sanjay K.Sharma ,Attended 84th Annual convocation of the Indian Society of Soil Science (ISSS) w.e.f 15-18 , 2019. BHU, Varanasi, UP.

Rajendranagar

Dr. Ch.Pragathi Kumari ,Short course on "Recent advances in organic production system involving oilseeds for soil health and export, IIOR, Rajenndranagar. From 16.09.19 to 25.09.19 IIOR, Rajendranagar

Dr.K.Chiranjeevi Training on On line submission and analysis of onfarm farming systems research data and preparation of NARP zone wise Promising farming systems for Scaling UP ICAR-IIFSR, Modipuram, 27 -29th August,2019

Udaipur

Dr.Hari Shailza, Sharma L. Singh Faculty of Management, Pacific Academy of Higher and Research University, Udaipur, Rajasthan, India. Proof no. 114- page number -196,Delivering his paper on smart cities: Digital solution for a mobile livable future in the technical track" Evolution of Agriculture and dairy Science with Digital Innovations" in 10th international conference held during 26 to 27 April, 2019

Hari Singh , M.K. Jangid, G.L. Meena, S.K. Sharma and B.G. Chhipa Souveniour of National Seminar on Entrepreneurship and Innovation in Agriculture for Socio-Economic Empowerment of Farmers" held on 12th-13th March, 2019 at SKRAU, Bikaner, page number, 198 Income and Employment Generation through Various Interventions of Farming Systems in Southern Rajasthan

8.3 TRAINING, GROUP MEETING, WORKSHOP ORGANIZED

Annual Group Meeting of AICRP on Integrated Farming Systems Junagadh Agricultural University, Junagadh (Gujarat) (27-29 November, 2019)

The Annual Group Meeting of ICAR-AICRP on Integrated Farming Systems was organized during 27-29 November, 2019 at Junagadh Agricultural University, Junagadh (Gujarat) in which review of on-going research programmes of on-station and on-farm centres including Tribal Sub Plan (STC), Scheduled Caste Sub Plan (SCSP), administrative and financial issues were undertaken. The inaugural programme of the annual group meeting started with Agricultural University invocation song and lighting of lamp. Dr. B. K. Sagarka, Professor and Head, Department of Agronomy, JAU, Junagadh welcomed the guests and delegates. He briefly informed about research activities being carried out by the university and the importance of farming systems research for enhancing the sustainability and income of the farmers. Shri Dhirubhai Gohil, Mayor, Junagadh Municipal Corporation graced the occasion as chief guest and inaugurated the programme. Dr. M. P. Singh, IPS, DIG, Junagadh range and Dr. T. Radhakrishnan, Director, ICAR-Directorate of Groundnut Research (DGR), Junagadh also graced the occasion as Guest of Honor. Dr. AS Panwar, Director, ICAR-IIFSR

welcomed the delegates and gave brief achievements of the scheme and highlighted the need for future planning to mitigate climate change effects on agriculture. The brief scheme report presented by Director, ICAR-IIFSR, Modipuram is appended in Annexure-1. Dr T. Radhakrishnan, Director, ICAR-DGR, Junagadh in his address called for technology which should be reliable, debatable and adoptable. Dr. M. P. Singh, IPS, DIG, Junagadh range in his address highlighted the need for addressing farmers' distress and suggested to be careful while suggesting new technology to the farmers as adopting to new technology is not easy for farmers as changing farming means changing his life style. He also called for finding the issues which prevents the farmers from adopting new technologies. He was hopeful that integrated farming systems technology will pave way for improving social condition of farming community and save him from distress. Chief Guest Shri Dhirubhai Gohil, Mayor, Junagadh Municipal Corporation congratulated all the delegates for involving in farming systems research and working for farming community. He had also acknowledged the work done by Junagadh Agricultural University for the betterment of the farming community of the region by bringing new varieties and technologies specific to the region. Dr. V. P. Chovatia, Vice Chancellor, Junagadh Agricultural University chaired the session and, in his remark, he apprised the guests and delegates about university activities and thanked ICAR for selecting the venue for such an important meeting for working towards farmers betterment. In the inaugural session, the soft copy of Annual Report 2017-18 and publications brought out by the centres were released by the dignitaries. Dr R. M. Solanki, Agronomist, AICRP-IFS, Junagadh Sub Centre and Organizing Secretary of the meeting proposed the vote of thanks.

Recommendations

On-Station Research

1. All the centers should explore and include animal feed concentrate generating modules in the cropping systems of IFS Model and aim to reduce the outside feed purchase by 10% on Year over Year (YoY) basis.
2. Emphasis on small scale mechanization for operations such as planting/sowing, weeding, harvesting/threshing and other similar intercultural activities should be given in IFS models. Target of 10 % reduction in labour on Year over Year (YoY) basis can be targeted.
3. Sustainability of individual modules in IFS should be worked out. The modules having sustainable value index of <0.6 should be replaced with new modules for improving the sustainability of IFS models.
4. Synthesis of data of "Identification of cropping systems for various farming systems" experiment should be carried out using the standard parameters of family nutrition (ICMR), livestock nutrition (NIANP), soil health etc. Accordingly, the results should be synthesized and presented in the next biennial workshop with suggested cropping systems for 1, 2 and 3 acres of IFS models.
5. Bankable projects on IFS should be finalized State wise and published.
6. Documentation of practices and modules contributing for climate smart IFS should be prepared by all centers and reported during presentation and in the annual reports.

On-Farm Research

7. Constraint and targeted intervention should be prepared for each farm types identified based on farming system typology. This should be completed by March 2020 followed

by stake holders meeting organized in the mandated district involving ICAR-IIFSR, State government agencies, KVKs and university authorities for finalizing the action plan for up-scaling IFS modules in cluster approach.

8. Partial budgeting analysis using incremental cost benefit ratio (ICBR) should be made for farming system diversification (OFR-2) and farming system improvement (OFR-3) experiments.

9. The last date for submission of farming system typology data with farm types is March 2020 especially for those centres who have not yet collected and analyzed the data.

10. Relevant scientific parameters such as improvement in income, reduction in labour, use efficiency etc. due to capital assets such as implements, machineries, livestock etc. should be recorded under STC/ SCSP programmes\

11. Community intervention such as establishment of nursery, pulses processing, apiary group, custom hiring centres etc. can be established under STC/SCSP. Self-help group may be formed in each community intervention area and be registered using common nomenclature viz., ICAR-IIFSR-AICRP-IFS-University name-location.

General:

12. Tripartite MoU should be developed by involving ICAR-IIFSR, Modipuram, concerned SAU and State Government for up scaling of cropping and farming systems technology generated through on-station and on-farm centers of AICRP-IFS. Efforts should be made to sign the tripartite MoU by May, 2020 in Punjab, Jammu & Kashmir, Tamil Nadu and Kerala.

13. A training on farming system typology and farm design tool including interpretation of results may be organized at ICAR-IIFSR during June 2020 involving selected scientist of On-farm and On-station centres.

14. Commissioning of online data submission and analysis process for on-station and on-farm experiments should be expedited in collaboration with ICAR-IASRI, New Delhi.

15. A special issue on farming system typology in reputed refereed journals may be brought out by including papers from selected OFR centre by combining data of typology and OFR 2 and 3 experiments.

16. Since, 2019-20 is final year of SFC period (2017-20), all the centres should utilize the released funds by February 2020. Provisional Statement of Expenditure (SOE) of previous year should be submitted by 30 April while AUC should be submitted positively by 30 June of every year.

17. Chief Agronomist (On-station) and Agronomist (OFR), ANDUAT, Faizabad has not attended the Annual Group Meeting. As a result, the 2018-19 result of OFR-Centre Mirzapur could not be reviewed. Further, no prior information was sent regarding the same by the Chief Agronomist. Hence this should be brought to the knowledge of VC, ANDUAT, Faizabad.

Recommendations finalized from On-station research for up-scaling through development schemes

Recommendations from the on-station experiments of AICRP on IFS

1. Recommendation shared with State Government agencies/ Included in the packages of University during 2018-19

State /UT	Name of Centre	Brief description of technology/ Recommendation (Name of cropping system or details of IFS models)	Suitable district (s)	% improvement in productivity	% improvement in Net income	Document reference (State/University)
Assam	Jorhat	Rice (winter)-potato-lady's finger	All agro climatic zone of Assam	14	10	Organic package of practices for Selected crop of Assam
		Rice (winter)- toria-black gram		40	28	
Andhra Pradesh	Maruteru	Wetland IFS model	East Godavari West Godavari & Nellore Districts of Andhra Pradesh	25	15	Included in proceedings of ZREAC, ATMA action plan
Bihar	Sabour	Rice-potato-radish-mungbean	Most of the districts of Bihar	151	118	Sabour University
		Rice-wheat (INM substitution of 50% N through FYM)	Whole Bihar	117	14	
	Patna	1 acre IFS model : crop+ Horticulture +goat +Poultry	For whole Bihar	75-80	280	The both model have been transferred to Dept. of Agril., Bihar in the year of 2014 and 2016 and Govt. of Bihar selected 1068 farmers from 534 block for replications at farmers field
		2 acre IFS model : crop+ Horticulture +dairy +fishery/duck	For low land area of Bihar especially north Bihar	35-50	200	
Chhattisgarh	Raipur	Need based cropping systems for Chhattisgarh Rice-onion – coriander (leaf) 3 :1- cowpea (grain)	Raipur, Durg, Bametera, Bilaspur, Dhamteri,&Janjgir-chamba districts	80	75	IGKV, Raipur
		Remunerative crops+ live stock model for small and marginal farmers (IFS model of 1 ha)	Complete Chhattisgarh state	121	120	

State /UT	Name of Centre	Brief description of technology/ Recommendation (Name of cropping system or details of IFS models)	Suitable district (s)	% improvement in productivity	% improvement in Net income	Document reference (State/University)
Gujrat	SK Nagar	Groundnut-wheat-multicutfodder Rajkabajara (0.07 ha)+horticultural and vegetable crop (0.2 ha) livestock (0.025 ha)vermicompost (0.010 ha) boundary plantation +farm pond (0.015ha)	Banaskhantha	42	63	Recommended in state AGRESCO-2018-19
		IFS model (castor+green gram (0.32 ha)+groundnut-wheat-multicut F RajkaBajra (0.08ha)+ Green gram-mustard-pearlmillet (0.24 ha)+hynapier+cowpea (F)-lucerne +F. Chicory (0.06 ha)+horticultural and vegetable crops (0.25 ha)+livestock (0.025 ha)+vermicompost (0.010 ha)+boundary plantation +farm pond (0.015 ha)				
Jammu & Kashmir	Jammu	Integrated farming system model for small and marginal farmers of Jammu region: (Integrated crop+ horticulture intercroped with high value vegetable crop + livestock + fisheries poultry + mushroom	10 districts	Under process		Minutes of the meeting was discussed by the government of J&K for adoption of IFS model in all 10 district of Jammu & Kashmir
Jharkhand	Ranchi	Rice (Sahbhogi)-potato (K. Ashoka)+wheat (K9107)-green gram(P. Vishal)	Damuka, Samtara,Pakur, Sahebganj	80	90	TSP, FLD, Training through KVK's
		Integrated nutrient management in maize-wheat sequence	Sahebganj, E. Singhbhum, N. Singhbhum, Hazaribag, Dumka	50	70	
		IFS model: crop + dairy + vermin + mushroom +fishery	Sahebganj, E. Singhbhum, N. Singhbhum, Hazaribag, Dumka	75	100	

State /UT	Name of Centre	Brief description of technology/ Recommendation (Name of cropping system or details of IFS models)	Suitable district (s)	% improvement in productivity	% improvement in Net income	Document reference (State/University)
Kerala	Karmana	Coconut based	About Kerala all 14 district	29	39	letter from Directorate of research, KAU already handed over to IIFSR Plan state document of department of agriculture also handed over 2017-18,2018-19, 2019-20 to be transmitted in a week
		Homestead base		14	24	
		Banana based		12	14	
		Rice based		44	57	
Madhya Pradesh	Indore	Soybean +maize (2:1)-wheat	Indore, Ujjain, Dewas, Ratlam, Dhar, Jhabua	30	20	University report
		Arhar+Jawar fodder(1:1)-wheat under minimum tillage	Malwa region of MP	25	20	
	Jabalpur	1. Identification of cropping system models for different farming systems: a) Rice-potato-maize b) Greengram-chickpea-green gram	Jabalpur, Narsinghpur, Katni, Balaghat, Chhindwara	69	59	
		2. IFS Model 1 ha : Crop+ live stock +horticulture+ vermicomposting recycling		244	248	
	Powarkheda	Identification of cropping system model: 1. Maize-potato-okra 2. Soybean-vegetable-onoin 3. Soybean-chickpea-green gram 4. Rice-wheat green gram	Hoshiarpur, Narsinghpur, Baitul	 718 224 73 161	 583 277 85 53	University annual report
	Rewa	A. Identification of cropping systems model under different farming system: cropping systems- 1. Rice-garlic 2. Rice-toria-onion 3. Rice-potato-green gram B. Evaluation of weed management practices in rice-garlic under organic production system: 1. incorporation of mustard oil cake 5 tons per hectare + one hand weeding, 2. 2 weeding at 25 days and 50 days	Rewa, ShahdolSatna, Siddhi	 190 132 49 111 80	 218 139 97 86 149	University annual report

State /UT	Name of Centre	Brief description of technology/ Recommendation (Name of cropping system or details of IFS models)	Suitable district (s)	% improvement in productivity	% improvement in Net income	Document reference (State/University)
Maharashtra	Akola	1. 1 hectare model (integrated) for small and marginal farmers of Western Vidarbha zone of Maharashtra comprising of cropping systems 0.70 ha + Horticulture 0.25 ha + livestock 0.03 ha + others 0.02 ha + boundary plantations that is recommended to adapt 2. In sorghum-wheat crop sequence for obtaining higher and monetary returns with improvement and sustaining soil health apply of 75% RDF through chemical fertilizers along with 25% N through FYM/leucena/ wheat straw	Akola Amravati Yeotmal			Document in university package of practices
Odisha	Bhubneshwar	Farming systems with cropping system, horti-cultural system, dairy, fishery and poultry module.	Costal districts	70% over mono-cropping	70% over mono-cropping	Through Dean of Extension Education, OUAT and KVK's
Punjab	Ludhiana	1. Integrated Farming systems chapter Ludhiana in Package of practices for kharif and rabi crops 2. The funding agencies DBT agreed for one project on IFS of Rs. 1.61 crores during the current financial year. The ditricts are seleted namely ferozpur and Moga for Punjab and Chamba for Himachal Pradesh.	All Punjab	Almost 4 times	Approximate 3 times	PoP's of PAU, Ludhiana
Rajasthan	Kota	1. Urdbean (Broad Bed)+DSR-Veg.pea (BB)+coriander leafy (furrow) 2. Soybean (short duration)-mustard-cowpea (green pods+fodder)	Kota, Bundi, Jhalawar	42 19	47 17	POP of SE humid plain zone of Rajasthan
TamilNadu	Coimbatore	1. Crop+dairy+horticulture+fishery+poultry+ vermicompost 2. Crop +goat +poultry +kitchen garden + apiary + biogas plant +agroforestry 3. Vermi-compost unit: crop+desi cow +goat + desi poultry +agro forestry +kitchen gardening+fruit trees +farm pond+compost pit	5 districts namely Erode, Madurai, thirunelvel, Thanjavur, Villuppuram	25	25	GO (2D) No.143, Agriculture (AP5) department dt. 21.8.2018 25.772 crores

State /UT	Name of Centre	Brief description of technology/ Recommendation (Name of cropping system or details of IFS models)	Suitable district (s)	% improvement in productivity	% improvement in Net income	Document reference (State/University)
	Thanjavur	Wet land based farming system: crop+ horticulture+ dairy+ fishery+ poultry+ vermicompost (0.8 ha)	Thanjavur, Cauvery delta zone	25	25-30	GO (2D) No.143, Agriculture (AP5) department dt. 21.8.2018 25.772 crores for thanjavur district, Rs. 300 lakhs has been sanctioned to benefit 300 farmers @ Rs. 1 lakh/ farmer to implement wet land based farming system
Telangana	Rudrur	1. Bt. cotton+soybean(1:2)-sesame + groundnut (2:4) 2. Maize+soybean (2:4)-Tomato	All districts of northern Telangana	50	60	Zonal recommendation in zonal research advisory committee proceeding
Uttrakhand	Pantnagar	Crops + dairy + horticulture + agroforestry + vermincomost + fishery + duck	US nagar, Haridwar	110	146	Annual Report, directorate of Extension, GBPUA&T, Pantnagar
Uttar Pradesh	Kanpur	Maize (cob0-potato+mustard-okar	Kanpur nagar and Dehat	93	114	

