



वार्षिक प्रतिवेदन ANNUAL REPORT 2020-21



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 2020-21



ICAR-Indian Institute of Farming System Research

Modipuram, Meerut - 250110, INDIA



Correct Citation:

AICRP on IFS. 2021. Annual Report 2020-21. ICAR-Indian Institute of Farming Systems Research (Indian Council of Agricultural Research). Modipuram, Meerut- 250 110, pp. 1-
© reserved with the Director, ICAR-IIFSR

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

Dr Anil Kumar, Principal Scientist & PI, AICRP-IFS

IASRI, New Delhi by:

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 2019-20 (period ending June 2020), under 'on-station' and 'on-farm' research programmes of AICRP on Integrated Farming Systems. The other details are relevant to 31st March 2021.
- 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 2019-20 by all the co-operating centres are processed and compiled in the Annual Report 2020-21. 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 experiment, 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. Significant findings obtained from the experiments of cropping and farming systems and its validation in the farmers field including programmes undertaken with the participation of under privileged households through STC/SCSP programmes will serve as model for scaling of cropping systems and farming systems by State agencies.

(A.S. Panwar)

CONTENTS

सारांश	01
1. INTRODUCTION	03
2. OBJECTIVE	06
3. LOCATION	07
4. SOIL AND CLIMATE	11
5. STAFF POSITION	19
6. BUDGET	21
7. RESEARCH RESULT	23
7.1 Integrated Farming System	24
7.3 Organic Agriculture	42
7.4 On-Farm Research	49
8. GENERAL/MISCELLANEOUS	97
8.1 List of Publication	98
8.2 Training, Group meeting, Workshop Organized	125
9. APPENDIX	134
I. Weather Parameters at different Farming System Centers	135
II. Maximum and minimum temperature (0C)	137
III. Centre-Wise Staff Position	139
III. Soil Fertility Status and Nutrient Uptake	145
10. ANNEXURES	153
I. Current Address of Contact persons	154
II. Price (Rs/Q) and Calorie per 100 gm for 2017-18 and 2018-19	163
III. Botanical and Hindi Names of Different Crop	165

सारांश

अखिल भारतीय समन्वित एकीकृत कृषि प्रणाली अनुसंधान परियोजना 25 मुख्य केन्द्रों 11 उपकेन्द्रों 32 फार्म प्रक्षेत्र अनुसंधान एवं 6 भारतीय कृषि अनुसंधान परिषद संस्थानों 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।

2020-21 के दौरान कृषि जलवायु में जलवायु स्मार्ट IFS के अध्ययन में यह दर्शाया गया है:

- श्रम को छोड़कर बाजार इनपुट लागत (एलजीपी में 13.11% से टीजीपी में 66.43%)
- पारिवारिक श्रम को छोड़कर पुनर्चक्रण का मूल्य (डब्ल्यूसीपीएच में 10.65% से 43.59% डब्ल्यूएचपी)
- काम पर रखे गए श्रम की लागत (ट्वीप में 0% से सीपीएच में 40.2%)
- पारिवारिक श्रम द्वारा लागत बचत (यूजीपी में 49.83% उच्चतम और टीजीपी में सबसे कम यानी 0 है)
- श्रम को छोड़कर बाजार इनपुट के हिस्से के रूप में बाजार से पशु फ़ीड की खरीद (जीपीएच में 18.2% से ट्वीपों में 89.5%)
- एलजीपी में 0.38 से लेकर यूजीपी में 1.7 तक प्रति रूपये का शुद्ध रिटर्न निवेश किया गया।
- एसवीआई 0.6 से 0.8 के बीच भिन्न था।
- 4.8% (जीपीएच) से 96.2% (टीजीपी) की प्रारंभिक स्थिति में मृदा ओसी में सुधार।
- जल उत्पादकता (रूपये/मी.घन)एमजीपी (186) में उच्चतम थी जबकि ईसीपीएच में सबसे कम (14.9%)

प्रयोग1-: फार्म प्रक्षेत्र पर पोषण तत्वों के प्रति फसल प्रतिक्रिया

विभिन्न एनएआरपी क्षेत्रों में लागू पोषक तत्वों के लिए प्रचलित फसल प्रणाली की प्रतिक्रिया पर परिणामों का सारांश इस प्रकार है

- विभिन्न एनएआरपी क्षेत्रों में किए गए ऑन-फार्म पोषक तत्व प्रतिक्रिया परीक्षण (455 नग) संकेतित स्थानों और प्रणालियों में, पोषक तत्व N, P₂O₅, K₂O और सूक्ष्म पोषक तत्वों में 17, 31, 58 और 98% का अनुप्रयोग अंतर किसानों के अभ्यास और अनुशंसित पोषक पैकेज के बीच मौजूद है। यह प्रमुख फसल प्रणालियों की प्रणाली उपज में भी परिलक्षित होता है।
- चावल-चावल, चावल-गेहूं, मक्का-गेहूं, और चावल में एन की कृषि दक्षता (ईई) को 8, 10, 8, 16 से 32, 23, 19 और 42 किग्रा (अनाज उपज/किग्रा) तक बढ़ाया जा सकता है। अकेले N के बजाय P और K के साथ N की अनुशंसित खुराक के आवेदन द्वारा क्रमशः ग्राम सिस्टम
- लागू पोषक तत्वों के लिए फसल प्रणालियों की औसत आर्थिक प्रतिक्रिया इंगित करती है, N, P₂O₅ और K₂O पर क्रमशः 11 रूपये, 4.0 और 7.0 रूपये की वापसी का संकेत देती है।
- N P₂O₅ K₂O की अनुशंसित खुराक और किसान पैकेज के बीच ऑन-फार्म सिस्टम उपज अंतर चावल-गेहूं, मक्का-गेहूं और चावल-चना में 1843, 2124 और 1177 पाया गया, जिसे 2552, 2530 और 1596 किलोग्राम हेक्टेयर तक बढ़ाया जा सकता है।
- चावल-गेहूं में पटियाला (पंजाब) और चावल-चावल किसान प्रथाओं में वेल्लयानी (केरल) जैसे कुछ केंद्रों 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

सभी स्थानों के परिणाम नीचे संक्षेप में दिए गए हैं।

- विभिन्न जिलों में कृषि प्रणालियों की संख्या 1 से 5 तक भिन्न है। ग्वालपारा (असम) में अधिकतम 5 कृषि प्रणालियों की उपस्थिति देखी गई, इसके बाद कांकेर (छत्तीसगढ़), हिंगोली में 4 प्रणालियां देखी गईं, सतारा और नागपुर (महाराष्ट्र)। उमरिया (मध्य प्रदेश) और आदिया (गुजरात) में एकल कृषि प्रणालियों का अस्तित्व देखा गया।
- सीमांत परिवारों में सभी स्थानों पर खेत की फसल + डेयरी सामान्य कृषि प्रणाली पाई गई और यह प्रणाली का अभ्यास करने वाले परिवारों की संख्या के आधार पर 7 जिलों में प्रचलित प्रणाली (32% परिवार) है।
- दो घटक प्रणालियां (डेयरी या सेरीकल्वर या बकरी या बैल या पोल्टी और बागवानी या तो पोल्टी या डेयरी के साथ खेत की फसलें) का अभ्यास 46% परिवारों द्वारा किया जाता है, जिनका औसत लाभ बेंचमार्क में 0.82 हेक्टेयर से 84,954 रुपये पाया गया था। तीसरे वर्ष में फसल प्रणालियों, पशुधन और क्षमता निर्माण में विविधीकरण हस्तक्षेपों के कारण, लाभ 0.82 हेक्टेयर से 99050 रुपये तक बढ़ाया जा सकता है जो औसतन 116% अधिक है।
- संख्यिकीय विश्लेषण के आधार पर, प्रत्येक जिले के लिए सबसे अच्छा प्रदर्शन करने वाली कृषि प्रणाली की पहचान की गई है, जिसे सीमांत कृषि परिवारों की आजीविका में सुधार के लिए सभी संभावित हस्तक्षेपों और विविधीकरण दृष्टिकोण के साथ बढ़ाया जा सकता है।

प्रयोग 3: फार्म प्रशिक्षण कृषि प्रणाली मॉड्यूल का मूल्यांकन

सभी स्थानों के परिणाम नीचे संक्षेप में दिए गए हैं।

- विभिन्न जिलों में कृषि प्रणालियों की संख्या 1 (फतेहाबाद और कालाहांडी) से 3 (गोलपाड़ा, कांकेर, क्योंझर और हिंगोली) के बीच थी।
- 1.28 हेक्टेयर के औसत क्षेत्रफल वाले 6 जिलों (कुल घरों का 28%) में परिवारों की संख्या के आधार पर सभी कृषि प्रणालियों में, खेत की फसल + डेयरी को प्रमुख देखभाल प्रणाली के रूप में पाया गया। विविधीकरण के कारण, समतुल्य आधार पर उत्पादन में 11% का सुधार हुआ जबकि लाभ में 9% का सुधार हुआ।
- दो घटक प्रणालियाँ जैसे कि खेत की फसल + डेयरी, खेत की फसल + कुक्कुट, खेत की फसल + रेशम उत्पादन, खेत की फसल + बकरी, खेत की फसल + बैल और आकार के साथ किया गया था जिसका उत्पादन और लाभ में क्रमशः 18.9 और 27.3% का सुधार हुआ।
- तीन घटक प्रणालियाँ जैसे खेत की फसल + डेयरी + मत्स्य, खेत की फसल + डेयरी + बागवानी, खेत की फसल + डेयरी + मुर्गी पालन, खेत की फसल + डेयरी + बकरी/भेड़, खेत की फसल + डेयरी + सब्जियाँ 28% अध्ययन परिवारों द्वारा अपनाई गई 1.22 हेक्टेयर के औसत जोत आकार के साथ जिसका उत्पादन 72% बढ़ गया।
- सामान्य तौर पर, सभी स्थानों पर, फसल, पशुधन, प्रसंस्करण और वैकल्पिक मॉड्यूल में बाधा-आधारित हस्तक्षेपों के परिणामस्वरूप उत्पादन (1.48 गुना) में 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 evaluated 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 finished 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 74 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 (2019-20) is depicted in Map - 1 &2 ,and details are given in table 3.

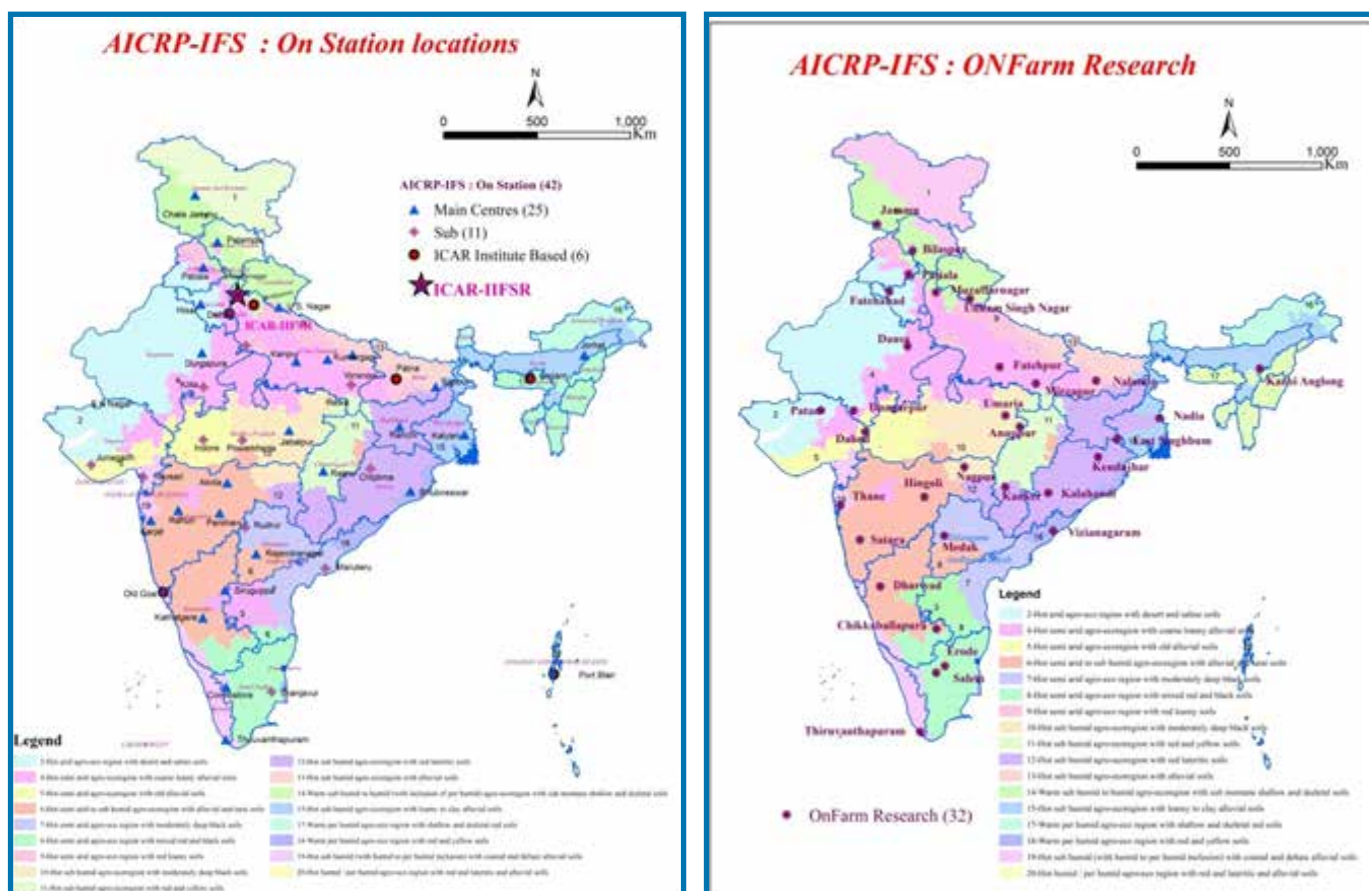


Table-3/1: Location of Different AICRP-IFS centres during the year under report (2019-20)

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 (B1-3)
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, Devgad	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
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

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/Sub-Region of Planning			NARP 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. Thiruvananthapuram)	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	Meghalaya	Umiam	Vol. Centre	Sub-humid To Humid	Eastern Himalayan Region			Sub-Tropical Hill 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)