2. Promising cropping systems identified for inclusion in Farming systems during 2018-19

State / UT	Name of Centre	Name of the cropping system	Purpose (Soil health / livestock nutrition/ family nutrition/ income generation)	Suitable district (s)	% improvement in productivity	% improvement in net income
Assam	Jorhat	1. Bitter gourd-tomao-french bean	Income generation	All districts of	703	647
		2. Rice-Rajmah-cowpea	Family nutrition	Assam	242	166
		3. Soybean-toria-blackgram	Soil health		227	183
		4. Teosinte-oat-cowpea (fodder)	Live stock nutrition		41	53
		5. Green gram + sesamum (2:1) on broad bed and rice in furrow kharif followed by chilli (BB)-toria(furrow) rabicowpea summer	Resource conservation & land configuration under rainfedsiuation	All districts of Assam except hill	370	153
		6. Rice (pre flood, cv joymoti) – rice (post flood, cv; Luit)	Suitable for flood prone area	All the flood prone area districts of Assam	62	180
Andhra Pradesh	Maruteru	Rice-sweet corn-vegetables	Income generation	13 Districts of AP	65	95
		Rice –black gram	Soil health		35	92
Bihar	Sabour	Rice –potato- radish-moongbean	Income generation as well as family nutrition	Bhagalpur	15	118
	Patna	Rice-wheat-monng	Income generation/ family nutrition/soil health	All districts	30-35	145
		Rice-cauliflower-onion	Income generation/ nutrition		42-46	160
Chhattisgarh	Raipur	Rice-onion – coriander (leaf) 3 :1- cowpea (grain) Rice-sweet corn-cluserbean	Income generation Income generation	Raipur, Durg, Bemetara -do-	80 66	75 65
Gujarat	Junagarh	Groundnut-Coriander-sesame Groundnut +maize (F)-drilled fennel-groundnut +sesame	Income generation Family nutrition, income generation, live stock nutrition	Junagarh,GirSomnath, Rajkot, Porbander	40 35	49 26
	Navsari	Rice-fenugreek-cluster bean Rice-cabbage-bottle gourd	Income generation		273 242	470 422
Haryana	Hisar	Rice- wheat	NPK: 150 60 60 (Rice) NPK: 150 60 30 (Wheat)	Fatehabad	1.94% in rice 1.62% in wheat	1.88 % in rice 1.02% in wheat

State / UT	Name of Centre	Name of the cropping system	Purpose (Soil health / livestock nutrition/ family nutrition/ income generation)	Suitable district (s)	% improvement in productivity	% improvement in net income
		Rice- wheat	NPK+ Zn: 150 60 60 25 (Rice) NPK + Zn: 150 60 30 25 (Wheat)	Fatehabad	11.02% in rice 13.30 % in wheat	10.87 % in rice 16.24 % in wheat
Himachal Pradesh	Palampur	Maize (green cob)-Turnip-tomato	Income generation	Kangra	62	73
Jammu & Kashmir	Jammu	Rice-broccoli-bhindi	family nutrition and income generation	integrated area of Jammu and Kashmir having 6 districts	65	89
		Rice-pea-bhindi	soil health &income generation		46	53
		Rice-potato-moth	family nutrition and income generation		45	43
Jharkhand	Ranchi	Rice (Naveen)+Daincha-lentil-green gram	Soil health	Palamu, Garhwa, Chatra	15	17
		Rice-gram-cowpea	Family nutrition	Gulma, lohargada, Latehar, Simdega,Khunti	24	10
		Rice-oat + berseem (1:1)	Livestock nutrition	Hazaribag, Dhanbad, Ramgarh	100	115
		Rice-potato-okra	Income generation	Shebganj, Pakur, Jamutara, Ranchi	338	297
Kerala	Karmana	Rice -bhindi-cocumber	income generation	south Kerala 3 district south Kerala district	36	224
		Rice+dhaincha-rice- green gram	soil health		26	48
		Rice -rice -amaranthus			29	574
Madhya Pradesh	Indore	Baby corn-brinjal (1:1)-onion-okra	Income generation	Malwa region of MP	30	22
		Arhar+ hybrid bajra-berseem-sweet sorghum (fodder)	Livestock nutrition		25	15
		Soybeans+ sesbania-wheat + chickpea + moong	Soil health		15	10
	Jabalpur	Sorghum-berseem	Fodder	Jabalpur, NarsinghpurChhindwara	15	57
		Greengram-chickpea-greengram	Soil health		69	132
		Rice-potato-maize	Family nutrition		69	59
		Sorghum-marigold-cowpea	Income generation		37	20

State / UT	Name of Centre	Name of the cropping system	Purpose (Soil health / livestock nutrition/ family nutrition/ income generation)	Suitable district (s)	% improvement in productivity	% improvement in net income
	Powarkheda	1. Sorghum-gram-green gram 2. Rice-wheat-green gram 3. Maize-berseem-sorghum(F) 4. Maize (cob)- potato- okra	Soil health Family nutrition Fodder nutrition Income generation	Hoshangabad	73 161 75 718	85 53 -25 583
	Rewa	1. Rice-garlic 2. Rice-groundnut+mustard-GM 3. Rice-potato-green gram 4. Rice-barley-bajra	Income generation Soil health Family nutrition Livestock	Rewa, Sidhi, Satna, Shahdol	189 30 50 33	218 65 96 68
Odisha	Bhubneshwar	1. GM-rice-groundnut-cowpea(veg) 2. Rice-maize-cowpea (fodder) 3. Rice-groundnut–green gram 4. Scented rice- sweet corn-bitter gourd	Soil health Livestock nutrition Family nutrition Income generation	Costal districts with assured irrigation -do- -do- -do-	Summer crop were harvested due to the cyclone "Fani" so System productivity was not calculated	
	Chiplima	1. Dhaincha-rice-groundnut-cowpea 2. Rice-maize-cowpea 3. Rice-groundnut-green gram 4. Rice-sweetcorn-bittergourd	soil health livestock nutrition Family nutrition Income generation	Sambhalpur, Sonepur Sambhalpur Sambhalpur Sambhalpur	12 13	33 35
Rajasthan	Durgapura	Groundnut (green pod)- onion rabi	Income generation	10 districts of Rajasthan	242 over pearl millet-wheat	338 over pearl millet-wheat
Tamil Nadu	Coimbatore	1. Maize-bengal gram-cowpea 2. BajraNapier+desmenthus 3. Pearl millet-cowpea (g)-sunflower 4. Maize-chilli-radish	Soil health Livestock nutrition Family nutrition Income generation		 127 21 21	7 299 31 26
Uttarakhand	Pantnagar	1. Rice-wheat-sesbania 2. Multicut sorghum-berseem + oat-maize+cowpea 3. Rice-yellow sarson-cowpea (grain) 4. Maize-broccoli-okra	Soil health Livestock nutrition Family nutrition Income generation	US nagar, Haridwar	2 82 19 142	10 42 28 160
Uttar Pradesh	Kanpur	Maize (cob)-potato+ mustard-okra	Income generation	Kanpur	93	114
	Varanasi	1. Rice -potato-green gram 2. Rice-cabbage -cowpea (fodder)	Income generation Livestock nutrition	Varanasi	141 109	134 121

3. Promising Integrated Farming System models / modules identified

State / UT	Name of Centre	Name of the Farming system model / module	Area (ha)	Suitable district (s)	% improvement in net income over existing farming system	Value of recycling (%)
Assam	Jorhat	Crops (field+ horticultural crops:0.7946 ha)+ cattle 2 cows with heifer+ poultry (4 batch with 25 nos. broiler chicken+ fishery (0.92 ha)+apiary (5 nos. of hives)	1.0 ha	All districts of Assam except hill districts	249	30
		Raised and sunken beds module	0.12 ha	All districts of Assam	100	44
Andhra Pradesh	Maruteru	Wetland IFS model : cropping system+ fishery+ livestock + poultry +horticulture	0.5 ha	Godavari and Krishna delta region of AP	23	75
Bihar	Sabour	Cropping + dairy +goat + duck+ fishery + fruit + vermicomposting + boundary plantation	1.0 ha	Bhagalpur	128	Vermicompost: 81% Heapcompost: 67%
	Patna	1 acre IFS model : crop+ Horticulture +goat +Poultry	0.40 ha	For districts of Bihar	165	Waste material: 35
		2 acre IFS model : crop+ Horticulture +dairy +fishery/duck	0.80 ha	North Bihar		Waste material: 42
Chhattisgarh	Raipur	Crop+dairy+goat+ duck+ fishery + fruit composting + mushroom	1.0 ha	Raipur, Durg, Bametera, Bilaspur, Dhamteri, Janjgir-chamba and part of Bastaradistricts	120	26
Gujarat	Junagarh	Cropping system: Groundnut-onion-sorghum (f) Dairy compost	0.1602 ha 0.0636 ha	Junagarh, GirSomnath, Rajkot, Bhavnagar	60	5 7
	Navsari	Mango +Sapoth Sopata +turmeric Cropping sequence Nursery +kitchen gardening Compos pit/vermin-composting Boundary plantation	0.20-0.09 0.20-0.096 0.18 0.015 0.005 0.025	Multiple land use		32
Haryana	Hisar	Crop- dairy	0.25 ha	Fatehabad	11775	70.82
Himachal Pradesh	Palampur	Crops (0.65 ha), vegetable (0.175 ha), Fodder (0.10ha), Dairy,Poultry, Mushroom (0.075 ha)	1.0 ha	Kangra	75%	48

State / UT	Name of Centre	Name of the Farming system model / module	Area (ha)	Suitable district (s)	% improvement in net income over existing farming system	Value of recycling (%)
Jammu & Kashmir	Jammu	Crop based farming system	0.65 ha	6 districts of Jammu region	30 -40	75
		crop + dairy + horticulture based IFS	0.80 ha		85	90
		crop diversification +dairy + horticultural inter cropping with vegetable + biogas + vermin-composting +fishery+ poultry	1.0 ha		210	100
Jharkhand	Ranchi	Crop+dairy (2 cow)+ vermin(3 bed)-musroom-fishery	1.0 ha	East Singhbhum,Dumka, Jamtara, Pakur, Sahebganj	100	30
Kerala	Karmana	Coconut based	0.2 ha	14 district of Kerala	97	66
		Homestead base	0.2 ha		80	73
		Banana based	0.2 ha		60	57
		Rice based	0.2 ha		87	60
Madhya Pradesh	Jabalpur	IFS model 1 hectare crop+ horticulture + dairy + poultry + composting +mushroom	1.0 ha	Jabalpur, Katni Narsinghpur Chhindwara		
Maharashtra	Prabhani	Evaluation and establishment of farming systems model for Maharashtra region of marginal farmer	1.0 ha	Prabhani	50-60	90
Odisha	Bhubneshwar	Cropping systems +horticultural system including kitchen gardening + fishery+ Poultry+ Dairy	1.25 ha	coastal Odisha, cuttack, Puri, Kendra pra, Jagatsingh, Nayagadh	52	12
Rajasthan	Durgapura	development and validation of on-station IFS model	1.45 ha	10 districts of Rajasthan	331	29
Tamil Nadu	Coimbatore	Crop + horticulture + dairy + goat + poultry + kitchengardening + bordercrops + vermicompost	1.0 ha	Coimbatore, Erode, salem	70	65
Uttarakhand	Pantnagar	Crop + horticulture + dairy + biogas + boundary plantation + veg. cowpea + fish + duck	1.0 ha	US nagar, Haridwar	56	51
Uttar Pradesh	Kanpur	Crop+dairy+horticulture	1.0 ha	Kanpur	156	61
West Bengal	Kalyani	IFS model comprising crop, livestock, fishery and horticulture with supplementary enterprises like vermicompost and biogas unit	0.66	Districts under lower gangetic plains of WB (Nadia, Murshidabad, Hooghly, eastern parts of Burdwan)	69	31

Recommendations finalized from On-Farm research for up-scaling through development schemes

1. Recommendation shared with State Government agencies/ Included in the packages of University etc. during 2018-19

S. No.	State / UT	OFR_Centre	Brief description of technology/ Recommendation (Nutrient recommendation or IFS models/modules)	Suitable district (s)	% improvement in productivity	% improvement in Net income	Document reference (State/University)
1	Andhra Pradesh	Vizianagaram	NPK + $Znso_4$ (80:60:50:50 and NPK @ 200:80:80 kg/ha in rice – maize systems Zn recorded grain yield 5797 kg ha^{-1} & 7370 kg ha^{-1}.	Vizianagaram	15 in rice and 24 in Maize	26	Acharya N.G. Ranga Agricultural University publication
2	Chhattisgarh	Kanker	Rice- chickpea / wheat / linseed- greengram / blackgram	Uttar BastarKanker, Kondagaon, Narayanpur, Bastar, Dhamtari, Balod	24	27	-
3.	Maharashtra	Thane	100:50:50:6 Kg ha^{-1} of to Kharif (hybrid variety) okra and 120:50:25 Kg ha^{-1} to rabi/summer rice	Palghar, Thane, Raigad	80	125	--

2. Promising Nutrient package identified from nutrient response experiment during 2018-19

S. No.	State / UT	OFR_Centre	Name of the cropping system	Nutrient application package	Suitable district (s)	% improvement in productivity	% improvement in net income
1	Assam	Goalpara	Rice - toria	40 kg N + 20 kg P_2O_5 + 20 kg K_2O + 25 kg $ZnSO_4$ in Kharif rice and 40kgN + 35 kg P_2O_5 + 15 kg K_2O + 10 kg Borax in toria	Kamrup/Goalpara	68	204
2	Bihar	Nalanda	Rice - wheat	100:60:40:25 Kg N P K $Znso_4$ /ha in rice and 120:60:40 Kg N P K /ha in wheat	Nalanda, Saikhpura	22	29
3	Chhattisgarh	Kanker	Rice - chickpea	100:60:40 kg NPK + 20 kg $ZnSO_4$ ha^{-1} and 20:40:20:20 kg NPK Sulpur ha^{-1} in rice-chickpea system	Uttar BastarKanker, Kondagaon, Narayanpur, Bastar, Dhamtari, Balod	283 in rice and 256 in chickpea	155 in rice and 178 in chickpea

S. No.	State / UT	OFR_Centre	Name of the cropping system	Nutrient application package	Suitable district (s)	% improvement in productivity	% improvement in net income
4	Gujarat	Adiya/Patan	Fodder sorghum-Wheat- Fallow	100+50+25+20 ($N+P+K+ZnSO_4$ kg/ha) in fodder sorghum and 120+60+30+15 ($N+P+K+ZnSO_4$ kg/ha) in wheat	Patan (Harij and Radhanpur block)	21	137
		Dahod	Maize-chickpea	$N+P+K+ ZnSO_4$	Dahod	34	50
			Maize-chickpea	N+P+K	Dahod	16	32
5	Himachal Pradesh	Bilashpur	Maize-wheat	90 + 45+ 30 + 25 in maize and 80 + 40 + 40+ 25 NPK and $ZnSO_4$ in Wheat	Bilaspur,Hamirpur,Una	53	100
6	Jammu & Kashmir	Jammu	Rice -wheat	30 +20 +10+ 20kg $ZnSO_4$) in rice and 100+50+25 + 10kg $ZnSO_4$ +0.5% foliar spray at pre &post flowering in wheat	Jammu, Samba	31	41
7	Jharkhand	East Singhbhum	Rice - wheat	100 + 50 + 25 NPK + 25 kg /ha $ZnSo_4$	EastSinghbhum, SaraikelaKharsawan and WestSinghbhum	47	70
			Rice - Wheat	100 + 50 + 25 NPK kg / ha	EastSinghbhum, SaraikelaKharsawan and WestSinghbhum	36	62

S. No.	State / UT	OFR_Centre	Name of the cropping system	Nutrient application package	Suitable district (s)	% improvement in productivity	% improvement in net income
8	Karnataka	Dharwad	Chilli + onion + cotton (1 : 3 : 2 rows) intercropping .	Chilli + onion + cotton (1 : 3 : 2 rows) intercropping, Farmers practice of groundnut -rabi sorghum.	Gadag, Koppal, Dharwad, Haveri	54	47
			Intercropping Bt cotton + Peas (vegetable) in 1 : 2 row ratio)	T1 : Intercropping Bt cotton + Peas (Vegetable) in 1 : 2 row ratio T2 : Sole Bt cotton	Belagavi, Dharwad, Haveri	34	49
		Chikkaballapura	Finger millet - tomato	100:50:50:10 kg/ha NPK and $ZnSo_4$ in finger millet 250:250:250 kg/ha NPK and 10 kg/ha Trichodermaviridae as biofungicide in tomato	Chikkaballapura and Kolar	18	40
			Maize-french bean	150:75:40:10 kg/ha NPK and $ZnSo_4$ in maize 62.5:100:75 kg/ha NPK and 10kg/ha Trichodermaviridae as biofungicide in French Bean	Chikkaballapura and Kolar	10	16
9	Kerala	Vellyani	Rice-rice-fallow	In zinc deficient soils, In rice-rice-fallow cropping system having medium duration rice, application of NPK+Zn (N:P_2O_5:K_2O @ 90:45:45 kg/ha + ZnSO4 @ 20 kg/ha) to kharif and NPK alone to rabi	Thiruvananthapuram, Kollam and parts of Pathanamthitta districts (Southern NARP Zone)	10	126
11	Madhya Pradesh	Umaria	Rice-Wheat	120:60:40 kg NPK + 25 kg $ZnSO_4$	Umaria, Anuppur	57	87
		Anuppur	Rice-Wheat	120:60:40+ $ZnSO_4$ 25kg/ha in both crop	Anuppur, Dindori, Mandla	53	91

S. No.	State / UT	OFR_Centre	Name of the cropping system	Nutrient application package	Suitable district (s)	% improvement in productivity	% improvement in net income
11	Maharashtra	Padegon	Pearlmillet-Wheat	50 + 25 + 25 NPK + 25 $FeSO_4$kg ha^{-1} In pearlmillet and 120 + 60 + 40 NPK + 20 $FeSO_4$kg ha^{-1} In wheat	Satara	33	26
		Thane	Rice –okra	100 +50 + 50 NPK + 6 $ZnSO_4$ Kg ha^{-1}-in rice and 120+ 50 +25 NPK,kg/ha in okra	Palghar,Thane,raigad	80	125
12	Odisha	Keonjhar	Maize-toria	Maize- 120 + 60 + 60 NPK + 25 $ZnSO_4$kg /ha in maiz and 30+15 +15 NPK + 40 sulphur kg /ha in toria	Keonjhar, Mayurbhanj	47 in maize- and 75 in toria	106
			Rice-chickpea	60 +30 + 30 NPK + 25 $ZnSO_4$kg/ ha in rice and 20+40+:20 NPK kg/ha + Sodium Molybdate (ST) @3 g/ 10 kg seed in chickpea	Keonjhar, Mayurbhanj	18 in rice and 51 in chickpea	45
		Kalahandi	Rice- green gram	Rice- 80 + 40 + 40 NPK + 25 $ZnSO_4$kg /ha in rice and 20+40 +:40 NPK kg kg / ha + Sodium Molybdate (ST) @3 g/ 10 kg seed in greengram	Kalahandi, Nuapara	50 in rice and 42 in green gram	261
13	Punjab	Patiala	Rice- wheat	Application of Zn in Rice and Application of Mn in Wheat	Patiala	9	5

S. No.	State / UT	OFR_Centre	Name of the cropping system	Nutrient application package	Suitable district (s)	% improvement in productivity	% improvement in net income
14	Rajasthan	Dausa	Pearl millet + mustard	90+30+30 NPK + 25 $Znso_4$Kg/ha in Pearl millet	Dausa	33	59
			Pearl millet + mustard	60+30+30 NPK NPK + 30 Sulphur Kg/ha in mustard	Dausa	44	63
		Dungarpur	Maize-wheat	90+35+30 NPK + 25 $Znso_4$Kg/ha in maize and 120+40+30 NPK Kg/ha in wheat	Banswara, Dungarpur and Pratapgarh	40 in maize and 29 in wheat	52
15	Telangana	Medak	Rice- rice	120+60+40 NPK + 50 $Znso_4$Kg/ha in rabi rice only	medak	12	22
16	Tamil Nadu	Salem /Yetepur	Maize-maize	250+75+75 NPK + 37.5 $Znso_4$Kg/ha in kharif and rabi maize	Salem	18 and 105	215 and 239
			Groundnut-fingermillet	25+50+75 NPK + 10 borax Kg/ha in groundnut and 60+ 30+30 NPK + 37.5 $Znso_4$Kg/ha in finger Millet	Salem	19.3 and 92.3 (over farmers practice and control)	29.8 and 168.2 (over farmers practice and control)
		Erode	Rice-gingelly	150+ 50+50 NPK + 25 $Znso_4$Kg/ha and rabi rice and 35+ 23+23 NPK + 5 $Znso_4$Kg/ha in summer gingelly	Erode and Coimbatore	21 and 101	20 and 29
17	Uttarakhand	Udham Singh Nagar	Rice-wheat	150+ 60+40 NPK + 20 sulphur Kg/ha	Udham Singh Nagar	13 in rice and 11in wheat	15
18	Uttar Pradesh	Fatehpur	Rice-wheat	150+ 60+40 NPK + 25 $Znso_4$Kg/ha in rice and 120+ 60+40 NPK kg/ha in wheat	Fathepur	27	59
		Muzaffarnagar	Sugarcane-ratoon-wheat	180+60+120 NPK/ha + 25 ZnSo4+25 kg FeSo4 in sugarcane	Muzaffarnagar Bagapat,Meerut Shaharanpur, Bijnor, Bulandashar, Ghaziabad, Noida	28	41
			Rice -wheat	120 + 60 + 25 NPK ZnSo4 + 25 kg boron kg / ha in rice	Muzaffarnagar Bagapat,Meerut Shaharanpur, Bijnor, Bulandashar, Ghaziabad, Noida	52	68

S. No.	State / UT	OFR_Centre	Name of the cropping system	Nutrient application package	Suitable district (s)	% improvement in productivity	% improvement in net income
19	West Bengal	Nadia	Rice - mustard	80 + 40 + 40 NPK + 4 kg ZnSo4 kg/ha in rice and 80+40+40 NPK + 30kg sulphur kg /ha in mustard	Nadia, Murshidabad parts of Burdwan Hooghly	57	111

3. Promising Integrated Farming System models / modules identified

S. No.	State / UT	OFR_Centre	Name of the promising farming system model / module (from OFR 2 and 3 experiments)	Area (ha)	Suitable district (s)	Cost of intervention (Rs)	% improvement in net income over existing farming system
	Andhra Pradesh	Vizianagaram	Crop+Dairy+Poultry	1.13	Vizianagaram	5110	23
	Assam	Goalpara	Crop + Dairy+ Piggery + Poultry + Fishery		Goalpara	7950	25
			Crop + Piggery +Goatary + Poultry		Goalpara	6650	45
			Crop + Goat + Poultry		Goalpara	4650	56
	Bihar	Nalanda	Crop + Dairy + Buffalo	0.86	Nalanda, Saikhpura	5240	60
			Crop +Dairy	0.79	Nalanda,Saikhpura	4010	78
	Chhattisgarh	Kanker	Crop+ Poultry	0.94	Uttar BastarKanker, Kondagaon, Narayanpur, Bastar, Dhamtari, Balod, Sukma, Dantewada, Bijapur	4433	98
			Crop + poultry	1.14	Uttar BastarKanker, Kondagaon, Narayanpur, Bastar, Dhamtari, Balod, Sukma, Dantewada, Bijapur	6305	120
	Gujarat	Adiya/Patan	Crops + Dairy	1 ha	Patan	8695 2194	45 75
			Crops + Dairy	1 ha	Patan	2194	74.9
		Dahod	Crop +Dairy + Goat +Poultry	0.92	Dahod	2441	38
			Crop +Dairy	1.27	Dahod	2585	31
	Himachal Pradesh	Bilashpur	Crops+ Dairy	0.55 ha	Bilaspur,Hamirpur,Una	2883/-	82
			Crops+ Dairy+Goats	0.44	Bilaspur,Hamirpur,Una	2462/-	67

S. No.	State / UT	OFR_Centre	Name of the promising farming system model / module (from OFR 2 and 3 experiments)	Area (ha)	Suitable district (s)	Cost of intervention (Rs)	% improvement in net income over existing farming system
	Jammu & Kashmir	Jammu	NKG+oyster mushroom	-	Jammu, samba	800	100
			Fishery + oystermushroom+ NKG	0.125	Jammu	2700	35
	Jharkhand	East Singhbhum	Crop+Goat+Poultry	0.75	East Singhbhum, Saraikela Kharsawan and West Singhbhum	9062	186
			Crop+Goat+Poultry	1.24	East Singhbhum, Saraikela Kharsawan and West Singhbhum	12322	108
	Karnataka	Dharwad	Crop + DairyIntegrated Farming systemwith new Modules / Interventions for small and marginal farmers of Northern Dry Zone of Gadag district, Karnataka.	1.26	Gadag, Dharwad, Vijayapur, Koppal	3960	112
		Chikkaballapura	Crop+dairy+sheep	0.52	Chikkaballapura	9500	144
			Crop + horticulture + dairy + sheep	1.43	Chikkaballapura	5750	56
	Kerala	Vallyainii	Hort. + Crop + Dairy	0.49	Thiruvananthapuram, Kollam and parts of Pathanamthitta districts (Southern NARP Zone)	10000	215
			Hort. + Poultry	0.34	Thiruvananthapuram, Kollam and parts of Pathanamthitta districts (Southern NARP Zone)	10000	192
			Hort. + Dairy	0.35	Thiruvananthapuram, Kollam and parts of Pathanamthitta districts (Southern NARP Zone)	10000	169
			Hort. + Crop + Dairy	1.00	Thiruvananthapuram, Kollam and parts of Pathanamthitta districts (Southern NARP Zone)	10000	389
			Hort. + Poultry	0.95	Thiruvananthapuram, Kollam and parts of Pathanamthitta districts (Southern NARP Zone)	10000	550

S. No.	State / UT	OFR_Centre	Name of the promising farming system model / module (from OFR 2 and 3 experiments)	Area (ha)	Suitable district (s)	Cost of intervention (Rs)	% improvement in net income over existing farming system
	Madhya Pradesh	Umaria	Crop + Dairy	1.20	Umaria, Anuppur	15262	78
			Crop + Dairy + Goatary	1.00	Umaria, Anuppur	13552	55
			Crop + Dairy	1.36	Umaria, Anuppur	17028	62
			Crop + Dairy + Goatary	2.00	Umaria, Anuppur	20600	45
		Anuppur	Crop+Dairy+Horticulture	0.92	Anuppur,Dindori	8125	37
			Crop+Dairy+Goatry	0.85	Anuppur,Dindori	7625	45
	Maharashtra	Padegon	Crop + Dairy + Goatery +Poultry	0.70	Satara	2193	17
			Crop + Dairy + Goatery +Poultry	1.19	Satara	2068	19
		Thane	Crop + Dairy	0.40	Palghar,Thane,Raigad	4230	22
			Crop + Poultry	0.38	Palghar,Thane,Raigad	6080	28
	Odisha	Keonjhar	Crops+Horticulture+Poultry	0.79	Keonjhar, Mayurbhanj	4134	118
			Crop + Horticulture + Poultry + Goat+Fishery	1.26	Keonjhar, Mayurbhanj	5135	50
		Kalahandi	Crop+ Dairy	0.65	Kalahandi, Nuapara	3465	65
			Crop+ Dairy + Goatery + Poultry	1.26	Kalahandi, Nuapara	3465	85
	Punjab	Patiala	Crop+ Livestock (Rice- wheat) Additional- Basmati Rice, Summer Moong, Kitchen garden, Poultry)	1	Patiala	5500	43
			Crop +Livestock (Rice-Wheat) Additional- BarseemFodder Kithcen garden,	1	Patiala	3400	95

S. No.	State / UT	OFR_Centre	Name of the promising farming system model / module (from OFR 2 and 3 experiments)	Area (ha)	Suitable district (s)	Cost of intervention (Rs)	% improvement in net income over existing farming system
	Rajasthan	Dausa	Crop+ Dairy + Horticulture	1.2	Dausa	7800	170
			Crop+ Dairy + Goat	2.7	Dausa	9600	115
		Dungarpur	Crop+ Dairy + Horticulture	0.82	Banswara, Dungarpur and Pratapgarh	1671	91
			Crop+ Dairy + Poultry	0.93	Banswara, Dungarpur and Pratapgarh	2807	89
	Telangana	Medak	Crop + Diary +Sheep + Vegetables	0.85	Medak	20,000	57
			Crop + Diary +Sheep	0.76	Medak	20,500	38
	Tamil Nadu	Salem /Yetepur	Crop + Dairy + Goat + Poultry	0.86	Salem, Namakkal	8670	158
			Crop + Dairy	1.08	Salem, Namakkal	4350	74
		Bhavanisagar	Crop +dairy +poultry	0.89	Erode and Coimbatore districts of TamilNadu	4554	101
			Crop +dairy +Goat/ sheep+ poultry	0.91	Erode and Coimbatore districts of TamilNadu	5890	94
			Crop +dairy +poultry	1.15	Erode and Coimbatore districts of TamilNadu	4648	81
			Crop +dairy +Goat/ sheep+ poultry	1.34	Erode and Coimbatore districts of TamilNadu	5200	74
	Uttar Pradesh	Fatehpur	Crop + Dairy + Horticulture	0.6	Fathehpur	750	63
			Crop + Dairy + Horticulture	0.92	Fatehpur	1400	63
		Muzaffarnagar	Crop+dairy (OFR3)	0.98	All districts of western part of Uttar pradesh(Muzaffarnagar, Meerut, Bagpat, Bulandsahar, Noidam, Gaziabad, Shaharanpur,Bijnor)	6000	250
	West Bengal	Nadia	Crop+Hort+Dairy	0.52	Nadia, Murshidabad parts of Burdwan Hooghly	3637	131
			Crop+Hort+Dairy	1.07	Nadia, Murshidabad parts of Burdwan Hooghly	4428	76 P

9

APPENDIX

APPENDIX I A : WEATHER PARAMETERS (MONTHELY AVERAGES RAINFALL) AT DIFFERENT FARMING SYSTEM CENTERS DURING 2018-19

	Name of FSR centre	June	July	August	September	October	November	December	January	February	March	April	May
1	Akola	291.6	261.9	212.2	64.4	0	4.5	0	0	0	0	0.3	0.5
2	Ayodhya	12.4	340.6	349.4	113.4	0	0	0	41	0	7	0	0
3	Bhubneswar	95.3	158.9	585.4	211.7	247.6	5.6	0.0	0.0	0.0	7.5	7.2	200.3
4	Chiplima	217.8	241.3	357.9	116.5	0.0	0.0	0.4	0.0	0.0	13.4	2.4	5.7
5	Coimbatore	54	73.4	60.4	115.7	151.6	57.1	8	0	0	0	23.6	77.8
6	Durgapura	30.0	291.4	147.6	107.0	0.0	0.0	0.0	7.0	0.6	0.0	13.8	9.2
7	Goa	1100.6	898.6	461.9	36.7	145.4	10.4	0	0	0	0	0	0.4
8	Hisar	58.9	158.8	23.5	115.8	0.0	0.0	0.0	13.8	8.8	6	15.5	59.8
9	Indore	0	136.3	226.1	190.2	204.1	1	0	0	0	0	0	0
10	Jabalpur	56.3	365.2	588.0	105.6	0.0	0.0	0.0	4.3	6.4	18.2	22.9	0.4
11	Jammu	66.2	244.1	470.4	202.4	3.6	14.8	11.8	64.2	155.4	36.2	42.4	5.6
12	Jorhat	399.2	275.0	361.3	340.2	17.4	32.4	29.6	10.7	36.0	77.2	184.6	327.6
13	Junagadh	2.5	646.3	73.6	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Kalyani	106.6	405.9	207.0	157.3	10.8	4.3	21.4	0.0	77.1	24.9	142.5	94.4
15	Kanpur	63.4	386	365.3	143.8	0	0	0	13.5	17.5	4.2	2.8	3.8
16	Karmana	296.8	131.0	317.0	267.0	320.0	110.0	55.0	0.0	1.1	3.0	31.2	114.8
17	Kathalagere	65.00	62.60	118.20	122.80	84.90	33.00	0.00	0.00	0.00	0.00	0.00	34.10
18	Kota	10	147	192.8	174.0	0.0	0.0	0.3	0.0	0.0	0.2	36.0	5.0
19	Ludhiana	141.8	376.6	74.0	250.6	0.0	2.6	0.0	66.0	95.6	7.4	37.8	20.0
20	Maruteru	296.8	250.2	374.0	114.0	16.4	10.2	65.2	0.0	0.0	0.0	0.0	0.3
21	Modipuram	48.1	494.5	209.9	180.4	4	1.3	0.0	65.5	51.40	10.6	2.4	9.0
22	Navsari	120.00	1282.00	209.00	64.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	Palampur	259.4	508.8	634.6	98.4	0	26	41.8	51.6	22.4	18	153.8	108
24	Pantnagar	73.0	402	657	231.2	0.0	0.0	2.8	0	1	0	3	4
25	Parbhani	325.8	193.8	274.6	8.2	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0
26	Patna	46.0	241.6	183.2	116.7	0.0	0.0	1.1	2.7	13.8	0.0	11.6	4.4
27	Portblair	665.3	203.0	522.2	340.0	335.6	331.6	203.8	125.8	0.0	50.8	17.9	336.6
28	Powarkheda	92.1	268.3	351.8	116	5.6	0	0	0.0	0	13.5	11.4	0.0
29	Rahuri	3	3.4	89	3.8	0	2	0	0	0	0	0	0
30	Raipur	141.5	328	560.2	84.8	0	0	47.2	23.6	12.4	9.4	22	10.6
31	Rajendranagar	51.6	87.6	159.6	43.4	43.2	0	13.6	25.2	2	0	43.2	
32	Ranchi	150.1	184.7	305.9	200.5	2.0	0.0	13.5	2.0	10.4	38.9	23.7	35.8
33	Rewa	138.2	246.8	393.2	99.0	0.0	0.0	0.0	15.2	0.0	18.2	15.2	6.0
34	Rudrur	104	93	233	25	9.6	0	0	0	0	0	0.00	0.00
35	Sabour	118.0	254.9	234.2	66.3	76.2	0.0	11.2	4.2	42.2	1.2	38.0	61.2
36	Siruguppa	60.9	22.1	56.8	96.5	31.0	0.0	0.0	0.0	0.0	0.0	2.0	4.2
37	SK Nagar	31.0	205.4	91.5	0.0	0.0	0.0	0.0	0.0	1.0	1.2	8.0	3.0
38	Thanjavur	45.7	81.5	55.0	61.4	79.6	284.2	35.2	0.0	0.0	0.0	0.0	0.0
39	Umiam	433.3	327.4	455.6	241.8	213.6	8.6	28.6	20.9	10.5	44.8	207	298.9
40	Varanasi	35.7	245.4	276	223	0	0	0	17.8	9.8	1.4	46.00	0.00