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/Sub-Region of Planning	NARP Zone
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	Sothorn 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)
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 experiment of CSR/FSR were conducted during the year 2019-20 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
	Rajendranagar	Udic Ustochrepts, black soils	18° 59' N	78° 55' E
	Maruteru	Chromusterts clayey, medium black soils	16° 38' N	81° 44' E
	Rudrur	Chromusterts clayey, deep (90 cm depth), deep black soils	18° 30' N	77° 51' E
	Jorhat	Fluvaquents/ Udicquents association, very deep (90 cm depth), alluvial sandy clay loam soils	26° 47' N	94° 12' E
	Sabour	Eutrochrepts (Very deep), low and clay soils	25° 23' N	87° 07' E
	Raipur	Ochraquas association, deep black soils	21° 16' N	81° 36' E
	S K Nagar	Haplaquas, deep medium black soils	24° 90' N	72° 19' E
	Junagadh	Ustochrepts, deep medium black soils	21° 30' N	70° 30' E
	Hisar	Vertic Ustochrepts deep medium black soils	20° 57' N	72° 54' E
	Palampur	Ustochrepts, very deep silty alluvial soils	29° 08' 55" N	74° 41' 16" E
	Navsari	Udic Haplustalfs, red soils	32° 06' N	76° 03' E
	Chatha (Jammu)	Eutrochrepts very deep clay soils	32° 05' N	74° 04' E
	Ranchi	Ultic Palustalfs very deep (90 cm) red soils	23° 79' N	85° 19' E
	Kathalagere	Aficols, dark reddish brown sandy clay loam	13° 02' N	76° 15' E
	Siruguppa	Type Chromusterts, very deep (90 cm) black soils	15° 38' N	76° 54' E
	Karamana	Typic Tropofluvents, very deep (90 cm depth)	11° N	77° E
	Jabalpur	Chromusterts, very deep (90 cm depth), medium to deep black	23° 10' N	79° 57' E
	Indore	-	22° 04' N	79° 57' E
	Powarkheda	-	23° 25' N	73° 98' E
	Rewa	Ustochrepts-Vertic Ustochrepts association, fine loamy soils	24° 41' N	81° 15' E
	Akola	Medium deep black clayey soil	20° 42' N	77° 02' E
	Karjat	Haplustults Udic-Fluvents, red soils	18° 33' N	75° 03' E
	Parbhani	Chromusterts, deep (90 cm depths.), deep black soils	19° 08' N	76° 05' E
	Rahuri	Chromusterts, fine clayey soils	19° 47' N	74° 18' E

S.No.	Centre	Soil Type	Latitude	Longitude
	Bhubaneshwar	Haplustais very deep (90 cm depth), medium textured lateritic soils	20° 15' N	85° 52' E
	Chiplima	Haplaquents, very deep (90 cm depth) clay, ill-drained soils	20° 21' N	80° 55' E
	Ludhiana	Ustochrepts-Ustic Psamments Association, very deep (90 cm depth), alluvial sandy and sandy-loam soils	30° 56' N	75° 52' E
	Durgapura (Jaipur)	Torrid-Psamments/ Torrid-Fluents Association, sandy loam soils	26° 55' N	75° 49' E
	Kota	Chromsterts-Paleusterts association, very deep (90 cm depth) clay loam soils	25° 26' N	75° 30' E
	Coimbatore	Udic Rhodustals, fine loamy red sandy soils	11° 59' N	78° 55' E
	Thanjavur	Typic Pellusterts, clayey very deep (90 cm depth)/ deep black soils of deltaic origin	10° 47' N	79° 10' E
	Kanpur	Udic Ustochrepts, alluvial soils	26° 28' N	80° 21' E
	Faizabad	Udic fluents-Fluquents Association, loamy clayey soils	26° 47' N	82° 12' E
	Bichpuri	Ustochrepts, very deep (90 cm depth) alluvial soils	27° 02' N	77° 09' E
	Varanasi	Aeric Chroquals very deep (90 cm depth) alluvial clayey soils	25° 18' N	83° 03' E
	Pantnagar	Hapludolls, very deep (90 cm depth) alluvium coarse loam soils	29° 08' N	79° 05' E
	Kalyani	Fluventic Eutrochrepts, very deep (90 cm depth) alluvial soils	23° 40' N	88° 52' E
	ICAR-IIFSR, Modipuram	Ustochrept	29.4° N	77.46° E
	ICAR-RC, Patna	Alluvial soil	25° 50' N	84° 45' E
	ICAR-RC, Umiam	Slfisols, Entisols, Inceptisols	25° 59' N	85° 08' E
	ICAR-RC, Goa	Lithic dystrochrepts karmali soils series	15° 13' N	75° 55' E
	ICAR-RC, Port Blair	Costal alluvial soil	11° 38' N	92° 39' E

Weather condition at different farming system research centres during 2019-20

The weather conditions including important parameters such as rainfall and air temperature (maximum and minimum) prevailed during the reporting period (July 2019 to June 2020) at the various Integrated Farming Systems Research Centers of the AICRP on IFS were analyzed. The rainfall data was categorized into 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 centre (fig.2). Centre-wise per cent departure of the annual rainfall was calculated. Air temperature data was collected at all the centres and analysed. Annual temperature range (lowest to highest) of maximum and minimum temperature are depicted in figures 3-4. Compiled results revealed that centers like Akola, Chiplima, Durgapura, Indore, Junagarh, Kathalgere, Maruteru, Navsari, Rahuri, Rudrur, Siruguppa and S. K. Nagar did not

receive winter season rainfall during the reporting period. However, Indore, Junagadh and Navsari were the centres that were remained deprived of rainfall in subsequent season (Pre-monsoon). During the southwest monsoon season, Thanjavur and Rudrur were the centres that received the highest (577.0 mm) and lowest (16.0 mm) rainfall while during post-monsoon season, Chiplima was found to be dry centres. In terms of annual rainfall, the highest rainfall (2495.0 mm) was received at Portblair and lowest (308.0 mm) at Coimbatore centre. Powarkheda was found to be hottest among the AICRP-IFS centre with maximum temperature of 46.0oC whereas the Parbhani recorded the highest range (15.3-41.7oC) of 26.4oC variations in maximum temperature during reporting period. Palampur was found to be coldest centre with minimum temperature of 3.0oC. The center wise brief of the prevailing weather condition are described below.

Akola: During the reporting period, with (-) 1.7 % departure of annual rainfall, 956.5 mm rainfall was received at the centre. No rainy day was recorded during winter season. Southwest monsoon contributed 86.0% to the total annual rainfall where August month was found to be the wettest month at this centre with 291.6 mm rainfall.

Ayodhya: All the four seasons received some rainfall ranging from 322.0 mm to 940.0 mm. With contribution of 940.0 mm rainfall by southwest monsoon, centre recorded annual rainfall of 1200.0 mm. July was found to be the wettest month with 396.5mm rainfall during the reporting period. The monthly average maximum temperature ranged between 19.1oC to 38.9oC while monthly average minimum temperature range was 8.6oC to 26.3oC.

Bhubaneswar: Total rainfall received during the reporting period was 1958.5 mm which was 33.4% higher over the normal rainfall. All the four seasons received some rainfall ranging from 107.0 mm to 1212.0 mm. Southwest monsoon contributed about 62.0% rain to the total amount of rain. With 341.7 mm of rainfall, July was found to be wettest month for the reporting period. The monthly average maximum temperature was found in the range of 27.9oC to 36.9oC while minimum temperature ranged between 16.1oC to 26.6oC.

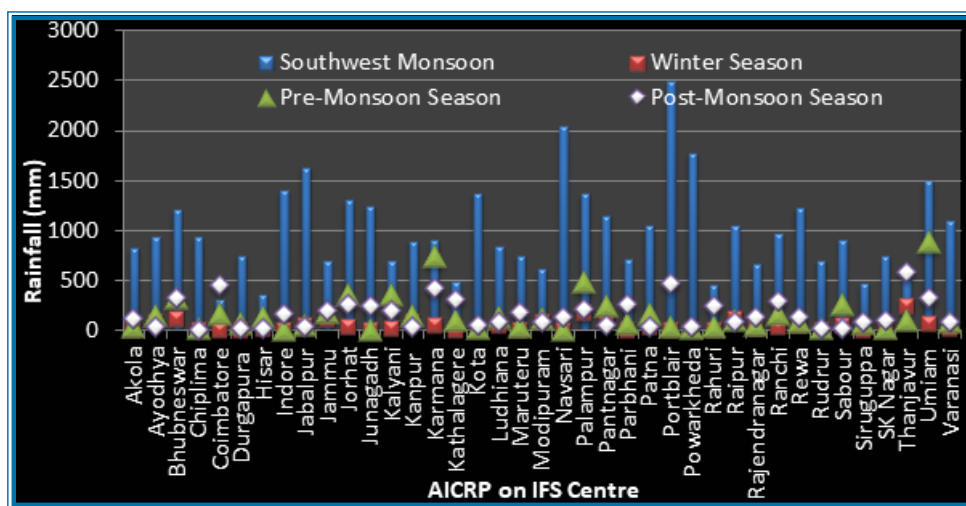


Fig. 1 Season-wise rainfall received at centres of AICRP on IFS during 2019-20

Chiplima: No rainfall was found during winter and post-monsoon seasons. Southwest monsoon contributed 98.0% to the total rain received during the reporting period. Total rain recorded at the centre was 1470.5 mm, which was 35% higher over the annual rainfall of the centre. The average monthly maximum and minimum temperature ranges were 27.1 to 42.7oC and 9.35 to 24.6oC respectively.

Coimbatore: Centre received 929.1.0 mm rainfall during the reporting period, which was 29.9% lower than the normal rainfall. Monthly average maximum and minimum temperature ranges for the reporting period were 27.8 to 35.2oC and 20.4 to 32.1oC respectively.

Durgapura: Centre did not observe any rainy day in the winter season however, a very meager amount of rainfall (21.0 mm) was recorded during post-monsoon season. With 48.4% departure of annual rainfall, centre received 830.8 mm of rain. 21.0 to 40.5oC was the range of maximum temperature and 6.4 to 28.1oC was the range of minimum temperature for the reporting period.

Hisar: All four seasons center received rainfall. Centre received 38.5% higher rainfall than the normal rainfall (381.9 mm). As usual, summer was very hot, monthly maximum temperature (40.5oC) was reported highest during the June, and winter was severe during which average monthly minimum temperature dropped below 5.2oC in January.

Jammu: Centre received rain during all the four seasons with maximum contribution from southwest monsoon season (688.0 mm). Centre received 1174.1 mm rain during the reporting period. The range of monthly average maximum temperature was 16.2oC to 40.5oC. January month was found to be coldest where night temperature was dropped to 6.4oC.

Jorhat: With the highest contribution from the southwest monsoon (1297.0 mm), center received rain during all other three seasons (655.0 mm). Received rainfall during the reporting period was (-)1.7% lower over the normal rainfall of the centre. The highest monthly mean maximum temperature was observed between 22.6 to 33.8oC while monthly mean minimum temperature was recorded between 9.8 to 26.2oC.

Junagarh: Winter season and pre-monsoon season did not received rainfall. Total 1492.0 mm rainfall was recorded at the centre, which was 69.0% higher than the normal rainfall of the centre. The highest monthly average maximum temperature (38.6oC) was observed during April whereas, lowest minimum temperature (12.6oC) was recorded during January.

Kalyani: Rain was observed during all four seasons, 1251.0 mm. Southwest monsoon season contributed 686.00 mm of rain, The range of monthly average maximum temperature was 22 to 35.4oC. Lowest monthly average minimum temperature (11.3oC) was recorded during January.

Kanpur: All the four seasons received some rainfall ranging from 37.0 mm to 886. 0 mm. There was 55.0% departure of annual rainfall was calculated for the center with 1154 mm rainfall. With 39.8oC monthly average maximum temperature, June was recorded as the warmest month while mercury dropped down to 8.8oC during nighttime of December.

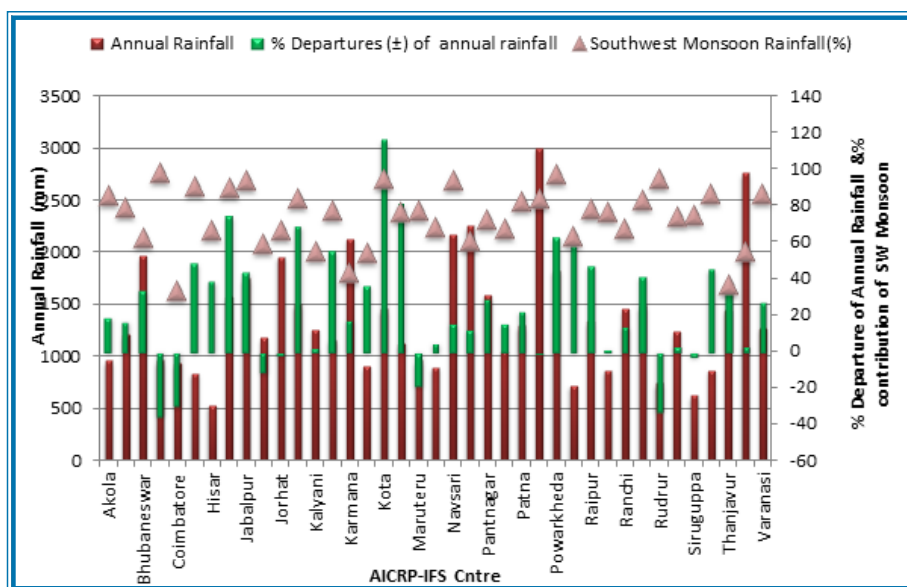


Fig. 2 Annual rainfall with percentage departure and contribution of southwest monsoon season at centres of AICRP on IFS during 2019-20

Karmana: During the reporting period, the total rainfall received was 2122.0 mm which was 17.1% higher than the normal rainfall received at the centre. Here, all the season received rain in between 55.0 mm (winter season) to 903.0 mm (Southwest monsoon season). With the rainfall amount of 594.0 mm, May month was recorded as the wettest month of the season. The range of monthly average maximum temperature was 29.9 to 33.0oC. Minimum temperature remained above 22.9oC during the reporting period.

Kathalagere: Total rainfall received during the reporting period was 895.0 mm (36.3% higher over normal rain). October month was recorded as the wettest month of the season where 274.7 mm rainfall was received. The range of monthly average maximum temperature was 27.2 to 34.7oC. Night temperature remained above 15.9 oC during the reporting period.