Appendix I B : Maximum and minimum temperature(0C) (June 2018 to May 2019)

	Name of CSR centre	Temperature (0C)																							
		JUNE		July		August		September		October		November		December		January		February		March		April		May	
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	Akola	37.20	36.60	32.50	30.00	30.40	29.60	32.50	32.10	33.70	35.00	31.60	33.20	28.3	28.5	29.8	28.5	32.5	32.2	37.3	36.7	41.2	42.1	42.5	43.1
2	Bhubneswar	35.4	26.5	32.5	26.0	32.2	25.9	32.6	25.2	32.5	22.8	31.5	18.7	27.2	14.1	28.5	13.0	32.9	17.0	35.2	23.2	38.0	25.337.1	27.4	35.5
3	Chiplima	38.9	20.5	30.5	18.6	28.8	17.6	32.5	19.5	32.5	21.2	30.3	18.5	29.4	10.3	28.6	5.5	30.0	11.3	31.0	16.2	35.1	19.8	40.2	23.2
4	Coimbatore	30.3	23.7	30.3	23.3	30.2	22.9	32.8	22.4	30.4	21.9	29.1	21.5	30	20.8	29.9	17.9	33.1	21.4	35.7	23.5	36.7	24.5	35.8	24.9
5	Durgapura	40.0	28.0	34.6	25.6	32.7	25.1	31.3	22.8	35.3	19.3	30.3	13.2	22.5	5.8	22.1	7.6	23.8	11.0	29.7	16.0	37.5	23.5	40.1	25.4
6	Faizabad	39.1	27.4	33.5	26.5	31.6	25.8	32.0	25.1	33.4	21.0	30.3	14.1	23.5	6.3	21.8	6.7	22.8	9.8	29.4	13.1	36.9	20.5	40.9	24.8
7	Goa	30.4	23.3	29.5	23.2	29.1	22.0	31.0	21.0	34.2	21.0	35.2	18.6	33.7	19.1	33.7	17.6	34.5	18.6	33.5	20.7	35.0	23.4	34.9	23.7
8	Hisar	39.6	27.8	35.0	26.9	35.2	26.8	33.3	23.6	32.7	16.9	27.9	11.7	21.9	4.9	19.2	5.2	20.4	8.0	26.5	10.5	36.7	18.4	39.0	21.6
9	Indore	38.7	26.2	31.5	22.9	27.9	23.1	30.4	21.3							26.1	9.0	29.7	12.1	34.6	15.3	41.2	22.4	41.1	26.9
10	Jabalpur	37.9	26.7	31.2	24.5	29.1	24.0	30.1	22.6	32.4	17.2	29.5	10.5	23.9	6.7	23.4	7.1	27.6	11.5	31.3	13.5	38.6	18.8	40.9	22.5
11	Jammu	38.1	25.8	34.5	26.3	34.0	25.9	32.2	22.9	29.4	13.3	25.6	10.1	20.3	4.4	17.4	5.2	19.3	8.1	24.4	10.6	33.5	17.1	37.7	20.0
12	Jorhat	32.8	25.0	33.6	25.9	33.5	25.8	32.3	24.9	29.6	20.5	26.7	14.9	24.9	10.9	24.6	9.2	24.8	12.4	27.0	15.7	28.9	19.8	27.8	21.7
13	Junagadh	38.0	28.3	31.5	26.2	30.6	25.2	31.1	23.7	36.8	22.1	36.3	18.6	31.4	15.0	29.8	12.6	30.8	14.3	35.3	20.2	40.3	23.7	39.1	25.9
14	Kalyani	35.2	27.2	32.6	26.6	32.4	26.9	33.4	26.3	32.4	22.5	30.4	18.2	24.5	11.7	25.2	10.1	28.5	14.1	32.0	20.4	33.5	24.1	36.1	26.4
15	Kanpur	39.8	27.5	34.2	26.3	32.1	25.0	32.4	23.5	34.3	17.2	28.8	12.1	23.0	6.9	21.6	7.9	23.4	11.0	29.5	13.8	38.0	21.4	41.3	24.2
16	Karmana	29.5	26.4	30.1	24.4	30.1	24.1	30.7	24.5	30.6	23.5	32.0	24.1	32.0	24.7	31.6	21.1	32.4	24.1	33.3	25.0	33.7	26.3	32.7	26.2
17	Kathalagere	32.25	22.00	30.60	22.00	28.25	21.00	34.00	21.00	36.80	21.20	35.50	21.00	37.00	18.00	36.40	17.00	38.00	20.00	38.75	22.00	36.86	24.70	36.83	25.15
18	Kota	40.65	27.6	33.71	25.95	31.82	24.05	31.02	22.02	35	15.7	30.48	11.15	23.97	5.11	23.53	5.19	25.95	10.25	31.52	13.42	39.8	19.1	42.84	23.35
19	Ludhiana	37.6	27.2	34.3	26.6	34.1	27.3	32.1	24.0	31.3	17.1	26.8	11.8	20.6	5.5	18.5	6.1	20.1	9.2	25.3	11.8	35.4	19.8	38.0	22.1
20	Modipuram																								
21	Maruteru	34.1	27.5	29.6	26.1	29.2	25.7	31.3	26.4	31.9	25.4	31.0	23.2	28.9	22.2	28.8	20.4	30.5	22.0	32.4	24.3	34.4	24.6	36.1	23.5
22	Navsari	33.7	26.3	28.9	24.0	29.8	23.9	31.6	21.9	36.6	19.8	35.1	15.2	30.3	11.7	30.1	9.9	31.4	12.2	34.5	15.4	36.6	21.5	34.7	24.3
23	Palampur	29.9	19.8	27.2	19.8	26.1	19.8	25.7	17.1	25.1	12.0	20.6	7.8	6.4	3.7	14.2	3.7	15.3	5.2	19.4	7.9	26.6	13.9	29.3	16.7
24	Parbhani	34.1	22.7	30.2	21.9	29.7	21.4	32.8	20.6	34.6	16.8	32.6	14.2	29.1	11.3	30.0	9.9	33.1	13.0	38.1	29.2	41.7	10.9	42.7	26.2
25	Patna	36.4	27.9	33.8	27.7	32.3	27.0	32.8	26.2	31.8	20.8	28.8	15.0	23.6	9.6	22.3	9.1	24.7	12.7	30.1	16.0	35.7	23.4	39.6	26.2
26	Pantnagar	38.2	24.7	33.9	25.2	32.7	25.0	34.0	23.4	33.6	14.5	28.6	7.7	25.7	8.2	20.4	4.2	22.8	5.6	29.6	10.7	35.4	16.2	38.2	21.1
27	Portblair	29.6	24.7	29.8	25.3	28.9	24.6	30.4	24.3	30.6	24.6	30.5	25.1	30.2	24.4	30	24.6	31.1	24.1	31.3	23.4	33.1	25.4	32.4	25.6
28	Powarkheda	43.1	22.0	35.9	22.5	31.9	21.0	35.0	19.0	36.2	14.0	35.0	10.0	27.5	3.5	28.0	4.0	33.0	4.5	41.0	9.0	46.0	17.0	45.0	22.0
29	Rahuri	34.9	24	29.8	22.9	29.1	22.3	31.9	20.9	33.8	18.3	32	14.6	28.2	11.1	27.2	10.5	29.5	11.2	34.7	15.1	38.4	20.5	40	22.4
30	Raipur	36.9	26.3	31.2	25.4	29.8	24.8	31.3	24.5	32.9	21.4	31.3	16.0	25.9	12.4	26.8	10.3	30.7	14.3	34.5	19.5	40.3	24.6	42.9	27.5
31	Rajendranagar	29.4	10.9	31.6	13.0	35.9	17.4	37.6	21.7	39.3	24.1	34.7	22.6	30.6	21.4	28.7	8.3	32.2	14.4	36.7	16.8	39.0	18.3	41.2	21.3
32	Ranchi	35.3	22.0	29.3	20.4	28.3	20.5	28.7	19.3	26.5	16.3	26.8	13.6	22.5	5.1	21.8	4.5	26.2	10.0	28.3	14.1	36.4	21.4	38.3	24.1
33	Rewa	40.2	27.2	32.4	23.9	31.2	24.3	32.9	22.4	38.6	16.1	29.4	10.8	28.6	6.3	22.7	6.0	26.1	9.3	30.7	12.7	40.6	19.8	42.5	22.4
34	Rudrur	34.8	28.2	30.4	27.5	30.0	27.1	31.9	27.6	32.7	24.0	32.7	20.4	29.0	17.9	29.8	16.1	32.4	20.7	34.6	21.4	42.5	29.7	37.6	27.8
35	Sabour	35.3	25.3	33.3	24.8	32.9	25.3	33.2	24.8	31.2	19.7	29.6	12.9	24.2	7.4	23.0	5.6	25.2	10.1	30.5	15.4	33.5	21.4	38.8	24.3
36	Siruguppa	36.0	26.2	36.6	26.8	33.9	26.0	35.9	26.9	35.7	24.9	33.4	23.1	32.8	22.2	32.3	21.3	35.3	26.7	38.8	28.2	39.9	31.5	42.5	33.8
37	Thanjavur	36.1	26.8	35.4	26.6	35.6	27.3	35.8	25.9	33.0	25.1	31.0	24.0	31.0	28.0	30.0	29.0	31.9	24.0	35.9	23.6	38.1	30.3	39.7	33.6
38	SK Nagar	39.4	27.1	33.2	25.7	32.0	25.0	33.6	22.6	38.3	18.3	33.6	12.9	27.2	8.2	26.3	7.4	27.1	10.2	33.6	13.8	40.0	21.7	39.6	23.7
39	Umiam	27.8	20.1	28.5	21.0	28.9	20.7	28.3	19.0	25.5	15.1	24.2	11.6	21.2	8.1	21.3	6.6	22.3	8.7	25.0	16.0	26.8	14.9	22.2	14.6
40	Varanasi	37.7	27.1	32.8	25.7	31.5	24.5	34.0	25.7	32.3	17.8	28.6	11.9	23.3	6.3	21.4	6.7	24.3	9.7	29.5	12.7	25.1	9.7	41.3	23.0

APPENDIX III : CENTRE-WISE STAFF POSITION

1.AAU JORHAT (ASSAM)	
Main Centre, Jorhat	
Chief Agronomist	Dr.Ajit Baishya
Jr. Agronomist	Mrs. J. R. Hazarika
Jr. Soil Scientist	Mr. Bhabesh Gogoi
Technical Asstt.	Mr. K. K. Bordoloi
On-Farm Centre,Goalpara	
Agronomist	Mr. Ajoy Sankar Bora
Jr. Economist	Mrs. M. Borah
Field assistant	Mr. R. Borah
Field assistant	Mr. D. Sarma
Field assistant	Mr. L. Khaund
Field assistant	Mr. A.K.Borthakur
Driver	Sri Suresh Boro
2.ANGRAU, Guntur (A.P.)	
Sub Centre,Maruteru	
Agronomist	Dr. M. Srinivas
Technical Asstt.	A. S. Saibaba Reddy
On-Farm Centre,Vizianagaram	
Agronomist	Dr.M.M.V.Srinivasa Rao
Field assistant	Mr.N.Murali Mohan Rao
Field assistant	Mr. B.V.A. Satyanarayana
Field assistant	Mr. A.V.Ramana
Field assistant	Mr. K.Gopi
Driver	Vacant
3.BAU, Sabour (BIHAR)	
Main Centre, Sabour	
Chief Agronomist	Dr. Sanjay Kumar
Jr. Soil Scientist	Sri Anupam Das
Jr. Agronomist	Dr. Sushant
Technical Asstt.	Vacant
On-Farm Centre,Nalanda	
Agronomist	Dr. D.K. Mahto
Jr. Economist	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant

4.IGKVV,RAIPUR (CHHATISSGARH)	
Main Centre,Raipur	
Chief Agronomist	Dr. M.C. Bhambri
Jr. Soil Scientist	Mr.S.S. Porte
Jr. Agronomist	Mr. Sunil Kumar
Technical Asstt.	Mr. B.K.Chandrakar
On-Farm Centre, Kanker	
Agronomist	Shri Anil Kumar Netam
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant
5. SDAU, S.K.NAGAR (GUJRAT)	
Main Centre, S K Nagar	
Chief Agronomist	Dr A.M Patel
Jr. Soil Scientist	Mr. P.K.Patel
Jr. Agronomist	Dr. K. M. Patel
Technical Assistant	Vacant
On-Farm Centre, Adiya, Patan	
Agronomist	Dr. L. J. Desai
Jr. Ag Economist	Dr. R.R.Patel
Field assistant	Mr.A.K Goswami
Field Assistant	Mr. M.N.Prajapati
Field Assistant	Mr. D.P. Parekh
Field Assistant	Mr. S.S.Patel
Driver	Vacant
6.JAU,JUNAGADH(GUJARAT)	
Sub Centre, Junagadh	
Agronomist	Dr. R. M. Solanki
Technical Asstt.	Shri K. K. Sarvaiya
7. NAU,Navsari (GUJRAT)	
Sub Centre, Navsari	
Agronomist	Dr. L.K. Arvadiya
Technical Asstt.	K.M. Patel
8. AAU,ANAND (GUJRAT)	
On-Farm Centre,Dahod, Devgadh	
Agronomist	Dr Girishbhai J Patel
Field assistant	Mr. D.J. Gohil

Field assistant	Mr.V.H. Rathva
Field assistant	Mr. P.G. Solanki
Field assistant	Mrs. R.S. Thakor
Driver	Mr. B.S.Patel
9.CCS HAU,HISAR (HARYANA)	
Main Centre, Hisar	
Chief Agronomist	Dr. Pawan Kumar
Jr.. Agronomist	Dr. Uma Devi
Sr. Soil Scientist	Vacant
Technical Asstt.	Vacant
OFR Centre,Fatehabad	
Agronomist	Vacant
Jr. Scientist(Ag. Econ.)	Dr. Gulab Singh
Field Assistant	Mr.Mahinder Singh
Field Assistant	Sh. Sadi Lal
Field Assistant	Sh. Hariom
Field Assistant	Mr.Sube Singh
Driver	Vacant
10.CSK HPKVV,PALAMPUR (H.P.)	
Main Centre, Palampur	
Chief Agronomist	Dr.S.C Negi
Jr. Soil Scientist	Dr. Sanjay K Sharma
Jr. Agronomist	Dr.Pawan Pathania
Technical Asstt.	Sh. Manohar Lal
On-Farm Centre, Bilaspur	
Agronomist	Dr.S.K.Sharma
Field assistant	Sh. Ramesh Chand
Field assistant	Sh. Gurmeet Singh
Field assistant	Mr.Saran Das
Field assistant	Mani Raj
Driver	Mr. Ashok Kumar
11.SKUAST,Jammu(J &K)	
Main Centre, Chatta,Jammu	
Chief Agronomist	Prof. Dileep Kachroo
Jr. Soil Scientist	Dr.N. P.Thakur
Jr. Agronomist	Dr. Vijay Khajuria
Technical Asstt.	Vacant
OFR Centre ,Jammu	
Agronomist	Dr. A.K.Gupta
Field assistant	Kuldeep Sharma
Field assistant	Dheeraj Rajwal
Field assistant	Mr.A.W. Katoch
Field assistant	Vikas Koul
Driver	Mohd.Saleem
12.BAU, Ranchi (JHARKHAND)	
Main Centre,Ranchi	
Chief Agronomist	Dr. M. S. Yadava
Jr. Soil Scientist	Mr. A. N. Puran
Jr. Agronomist	Mr.R.P.Manjhi
Technical Asstt.	Mr.Rakesh Mitra
On-Farm Centre,East Singhbhum	
Agronomist	Dr.Shambhu Saran Kumar
Field assistant	Rajesh Kujur
Field assistant	Parvej Alam
Field assistant	Anant Kumar Mandal
Field assistant	Tulsi Baitha
Driver	Vacant
13. UAHS, Shivamoga	
Main Centre, Kathalagera	
Chief Agronomist	Dr. O Kumara
Jr. Soil Scientist	Dr. Rajashakhar L
Jr. Agronomist	Dr.H.G.Sannathimmappa
Technical Asstt.	Mr. VijayS.Dannaraddi
14.UAS,Banglore (KARNATAKA)	
On-Farm Centre, Chikkaballapura	
Agronomist	Dr.M.T.Sanjay
Jr.Scientist	Dr. Mahin Sharif/Dr.Anjan kumar M J
Field assistant	Mr.Sunil Kumar
Field assistant	Mr. Narayanaswamy
Field assistant	Mr. Basavaraja
Field assistant	Mr. ALN Gowda
Driver	Jagadeesh, M. K.
15. UAS, Raichur	
Main Centre, Siruguppa	
Chief Agronomist	Dr.Basavarajappa M.A
Jr. Soil Scientist	Dr.Ashok Kumar Gaddi
Jr. Economist	Dr.Prabhuling Tewari
Technical Asstt.	Mr.Erappa Yankannvar
16.UAS, Dharwad (KARNATAKA)	
On-Farm Centre, Dharwad (KARNATAKA)	
Agronomist	Dr. V.V. Angadi
Field assistant	Mr. V.D. Kalwad
Field assistant	Mr. R.S. Hiremath
Field assistant	Mr.V.D.Kalawad
Field assistant	Mr. V.G. Chickmath
Driver	Mr. U.S. Athanimath
17.KAU,THRISSUR (KERALA)	
Main Centre, Karmana (Thiruvandrum)	
Chief Agronomist	Dr.Jacob John
Jr. Soil Scientist	Dr.Meera.A.V.

Jr. Agronomist	Dr.Sudha. B
Technical Asstt.	Mr. Krishnakumar.G
On-Farm Centre, Thiruvananthapuram	
Agronomist	Dr. D. Jacob
Jr. Ag. Economist	Dr. Bindhu J.S.
Field assistant	Sri. Manu M.
Field assistant	Sri Santhosh N.
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant
18.JNKVV,Jabalpur (M.P.)	
Main Centre,Jabalpur	
Chief Agronomist	Dr.V.K.Shukla
Jr. Soil Scientist	Vacant
Jr. Agronomist	Dr. R.P.Sahu
Technical Asstt.	Dr. Abhijeet Dubey
Sub Centre,Rewa	
Agronomist	Dr.B.M.Mourya
Tech.Assistant	Vacant
Sub Centre,Powerkheda	
Agronomist	Dr. V.K. Singh
Tech.Assistant	Shri. Sudhir Dubey
On Farm Centre,Anuppur	
Agronomist	Dr D.N. Shrivash
Field assistant	Mr.V.R.Ghorke
Field assistant	Shri Sunil kumar Malviya
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant
On Farm Centre,Umaria	
Agronomist	Dr. Namrata Jain
Field assistant	Shri M. S. Prajapati
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant
19.RMVRSUA&T GWALIAR ,(M.P.)	
Sub Centre, Indore	
Agronomist	Dr. S.K. Choudhary
Technical Asstt.	Shri N.K. Sinha
20.MPKV,RAHURI (MAHARASHTRA)	
Main Centre,Rahuri	
Chief Agronomist	Dr U S Surve
Jr. Agronomist	Dr.N.S.Ugale
Jr.Soil Scientist	Dr. A. S. Takate
Field Assistant	Mr.B.K.Jadhay

On Farm Centre, Padegaon, Satara	
Agronomist	Dr. Arun D. Tumbare
Jr.Economist	Dr Yashawant C Sali
Field Assistant	Shri R. K. Chaudhari
Field Assistant	Shri A. G. Nikrad
Field Assistant	Shri B. K. Pisal
Field Assistant	Vacant
Driver	Vacant
21.PDKV,AKOLA (MAHARASHTRA)	
Main Centre,Akola	
Chief Agronomist	Dr. B. V. Saoji
Jr. Agronomist	Mr.B.S. Morwal
Jr.Soil Scientist	Vacant
Technical Assistant	Mrs. P. N. Kalane
On-Farm Centre, Katol, Nagpur	
Agronomist	Dr.S.N.Potkile
Field Assistant	Mr.S.D.Kadam
Field Assistant	Mr. R. S. Ghorpade
Field Assistant	Miss Sharda G. Bunde
Field Assistant	Vacant
Driver	Vacant
22.MAU,Parbhani (MAHARASHTRA)	
Main Centre,Parbhani	
Chief Agronomist	Dr. A. S. Karle
Jr.Economist/ Jr.Agronomist	Vacant
Jr.Soil Scientist	Dr. S. T. Shirale
Tech. Assistant	Shri. D. Y. Chavan
On Farm Centre, Hingoli	
Agronomist	Dr. D. C. Lokhande
Field Assistant	Shaikh Ilahi Shaikh Lal
Field Assistant	Mr.A.U.Dukre/Mr.A.U.Dukre
Field Assistant	N.V.Kadam
Field Assistant	Vacant
Driver	Vacant
23.DBSKKV, Dapoli (MAHARASHTRA)	
Main Centre,Karjat	
Chief Agronomist	Dr. S. B. Bhagat
Jr. Soil Scientist	Dr.D.G.Jondhale
Jr. Agronomist	Dr.N V Mhaskar
Technical Asstt.	Shri. D. J. Shet
On Farm Centre,Thane	
Agronomist	Dr Amol V Dahiphale
Field Assistant	Shri. S.V. Kamble
Field Assistant	Shri. V.S. Daphal
Field Assistant	Shri. V. N. Patil

Field Assistant	Shri. G. N. Totkar
Driver	Mr.Vaibhav R Salunke
24.OUAT,Bhubaneswar (ODISSA)	
Main Centre,Bhubaneswar	
Chief Agronomist	Dr.Rabindra Kumar Paikaray
Jr. Agronomist	Dr.Alok Kumar Patra
Jr. Soil Scientist	Mr.B.B.Behera
Tech. Assistant	Mr.Dilip Kumar Rout
Sub Centre,Chiplima	
Agronomist	Dr. Sanjukta Mohapatra
Tech. Assistant	Vacant
On Farm Centre, Kendujhar	
Agronomist	Dr.T. R. Mohanty/ Dr. K.C. Sahoo
Jr.Economist	Vacant
Field Assistant	Mr.Kasinath Mallick
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant
On Farm Centre, Kalahandi	
Agronomist	Dr.Bhabani Shankar Nayak
Field Assistant	Mr. Ananda Chandra Sahu
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant
25.PAU, Ludhiana (PUNJOB)	
Main Centre,Ludhiana	
Chief Agronomist	Dr.Sohan Singh Walia
Agronomist	Dr.C.S.Aulakh
Jr.Soil Scientist	Dr (Mrs). Neeraj Rani
Tech. Assistant	Manpreet Singh
On Farm Centre,Patiala	
Agronomist	Dr Jashanjot Kaur
Field Assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Driver	Mr.Avtar Singh
26. AU, Kota (RAJASTHAN)	
Sub Centre,Kota	
Agronomist	Dr. J. P. Tetarwal
Tech. Assistant	Vacant

27.MPUAT,Udaipur (RAJASTHAN)	
On Farm Centre, Dungarpur	
Agronomist	Dr. L N Dashora
Jr.Economist	Dr.Hari Singh
Field Assistant	Mr.N.S.Jhala
Field Assistant	Mr.Ramji Lal
Field Assistant	Mr.Madan Lal
Field Assistant	Mr.A.S.Rathore
Driver	Sh. Neeraj Kumhar
28.SKNAU, Jobner, (RAJASTHAN)	
Main Centre, Durgapura,Jaipur	
Chief Agronomist	Dr. R. Sammauria
Jr. Agronomist	Dr. O.P.Meena
Jr. Soil Scientist	Dr Pratibha
Technical Asstt.	Shri Ram Lal Nehra
On-Farm Centre, Dausa	
Agronomist	Dr. B. L. Meena
Field Assistant	Sri. Ramesh Gaotm
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant
29.PJTSAU, Rajendernagar, Hyderabad	
Main Centre, Rajendranagar	
Chief Agronomist	Dr.M.Goverdhan
Jr. Agronomist	Dr.Ch.Pragathi Kumari
Jr. Soil Scientist	Sri G.Kiran Reddy
Technical Asstt.	C.Madhusudhan
Sub Centre,Rudrur	
Agronomist	Smt.Firdoz Shahana
Technical Asstt.	M.Praveen
On-Farm Centre, Medak	
Agronomist	Dr.Md Lateef Pasha
Jr. Economist	Dr. Md. Ali Baba
Field assistant	Md Munaweruddin
Field assistant	Sri. P.Yadagiri
Field assistant	S.Aziz Hasan
Field assistant	Vacant
Driver	Sri. Shaik Shabbir
30 .TNAU,Coimbatore (TAMILNADU)	
Main Centre, Coimbatore	
Chief Agronomist	Dr.K.R.Latha
Jr.Soil Scientist	Dr.A.Renukadevi
Jr. Agronomist	Dr. S.P.Sangeetha

Tech. Assistant	Mrs. P.Kasthuri
Sub Centre,Thanjavur	
Agronomist	Dr.S. Porpavai
Tech. Assistant	S.Palanisamy
On farm ,OFR Centre Erode, Bhavanisagar	
Agronomist	Dr.N.Satheeshkumar
Field Assistant	Th. R. Rajesh
Field Assistant	Ms. A. Kasthuri
Field Assistant	Th. M. Vijay
Field Assistant	Th. S.Sakthivel
Driver	Th.S.Sureshkumar
On farm,OFR Centre, Salem, Yethapur,	
Agronomist	Dr.D.Raja/ Dr.D.Ravisankar
Jr. Ag economist	Vacant
Field Assistant	Mr.V.Sekar
Field Assistant	Mr.A.Ravichandran
Field Assistant	Mr.A.Murugan
Field Assistant	Mr.C.Muthulakshmi
Driver	Mr.P.Govindaraju
31 .CSAUA&T,Kanpur (UTTAR PRADESH)	
Main Centre,Kanpur	
Chief Agronomist	Dr. Karam Husain
Jr. Soil Scientist	Dr.U.S.Tiwari
Jr. Agronomist	Vacant
Technical Asstt.	Mr. U. S. Yadav
On Farm Centre,Fatehpur	
Agronomist	Vacant
Field Assistant	Mr. Sudhir Pratap Singh
Field Assistant	Mr. Jagdish Chandra
Field Assistant	Mr. R.B.Yadav
Field Assistant	Vacant
Driver	Mr. Vijay Kumar
32.ANDUAT, Ayodhya (UTTAR PRADESH)	
Main Centre, Ayodhya	
Chief Agronomist	Dr.N.B.Singh
Jr. Soil Scientist	Vacant
Jr. Agronomist	Vacant
Technical Asstt.	Mr. A. P. Singh
On Farm Centre,Ambedkar Nagar	
Agronomist	Vacant
Field Assistant	Mr. A.N.Pandey
Field Assistant	Mr. Ashutosh Singh
Field Assistant	Mr. V.B.Singh
Field Assistant	Vacant
Driver	Vacant
33. OFR Centre, ICAR-IIFSR, Modipuram,Meerut,(UTTAR PRADESH)	
Agronomist	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
34.BHU,Varanasi (UP)	
Sub Centre,Varanasi	
Agronomist	Dr.J.S.Bohra
Tech. Assistant	Vacant
35.GBPUAT,Pantnagar (UTTARAKHAND)	
Main Centre,Pantnagar	
Chief Agronomist	Dr.Rohitashav Singh
Jr.Soil Scientist	Dr.Ajeet Pratap Singh
Jr. Agronomist	Dr. Dinesh kumar Singh
Tech. Assistant	Mr.Y.S.Khokar
On- Farm Centre,Udham Singh Nagar	
Agronomist	Dr.D K Singh I/C
Jr. Scientist (Economics)	Vacant
Field Assistant	M P Singh
Field Assistant	Mahendra Singh
Field Assistant	Ashok Kumar
Field Assistant	Vacant
Driver	R B Yadav
36.BCKV,Kalyani (WEST BENGAL)	
Main Centre,Kalyani	
Chief Agronomist	Dr. S. K. Mukhopadhyay
Jr. Soil Scientist	Dr. Sushanta Saha
Jr. Agronomist	Vacant
Technical Asstt.	Mr.Basudeb Datta
On-Farm Centre, Nadia	
Agronomist	Dr.Manabendra Ray
Jr. Economist	Dr.Soumitra Chatterjee
Field assistant	Mr.A.K.Bhaumik
Field assistant	Mr.K.Maiti
Field assistant	Mr.N.Das
Driver	Vacant

APPENDIX IV: SOIL FERTILITY STATUS AND NUTRIENT UPTAKE 2018-19

Table A :Soil fertility status-Organic carbon (%) and available N,P and K (Kg/ha) after kharif/rabi/summer season in Exp No. 1(a)

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Ayodhya	Summer	OC%	4.61	4.82	5.71	5.12	4.73	4.91	4.62	4.48	4.71	4.53
		N	197.5	212.4	223.56	229.56	207.56	211.56	189.25	193.56	124.32	228.54
		P	16.5	19.8	15.35	17.45	16.35	16.91	16.82	18.02	18.99	18.32
		K	263.5	267.88	272.45	265.8	254.6	259.6	247.6	258.65	274.4	269.89
Bhubneswar	Kharif	OC% g/kg	7.1	7.2	7.4	7.3	7.1	6.9	7.2	7.2	7.2	7.2
		N	283	275	293	292	279	283	275	283	289	281
		P	12.1	12.1	12.4	12.3	12.4	12.2	12.2	12.5	12	11.9
		K	167	169	176	178	176	177	183	169	181	178
Chiplima	Kharif	OC% g/kg	6.4	6.3	6.5	6.7	6.6	6.1	6.7	6.4	6.6	6.6
		N	292	295	312	320	303	316	277	299	280	299
		P	14.1	14.3	13.9	14.4	14.9	14.3	14.5	14.4	14.8	13.5
		K	190	173	191	183	190	184	191	188	191	179
Coimbatore	Summer	O.C. g/kg	5.54	5.34	5.64	5.71	5.63	5.48	5.53	5.54	5.81	5.78
		N	262.5	252.4	274.1	269.7	248.2	248.8	245.3	248.5	236.4	238.9
		P	21.6	20.5	21.67	20.62	20.82	21.35	20.74	21.82	21.21	22.57
		K	569.42	548.35	565.78	558.25	558.21	551.25	548.71	564.85	541.25	537.48
Jabalpur	Rabi	OC (g/Kg)	6.90	6.60	6.70	6.70	6.80	6.80	6.90	6.70	6.70	6.80
		N	229.00	220.00	219.00	220.00	226.00	227.00	227.00	221.00	226.00	227.00
		P	10.00	9.00	10.00	10.00	10.00	10.00	10.00	10.00	9.00	10.00
		K	303.00	300.00	297.00	301.00	302.00	301.00	302.00	298.00	300.00	301.00
Jammu	Kharif	OC%	0.55	0.67	0.66	0.64	0.65	0.63	0.6	0.61	0.61	0.6
		N	211	222	226	232	228	230	225	220	210	198
		P	18.3	22.1	22.7	19.75	20.15	20.1	19.7	20.25	20.1	21.15
		K	115	118	122	118	120	130	125	118	117	120
	Summer	OC%	0.56	0.66	0.65	0.64	0.62	0.6	0.62	0.62	0.6	0.61
		N	217	240	232	220	236	228	230	225	212	202
		P	19.6	26.2	24.7	21.2	22.5	22.8	21.5	23.1	23.4	24.2
		K	120	130	134	122	124	128	130	122	127	125
Junagadh	Summer	OC%	0.75	0.71	0.79	0.75	0.75	0.67	0.7	0.76	0.71	0.71
		N	255.54	257.65	261.25	249.85	257.63	252.42	245.65	264.58	261.23	252.66
		P	28.69	25.24	28.45	24.55	27.89	23.82	23.28	22.59	29.21	27.87
		K	206.25	210.33	178.89	212.33	197.52	212.32	209.54	215.66	219.54	235.25