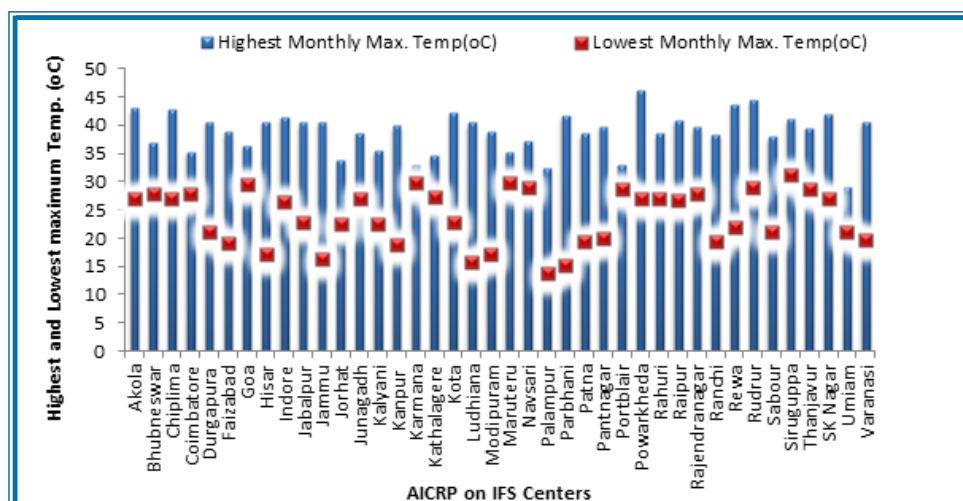


Fig. 3 Highest and lowest monthly average maximum (oC) temperature at centers of the AICRP on IFS during 2019-20

Kota: 4.0 mm and 23.0 mm rainfall was recorded during winter season and pre-monsoon season at the centre. Post-monsoon season received a very meager amount of rainfall i.e., 52.0 mm. Southwest monsoon season contributed 1372.0 mm rainfall at the centre. Here, 116.0 % higher

rain than the normal rainfall was received during the reporting period. The highest average monthly maximum temperature (42.2oC) was recorded during May whereas lowest minimum temperature (8.2oC) was recorded during January.

Ludhiana: The total annual rainfall received during the reporting period was 113.0 mm. Here, all the seasons received almost similar amount of rain except southwest monsoon season. The highest range of monthly mean maximum temperature (15.8 to 40.4oC) was observed at this centre and lowest minimum temperature (6.7oC) was recorded during January.

Modipuram: winter season, pre-monsoon and post-monsoon season received almost equal rainfall whereas southwest monsoon received 609.0 mm rainfall. Here, 4.5% higher rains were received during the reporting period than the normal rainfall of the centre. The average monthly maximum and minimum temperature ranges were 17.2 to 38.8oC and 6.9 to 25.0oC respectively.

Navsari: The reporting period received 2170.0 mm rainfall, which was 15.6% higher 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. Southwest monsoon contributed 93.0% rain to the total rainfall received at the centre. The average monthly maximum and minimum temperature recorded at the centre were 37.1oC and 11.6oC.

Pantnagar: Rain received during southwest monsoon was 1143.0 mm which was 72.0 % of the total rainfall received during the reporting period however rest three seasons contributed only 445.0 mm of rain where October did not observe any rainy day. During the season, 29.1% higher rain was poured at the centre. The highest monthly average maximum temperature (39.7oC) was recorded in the month of July however, average minimum temperature (4.0oC) was observed during the month of February.

Parbhani: Centre received total 340.0 mm rainfall during winter season (5.0 mm), pre-monsoon (70.0 mm) and post-monsoon season (265.0 mm) with 67.0% contribution to the total rainfall (1042.0 mm) from southwest monsoon season. In the reporting period 15.2%, higher rainfall was received over the normal rain. The highest monthly mean maximum temperature (41.7oC) was observed during May whereas; lowest minimum temperature (13.7oC) was recorded during January.

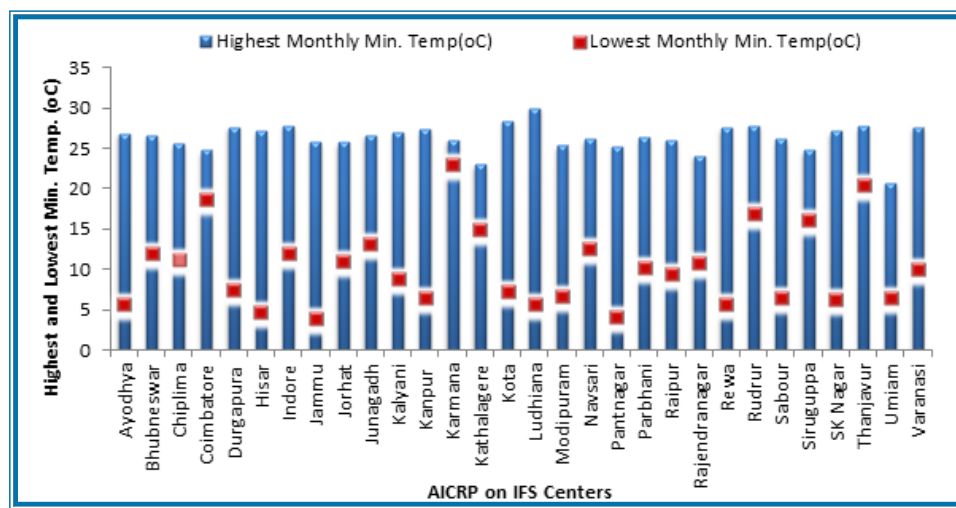


Fig. 4 Highest and lowest monthly average minimum (oC) temperature at centers of the AICRP on IFS during 2019-20

Rajendranagar: Centre received 16.0mm rainfall during winter season, where pre-monsoon (50.0 mm) and post-monsoon (138.0 mm) added 187.0 mm of rain to the total (858.0 mm) rainfall. With 76.0% contribution to the total, southwest monsoon added 655.0 mm rain. During the reporting period, Centre received 1.4% higher rain over the normal rainfall of the centre. The range of average monthly maximum temperature was 27.8 to 39.6oC whereas February has recorded as the coldest month with 15.6oC night temperature.

Ranchi: During the reporting period, the total rainfall received was 1446.3 mm. with 967.0 mm rainfall from south-west monsoon (67.0% to the total rain). The range of rainfall received during four seasons was 31.0 -967.0 mm. The highest monthly mean maximum temperature (38.3oC) was observed during June whereas; lowest minimum temperature (4.7oC) was recorded during January.

Rewa: Centre received 47.0mm rainfall during winter season, where pre-monsoon (80.0 mm) and post-monsoon (129.0 mm) added 209.0mm of rain to the total (1481.0 mm) rainfall. Southwest monsoon contributed 83.0% of rain to the total rainfall (1481.0 mm) recorded during the reporting period. In this period, 41.1% departure of rainfall was calculated. The range of average monthly maximum temperature was 22.0 to 43.5oC whereas February was recorded as the coldest month with 6.6oC night temperature.

Rudrur: Winter season did not observe any rainy day however pre-monsoon and post monsoon season received 24.0 mm and 16.0 mm rainfall. total rainfall received at centre was 740.2 mm with (-) 32.4% departure to normal rainfall. Southwest monsoon contributed 95.0% to the total rainfall. The ranges of monthly average maximum and minimum temperature were 29.0 to 44.3oC and 16.8 to 35.3oC respectively.

Sabour: The total annual rainfall received during the reporting period was 1230.0 mm which was almost equal to normal rainfall of the centre. Winter season, pre-monsoon and post-monsoon received 328.0 mm of rain whereas southwest monsoon received 902.0 mm of rain which was 73.0% of the total rainfall received during the reporting period. The highest monthly mean maximum temperature (37.9oC) was observed in June whereas; lowest minimum temperature (8.8oC) was recorded during January.

Siruguppa: During the reporting period, winter season did not receive any rainy days at the centre where as southwest monsoon contributed 75.0% to the total rainfall. The range of average monthly maximum temperature was 31.2 to 41.1oC whereas May was recorded as the coldest month with 19.1oC night temperature.

SK Nagar: During reporting period, winter season did not observe any rainy day however pre-monsoon season and post monsoon received 18.0 mm and 103.0 mm of rainfall. Southwest monsoon contributed 86.0% to the total rainfall received at the centre. In this period, 45.0% higher rain was received over the normal rainfall of the centre. The ranges of average monthly maximum and minimum temperature recorded at the centre were 26.9oC to 41.9oC and 8.6oC to 26.2oC respectively.

Thanjavur: All the four seasons received some rainfall ranging from 95.0 mm to 577.0 mm. With contribution of 527.0 mm rainfall by southwest monsoon, centre recorded annual rainfall of 1444.0 mm. In this period about 36.4% higher rain was received than the normal rainfall of the centre. The highest monthly average maximum and minimum temperature recorded during the reporting period was 39.4oC during April and 27.4oC during month of December, respectively.

Umiam: Total rainfall recorded during the reporting period was 2761.0 mm which was 2.9% higher to the normal rainfall of the centre. Here, southwest monsoon season contributed 54.0% rain to the total rainfall whereas, 11.4% was contributed by post-monsoon season. The ranges of average monthly maximum and minimum temperature were 21.2-28.9oC and 6.6-21.0oC.

Varanasi: All the four seasons received some rainfall ranging from 15.0 mm to 1096.0 mm. Southwest monsoon contributed 86% to the annual rainfall of 1269.2 mm. In this period about 27.3% higher rain was received than the normal rainfall of the centre. The highest monthly average maximum and minimum temperature recorded during the reporting period was 40.6oC during June and 10.4oC during month of January, respectively.

5. STAFF POSITION

Out of 327 total staff sanctioned for different centres, 233 staff were actually in position as on 31st March 2021, suggesting that 28.7 percent total post were vacant. (Table 5.1 and Appendix-III)

Table -5: Staff position under AICRP-IFS (University-wise) as on 31.3.2021

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	4
6	IGKV, Raipur	4	3	6	1
7	CSKHPKV, 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	3	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
26	KKV, Dapoli	4	4	6	5

S.N.	Name of the University	Scientific		Technical	
		Sanctioned	Filled	Sanctioned	Filled
27	UAS, Raichur	3	3	1	1
28	UAS, Dharwad	1	1	5	5
29	UAS, Bangalore	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	111	196	122

6. BUDGET

Revised Estimate (RE) for the year 2020-21 in the scheme of AICRP-IFS (ICAR share)

(Rs. in Lakhs)

Sl. No.	Name of University/ Institute	A. Other than STC (TSP)/SSP/NEH					B. STC (TSP)					C. SSP					D. NEH					Grand Total (A+B+C+D)							
		Grant-in-Aid General					Grant-in-Aid Capital #					Grant-in-Aid General					Grant-in-Aid Capital #												
		Grant-in-Aid Salaries	Domestic TA	Operational Charges	Research Expenses	Sub Total	Total (Other than STC (TSP) / SS/SP/NEH)	Operational Charges	Research Expenses	Sub Total	Total STC (TSP)	Operational Charges	Research Expenses	Sub Total	Information Technology (14)	Equipment (11)	Livestock (12)	Works (13)	Information Technology (19)	Furniture & Fixtures (18)	Livestock (17)		Works (16)	Equipment (15)	Sub Total				
1	ANGRAU, Guntur	35.54	0.18	17.43	3.00	20.61	2.00	3.15	5.15	2.86	1.00	0.00	0.00	3.86	9.01	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	65.16
2	PUSAU, Hyderabad	101.16	0.25	19.72	16.48	36.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	3.30	6.30	1.00	0.50	0.00	0.00	1.50	7.80	0.00	0.00	0.00	0.00	148.23
3	HPKV, Palampur	62.18	0.18	7.50	6.00	13.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.80	3.30	1.00	0.50	0.00	0.00	1.50	4.80	0.00	0.00	0.00	0.00	80.66
4	GBPUAT, Pantnagar	56.97	0.60	9.00	7.18	16.78	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	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	74.75
5	CSAU, Kanpur	67.80	0.71	8.63	4.00	13.34	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	81.14
6	NDUAT, Faizabad	49.73	0.23	2.50	5.07	7.80	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	0.00	0.00	57.53
7	BHU, Varanasi	24.70	0.78	14.45	3.00	18.23	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	0.00	0.00	42.93
8	BAU, Ranchi	33.08	0.17	2.50	3.00	5.67	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	38.75
9	BAU, Sabour	88.11	0.18	6.00	5.50	11.68	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	99.79
10	BCKV, Kalyani	54.46	0.30	5.40	4.50	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	1.50	1.80	3.30	1.00	0.50	0.00	0.00	1.50	4.80	0.00	0.00	0.00	0.00	0.00	72.46
11	AAU, Jorhat	64.59	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	0.62	5.90	3.90	10.42	99.89
12	PAU, Ludhiana	47.85	0.40	17.50	4.50	22.40	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	73.25
13	HAU, Hisar	43.47	0.08	4.50	4.70	9.28	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	0.00	0.00	0.00	0.00	56.25
14	SKVAFU, Jodhpur	54.27	0.17	3.00	6.00	9.17	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	3.60	5.10	1.00	0.50	0.00	0.00	1.50	6.60	0.00	0.00	0.00	0.00	0.00	72.54
15	SDAU, S.K. Nagar	64.97	0.67	5.40	4.30	10.37	2.15	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	0.00	77.84
16	NAU, Navsari	24.36	0.08	4.00	3.30	7.38	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	0.00	0.00	0.00	0.00	34.24
17	PAU, Junagadh	25.80	0.08	5.00	3.40	8.48	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	0.00	0.00	0.00	0.00	36.78
18	AAU, Anand	43.72	0.08	2.00	2.50	4.58	0.00	0.00	0.00	0.00	0.00	1.90	5.20	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	53.50
19	JKVAFU, Jabalpur	74.78	0.32	9.00	8.00	17.32	2.50	0.00	0.00	0.00	0.00	2.00	5.80	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	102.40
20	RVKV, Gwalior	17.24	0.08	5.00	3.30	8.38	2.20	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	27.82
21	IKV, Raipur	63.55	0.17	5.00	3.00	8.17	2.50	0.00	0.00	0.00	0.00	0.75	4.05	0.75	1.80	2.55	1.00	0.50	0.00	0.00	1.50	4.05	0.00	0.00	0.00	0.00	0.00	0.00	82.32
22	QUAT, Bhubaneswar	88.56	0.34	10.00	9.00	19.34	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	0.00	0.00	0.00	0.00	112.40
23	PDKV, Akola	47.62	0.47	4.50	7.50	12.47	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	0.00	0.00	0.00	0.00	62.59