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Kanpur	Summer	OC%	0.422	0.424	0.425	0.436	0.434	0.426	0.432	0.424	0.426	0.428
		N	13.24	13.24	13.26	13.32	13.3	13.26	13.28	13.24	13.26	13.28
		P	186.2	186.5	186.8	187.3	187.15	187.1	186.8	186.3	186.4	187
		K	186.2	186.5	186.8	187.3	187.15	187.1	186.8	186.3	186.4	187
Karamana	Rabi	OC%	13.46	13.74	15.04	14.39	14.95	15.04	17.19	16.54	19.24	15.98
		Dehydrogenase	24.36	30.24	20.69	25.59	24.3	32.38	30.54	25.86	27.39	26.46
		Urease	78.52	82.41	86.46	89.74	80.74	85.91	84.13	86.52	86.69	88.35
		Acid phosphatase	23.48	29.56	20.73	21.69	31.54	20.98	22.84	20.03	26.04	26.68
		N	268	259	293	293	309	322	288	293	272	284
		P	37	36	39	38	35	33	36	40	34	40
		K	156	126	159	130	161	139	107	120	138	141
		B mg kg-1	1.01	1.02	1.01	1.04	1.08	0.97	0.99	1.01	1	0.99
Kota	Summer	OC%	0.65	0.66	0.69	0.65	0.68	0.69	0.71	0.67	0.65	0.65
		P	19.32	22.16	23.87	24.01	20.87	20.21	24.35	21.1	22.45	19.92
		K	441.7	454.3	540.7	429	442	516.3	522.3	533	461.7	471.3
		S	97.2	96.2	125.9	113.1	120.5	129.4	106.8	113	99.1	87.8
		Fe	3	2.52	2.13	2.78	3.28	3.81	2.59	2.34	2.38	2.29
		Mn	8.01	8.15	8.76	10.7	10.97	11.68	8.54	9.05	7.51	8.75
		Zn	1.12	1.1	1.32	1.33	1.63	1.27	1.34	1.12	0.94	1
		Cu	1.31	1.21	1.14	1.3	1.3	1.31	1.15	1.28	1.18	1.29
		B	0.9	0.92	1.19	1.15	0.9	0.94	1.15	0.99	0.97	0.97
Ludhiana	Summer	OC%	0.35	0.31	0.31	0.27	0.36	0.28	0.3	0.27	0.29	0.34
		N	232.24	243.04	290.08	258.72	250.88	258.72	180.53	274.4	462.56	227.36
		P	18.23	13.23	38.47	25.47	35.31	42.55	27.88	29.37	35.38	37.57
		K	74.8	74.2	69.45	85.15	82.6	84.6	89.15	79.8	67.8	100.13
		Fe	12.01	11.23	8.75	8.75	13.18	9.54	9.18	8.89	7.25	9.16
		Mn	11.2	11.07	9.49	8.71	8.75	11.63	9.85	11.66	11.94	9.32
		Zn	2.57	2.35	2.57	2.36	2.27	2.46	2.48	2.09	2.3	2.29
		Cu	0.71	0.56	0.75	0.6	0.77	0.63	0.72	0.49	0.6	0.58
Navsari	Summer	OC%	5.79	5.83	5.82	6.07	5.9	6.06	6	5.68	6.06	5.98
		N	227.67	230	226.33	233.67	225	229.33	232.33	228.33	229.33	231.67
		P	25.73	26.57	29.57	27.1	27.83	28.13	26.87	28.2	31.67	29.27
		K	273.33	254.67	262	253.67	266.67	265.67	259.33	254	297.67	260

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Parbhani	Rabi	OC%	0.77	0.73	0.76	0.78	0.72	0.69	0.71	0.71	0.7	0.64
		N	156.1	149.9	157.1	155.1	154.45	145.7	138.43	144.13	150.3	146.8
		P	16.13	16.08	16.28	16.2	15.7	15.62	14.98	15.16	15.1	14.92
		K	518.8	516.32	514.1	516.03	510.42	509.1	490.32	492.27	500.46	501.3
		S	23.56	23.1	23.72	23.6	22.1	22.5	20.9	21.46	21.98	21.4
		Fe	3.87	3.84	3.79	3.82	3.71	3.7	3.55	3.59	3.62	3.67
		Mn	7.25	7	7.7	7.46	7.1	7.28	7.19	7.3	7.42	7.37
		Cu	2.51	2.38	2.54	2.4	2.32	2.26	2.21	2.3	2.4	2.38
		Zn	0.63	0.6	0.56	0.65	0.61	0.58	0.52	0.5	0.55	0.56
Pantnagar	Summer	OC%	0.74	0.8	0.85	0.96	0.88	0.86	0.89	0.92	0.79	0.8
		N	178	232	235	240	239	236	233	237	211	219
		P	24.7	35.4	33.2	38.5	36.5	31.5	30	31.3	27.3	29.2
		K	239	286	281	314	301	288	258	265	248	252
Rahuri	Kharif	OC%	0.62	0.63	0.64	0.63	0.62	0.64	0.65	0.63	0.67	0.66
		N	207	210	201	220	216	210	220	204	216	201
		P	13	13	13	12	13	14	14	13	14	14
		K	500	534	504	537	518	523	532	538	545	575
	Rabi	OC%	0.64	0.65	0.62	0.64	0.63	0.66	0.67	0.66	0.68	0.65
		N	198	202	192	211	208	202	211	195	208	192
		P	12	12	13	12	13	13	14	11	13	13
		K	493	526	497	511	519	530	538	530	538	567
Rajenderanagar	Rabi	OC%	0.35	0.38	0.42	0.45	0.38	0.44	0.42	0.42	0.38	0.41
		N	154.7	179.8	192.3	204.9	146.3	192.3	196.5	213.2	234.2	200.7
		P	36.1	32.5	44.6	47.7	47.5	48.7	42.6	51.3	36.3	42.1
		K	200.7	202.2	200.9	225.2	195.8	214.5	202.6	205	192.2	207.1
Rewa	Summer	OC%	0.49	0.52	0.49	0.5	0.51	0.51	0.51	0.59	0.58	0.56
		N	145.9	139.9	142.7	145.3	142.9	140.9	130.1	129.8	146.2	169.5
		P	11.9	11.5	12.6	13.7	14.1	14.1	17.2	15.8	16.1	13.2
		K	315.8	319.9	316.9	320.7	321.1	319.8	220.1	311.2	315.3	228.3
		Sulphur kg/ha	32.81	32.78	36.71	29.99	32.02	33.03	19.76	27.65	28.42	21.52
		Zinc PPM	2.01	2.07	2.12	2.05	2.01	4.99	1.96	2.79	2.14	1.97
		Fe PPM	16.15	17.09	15.1	15.12	14.92	14.87	12.87	13.45	22.4	19.75
		Boron PPM	2.42	2.39	2.49	3.01	3.05	3.02	2.42	2.48	2.02	3.42
Sabour	Summer	OC%	0.52	0.46	0.44	0.51	0.48	0.49	0.52	0.46	0.50	0.47
		N	224.8	208.1	253.1	217.8	202.8	281.2	281.7	242.2	253.5	253.5
		P	10.9	9.9	9.7	10.7	10.2	10.7	11.2	15.6	13.5	13.0
		K	156.9	189.6	157.7	148.0	163.1	159.1	165.2	194.3	199.2	164.7
Siruguppa	Rabi	OC%	0.66	0.65	0.71	0.62	0.61	0.68	0.75	0.79	0.70	0.70
		N	170.00	194.00	207.00	179.00	198.00	187.00	205.00	230.00	185.00	194.00
		P	10.50	13.60	13.70	13.00	14.50	14.90	16.60	17.30	14.70	11.70
		K	358.00	347.00	344.00	373.00	356.00	391.00	350.00	354.00	359.00	356.00

APPENDIX IV: SOIL FERTILITY STATUS AND NUTRIENT UPTAKE 2018-19

Table A : Nutrient uptake N P and K kg/ha in exp no1(a) 2018-19

Name of CSR centre	Season	Nut/ treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Bhubneswar	Total uptake of the System	N	150.6	107.2	172.2	164.7	135.2	149.5	201.2	205.7	138.3	109.5
		P	26.7	24.2	31.8	31	31.6	29.1	35.6	36.2	28.4	21.7
		K	104.5	93.8	119.5	120.9	115	109	180	141.2	106.4	82.2
Chiplima	Total uptake of the System	N	230	213	206	250	225	173	206	212	258	219
		P	33.5	23.7	33.1	26.2	27.71	29.6	34.8	37.1	36.7	28.6
		K	113	95	117	98	94	99	122	94	129	97
Jabalpur	(Kh+Rb)	N	220	194	186	191	305	146	197	250	290	316
		P	55	32	15	17	65	28	37	45	63	59
		K	309	219	130	245	310	217	190	304	306	308
Junagadh	Total uptake of the System	N	194	129	164	219	209	134	129	165	178	178
		P	31.1	18.7	20.3	39.4	33.7	17.8	34	23.7	22.7	26.9
		K	102.3	65.5	68.5	105.8	129.2	92.8	88.8	96.7	81.9	119.8
Karmana	Kharif	N	414	323	350	410	514	280	326	415	468	494
		P	86.1	50.7	35.3	56.4	98.7	45.8	71	68.7	85.7	85.9
		K	411.3	284.5	198.5	350.8	439.2	309.8	278.8	400.7	387.9	427.8
	Rabi	N	0	44.91	58.56	49.62	36.16	39.85	44.35	58.75	16.96	17.98
		P	0	6.95	6.75	7.34	7.39	8.14	9.8	11.2	3.46	3.82
		K	0	20.37	22.5	21.24	40.27	41.24	39.24	49.74	14.13	15.99
	Summer	N	0	0	1.32	22.03	14.01	0.64	67.85	35.23	12.13	9.94
		P	0	0	0.08	0.95	1.45	0.04	6.77	12.11	0.95	0.64
		K	0	0	0.59	9.5	16.15	0.3	69.13	59.3	15.06	4.45
Ludhiana	Kharif	N	0	44.91	59.88	71.65	50.17	40.49	112.2	93.98	29.09	27.92
		P	0.00	6.95	6.83	8.29	8.84	8.18	16.57	23.31	4.41	4.46
		K	0.00	20.37	23.09	30.74	56.42	41.54	108.37	109.04	29.19	20.44
	Rabi	N	0	44.91	61.2	93.68	64.18	41.13	180.05	129.21	41.22	37.86

Name of CSR centre	Season	Nut/ treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
		P	0.00	6.95	6.91	9.24	10.29	8.22	23.34	35.42	5.36	5.10
		K	0.00	20.37	23.68	40.24	72.57	41.84	177.50	168.34	44.25	24.89
	Summer	N	0	0	48.43	0	108.58	41.67	0	0	33.08	0
		P	0	0	16.4	0	47.73	15.39	0	0	12.64	0
		K	0	0	39.49	0	143.51	36.65	0	0	37.14	0
Navsari	Kharif	N	135.3	156.7	171	129.9	175.6	193.9	221	226.1	126.2	110.3
		P	22.6	30.4	32.5	22.7	42.1	25.2	45.7	59.9	51.9	23.5
		K	127.2	150.1	170.7	119.4	183.2	96.3	298.7	327.5	181.2	179.3
Pantnagar	Kharif	N	206	261.9	205.5	260.4	161.6	214.9	162.4	140.4	238.9	145.7
		P	73.5	64.5	74.7	99.2	53.1	86.2	62.9	34.4	55.2	33.8
		K	283	261.5	258.5	367.5	145.7	240.5	205.7	163.8	264.4	167.5
Rajendranagar	Kharif	N	97.3	89.2	100.7	84.8	128.4	137.9	273	207.4	189.8	40.9
		P	27.1	9.1	10.8	9.2	30.5	14.7	23.9	31.6	34.3	8.4
		K	120.8	60.1	62.3	43.6	100.4	55.4	159.7	359.2	231.1	59.6
	Rabi	N	67.9	0	59.6	33.4	61.9	59.9	175.4	212.7	172.3	236.6
		P	29.9	0	7.7	6.9	7.6	9	14.3	14.1	24.3	40.3
		K	78.6	0	17	14.7	17	22.2	162.2	146.7	92.2	142
	System Uptake	N	165.2	89.2	160.3	118.2	190.3	197.8	448.4	420.1	362.1	277.5
		P	57	9.1	18.5	16.1	38.1	23.7	38.2	45.7	58.6	48.7
		K	199.4	60.1	79.3	58.3	117.4	77.6	321.9	505.9	323.3	201.6
Sabour	Kharif	N	130.5	118.8	116.2	115.3	124.1	118	124.3	121.9	115.4	116.8
		P	34.8	35.4	35.3	34.2	37	34.9	37.2	36.7	34.8	34.7
		K	142.1	143.1	150.3	136.9	152.6	144	153.6	153.5	140.6	143.9
	Rabi	N	83	96.2	164.9	229.3	130.1	318	86.1	173.8	49.4	19.9
		P	22.1	23.9	44	59.5	48	108.3	7.2	41.3	11.8	7.6
		K	94.1	112.2	129.2	166.4	159.5	290.4	10.4	89.3	16.1	25.3
Siruguppa	Kharif	N	93.5	104.4	107.9	101.5	108.4	111.6	120.6	116.9	112.2	104.5
		P	26.5	31.9	31.8	34.8	34.3	39	34.2	36.3	28.7	31.3
		K	125.8	136.3	131.1	133.4	152.3	148.9	141.9	150	124.9	125.2
	Rabi	N	74.8	55.5	22.2	42.7	15.8	12.1	48.9	37.3	74.7	74.5
		P	20.6	11.2	2.4	6.4	2.1	3.7	6	4.5	17.4	16.8
		K	86.9	54.3	11.6	30.2	9.1	15.8	23.2	20.9	82.4	89.1

10

ANNEXURES

ANNEXURE - I

CURRENT ADDRESS OF CONTACT PERSON

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
			ICAR-IIFSR,Modipuram Meerut	
1	Uttar Pradesh	Modipuram (Head Quarter)	Dr A.S. Panwar, Director, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, U.P.	Tel: (Off.) 0121-288 8611; (Mob.) 09412078001; (Fax) 0121-288 8546 Email: directorpdfsr@yahoo.com
			Dr N.Ravisankar, Pr. Scientist, Project Coordinator (In-charge), AICRP-IFS -Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, U.P.	Tel: (Off.) 0121-288 8611; (Mob.)08410020345 Email: ifsofr@gmail.com,
			Dr. A K Prusty, Sr. Scientist, Project Coordination Unit, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250110, U.P.	Mob:07599157944 Email:ashish.prusty@icar.gov.in
			Dr. Mohammad Shamim, Sr. Scientist, Project Coordination Unit, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, U.P.	Mob:9045040407 Email:mohammad.shamim@icar.gov.in
			Dr.Meraj Alam Ansari, Sr. Scientist Project Coordination Unit, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, U.P.	Tel: (Mob.) 9089654323; Email: meraj.ansari@icar.gov.in
			Dr. Raghuveer Singh, Scientist Project Coordination Unit, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, U.P.	Tel: (Mob.) 9458613219; Email: rsbicar@gmail.com
			Dr. Raghavendra K.J, Scientist Project Coordination Unit, ICAR-Indian Institute of Farming Systems Research, Modipuram Meerut-250110	Tel: (Mob) 8745020500 Email:raghavakj@gmail.com
			DhananjayTripathi, Chief Technical Officer Project Coordination Unit, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, (U.P.)	Tel: (Mob.) 9412579462; Email: ctoosr@gmail.com dhananjai.tripathi@icar.gov.in