Sl. No.	Name of University/ Institute	A. Other than STC (TSP)/SCSP/NEH										B. STC (TSP)					C. SCSP					D. NEH					GRAND TOTAL (A+B+C+D)																		
		Grant-in-Aid General					Grant-in-Aid Capital #					Total (Other than STC (TSP) / SCSP / NEH)	Grant-in-Aid General					Grant-in-Aid Capital #					Grant-in-Aid General					Grant-in-Aid Capital #																	
		Domestic T.A.	Operational Charges	Research Expenses	Sub Total	Information Technology (3)	Livestock (4)	Furniture & Fixture (5)	Vehicle (6)	Equipment (1)	Works (2)		Information Technology (3)	Livestock (4)	Equipment (1)	Works (2)	Operational Charges	Research Expenses	Sub Total	Information Technology (10)	Equipment (11)	Livestock (12)	Works (13)	Information Technology (14)	Sub Total	Total (SCSP)		Domestic T.A.	Operational Charges	Research Expenses	Sub Total	Information Technology (15)	Equipment (16)	Livestock (17)	Furniture & Fixtures (18)	Information Technology (19)	Sub Total	Total NEH							
24	MAU, Parbhani	42.62	0.17	2.80	8.00	10.97	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	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	56.09							
25	MPKV, Rahuri	61.84	0.18	6.72	4.00	10.90	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	75.24							
26	KKV, Dapoli	63.07	0.40	4.00	3.50	7.90	2.50	0.00	0.00	0.00	0.00	2.50	10.40	2.00	1.30	3.30	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	76.77						
27	UAS, Raichur	33.33	0.08	2.50	4.50	7.08	0.00	0.00	0.00	0.00	0.00	0.00	7.08	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	40.41							
28	UAS, Dharwad	45.15	1.02	3.00	4.00	8.02	0.00	0.00	0.00	0.00	0.00	0.00	8.02	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	0.00	0.00	0.00	0.00	53.17							
29	UAS, Bangalore	28.45	0.18	3.00	1.50	4.68	0.00	0.00	0.00	0.00	0.00	0.00	4.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	3.60	5.10	1.00	0.50	0.00	0.00	1.50	6.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.73							
30	UAS, Shimoga	31.22	0.08	5.00	4.00	9.08	0.00	0.00	0.00	0.00	0.00	0.00	9.08	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	40.30								
31	TNAU, Coimbatore	139.30	1.12	16.24	11.58	28.94	2.50	2.00	0.00	0.00	0.00	6.50	35.44	0.00	0.00	0.00	0.00	0.00	0.00	0.75	1.50	2.25	0.70	0.50	0.00	0.00	1.20	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	178.19							
32	SKUAST, Jammu	115.82	0.17	10.00	8.50	18.67	0.00	0.00	0.00	0.00	0.00	0.00	18.67	0.00	0.00	0.00	0.00	0.00	0.00	4.50	5.60	10.10	1.00	0.50	2.00	0.00	3.50	13.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	148.09							
33	KAU, Thrissur	67.87	0.67	11.00	8.00	19.67	0.00	1.00	0.00	0.00	0.00	1.00	20.67	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	88.54							
34	MPUAT, Udaipur	28.40	0.30	1.80	3.75	5.85	0.00	0.00	0.00	0.00	0.00	0.00	5.85	2.00	1.30	3.30	0.00	1.00	0.00	0.35	1.35	4.65	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	38.90							
35	AU, Kota (*)	26.79	0.30	3.75	4.80	8.85	0.00	0.00	0.00	0.00	0.00	0.00	8.85	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	35.64								
36	ICAR-IFSR, Modipuram	0.00	0.00	14.70	2.00	16.70	0.00	0.00	0.00	0.00	0.00	0.00	16.70	1.03	1.84	2.87	0.00	0.00	0.00	0.00	2.87	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	19.57							
37	PC-Unit/IFSR, Modipuram	0.00	0.00	4.00	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.44	4.44	1.50	1.65	3.15	0.14	0.00	0.00	0.00	0.14	3.29	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	7.73							
38	ICAR Res. Comp., Patna	0.00	0.08	6.70	3.00	9.78	1.18	0.00	0.00	0.00	0.00	0.00	11.8	10.96	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	0.00	0.00	10.96								
39	ICAR Res. Comp., Umam	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	0.50	10.00	3.99	14.49	2.50	8.00	3.00	4.85	0.00	18.35	32.84			
40	ICAR-CCARI, Old Goa	0.00	0.00	8.82	5.60	14.42	0.00	0.00	0.00	0.00	0.00	0.00	14.42	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	14.42						
41	ICAR-CIARI-Port Blair	0.00	0.00	9.00	5.00	14.00	0.00	0.00	0.00	0.00	0.00	0.00	14.00	1.50	1.24	2.74	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	16.74						
42	ICAR-ASRI, New Delhi	0.00	0.00	8.50	0.00	8.50	0.00	0.00	0.00	0.00	0.00	0.00	8.50	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.50							
Total		1918.37	11.27	289.56	198.96	499.79	35.15	11.00	1.17	4.00	0.00	0.82	52.14	551.93	19.03	15.88	34.91	4.90	4.75	0.00	0.35	10.00	44.91	15.00	23.00	38.00	7.70	4.00	2.00	0.00	13.70	51.70	0.00	1.12	15.90	7.89	24.91	7.50	13.00	7.00	14.85	0.88	43.23	68.14	2635.05

Details of capital items (1) Rs.2.50 lakhs each to On-station centres of Hisar, Jobner,SK Nagar, Navsari, Junagadh, Jabalpur, Raipur, Chiplima, Akola, Parbhani, Rahuri, Karijat, Coimbatore and Rs.2.20 lakhs for Gwalior for Need based equipments costing <2.50 lakhs each, Rs.1.18 lakhs for Patna for Need based equipments (2) Rs.2.00 lakh each to OFR centres of Medak, Umariya, Kalahandi, Yethapur, Rs.1 lakh to Thiruvananthapuram (OFR centre) for livestock (goat/poultry/sheep) shed for demonstration of business models of IFs and Rs.2 lakhs to on-station centre at Ludhiana for livestock shed; (3) Rs.0.35 lakhs for Tablet to S.K. Nagar and Rs.0.44 lakhs for multifunction printer to PC Unit; (4) Rs.1 lakh each to on-station centres at Ludhiana & Hisar for livestock (cow/buffalo/small ruminants) and Rs.2 lakh to Main centre Coimbatore and OFR centre Erode and Yethapur for livestock (Cow/Buffalo/Goat/poultry); (6) Rs.0.82 lakhs to OFR centre Medak for balance amount of replaced vehicle; (7) Rs.1 lakh each to OFR centres Umariya, 0.14 lakh to PC Unit and Rs.0.90 lakhs to Dahod and Rs.2.86 lakhs to Vizianagaram for Need based equipments each costing <Rs.2.50 lakhs (8) Rs.1 lakh each to OFR centres Vizianagaram, Dahod, Umariya and Durgapur and Rs.0.75 lakhs for Kanker for livestock (goat/sheep/poultry/pig) (10) Rs.0.35 lakhs to OFR centre, Udaipur for Tablet/Notebook, (11) Rs.1 lakh each to OFR centres Medak, Bilaspur, Nadia, Dausa, Kanker, Chikkaballapura, Jammu and Rs.0.70 lakhs for Erode/Yethapur for need based equipments; (12) Rs.0.50 lakh each to OFR centres Medak, Bilaspur, Nadia, Dausa, Kanker, Chikkaballapura,Erode/Yethapur and Jammu for livestock (goat/poultry/sheep/pig); (13) Rs.2 lakhs to OFR centre, Jammu for livestock shed (poultry/goat) to demonstrate business (FS; (15) Rs.2.5 lakhs each to on-station centres Jorhat, Umiam and OFR centre Goalpara for need based equipments (16) Rs.5 lakhs to Goalpara for livestock shed (poultry/goat/pig) and Rs.8 lakhs to Umiam for renovation of fish ponds and livestock sheds; (17) Rs.4 lakhs to Goalpara for livestock (goat/poultry/pig) and Rs.3 lakhs to Umiam for replacement/ addition of livestock; (18) Rs.10 lakhs to Jorhat for furniture and fixtures; (19) Rs.0.88 lakhs to Jorhat for LCD display units for Advanced Farming Systems Research Centre

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 2020-21 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 2020-21 revealed that mean gross income of Rs. 533321 while the mean net return excluding family labour was found to be Rs. 396891. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 362166 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. 284255 while it varied from Rs 224360 at Palampur to Rs 359454 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+Horti-culture + Fish cum poultry + Mushroom	1.0	359454
Palampur	Crops + Dairy + Horticulture + Fodder + Vermi-compost + Boundary Plantations + Kitchen Gardening	1.0	224360
Pant-nagar	Crops + Dairy + Horticulture/Agroforestry + Fisheries	1.0	268953
Mean		1.0	284255

The models could generate mean employment generation of 410 mandays through different modules while the IFS models were also found to be carbon negative in terms of GHG emission at -7049 CO₂ equivalent. Further, study of different fractions of cost revealed about 34% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was to the tune of 37% of the cost. The cost incurred towards hired labour was 9%. These models revealed mean REY of 22.39 tonnes besides soil health improvement to the tune of 63.8 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.2.

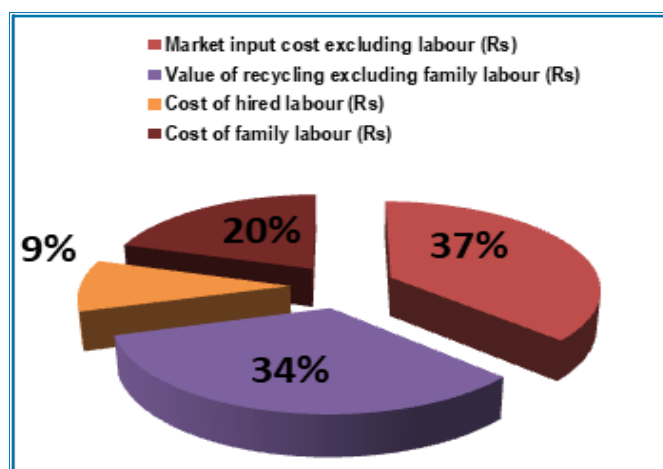


Fig 1. Different fraction of total cost

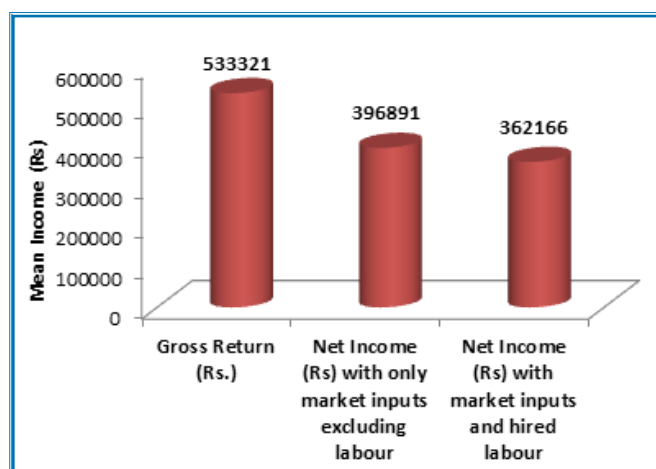


Fig 2. Economics of IFS models of WHR

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 2020-21 revealed that mean gross income of Rs. 558631 while the mean net return excluding family labour was found to be Rs.454797. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 448131. 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. 253812 while it varied from Rs 190712 at Umiam to Rs 316912 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	316912
Umiam	Crops + Livestock + Horticulture + Fishery	1.0	190712
Mean		1.0	253812

The models could generate mean employment generation of 464 mandays through different modules. 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 40% of the cost. The cost incurred towards hired labour was 2%. These models revealed mean REY of 28.5 tonnes besides soil health improvement to the tune of 31 % 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 0.8.

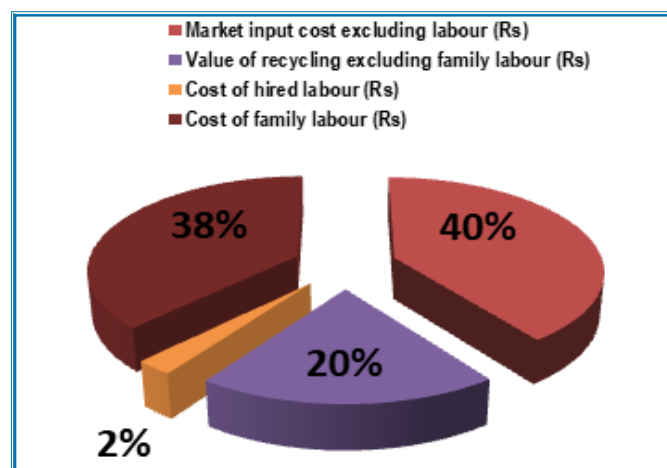


Fig 3. Different fraction of total cost

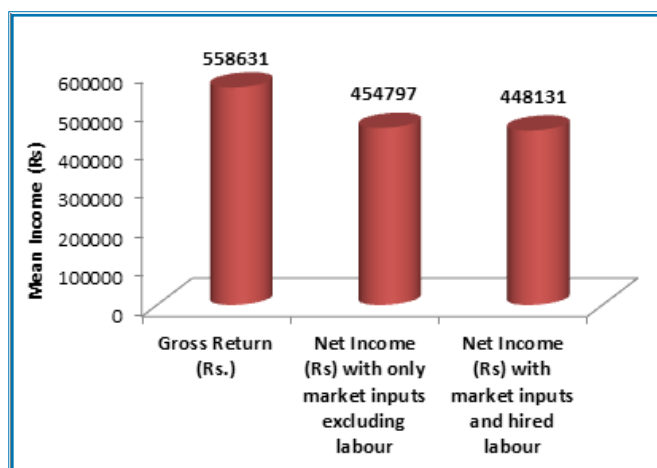


Fig 4. Economics of IFS models of EHR

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 2020-21 revealed that mean gross income of Rs. 620258 while the mean net return excluding family labour was found to be Rs.437994. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 406444. 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. 274386 while it varied from Rs 121145 at Hisar to Rs 427628 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	121145
Ludhiana	Crop + Dairy +Horticulture (fruits and vegetables)+ Fisheries + vermicomposting + agroforestry	1.0	427628
Mean		1.0	274386.5

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 GHG emission at -5451.6 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 71% of the cost. The cost incurred towards hired labour was 17%. These models revealed mean REY of 40.65 tonnes besides net returns per rupee invested being 1.2. The mean sustainable value index (SVI) for these models was found to be 0.4 with energy input – output ratio being 1.1.