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
			Dr.Vipin Kumar, Chief Technical Officer Project Coordination Unit, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, (U.P.)	Tel: (Mob.) 9457267100; Email: vipin.kumar2@icar.gov.in
			IASRI, New Delhi	
1	New Delhi	New Delhi (Data Analysis)	Dr Anil Kumar, Principal Scientist, Division of Design of Experiments, IASRI, Library Avenue, Pusa, New Delhi-110 012	Tel: (Off.) 011-25847121 (Ext-4154); (Mob.) 09868891600, (Fax) 011-25841564 Email: akumar@iasri.res.in, akumarchi72@gmail.com
			Dr (Mrs) Cini Varghese, Principal Scientist, Division of Design of Experiments, IASRI, Library Avenue, Pusa, New Delhi – 110012	Tel: (Off.) 011-25847121 Email:cini.varghese@icar.gov.in
			AICRP-IFS Centre State wise	
1	A & N Islands	Port Blair(Voluntary)	Dr T.P. Swarnam, Pr. Investigator (AICRP-IFS), Natural Resource Management Division, Central Agricultural Research Institute, PB No. 181, Port Blair-744 101 ()	Tel.: (Off.) 03192-250341, (Mob.) 09679541781, Email:portblair.icar@gmail.com
2	Andhra Pradesh	Maruteru (Sub-centre)	Dr M. Srinivas, Agronomist (AICRP-IFS), A.P. Rice Research Station, RARS, Maruteru-534 122, Dist. W. Godavari (AP)	Tel.: (Off.) 08819-246283, (Mob.) 09949599965, Email:maruteru.sub@gmail.com
3		Vizianagaram (OFR)	Dr.M.M.V.Srinivasa Rao, OFR Agronomist, AICRP-IFS, Gajularega OFR centre, VizianagaramDistt. (Andhra Pradesh)	(Mob.)09440123223 Email:vizianagaram.ofr@gmail.com
4	Assam	Jorhat (Main centre)	Dr.K.K. Sharma, Chief Agronomist (AICRP-IFS), Department of Agronomy, Assam Agricultural University, Jorhat-785 013 (Assam)	Tel.: (Off.) 0376-2311379, (Mob.) 09435352157, Email: jorhat.main@gmail.com
5		Golaghat (OFR)	Mr Ajoy Sankar Bora, Jr. Agronomist (OFR) AICRP on IFS, Sugarcane Research Station, Buralikson (Assam Agricultural University) P.O. Baruabamun Gaon -785618 Dist. Golaghat (Assam)	Tel.: (Mob.) 09508408214 Email:ajay_sb@yahoo.com
6	Bihar	Sabour (Main centre)	Dr. Sanjay Kumar, Chief Agronomist (AICRP-IFS), Bihar Agricultural, University,Sabour, Dist. Bhagalpur-813 210 (Bihar)	Tel.: (Off.) 0641-2451263, (Mob.) 09431310417, Email: sabour.main@gmail.com

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
7		Saharsa (OFR)	Dr.(Mrs) Sneha Kumari, OFR Agronomist (AICRP-IFS), Madan Bharti Agriculture College, Agwanpur,Saharsa Regional Research Station, Agwanpur, Sahara (Bihar)	Tel.: (Mob.) 9956447337 Email: nalanda.ofr@gmail.com
8		Patna (Voluntary)	Dr Sanjeev Kumar, Sr. Scientist & Pr. Investigator (AICRP-IFS), ICAR Research Complex for Eastern Region, ICAR Parisar, BVC Campus P.O., Patna-800 014 (Bihar)	Tel.: (Off.) 0612-2223962, (Mob.) 09431840189, Email: patna.icar@gmail.com
9	Chhattisgarh	Raipur (Main centre)	Dr.M.C. Bhambri, Chief Agronomist (AICRP-IFS), Indira Gandhi Krishi-Vishwavidyalaya, Krishak Nagar, Raipur-492 006 (Chhattisgarh)	Tel: (Off.) 0771-2442177, (Mob.) 09406470437 Email: raipurifs.main@gmail.com
10		Bastar (OFR)	Dr Narendra Nag, OFR Agronomist, AICRP-IFS, Saheed Gundadhar College of Agriculture and Research Station, Kumhrawand Farm,Chitrkote Road Jagdalpur, Bastar (Chhattisgarh)	(Mob.) Email: kanker.ofr@gmail.com
12	Gujarat	S.K. Nagar (MC)	Dr L.J. Desai, Chief Agronomist (AICRP-IFS), SardarKrushinagar-Dantiwada Agricultural University, SardarKrushinagar, Dist. Banaskantha –385 506 (Gujarat)	Tel.: (Off.) 02748-278434, (Mob.) 09429310273, Email: sknagar.main@gmail.com
13		Junagadh (Sub-centre)	Dr. R M Solanki, Agronomist (AICRP-IFS), Farming System research Centre, Department of Agronomy, Junagadh Agricultural University, Junagadh-362 001 (Gujarat).	Tel.: (Off.) 0285-2670139, (Mob.) 09428338680 Email: junagadh.sub@gmail.com
14		Navsari (Sub-centre)	Dr.L. K. Arvadiya, Agronomist (AICRP-IFS), N.M. College of Agriculture, Navsari Agricultural University, Navsari-396 450 (Gujarat)	Tel.: (Off.) 02637-282771-75, Ext. 1207, (Mob.) 08128681260. Email: navsari.sub@gmail.com
15		Devgadh (OFR)	Dr.Chirag, OFR Agronomist (AICRP-IFS), Tribal Research Cum Training Centre, Anand Agricultural University, Devgadh Bariya, Dahod-389 380 (Gujarat)	Tel.: (Off.) 02676-235528;(Mob.)9825930039, Email: dahod.ofr@gmail.com
16		Sabarkhantha (OFR)	DrJ.J.Mistri, I/C, Agronomist,OFR Agronomist AICRP-IFS,Krishi Vigyan Kendra Sardarkrushinagar Dantiwada Agricultural University Khedbrahma, District Sabarkantha (Gujarat)	(Mob):09106618244 Email: patan.ofr@gmail.com

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
17	Goa	Old Goa (Voluntary)	Dr Paramesh V., Pr. Investigator (AICRP-IFS), ICAR ICAR-Central Coastal Agricultural Research Institute, Ela, Old Goa-403 402 (Goa)	Tel.: (Off.) 0832-2284678, (Mob.) 09172693349, Email: oldgoa.icar@gmail.com
18	Haryana	Hisar (Main centre)	Dr.R.S.Dadarwal, I/C Agronomist (AICRP-IFS), Department of Agronomy, CCS Haryana Agricultural University, Hisar-125 004 (Haryana)	Tel.: (Off.) 01662-289151, (Mob.) 09729596590 Email: hisar.main@gmail.com
19		Rewari (OFR)	Dr. Anil Mehta, OFR Agronomist Krishi Vigyan Kendra, Rewari (Bawal) Regional Research Station, Bawal 125004 (Haryana)	(mob): Email: fatehabad.ofr@gmail.com
20	Himachal Pradesh	Palampur (Main centre)	Dr.Pawan Pathania, ChiefAgronomist (AICRP-IFS), Department of Agronomy, CSK Himachal Pradesh Krishi-Vishwavidyalaya, Palampur, Dist. Kangra-176 062 (H.P.)	Tel.: (Off.) 01894-230392 (Mob.) 09418253340, 9418167556, 09805944889 Email: palampur.main@gmail.com
21		Kullu (OFR)	Dr. Vinod Kumar Sharma, Agronomist (OFR) AICRP-IFS, Department of Agronomy, CSK-HPKV, Kullu Palampur (H.P)	Tel.:(Mob) 09805944889, 9418167556 Email: bilaspur.ofr@gmail.com
22	J & K	Chatha (Main centre)	Dr Anil Kumar, Chief Agronomist (AICRP-IFS), Sher-E-Kashmir University of Agricultural Sciences & Technology,Chatha, Jammu-180 012 (J&K)	Tel.: (Off.) 0191-2262026, (Mob.) 08825087701, Email:jammu.main@gmail.com
23		Udampur (OFR)	Dr A.K. Gupta, OFR Agronomist (AICRP-IFS), Farming Systems Research Centre, SKUAST-J& K. Main Campus Jammu-180009(J&K),	Tel.:(Off.)0191-2106409,(Mob.)09419100401, Email: jammu.ofr@gmail.com
24	Jharkhand	Kanke(Main centre)	Dr S Karmakar, Chief Agronomist (AICRP-IFS), Department of Agronomy, Birsa Agricultural University, Kanke, Ranchi-834 006 (Jharkhand)	Tel.: (Off.) 0651-2450608, (Mob.) 09431929915,08210096273 Email: ranchiifs.main@gmail.com
25		Saraikela-Kharsawan (OFR)	Dr.Shambhu Saran Kumar, OFR Agronomist (AICRP-IFS), Zonal Research Station, Darisai, P.O., Bara Khurshi, District East Singhbhum-832 304 (Jharkhand),	Tel.: (Off.) 06434-222052, (Mob.) 09431194519, Email:eastsinghbhum.ofr@gmail.com
26	Karnataka	Kathalgere (Main centre)	Dr A.Y. Hugar, Chief Agronomist (AICRP-IFS), Agricultural Research Station, Kathalagere, (UAHS ,Navile, Shivamogga), Dist. Davanagere-577 219 (Karnataka)	Tel.: (Off.) 08180-273555, (Mob.)9480838211Email: kathalagere.main@gmail.com

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
27		Siruguppa (Main centre)	Dr. C.M. Kalibavi, Chief Agronomist (AICRP-IFS), UAS-R Agricultural Research Station, Siruguppa, Dist. Bellary-583 121 (Karnataka)	Tel.: (Off.) 08396-220249, (Mob.)9845675485, siruguppa.main@gmail.com
28		Chikka-ballapura. OFR)	Dr M.T.Sanjay OFR Agronomist (AICRP-IFS), 1st Floor, Directorate of Extn. Office Building, University of Agricultural Sciences, Hebbal Campus, Kolar, Bangalore-560024(Karnataka),	Tel.:(Off.)080-65325146,(-Mob.)09243075082, Email:chikkaballapura.ofr@gmail.com
29		Uttara Kannada (OFR)	Dr. C.P. Chandrashekar, OFR Agronomist (UAS, Dharwad) OFR Scheme old ARS Building, College of Forestry Sirsi-581 401 Uttara Kannada District (Karnataka)	Mob.) 091-7829165693 Email: dharwad.ofr@gmail.com
30	Kerala	Karamana (Main centre)	Dr Jacob John, Chief Agronomist (AICRP-IFS), CSRC, Karamana, Thiruvanantha puram-695002 (Kerala)	Tel.: (Off.) 0471-2343586, (Mob.) 09847022929 Email: karamana.main@gmail.com
31		Alappuzha (OFR)	Dr Jacob D., OFR Agronomist (AICRP-IFS), KAU On-Farm Research Centre, Quarters V/13, College of Agriculture, Vellayani P.O., Thiruvananthapuram (Kerala),	Tel.: (Off.) 0469-2700343, (Mob.)09446355002,Email: thiruvananthapuram.ofr@gmail.com
32	Madhya Pradesh	Jabalpur (Main centre)	Dr.P B Sharma, Chief Agronomist (AICRP-IFS), Department of Agronomy, JNKVV, Adhartal, Jabalpur-482 004 (M.P.)	Tel.: (Off.) 0761- 2681771, (Mob.) Email: jabalpur.main@gmail.com
33		Indore (SC)	Dr A K Sharma, Agronomist (AICRP-IFS), RVSKVV College of Agriculture, Indore-452 001(M.P.).	Tel.: (Off.) 0731-2702911, (Mob.) Email: indore.sub@gmail.com
34		Powarkheda (SC)	Dr Vinod Kumar, Agronomist (AICRP-IFS), Zonal Agricultural Research Station, Powarkheda, Dist. Hoshangabad-461 110 (M.P.)	Tel.: (Off.) 07547-227257, (Mob.)09425044950, 9009291588 , Email:powarkheda.sub@gmail.com
35		Rewa (SC)	Dr B.M. Mourya, Agronomist (AICRP-IFS), Regional Agricultural Research Station, Kuthulia Farm, College of Agriculture, Rewa-486 001 (M.P.)	Tel.: (Off.) 07662-220732, (Mob.) 09981463851, Email:rewa.sub@gmail.com
36		Mandla (OFR)	Dr D.N. Shrivash, OFR Agronomist (AICRP-IFS), JNKVV Regional Agricultural Research Station (Near Collectorate), Dindori-481 880 (M.P.)	Tel.: (Off.) 07692-223765, (Mob.) 09424688898, (Fax) 07692-223765 Email:anuppur.ofr@gmail.com

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
37		Jabalpur (OFR)	Dr.(Mrs.) Namrata Jain, Agronomist (OFR) Department of Agronomy, JNKVV, Adhartal, Jabalpur-482 004 (M.P.)	Tel: 07653-280518 (Mob) 09424677473,09926350772 Email: umaria.ofr@gmail.com
38	Maharash-tra	Akola (Main centre)	Dr.J.P.Deshmukh, Chief Agrono-mist (AICRP-IFS), Department of Agronomy, Dr PanjabraoDeshmukh-KrishiVidyapeeth, Krishinagar, Ako-la-444 104 (Maharashtra)	Tel.: (Off.) 0724-2800628 (Mob.)7588884649 Email:akolaifs.main@gmail.com
39		Karjat (Main centre)	Dr.S B Bhagat, Chief Agronomist (AICRP-IFS), DBSKKV Agricultur-al Research Station, Karjat, Dist. Raigad -410 201 (Maharashtra)	Tel.: (Off.) 02148-222072, (Mob.)08879247408, Email: kar-jat.main@gmail.com
40		Parbhani (Main centre)	Dr.A S Karle, Chief Agronomist (AI-CRP-IFS), VasantraoNaikMarathwa-daKrishiVidyapeeth, Parbhani-431 402 (Maharashtra)	Tel.: (Off.) 02452-230089, (Mob.) 09423958309 Email: parbhaniifs.main@gmail.com
41		Rahuri(Main centre)	Dr.U.S.Surve, Chief Agrono-mist (AICRP-IFS), Mahatma PhuleKrishiVidyapeeth, Rahuri, Dist. Ahmednagar-413 705 (Maharash-tra)	Tel.: (Off.) 02426-243106, (Mob.)09822606511 Email:rahuri.main@gmail.com
42		Wardha (OFR)	Dr S.N. Potkile, OFR Agronomist (AICRP-IFS, Akola), Regional Fruit Research Station, Katol-441302 Dist.-Nagpur (Maharashtra)	Tel.:(Mob.),09422284834 Email: wardha.ofr@gmail.com nagpur.ofr@gmail.com
43		Palghar (OFR)	Dr S.S Pinigari, OFR Agronomist (AI-CRP-IFS, Dapoli, Palghar Regional Sugarcane Research Sta-tion, Palghar,Mahim Road Nandis-halla,Palghar -401404 (Maharash-tra)	Tel.:(Off.)02148-222035 (Mob.)9404972892 Email: thane.ofr@gmail.com
44		Nanded (OFR)	Dr. A. D. Pandagale,Agronomist (OFR) AICRP on IFS Cotton Research Station Bafna T Point ,Tq Distt. Nanded (Maharash-tra)	Mob:7588581713 Email: hingoli.ofr@gmail.com
45		Madha So-lapur (OFR)	Dr. M.N. Waghmare,OFR Agricultur-al AICRP-IFS, Agricultural Research Station Mohal, Distt. Solapur (Ma-harashtra)	Mob: Email: padegaon.ofr@gmail.com
46	Meghalaya	Umiam (Voluntary)	Dr. Jayanta Layek, Pr. Investigator, AICRP-IFS, Division of Crop Production, ICAR Res. Complex for NEH Region, Umroi Road, Umiam, Ri Bhoi-793 103 (Meghalaya)	Tel.:(Off.)0364-2570257, (Mob.)09101011194 Email: umiam.icar@gmail.com

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
47	Odisha	Bhubaneswar (Main centre)	Dr Alok Kumar Patra, Chief Agronomist (AICRP-IFS), Odisha University of Agriculture & Technology, Bhubaneswar-751 003 (Odisha)	Tel.:(Off.)0674-2397176,(-Mob.)7978445236 Email:bhubaneswar.main@gmail.com,
48		Chiplima (Sub-centre)	Dr.(Mrs) Sanjukta Mahapatra, Agronomist (AICRP-IFS), RRTTS Campus Chiplima, Dist. Sambalpur-768 025 (Orissa)	Tel.: (Off.) 0663-2460507, (Mob.) 07978929978 Emai: chiplima.sub@gmail.com
49		Kedujhar (OFR)	Dr. Kishore Chandra Sahoo, OFR Agronomist, On-Farm Research Centre (AICRP-IFS), Kendujhar RRTTS Campus, Judia Farm PO.- Kendujhar, Dist. Kendujhar-758 002(Odisha	(Mob): 08637264120 Emai:kedujhar.ofr@gmail.com
50		Khordha (OFR)	OFR Agronomist (AICRP-IFS), Kalahandi, RRTTS Campus, Arkabhalipara Farm Bhawanipatna, Dist. Kalahandi-766 001 (Odisha)	(Mob.) Email: ofrkalahandi@gmail.com
51	Punjab	Ludhiana(-Main centre)	Dr S.S. Walia, Chief Agronomist (AICRP-IFS), Department of Agronomy, Punjab AgriculturalUniversity, Ludhiana-141 004 (Punjab)	Tel.: (Off.) 0161-2401960 (Ext.-308), (Mob.) 09464760134, Email:ludhiana.main@gmail.com
52		Patiala (OFR)	Dr Vijinder Pal Kalra, Agronomist (OFR) AICRP on IFS, KrishiVigyan Kendra, Raunl, Patiala (Punjab)	Tel.: (Off.)0183-2501989, (Mob):09530796002 Email:patiala.ofr@gmail.com
53	Rajasthan	Durgapura (Main centre)	Dr Sudesh Kumar, Chief Agronomist (AICRP-IFS), SKNAU Rajasthan Agricultural Research Institute, Durgapura, Jaipur-303 329 (Rajasthan)	Tel.: (Off.) 0141-2720160, (Mob: 09414371485 Email: durgapura.main@gmail.com
54		Kota (Sub-centre)	Dr J.P. Tetarwal, Jr. Agronomist (AICRP-IFS), Agricultural Research Station, Ummedganj Farm, P.B. No. 7, GPO Nayapura, Kota-324 001 ((Rajasthan)	Tel.: (Off.) 0744-2844369, (Mob.) 09530091236, Email:kotaifs.sub@gmail.com jptetarwal@gmail.com
55		Bharatpur (OFR)	Dr Nirinjan Kumar Barod, OFR Agronomist (AICRP-IFS), College of Agriculture Kumher, Bharatpur-321201 (SKNAU, Jobner) (Rajasthan)	nkbarod.agro@sknau.ac.in dausa.ofr@gmail.com
56		Rajsamand (OFR)	Dr Hari Singh, Agronomist (OFR), AICRP on IFS, ZDR MPUA&T, Udaipur-313001 (Rajasthan)	Tel.: (Off.)294-2417374, (Mob): 09414801551 dungarpur.ofr@gmail.com