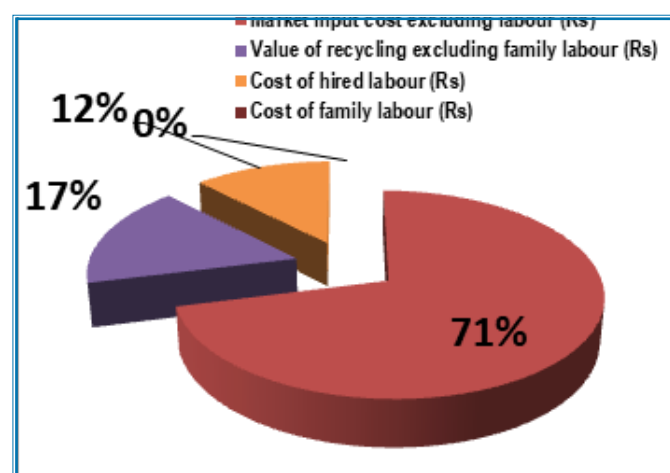


Fig 5. Different fraction of total cost

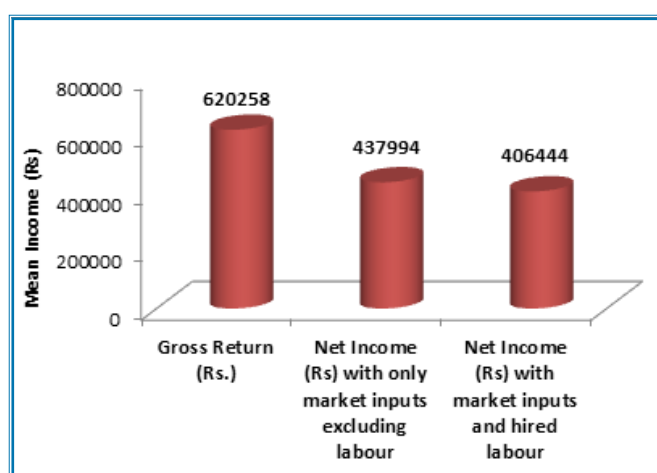


Fig 6. Economics of IFS models of TGP



IFS module at Ludhiana

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 2020-21 revealed that mean gross income of Rs. 378713 while the mean net return excluding family labour was found to be Rs.275837. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 245735. 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. 173478 while it varied from Rs 166801 at Modipuram for 0.7 ha model to Rs 180155 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	180155
Modipuram	Crops + Horticulture +Dairy+ fish pond+ Boundary Plantations + value addition	0.7	166801
Mean		0.86	173478

The models could generate mean employment generation of 572 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -28392 CO₂ equivalent. Further, study of different fractions of cost revealed about 19% 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 38% of the cost excluding labour. These models revealed mean REY of 21.0 tonnes besides soil health improvement to the tune of 14 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.7.

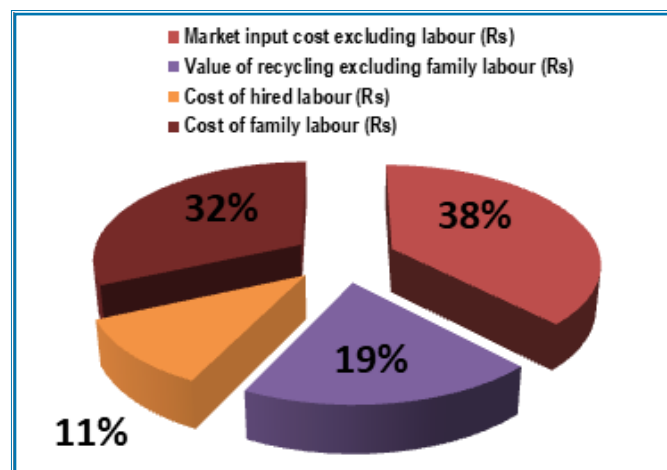


Fig 7. Different fraction of total cost

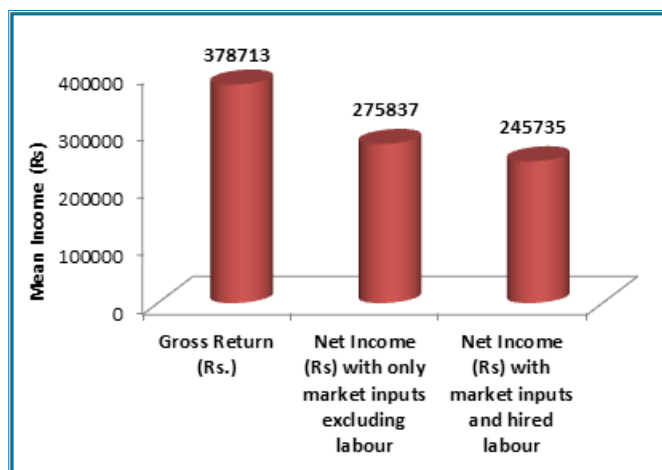


Fig 8. Economics of IFS models of UGP

5. MIDDLE GANGETIC PLAINS REGION (MGP)

Four AICRP –IFS Centers, two in eastern part of Uttar Pradesh namely i) IAS,BHU, Varanasi and NDUAT, 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 from the results of study during 2020-21. Details of different components of IFS are presented in Table 7.1.5. The results revealed mean gross income of Rs. 535202 while the mean net return excluding family labour was found to be Rs.455809. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 388937. Details of IFS model cost components presented in Table 7.1.5 indicated mean total cost for the IFS models to be Rs. 288258 while it varied from Rs 132210 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	250633
Patna	Main: Crop + Horticulture + Goatry + Poultry Allied: Mushroom /vermi-compost/B.P/ Agroforestry	0.4	132210
Patna	Main: Crop + Dairy+ Horticulture + Goatry + Poultry +Fish cum duckery, Allied: Mushroom /vermi-compost/B.P.	0.8	185490
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			288258

The models could generate mean employment generation of 375 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -1090.6 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 28%. The cost incurred towards hired labour was 23% while cost of family labour was 19 % of the cost. These models revealed mean REY of 29.2 tonnes besides soil health improvement to the tune of 12.7 % 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.

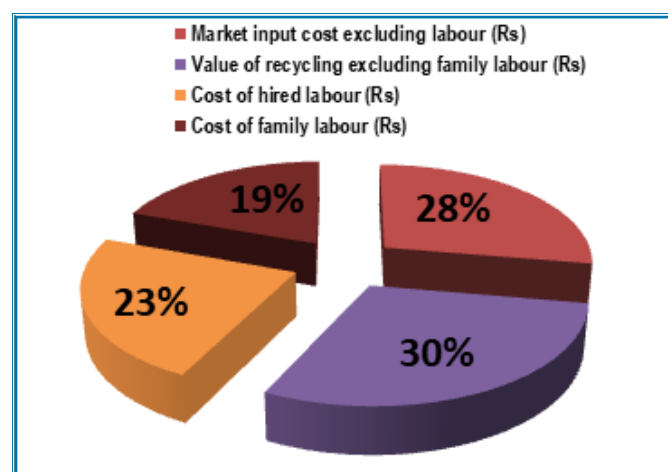


Fig 9. Different fraction of total cost

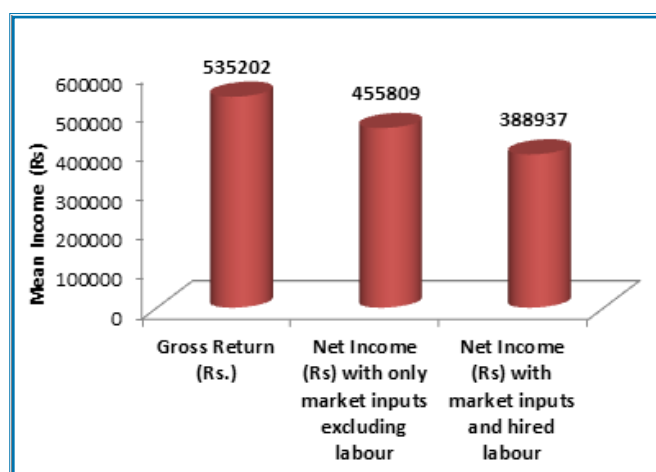


Fig 10. Economics of IFS models of MGP

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 2020-21 revealed gross income of only Rs. 178203 while the net return were found to be Rs. 161252 with only market inputs excluding labour and net return was Rs. 136227 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. 129968.

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	129968
Mean		0.66	129968

The models could generate employment generation of 328 mandays through different modules while the IFS model was found to be carbon negative in terms of mean GHG emission at -3012.6 CO₂ equivalent. Further, study of different fractions of cost revealed about 27% share of recycled inputs excluding family labour in total cost of the IFS whereas cost of outside purchase excluding labour was 14%. These models revealed mean REY of 7.75 tonnes besides soil health improvement to the tune of 5.9 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 0.4 with mean SVI of 0.70.

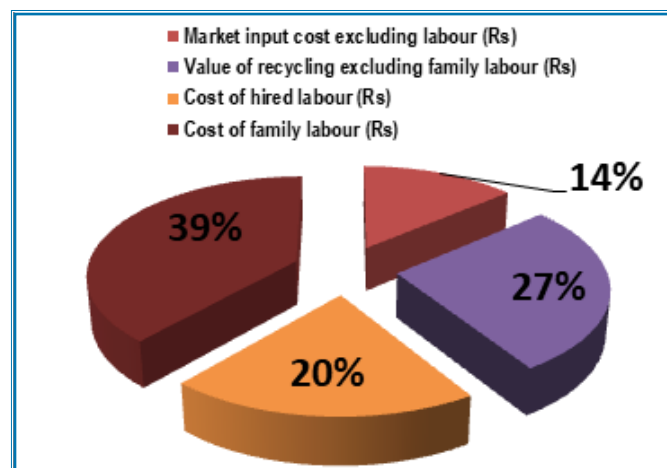


Fig 11. Different fraction of total cost

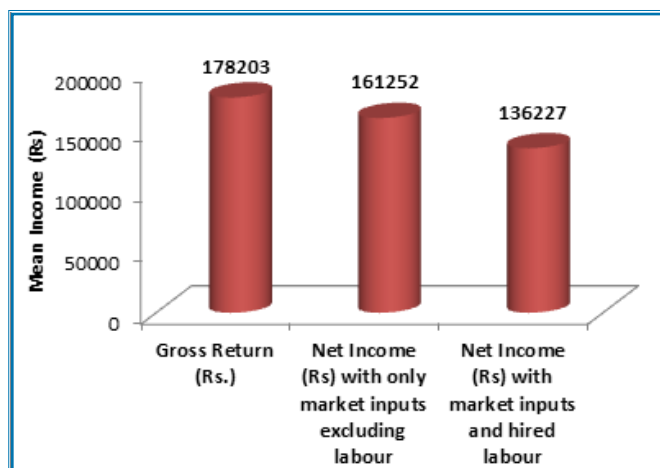


Fig 12. Economics of IFS model of LGP

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 2020-21 revealed that mean gross income of Rs. 460871 while the mean net return excluding labour was found to be Rs.424156. 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. 244531 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	244045
Ranchi	Crops + Dairy + Vermi-compost + Mushroom + Apiary + Fishery	1.0	245017
Mean		1.0	244531

The models could generate mean employment generation of 399 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -13716 CO₂ equivalent. Further, study of different fractions of cost revealed about 40% 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 14% 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 24.94 tonnes besides soil health improvement to the tune of 11.1 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 0.9 with mean SVI of 0.60.

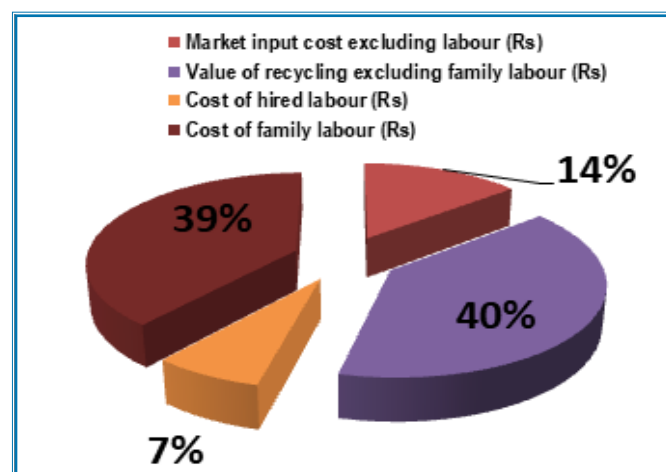


Fig 13. Different fraction of total cost

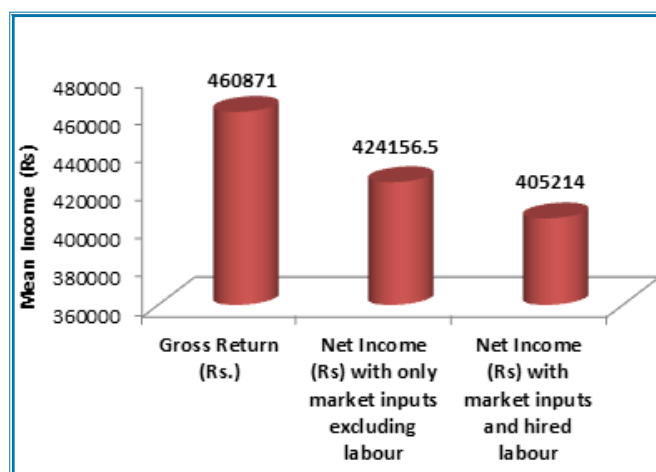


Fig 14. Economics of IFS models of EPH

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 m³), 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, dairy, horticulture, goatry, poultry as well as other complementary and supplementary modules in 1.45 ha area. The results of study during 2020-21 revealed gross income of Rs. 555388 while the return excluding family labour was found to be Rs.480572. However, when family labour was accounted for in the cost, the net return was found to be Rs 333445. Details of IFS model cost components presented in Table 7.1.8 indicated mean total cost for the IFS models to be Rs. 322282.

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	195460
Durgapura	Crops+ Dairy+ Horticulture + Goatry+ Poultry + Bio-compost	1.45	459105
			322282

The models could generate employment generation of 639 mandays through different modules while the IFS model was found to be carbon emissive in terms of mean GHG emission at +159.2 CO₂ equivalent, which can be made carbon neutral with suitable management strategies. 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 23%. The cost incurred towards hired labour was to the tune of 45% requiring special attention for reduction of labour hiring cost. These models revealed mean REY of 27.2 tonnes besides soil health improvement of 8.3 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 0.7.

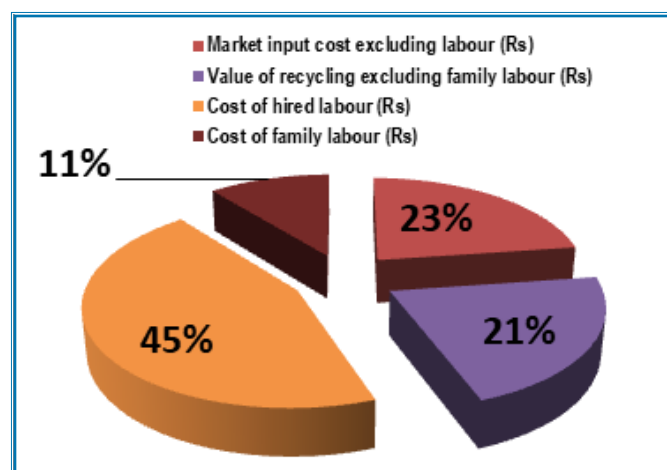


Fig 15. Different fraction of total cost

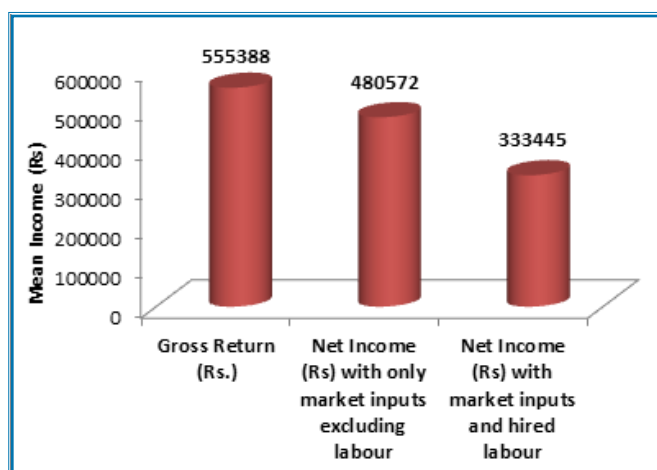


Fig 16. Economics of IFS models of CPH

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 2020-21 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	166485
Parbhani	Crops+ Dairy+ Horticulture + Vermicompost + Boundary Plantation	1.0	173240
Rahuri	Crops + Dairy + Horticulture + Poultry + Goat + Vermicompost	1.0	637994
Mean		1.0	325906

The models could generate mean employment generation of 526 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -8947 CO₂ equivalent. Further, study of different fractions of cost revealed about 20% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was to the tune of 39%. The cost incurred towards hiring labour was 28%. These models revealed mean REY of 22.74 tonnes besides soil health improvement to the tune of 11 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.6 with mean SVI of 0.7.

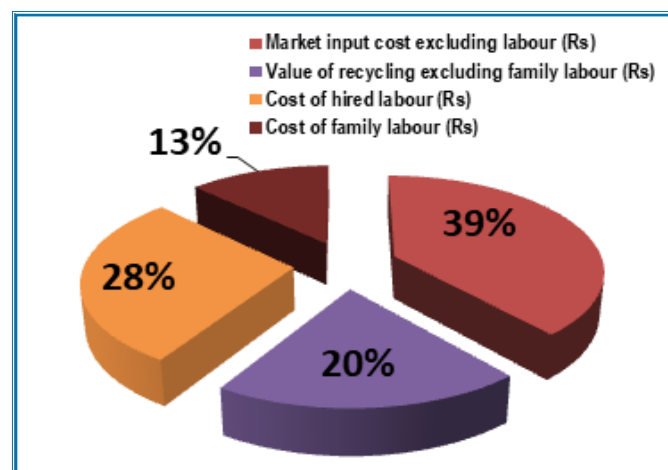


Fig 17. Different fraction of total cost

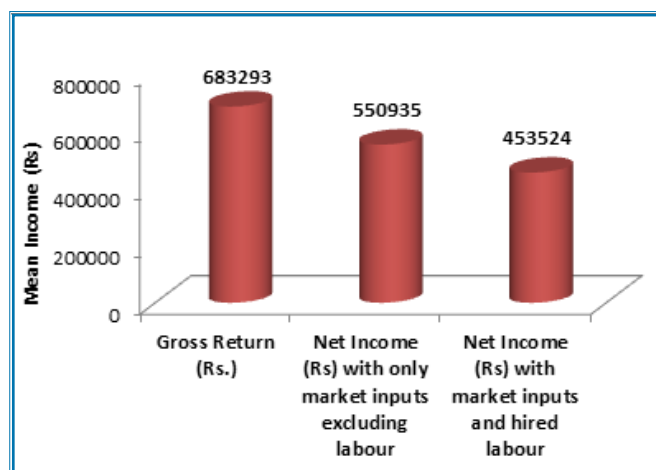


Fig 18. Economics of IFS models of WPH

10. SOUTHERN PLATEAU AND HILLS (SPH)

Four AICRP-IFS centers namely, TNAU, Coimbatore (Tamil Nadu), 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 2020-21 at these centres along with components of IFS is presented in Table 7.1.10 which revealed mean gross income of Rs. 452759

while the mean net return excluding family labour was found to be Rs.364672. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 332120. Details of IFS model cost components presented in Table 7.1.10 indicated mean total cost for the IFS models to be Rs. 228072 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	275302
Kathalgere	Crops + Horticulture +Plantation+ Dairy + Sheep + Vermicompost + Agroforestry + Boundary plantation	1.0	165960
Siruguppa	Crops + Dairy + Horticulture + Goatary + Vermicompost +Azolla +Boundary Plantations + Kitchen Gardening	1.0	218620
Rajendranagar	Crops + Dairy + Horticulture-Pasture + Compost + Boundary Plantations	1.0	287821
Maruteru_sub	Cropping systems + Dairy (2 Desi cows) + Fishery + Poultry + Horticulture + Compost /others	0.5	192658
Mean			228072

The models could generate mean employment generation of 502 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -6766 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 to the tune of 29%. The cost incurred towards hiring labour was 11%. These models revealed mean REY of 20.9 tonnes besides soil health improvement to the tune of 47.8 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.2 with mean SVI of 0.7.

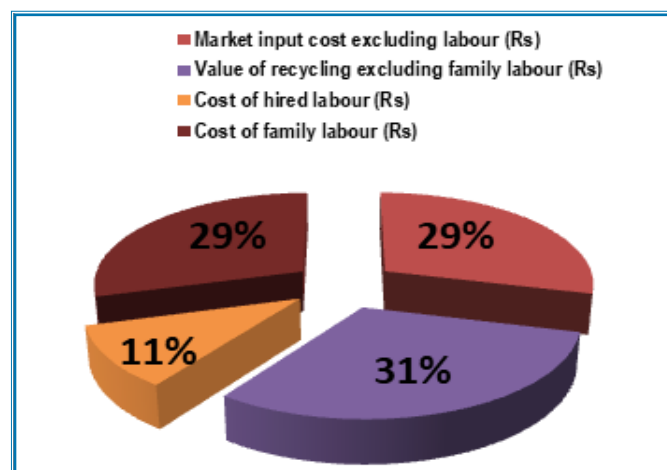


Fig 19. Different fraction of total cost

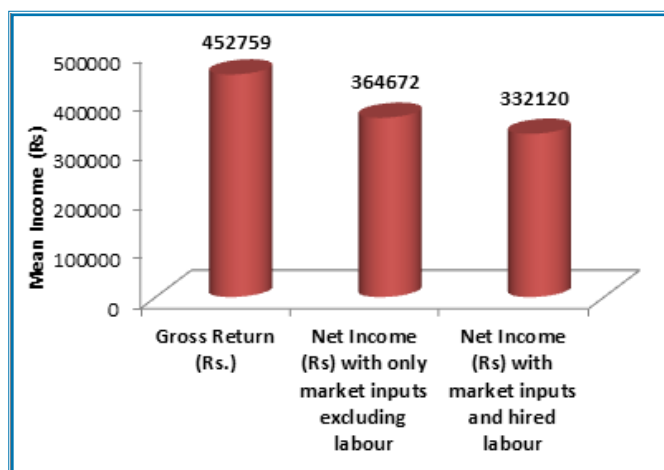


Fig 20. Economics of IFS models of SPH



IFS module at Coimbatore

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 Bhubaneswar (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 2020-21 revealed that mean gross income of Rs. 534176 while the mean net return excluding family labour was found to be Rs.401855. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 320486. 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. 301372 while it varied from Rs 295231 at Thanjavur for 0.8 ha model to Rs 307513 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	1.25	307513
Thanjavur	Crops + Dairy + Poultry +Horticulture + Fishery + Vermicompost + Boundary Plantations	0.8	295231
Mean		1.0	301372

The models could generate mean employment generation of 388 mandays through different modules while the IFS models were found to be carbon negative in terms of GHG emission at -773.1 CO₂ equivalent. Further, study of different fractions of cost revealed about 23% 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 43% of the cost. The cost incurred towards hired labour was 23%. These models revealed mean REY of 27.76 tonnes besides soil health improvement to the tune of 12.3 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.3 with mean SVI of 0.6.

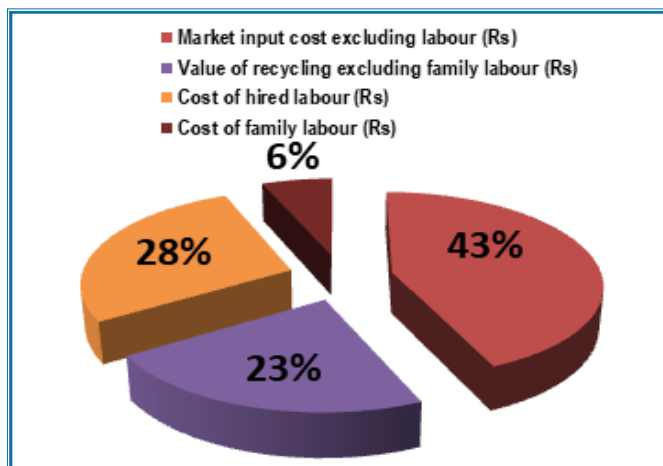


Fig 21. Different fraction of total cost

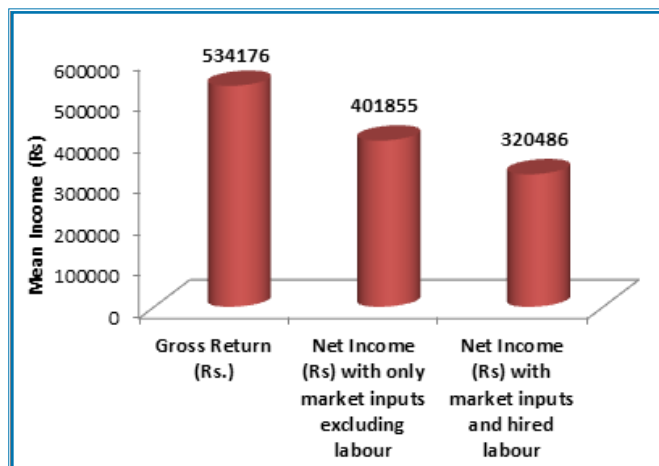


Fig 22. Economics of IFS model of ECPH

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 (Karamana) represented the climate smart IFS Models for respective states. The results of study during 2020-21 at these centres revealed mean gross income to be Rs. 358474 while the mean net return excluding family labour was found to be Rs.255106. However, when family labour was accounted for in the cost, the mean net return was found to be Rs. 233078. Details of IFS model cost components presented in Table 7.1.12 indicated mean total cost for the IFS models to be Rs. 262539.

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	587020
Karmana	Homestead based	0.2	204139
	Coconut based	0.2	177828
	Rice based	0.2	296500
	Banana based	0.2	192944
Mean		0.43	262539

The models could generate mean employment generation of 262 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission

at -14386 CO₂ equivalent. Further, study of different fractions of cost revealed about 24% share of recycled inputs in total cost of the IFS which could be further improved whereas cost of outside purchase was 45% of the model cost. The cost incurred towards hired labour was 10%. These models revealed mean REY of 13.0 tonnes besides soil health improvement to the tune of 49.4 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 0.8 with mean SVI of 0.70.

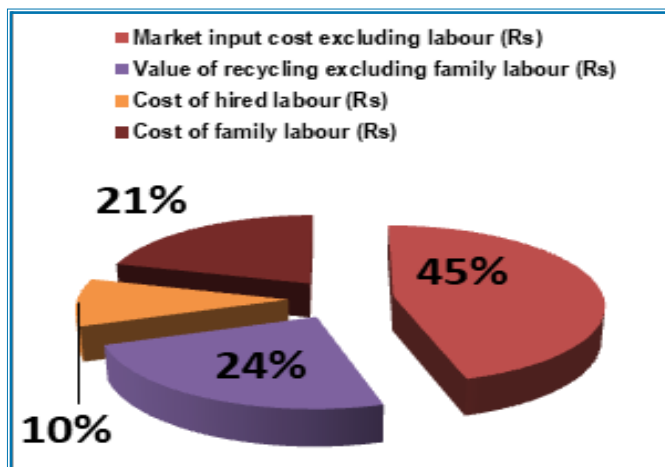


Fig 23. Different fraction of total cost

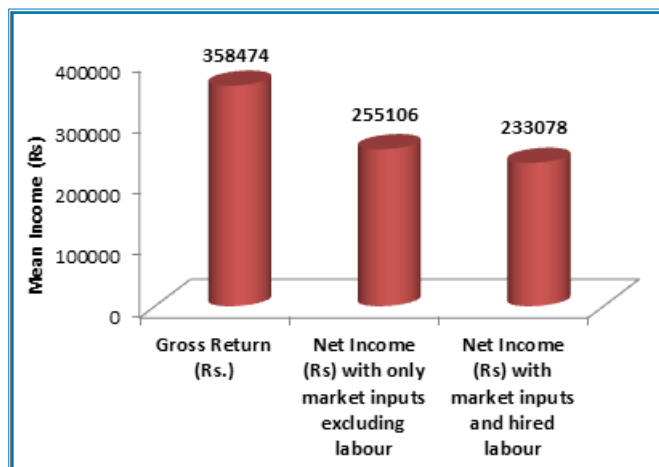


Fig 24. Economics of IFS models of WCPH





IFS module at Karamana

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 2020-21 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	259882
SK Nagar	Crops + Horticulture + Boundary plantation + Fisheries +Livestock+Nadep compost	1.0	211679
Mean		1.0	235780

The models could generate employment generation of 243 mandays through different modules.

Further, study of different fractions of cost revealed about 26% share of recycled inputs in total cost of the IFS whereas cost of outside purchase was 44% of the model cost. The cost incurred towards hired labour was 20%. These models revealed mean REY of 5.8 tonnes besides soil health improvement to the tune of 4.8 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 0.6.

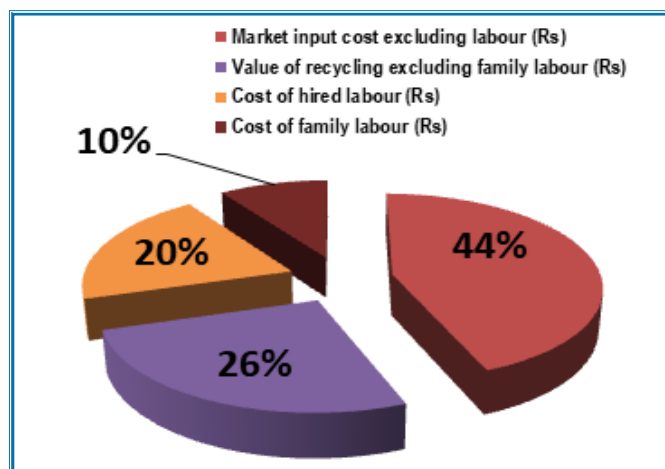


Fig 25. Different fraction of total cost

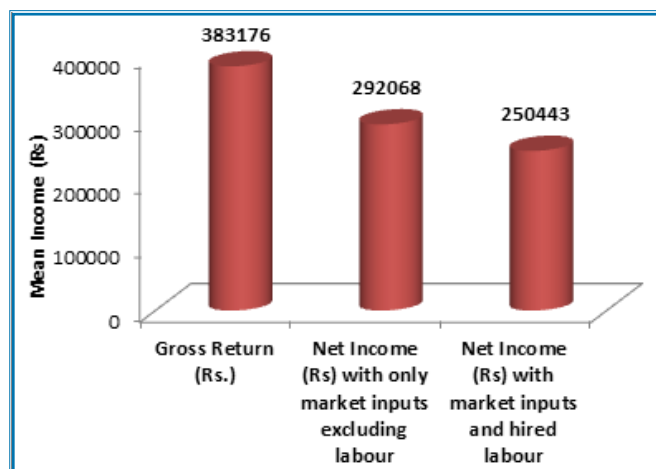


Fig 26. Economics of IFS models of GPH

15. ISLAND

The Andaman and Nicobar group of Islands lie in the Bay of Bengal 1200 km east of main land India between 6-14° N latitude and 92-94° 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. The results obtained during reporting period of 2020-21 from horticulture + pig + fishery for upland areas revealed the gross return to be Rs. 292820 while the net return excluding family labour was found to be Rs.261520. Details of IFS model cost components presented in Table 7.1.14 indicated total cost for the IFS models to be Rs. 133475 for 0.75 ha 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	Horticulture + Pig +Fishery for hilly upland	0.9	133745
Mean			133745

The model could generate mean employment generation of 191 mandays through different modules while the IFS models were found to be carbon negative in terms of mean GHG emission at -5236.3 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 46% which needs further reduction through small scale farm mechanization. These models revealed mean REY of 14.34 tonnes besides soil health improvement to the tune of 69 % in terms of organic carbon improvement as compared to benchmark with net returns per rupee invested being 1.2 with mean SVI of 0.6.