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
57	Telangana	Rajen-dranagar (Main centre)	Dr. M.Venkata Ramana, Chief Agronomist (AICRP-IFS), Professor JayashankarTelangana State , Agri-cultural University, Diamond Jubilee Block, College of Agriculture, Rajen-dranagar, Hyderabad-500 030	Tel.: (Off.) 040-24017463, (Mob 09440019029 Email:rajendranagar.main@gmail.com
58		Rudrur (Sub)	Dr.(Mrs) Firdoz Shahana, ,Agron-omist (AICRP-IFS),PJTSAU, Re-gional Sugarcane & Rice Res. Stn., Rudrur-503188 (Telangana)	Tel.: (Off.) 09440404050, (Mob.) 09848373997 Email:rudrur.sub@gmail.com
59		Rangareddy (OFR)	Dr.Kodam Chiranjeevi Senior scien-tist (Agro) & Officer I/c OFR Centre Madak, AICRP on IFS, DJ block, College of Agriculture,Ra-jendranagar, Hyderabad, 500030	(Mob):083743304031 Email: medak.ofr@gmail.com
60	Tamil Nadu	Coimbatore (Main centre)	Dr. P. M.Shanmugam, Chief Agrono-mist (AICRP-IFS), Departmentof Agronomy, TNAU, Coimbatore-641 003 (Tamil Nadu)	Tel.: (Off.) 0422-6611254, (Mob.) email:coimbatore.main@tnau.ac.in
61		Thanjavur (Sub)	Dr.T.Parthipan, Agronomist (AI-CRP-IFS) Soil& Water Management Research Institute ,Kattuthottam, Thanjavur-613501 (Tamil Nadu).	Tel.: (Off.) 04362-267680, (Mob.) 09551073118, Email: thanjavur.sub@gmail.com
62		Dindigul (OFR)	Dr.N.Sathish Kumar,Agronomist, (OFR) AICRP on IFS Agronomist, (OFR) AICRP on IFS Maize Research Station,Tamil Nadu Agricultural Uni-versity, Vagarai-624 613, Palani, Ta-luk, Dundigul district (T.N)	(mob):098945 63397 Email:
63		Salem (OFR)	Dr. S.K. Natarajan, Agronomist, (OFR), AICRP on IFS, Tapioca and Castor Research Station,Yethapur, P.G. Palayam(PO)-636 293526 (T.N)	04282-293526, Mob: 9626919760 salemofr@gmail.com
64	Uttar Pradesh	Kanpur (Main centre)	Dr Mohd. Zafar Siddiqui, Chief Agronomist (AICRP-IFS), Depart-ment of Agronomy, CS Azad University of Agriculture & Technology, Kanpur-208 002 (U.P.)	Tel.: (Off.) 0512-253456-62 (Ext.-218 & 193, (Mob.)7007876523, (Fax)0512-253808 Email:kanpurifs.main@gmail.com
65		Ayodhya (Main centre)	Dr A K Singh, Chief Agronomist (AI-CRP-IFS), Department of Agronomy, AcharyaNarendra Deva University of Agriculture & Technology Kumar-ganj, Ayodhya-224.229 (U.P.)	Tel.: (Off.) 05270-262053, (Mob.) 09450766594 Email:faizabadmain@gmail.com

S. No	State	Name of the Centre	Principal Investigator & Location along with complete address	Phone, Fax and E-mail addresses
66		Varanasi (Sub-centre)	Dr U.P.Singh, Agronomist (AI-CRP-IFS), Dept. of Agronomy, Institute of Agricultural Science, B.H.U., Varanasi-221 005 (U.P.)	Tel.: (Off.) 0542-2368381, (Mob.) 9415303524 Email:varanasiifs.sub@gmail.com
67		Baghpat (OFR)	Dr.P.C.Jat, Senior Scientist ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, U.P.,	(Mob.) 09410034958, Email: muzaffarnagar.ofr@gmail.com
68		Unnao (OFR)	Dr.Ravi Prakash , Agronomist (OFR), CSAU&T Kanpur.	(Mob): fatehpur.ofr@gmail.com
69		Mau (OFR)	Dr A K Singh, Agronomist Deptt. Of Agronomy,College of Agriculture NDUA&T Faizabad UP (Crop Research Station Tisuhi, Marihan,) Mirzapur-231310 (UP)	(Mob.) 09450766594 Email: mirzapurifs.ofr@gmail.com
70		Modipuram (Voluntary)	Dr N .Ravisankar, Pr Scientist & Programme Facilitator (IFS), ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, U.P.,	Tel: (Mob.) 08755195404, 8410020345 Email: modipuram.icar@gmail.com
71	Uttarakhand	Pantnagar (MC)	Dr Rohitashav Singh, I/C Chief Agronomist (AICRP-IFS), Department of Agronomy, GB Pant University of Agriculture and Technology, Pantnagar-263 145, Dist. Udham Singh Nagar (Uttarakhand)	Tel.: (Off.) 05944-233034; (Mob.) 09411088549 Email:pantnagar.main@gmail.com
72		Tarikhet Almora (OFR)	Dr. Dinesh Kumar Singh, Agronomist – OFR (AICRP-IFS), Deptt. Of Agronomy GBPUA&T, Pantnagar - 263145 Udamsinghnagar – Distt (Uttarakhand)	Mob.: 9410187299 Email:usnagar.ofr@gmail.com
73	West Bengal	Kalyani (MC)	Dr Swapan Kumar Mukhopadhyay, Chief Agronomist (AICRP-IFS), Directorate of Research BCKV, Mohanpur-741 252 Nadia (West Bengal)	Tel.:(Mob.) 0 9477231319/ 6289575494 Email:kalyaniifs.main@gmail.com
74		Bankura (OFR)	Dr.Manabendra Ray, OFR Agronomist (AICRP-IFS BCKV,Bankur campus,Susunia Bankura (West Bengal)	09432960882 / 09830844300 nadiaifs.ofr@gmail.com

ANNEXURE - II

PRICE (Rs./Q) & CALORIE PER 100 GM FOR 2019-20

Crops	Price (Rs./q) 2018-19	Price (Rs./q) 2019-20	Cal./ 100 gm	Crops	Price (Rs./q) 2018-19	Price (Rs./q) 2019-20	Cal./ 100 gm
All Fodders**	190	195	16	Groundnut*	4890	5090*	567
All green manuring**	285	290	16	Knolkhol**	1100	1200	43
Amaranthus grain**	5000	5100	49	Ladyfinger**	1640	1700	35
Arhar/Pigeon-pea/* Redgram	5675	5800*	335	Lentil /Masur*	4475	4800*	343
Baby Corn**	3000	3200	125	Linseed**	4175	4200	530
Barley*	1440	1525*	336	Maize(Grain)*	1700	1760*	342
Beetroot**	500	550	25	Maize (green cobs)**	1.50/cob or 450/q	3.50/cob or 500/q	125
Berseem (seed)**	16450	1700	344	Maize Sweet Corn**	1850	1900	342
Bitter Gourd**	1000	1100	25	Marigold**	2400	2500	4
Blackgram/ Urad*	5600	5700	347	Rapeseed& Mustard*	4200	4425*	541
Bottle gourd (Lauki)**	2000	2200	12	Gobi sarson/Hayola**	2725	2900	541
Brinjal**	1500	1700	24	Niger Seed*	5877	5940*	515
Broccoli**	4000	4200	45	Oat**	1475	1525	374
Buck Wheat**	1000	1200	346	Onion (big)**	1500	1700	50
Cabbage**	500	700	27	Pea*	6400	6450	315
Carrot**	1000	1200	48	Pea (veg.)**	2000	2500	93
Cassava**	1675	1750	134	Pearlmillet/Bajra**	1950	2000*	361
Castor**	4500	4700	440	Potato**	1000	1200	97
Cauliflower**	1150	1200	66	Pumpkin**	1600	1650	25
Chillies(green)**	2500	2550	29	Radish (White)**	500	550	17
Clusterbean **	2200	2300	35	Ragi/Fingermillet**	2000	3150*	328
Coleus**	2100	2100	86	Rice(coarse)*	1750	1835*	346
Coriander(S)**	5500	5550	288	Ricebean fodder**	210	210	16
Coriander(L)**	1500	1500	49	Ridge /Round gourd**	3000	3000	17
Cotton (F-4/1180)*	5150	5550*	332	Safflower**	4945	5215*	356
Cotton (H-1380)*	5450	5255*	332	Sesamum/Gingely/ Til**	6249	6485*	563

Crops	Price (Rs./q) 2018-19	Price (Rs./q) 2019-20	Cal./ 100 gm	Crops	Price (Rs./q) 2018-19	Price (Rs./q) 2019-20	Cal./ 100 gm
Cowpea/Lobia(S)**	2650	2700	323	Sorghum/ Jowar*	2430	2550*	349
Cowpea (Veg.) pod**	1590	1600	48	Soyabean (b)*	2900	3000	432
Cucumber**	700	800	13	Soyabean (y)*	3399	3710*	432
Cumin/Siya-Zeera**	13500	14000	356	Sugar beat**	975	1000	48
Fennel grain**	7200	7500	31	Sugarcane*	275	275	34
Fennugreek (seed)**	5100	5200	333	Summer Squash**	1450	1500	16
Fennugreek leaves/spinach**	1475	1525	49	Sweet Potato**	1500	1550	120
Field bean**	2800	2900	48	Tomato (green)	2000	2000	23
Fieldpeas/Veg. peas**	2500	2600	93	Toria/Raya/*	4100	4425*	541
Frenchbeans**	2000	2100	26	Turmeric**	7000	7500	349
Garlic**	5200	5500	145	Wheat*	1840	1925*	346
Ginger**	2000	2200	67	White gingely**	7100	7200	563
Gram/Chick-pea/ Bengal-gram*	4620	4875*	360	Rajmash/Rajmah**	5700	5800	346
Greengram/ Moong*	6975	7050*	334	Sunflower seed *	5388	5650*	620

*** Minimum support price fixed by Government of India for 2019-20.**

****Farm gate price at OFR centre.**

ANNEXURE - III

Botanical and Hindi Names of Different Crop

S.No.	Common Name	Botanical Name	Hindi Name
1	Ajwain/Ajowan Caraway	Trachyspermum copticum	Ajwain
2	Ashwagandha/India Ginseng	Withania somnifera(L.) Dunal	Ashwagandha
3	Barley	Hordeum vulgare L.	Jau
4	Black caraway /Fennel flower	Nigella sativa Sumac	Kalongi
5	Black gram	Phaseolus mungo L.	Urd/Urd bean
6	Bottle gourd	Lagenaria siceraria (Mol.)/L.vulgaris L.	Lauki
7	Brinjal/Egg plant	Solanum melongena L.	Baigen
8	Broccoli	Brassica oleracea (L.)var.italica	Hari Phool Gobhi
9	Cabbage	Brassica oleracea (L.)var.capitata	Band gobhi/Patta gobhi
10	Castor	Ricinus communis L.	Arandi
11	Cauliflower	Brassica oleracea L.var botrytis	Phool Gobhi
12	Chickpea	Cicer arietinum L.	Chana
13	Chickpea /Bengal gram	Cicer arietinum L.	Chana
14	Chicory	Cichorium intybus L.	Kasni
15	Chilli	Capsicum annum L.	Mirch
16	Cluster bean	Cyamopsis tetragonoloba L.Taub .	Guar/Guar bean
17	Coriander	Coriandrum sativum L.	Dhania
18	Cotton	Gossypium hirstum L.	Kapaas
19	Cowpea	Vigna unguiculata (L)Walp.	Lobia
20	Cumin	Cuminum cyminum L.	Jeera
21	Egyptian clover	Trifolium alexandrinum L.	Berseem
22	Fenugreek	Trigonella foenum -graecum L.	Methi
23	Finger millet	Eleusine coracana (L.)Gaertn.	Ragi/Mandua
24	Garden Cress/ Water Cress	Lepidium sativum L.	Chandrasur
25	Garlic	Allivum sativum L.	Lahsun
26	Garlic	Allium sativum L.	Lehsum
27	Green gram	Phaseolus radiatus (L,) Wilczek	Moong/Moong bean
28	Groundnut	Arachis hypogea L.	Moongfali
29	Hyacinth bean/indian bean	Dolichis lablab L./D.purpureus/Lablab purpureus	Seim
30	Indian Mustard	Brassica juncea Coss.	Sarson /Raya

S.No.	Common Name	Botanical Name	Hindi Name
31	Indian rape	Brassica campestris L.var .Toria	Toria
32	Lady finger /Okra	Abelmoschus esculantus Moench .	Bhindi
33	Lentil	Lean culinaris Medikus	masoor
34	Linseed /Flax /Flax seed	Linum usitatissinum L.	Alsi
35	Maize /Com	Zea mays L.	Makka
36	Marigold	Calendula officinalis L.	Gainda
37	Mustard	Brassic campestris L.var .Yellow sarson/Brown sarson	Sarson
38	Oat	Avena sativa L.	Jaee
39	Onion	Allium cepa L.	Pyaz
40	Pearl millet	Pennisetum americanum L.	Bajra
41	Pea /Vegetable Pea	Pisum sativum L.	Mastar
42	Pigeon pea	Cajanus cajan (L) Milsp	Arhar /Tauar
43	Potato	Solonum tuberosum	Aloo
44	Psyllium	Plantago ovata Forssk	Isabgol
45	Pumpkin	Cucurbita pepo Duch .	Kaddu
46	Radish	Raphanus sativus L.	Mooli
47	Rape/Oilseed rape	Brassica napus var.napus	Gobhi sarson
48	Red /Purple Amaranth	Amaranthus cruentus L.	Chauiai/Ramdana /Rajgira
49	Rice /Paddy	Oryza sativa L.	Dhan
50	Ridge groud /Sponge groud	Lufa acutangula /L.aegyptica/L. Cylindrica	Torai
51	Sesame	Sesamum indicum L.	Till
52	Sorghum	Sorghum bicolor (L.)Moench .	Jowar
53	Soybean	Glycine max L.(Merr.)	Soybean
54	Spinach	Spinacia oleracea L.	Palak
55	Suger beet	Beta vulgaris L.	Chukander
56	Sugarcane	Saccharum officinarum L.	Ganna
57	Sunflower	Helianthus annus L.	Surajmukhi
58	Sunhemp	Crotolaria juncea L.	Sanai
59	Sweet potato	Ipomoea batatas (L.)Lam.	Sakarkand
60	Tomato	Solanum lycopersicumL./Lycopersicon esculantum/L.lycopersicum	Tamatar
61	Turmeric	Curcuma longa L.	Haldi
62	Wheat	Triticum aestivum L.emend .Fiori $ Paol.	Gehun

CONTACT / सम्पर्क सूत्र

Dr A.S. Panwar
Director

ICAR-Indian Institute of Farming Systems Research
Modipuram, Meerut-250 110 Uttar Pradesh, India
Tel: (Off.) 0121-288 8711, 288 8811 (Fax) 0121-288 8546
(Mob): 09412078001
Email: director.iifst@icar.gov.in,
directoriifsr@yahoo.com

Dr. N Ravisankar
Project Coordinator (Acting)

ICAR-Indian Institute of Farming Systems Research
Modipuram, Meerut-250 110, Uttar Pradesh, India
Tel: (Off.) 0121-288 8548, (Fax) 0121-288 8546
E-mail: pcaocrpifs.iifsr@icar.gov.in,
ifsofr@gmail.com

Website: https://iifsr.icar.gov.in/icar-iifsr

अखिल भारतीय समन्वित कृषि प्रणाली अनुसंधान परियोजना

AICRP on Integrated Farming Systems

ICAR-Indian Institute of Farming Systems Research
Modipuram, Meerut-250110 (UP)