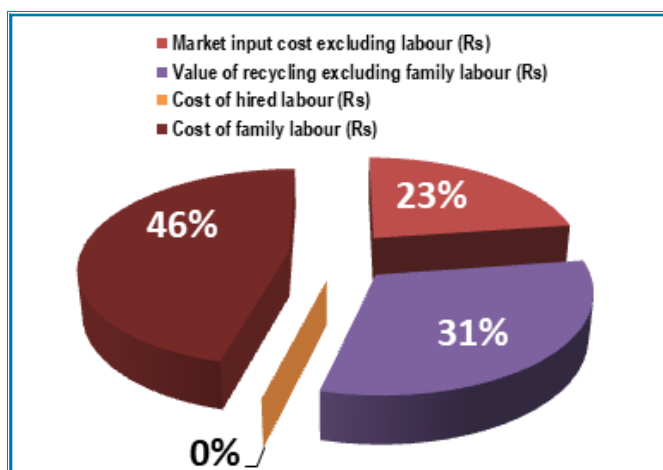


Fig 27. Different fraction of total cost

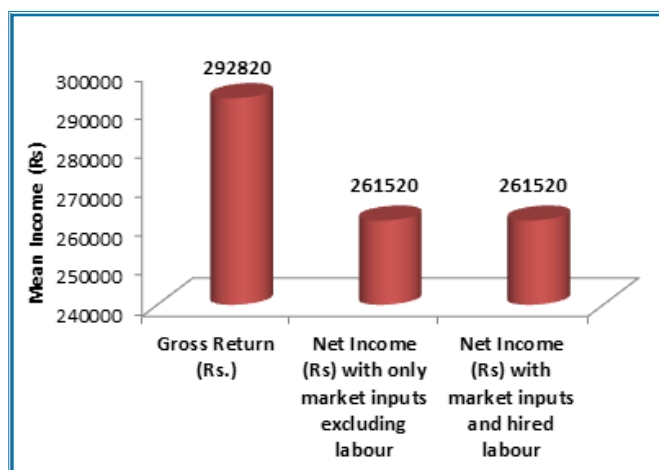


Fig 28. Economics of IFS model at Pot Blair (A & N)

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	36	67
• Soil health		
• Family nutrition		
• Income generation		
• Livestock nutrition		
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 2020-21 depicted that;-

- Market input cost excluding labour (13.11 % in LGP to 66.43 % in TGP)
- Value of recycling excluding family labour (10.65 % in WCPH to 43.59 % WHP)
- Cost of hired labour (0 % in Islands to 40.2 % in CPH)
- Cost saving by family labour (49.83% in UGP being highest and lowest in TGP i.e. 0)
- Purchase of animal feed from market as share of market input excluding labour (18.2 % in GPH to 89.5 % in Islands)
- Net return per rupee invested varied from 0.38 in LGP to 1.7 in UGP
- SVI varied between 0.6 to 0.8
- Improvement in soil OC over initial status in range of 4.8 % (GPH) to 96.2 % (TGP)
- Water productivity (Rs/m³) was highest being in MGP (186) while lowest being in ECPH (14.9)

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 Uttarakhand (TSP)	2017-2022	Nisha Verma	V.P. Chaudhary Amit Nath Vipin Kumar Chaudhary	ICAR-IIFSR, Modipuram	0.84 Lakh/year (2021-22)

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

T₁: Hand Weeding

T₂: One mechanical weeding + One hand weeding

T₃: Intercropping with pulses/green manure (location and crop specific intercropping)

T₄: Stale seed bed + reduced spacing (up to 25%) + mulching with previous crop residues + one hand weeding

T₅: Locally available weed mulch (water hyacinth/lantana etc.) + one hand pulling

T₆: 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

T₇: Soil solarization with 8-25 microns polythene mulch during summer + one HW (optional to centres)

T₈: ITK treatment on weed control practiced by farmers (like mulching with leaf of mango/ jackfruit etc.)

Ayodhya

Highest rice equivalent yield (2.27 t/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 T₄ state seed bed preparation + reduced spacing upto 25 % + mulching with one hand weeding at 50 DAS recorded the highest net income Rs 201549/ha and benefit : cost ratio 1.12.

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	3585	17020	6240	20170	179143	0.97
T ₂ Cono weeder -25DAT + one hand weeding -50 DAT,Rabiand summer, Hand hoe -25DAT + one hand weeding -50 DAT,Summer,	3065	16830	5980	19279	160528	0.86
T ₃ Intercropping with dhaincha,Rabi, Intercropping with lentil, Summer, Intercropping with moong	2810	12950 (210)	3925 (135)	15756	103402	0.60
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	3430	18540	6350	21123	201549	1.12
T ₅ Locally available weed mulch - water hyacinth + one hand pulling,Rabi and Summer, Locally available weed mulch - kanss + one hand pulling	3115	16260	5515	18576	155711	0.87
T ₆ Incorporation of neem cake 15 days before sowing @ 2 t/ha + one hand weeding (Kharif,Rabi and Summer)	3850	19760	6860	22777	171340	0.71
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	2885	14820	5215	17114	129386	0.72
T ₈ Without weed control	2740	13580	4460	15527	105907	0.61

Maruteru

At 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, 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-sweetcorn cropping systems.

Treatment details	Grain Yield of Rice (Kg/ha)	Green cob yield kg/ha	REY (kg/ha)	System Yield (Kg/ha)
T ₁ : Hand weeding (Twice)	4950	65333	26133	31216
T ₂ : One mechanical weeding + one hand weeding	4400	41833	16733	21133
T ₃ : Location specific green leaf manure incorporation	4337	81667	32667	37697
T ₄ : Reduced spacing (up to 25%) + mulching with previous crop residue + one hand weeding	4210	58667	23467	27344
T ₅ : Locally available weed mulch + One hand weeding	5183	88333	35333	40553
T ₆ : Incorporation of neem cake 15 days before planting @ 5 t/ha + one hand weeding	4283	83667	33467	37830
T ₇ : Soil solarization with polythene mulch during summer + One hand weeding	4193	80667	32267	36467
T ₈ : ITK treatment on weed control practiced by farmers (like mulching with leaf of mango/jack fruit etc.,)	4150	78333	31333	35493
CD (0.05)	438.6	NS	NS	-



General view of experiment at Maruteru

Kalyani

Effect of different organic weed management practices on yields of aromatic paddy, potato and okra showed definite influence on the economic yields of the crop. The grain yield of scented paddy (Gobindabhog) was found highest (2305 kg/ha) in T6 treatment (Incorporation of neem cake 15 days before sowing @ 5 t/ha + one hand weeding at 21 DAT) followed by T3 (Intercropping with green manuring crop) and T5 (Locally available weed mulch - water hyacinth + one hand pulling at 42 DAT) treatments. The lowest yield was obtained in treatment T7 (ITK treatment on weed control practiced by farmers as mulching with leaf of mango). The highest tuber yield of potato (10162 kg/ha) was also obtained in T5 treatment [Locally available weed mulch (water hyacinth/lantana etc.) + one hand pulling] followed by T1 treatment (Hand weeding – 25 & 45 DAP). However, the highest yield of okra (2510 kg/ha) was obtained in T6 (Incorporation of neem cake 15 days before sowing @ 5 t/ha + one hand weeding at 25 DAP). Yields to the tune of 2708 and 588 kg were obtained from coriander and greengram as intercrops in potato and okra, respectively from T3 treatment. Different treatments were found to have influenced SREY, however, T3 treatment recorded the highest SREY (4090.97+3393.50=7484.47 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 higher influence in achieving higher SREY over 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	
T ₁ : Hand weeding – 21 & 42 DAT, Rabi: Hand weeding – 25 & 45 DAP, Summer: Hand weeding – 25 & 45 DAS	2139	9580	1940	4918.42
T ₂ : 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	2083	8413	2030	4667.92
T ₃ : Intercropping with green manuring crop, Rabi: Intercropping with Coriander, Summer: Intercropping with greengram	2250	6831+2708	995+588	4783
T ₄ : 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 hand weeding at 45 DAP Summer: Stale seed bed + reduced spacing (up to 25%) + mulching with available CR one hand weeding at 45 DAS	2111	5914	1688	4053.62

Treatments	Yield kg/ha			System Rice equivalent yield (kg/ha)
	Rice (aromatic)	Potato	Okra	
T ₅ : Locally available weed mulch - water hyacinth + one hand pulling at 42 DAT Rabi: Locally available weed mulch (water hyacinth/lantana etc.)+ one hand pulling Summer: Locally available weed mulch (water hyacinth/lantana etc.) + one hand pulling	2222	10162	1625	4986.57
T ₆ : 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	2305	9288	2510	5273.70
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 water hyacinth/ lantana /banana leaves Summer: ITK treatment on weed control practiced by farmers as mulching with rice straw	2028	7914	2313	4630.567



Experimental view of Organic weed management at Kalyani

Rewa

Maximum rice yield 5626 kg/ha was noted under two hand weeding which was at par to stale seed bed + reduced spacing by 25 % + one HW and mulching by straw and T2 in which one Hoeing + 1 Hand weeding was given as weed control practices. Mulching alone with mango leave was found inferior among all the weed control practices. Garlic bulb yield 122.67 g/ha was maximum under the application of 5t/ha mustard oil cake + HW at 80 DAS followed by 10704 kg/ha in 2 HW at 40 and 80 DAS as weed control treatments. One Hoeing at 40 DAS and 1 HW at 80 DAS was also better than mulching and reduced spacing. The net profit Rs. 358550/ha and B:C ratio 2.76 was maximum under 2 HW followed by Rs. 334282 and B:C ratio 2.87 under one Hoeing and 1 HW as given in rice and garlic both.

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				
T1 Two hand weeding 25 and 50 DAT	5626	10704	25538	561850	358550	2.76
T2 Cono weeder 25 DAT + one HW at 50 DAT	5481	9541	23317	512982	334282	2.87
T3 Inter cropping with Dhaincha	4975 R 13310 GM	3657 G 1305 M	14364	316010	161687	2.04
T4 Stale seed bed + reduced spacing upto (25%) + mulching with wheat straw + one hand weeding	5568	6960	18777	413096	233196	2.29
T5 Locally available weed mulch + 1 hand pulling	4712	4147	12783	281244	101624	1.56
T6 Incorporation of mustard oil cake 15 days before sowing @ 5t/ha + 1HW	5051	12267	27972	615402	267276	1.76
T7 ITK treatment on weed control practices by farmers as mulching with leaf on mango	4373	5365	14600	321213	163100	1.94

Mustard crop as inter crop

Parbhani

Highest soybean equivalent yield of 6021 kg/ha and total GMR of sequence Rs. 204662/- obtained due to T4 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 T3 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

Treat-ments	Soybean	Chickpea	Yield Kg/ha		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
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	--

7.4 ON-FARM RESEARCH

7.4.1.1 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 predominant 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 (N0P0K0), 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	Patiala (Punjab), Udham singh nagar (Uttarakhand), East singh bhum (Jharkhand), Fatehpur (U.P.), Samba (J.K.), Fethabad (Haryana) Umara and Annupur (Madhy Pradesh)	176
Rice-Gram	Kanker (C.G.) and Keonjhar (Orissa)	36
Rice-Maize	Vizianagaram (A.P.)	24
Rice-Okra	Thane (Maharashtra)	24
Maize-Wheat	Dungarpur (Rajasthan), Bilashpur (H.P.)	48
Maize-Maize	Salem (Tamil Nadu)	12
Maize-Toria	Keonjhar (Orissa)	12
Pearmillet-Mustard	Dausa (R. J.)	24
Sorghum-wheat	Adiya (Gujarat)	24
Ground nut-Finger millet	Salem (Tamil Nadu)	12
Soybean-Wheat	Dharwad (Karnatka)	7
Soybean-Sorghum	Dharwad (Karnatka)	2
Soybean-Maize	Dharwad (Karnatka)	6
Total		455

Results: The centre-wise details of varieties, 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 comprising 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 148% to 223% and yield gap ranges from 3035 to 3445 kg ha⁻¹. Zinc application recorded good response at both centre and it helps in additional yield 3-10% over the RDF. It was found that in rice-rice system mean yield gap of -231 kg ha⁻¹ exists between farmers and recommended nutrient practice, as farmers applying higher dose of fertilizer than RDF, but they don't follow micro nutrient application. Additional yield of 1127 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 8 locations comprising of 8 NARP zones. Under these total 7 states covered which are Punjab, Uttarakhand, Jharkhand, Madhya Pradesh, Uttar Pradesh, Jammu Kashmir and Haryana.

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 (Annupur) in rice it was 16.6% and in case of wheat 12.6% at Patiala (Punjab) other centre also observed 3-16% 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 43 to 186% in case of rice and 23 to 309% in case of wheat. Highest yield gap 4396 kg ha⁻¹ in rice and 4758 kg ha⁻¹ in wheat were recorded at (East Singhbhum) of Jharkhand and highest percentage increase in yield 186 in case of rice and 309% in case of wheat were recorded at Umaria and Fatehabad centre respectively. In rice-wheat system, across the NARP zones, it was found that mean yield gap of 1843 kg ha⁻¹ exists between farmers and recommended nutrient practice. Additional yield of 708 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 36 trials were conducted in 2 NARP zones Chhattisgarh plain zone (Kanker) of Chhattisgarh and North Central Plateau of Kendujhar Orissa. At kanker it was found that significantly higher additional yield of 831 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 227 kg ha⁻¹ due to application of 20:50:20: Kg NPK ha⁻¹. Application of zinc as micronutrient in rice gave 3.3 per cent additional yield in rice and 5.5% in case of Gram than recommended NPK. At Kendujhar it was found that significantly higher additional yield of 672 kg ha⁻¹ can be obtained from rice through application of 60:30:30 Kg NPK + 25 kg zinc ha⁻¹. Application of zinc as micronutrient in rice gave 19.7 per cent additional yield than recommended NPK.

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 1826 kg ha⁻¹ and 227 kg ha⁻¹ over the control and farmer practice respectively which were 58 and 4% 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 3705 kg ha⁻¹ and 500 kg ha⁻¹ over the control and farmer practice respectively which were 132 and 8% higher over the control and farmer practice respectively.

Maize-Okra: A total 24 trials were conducted in 1 NARP zones. In North Konkan Coastal Zone (Thane) of Maharashtra, yield difference of system between farmers and recommended NPK practices were found to be 845 kg ha⁻¹ and 1378 kg ha⁻¹ in maize and okra.

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 191 and 214 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 59 and 56% 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 90 and 204 kg ha⁻¹ which was 6.7 and 5.9% higher than NPK alone. It was observed that farmer's practices of nutrient management resulted in lower yield (752 and 1219 kg ha⁻¹) of maize and wheat compared to application of recommended quantity of NPK and NPK+ Mn.

Maize-Maize: A total 12 trials were conducted in 1 NARP zones. In (Salem) of Tamil Nadu, yield difference of system between farmers and recommended NPK practices were found to be 253 kg ha⁻¹ and 469 kg ha⁻¹ in Kharif and Rabi season of maize.

Maize-Toria: A total 12 trials were conducted in (keonjhar) of Orissa, yield difference between farmers and recommended NPK practices were found to be 1373 kg ha⁻¹ in Maize and 334 kg ha⁻¹ in Toria. Which can be further increased up to 1650 kg ha⁻¹ in Maize and 380 kg ha⁻¹ in Toria with application of micronutrients.

Soybean-maize: A total 6 trials were conducted in Northern Transitional Zone (Dharwad) of Karnataka, It was observed that farmer's practices of nutrient management resulted in lower yield (161 and 609 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 150 kg ha⁻¹ in soybean and 253 kg ha⁻¹ in maize.

Soybean-gram: A total 7 trials were conducted in Northern Transitional Zone (Dharwad) of Karnataka, It was observed that there was huge yield gap between farmer's practices and recommended nutrient application and which gave (additional yield of 554 and 515 kg ha⁻¹) in soybean and Bengal gram respectively as compared to farmer practices. Which were 41.8 and 45.2% higher yield than farmer practices in soybean Bengal gram respectively.

Soybean-jawar: A total 2 trials were conducted in Northern Transitional Zone (Dharwad) of Karnataka, It was observed that there was huge yield gap between farmer's practices and recommended nutrient application and which gave (additional yield of 324 and 420 kg ha⁻¹) in soybean and jawar respectively as compared to farmer practices. Which were 22.4 and 36.2% 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 huge improvement in yield was recorded with the application of RDF over the farmer practice in pear millet (26%) and mustard (32%) further application of micronutrient enhance the yield up to (35%) and (42%) respectively. It indicated the importance of balance application of nutrients in the field.

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 huge improvement in yield was recorded with the application of RDF over the farmer practice in Sorghum (17%) and wheat (21%) further application of micronutrient enhance the yield up to (24%) and (34%) respectively.

Groundnut-Finger millet: In case of Groundnut-Finger millet system at Salem (Tamil Nadu) a total 12 trials were conducted huge improvement in yield was recorded with the application of RDF over the farmer practice in Groundnut (6%) and Finger millet (13%) further application of micronutrient enhance the yield up to (18%) and (22%) respectively.

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

- On-farm nutrient response trials (455 no's) conducted in various NARP zones indicated, across the locations and systems, nutrient application gap of 17, 31, 58 and 98 % 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 32, 23, 19 and 42 kg (grain yield /kg of N) from 8, 10, 8, 16 (grain yield /kg of N) in rice-rice, rice-wheat, maize-wheat, and rice-gram 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 11, 4.0 and 7.0 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 1843, 2124 and 1177 in rice- wheat, maize-wheat and rice-gram which can enhanced up to 2552, 2530 and 1596 kg ha⁻¹ with application of micronutrients.
- At few center like Patiala (Punjab) in rice-wheat and Vellyani (Kerala) in rice-rice 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 7.2.1. 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) Kharif	Rabi	Summer	Livestock /house- hold (including fisheries if any)	Product diversifi- cation	Crop (s)/Cropping system (s) Kharif	Rabi	Summer	Livestock / household (including fisher- ies)	Product diversi- fication	Capacity building
Western Himalaya														
Udam singh Nagar (Uttarakhand)/ UK-1/Hill Zone / Semi-arid to humid /55 rainy days /1428 mm rain	Field crops + dairy	0.40	10	Rice	Wheat/ sugarcane	-	Cow (1-2)	-	Rice	Wheat/ sugar- cane	-	Cow (1-2)	-	-
Eastern Himalaya														
Goalpara (Assam) / Central Brahmapu- tra Valley Zone / Per humid to humid /63 rainy days/ 1687 mm rain	Field crop + dairy (2) + pig (2) + poultry(9)	0.79	7	Rice/Arecanut	Banana/ Bamboo /Rabi Vegeta- bles	-	Cow (2)+ Pig (2) + Poultry(9)	-	Rice/ Arecanut	Toria/ Rabi Veg- etables	-	Cow (2) + goat (2)+ Pig (2) + Poultry(8-9)	Arecu- nut fruit of Winter Rice & Mak- ing of supari from raw Arecanut.	Scientific Cultivation of Winter Rice & Mak- ing of supari from raw Arecanut.
	Field crop + dairy(2) + poultry (11- 12)	0.81	5	Rice/Arecanut	Sesamum/ Rabi Vegeta- bles	-	Cow (2) + poultry (11- 12)	-	Rice/ Arecanut	Toria/ Rabi Veg- etables	-	Cow (2) + poul- try (11-12)	-do-	- do-
	Field crop + poultry + fish- ery + piggy	0.90	4	Rice/Arecanut	Banana/ Rabi - Vegetables	-	Cow (1) + pig(1)+poultry (9)+Fishery	-	Rice/Areca- nut	Banana/ Rabi Veg- etables	-	Cow (1) + pig (1)+poultry (7)+ fishery	-do-	- do-
	Field crop + goat (2-3) + poultry (16)	0.73	4	Rice/Arecanut	Banana/ Rabi - Vegetables	-	Cow (2) + goat (2- 3)+ poultry (16)	-	Rice/Areca- nut	Banana/ Rabi Veg- etables	-	Cow (2) + goat (2-3)+ poultry (16)	-do-	- do-
	Field crop + piggy (1-2) + poultry (12)	0.53	4	Rice/Arecanut	Bamboo	-	Pig (1-2)+ Poultry (12)	-	Rice/ Arecanut	Toria	-	Pig (1-2)+ Poul- try (12)	-do-	- do-
Upper Gangetic plains														
Fatehpur (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/cauliflow- er/sesame	Wheat/to- mato/gram/ pea/potato	Green Gram	Cow (0-1) + Buffalo (1-2)	-	Rice/Pearl Millet/Arhar/ cauliflower/ sorghum/ sasamum	Wheat/ tomato/ 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)		Livestock /house- hold (including fisheries if any)	Product diversifi- cation	Crop (s)/Cropping system (s)			Livestock / household (including fisher- ies)	Product diversi- fication	Capacity building
				Kharif	Rabi			Summer	Kharif	Rabi			
Eastern Plateau and Hills													
Kanker (Chhattis- garh)/ Chattisgarh Plain Zone / Moist sub-humid to dry mm rain	Field crop + dairy (2)+ fish + piggy (2-3) + poultry (16)	0.93	5	Rice / Ather maize/brinjal	Rice/gram/ - 								

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 /house- hold (including fisheries if any)	Product diversifi- cation	Crop (s)/Cropping system (s)	Livestock / household (including fisher- ies)	Product diversi- fication	Capacity building		
Umaria	Field crops + dairy (2-3)	1.22	24	Rice	Wheat	-	Cow (1-2) and Buffalo (1-2)	-	-	-	-	
Western Plateau and Hills												
Hingoli(Mahar- ashtra)/ Central Vidarbha Zone / Semi-arid / 45 rainy days / 886 mm rain	Field crops + dairy (1-2)	0.86	7	Soyabean/ cotton/pigeon pea / turmeric / greengram	Wheat/chick- pea/sorghum	-	Buffalo (1-2)	Cotton/sug- arcane/soya- bean.napier/ blackgram / greengram / turmeric	Chickpea - / sor- ghum	Buffalo (2)	-	Dry spelt streets- mange- ment and integrated pest maneg- ment& pink bolwarm- management
	Field crops + goat(6-7)	0.86	9	Soyabean/ cotton/pigeon pea / turmeric / maize/ green- gram	Wheat/chick- pea/sorghum	-	Goat (6-7)	Soyabean/ cotton/ pigeon pea / turmeric / maize/ Napier greengram / blackgram	Wheat/ chick- pea/sor- ghum/ Napier	Goat (6-7)	-do-	-do-
	Field crop + horticulture	0.83	4	Soyabean/ turmeric	Wheat / sorghum	-	Cow (1) + poultry (4-5)	Soyabean/ turmeric / chilli / Lime orchids	Chickpea - / sor- ghum / vegetable	-	-do-	-do-
	Field crop + sericulture	0.65	4	Soyabean/ cot- ton / turmeric	Chickpea / sorghum	-	Goat (4-5)	Cotton / mulberry / greengram / sorghum/ Napier / maize fodder	Wheat / sorghum /Cauli- flower / lucern	-	-do-	-do-
Satara (Mahar- ashtra)/ Western Maharashtra Plain Zone Ganeshkhind/ Semi-arid to dry sub-humid / 35 rainy days/ 561 mm rain	Field crops + dairy (5-6)	0.55	4	Pearl millet / cotton / maize / onion	Wheat/onion Sorghum / ground- nut	-	Cow (5-6) + poultry (2-3)	Pearl millet / greengram / maize / onion	Wheat/ onion / sorghum / chick- pea	Cow (3) + goat (1-2)	Milk pro- cessing	-

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 /house- hold (including fisheries if any)		Crop (s)/Cropping system (s)		Livestock / household (including fisher- ies)	
				Kharif	Rabi	Summer		Kharif	Rabi	Summer	Product diversi- fication
	Field crop + dairy (3-4)+ goat (1-2)	0.63	7	Pearl millet / sorghum / maize / onion / moth	Wheat/on- ion/ chickpea ground- nut	Sor- ghum / goat (1-2)	Cow (3-4) + buffalo (0-1)	Pearl millet / sorghum / maize / onion / moth bean / greengram	Wheat/ onion/ chickpea /sor- ghum	Brinjal / ground- nut + goat (2)	Milk pro- cessing
	Field crop + dairy (3-4)+ goat (2-3) + poultry (9-10)	0.70	6	Pearl millet / sorghum / maize / onion	Wheat/on- ion/ chickpea ground- nut	Sor- ghum / goat (2-3) + poul- try (9-10)	Cow (3-4) + buffalo (0-1)	Pearl millet / sorghum / maize / onion / greengram	Wheat/ onion/ chickpea /sor- ghum	Brinjal / ground- nut + goat (3) + poultry (7-8)	Milk pro- cessing
	Field crop + dairy (4-5) + poultry (5)	0.84	7	Pearl millet / maize / onion	Wheat/on- ion/ chickpea ground- nut	Sor- ghum / goat (4-5) + buffalo (0-1)	Cow (4-5) + buffalo (0-1)	Pearl millet / maize / onion / greengram	Wheat/ onion/ chickpea /sor- ghum	Brinjal / ground- nut + goat (1-2) + poultry (7)	Milk pro- cessing
Southern Plateau and Hills											
Yethpur(Tamil- Nadu)/ 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	Coco- nut / Tapioca / tur- meric	Cow (4) + goat (5-6)	Rice/ Tapio- ca /cotton/ maize/ sorghum / Coconut	Maize / ground- nut / sor- ghum/ Chrysan- themum /gingelly	Cow (3-4) + buffalo (1-2) + goat (3-4)	Kitchen garden Technology & balance nutrition
	Field crop + dairy (2-3) + goat/sheep (7) + poultry (14-15)	0.86	12	Rice/Tapio- ca /maize/ sorghum / sug- arcane / ragi / green gram / kh. vegetable	Sugarcane / maize / sesa- me /Tapioca / sorghum/ rabi vege- table	Coco- nut / Tapioca	Cow (2-3) + goat (7) + poultry (14-15)	Rice/Currey leaf/ suga- r cane/ /Chry- santhemum/ sorghum / lab lab/ Coconut / Finger millet / tomato / cotton / groundnut	Finger millet / ground- nut / sor- ghum/ maize / gingelly	Cow (3-4) + goat (7-8) + poultry (11-12)	Oil seeds production Technology & balance nutrition
	Field crop + dairy (2-3)+ poultry (8-9)	0.83	6	Maize Tapioca / cotton/maize/ Ridgegourd / chickpea / beans	Tapioca / sorghum/ sesame	Coco- nut	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)	Oil seeds production Technology & balance nutrition

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 Kharif	Rabi	Summer	Livestock /house- hold (including fisheries if any)	Product diversifi- cation	Crop (s)/Cropping Kharif	Rabi	Summer	Livestock / household (including fisher- ies)	Product diversi- fication	Capacity building	
East Coast Plains and Hills															
Bhavanis- agar(TamilNadu) / TN-3 /Western Zone / Semi-ar- id / 36 rainy days/ 775 mm rain	Field crop + dairy (4)+ poultry (14)	0.92	12	Rice / turmeric / Sugarcane / maize/Coconut	Sugarcane / banana/ rice		Cow (2-3) + buffalo (2) + poultry (14)		Sugarcane / maize / fod- der grass	Rice / banana /gingi- nally/F. sorghum	Water millon / maize / cotton (11-12)	Cow (2-3) + buf- falo (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 / turmeric / topioca/Co- conut	Maize / ba- nana/ rice		Cow (2-3) + buffalo (2) + goat (4-5) + poultry (9-10)		Sugarcane / F. sorghum	Rice / maize / gingelly / Ground- nut / F. sorghum	Cotton /F. sor- ghum	Cow (2-3) + buf- falo (2) + goat (8-9) + poultry (10)		do	
West Coast Plains and Ghats															
Vallayani (Kerala)/ KE-2 / Southern Zone/ Dry sub-hu- mid & per humid./ 84 rainy days /1538 mm rain	Field Crop + horticulture + dairy (1-2)	0.49	8	Rice / coconut	Rice	-	Cow (1-2)	-	Rice / coco- nut	Banana / rice	-	Cow (1-2)	Kitchen - gar- dening, Pisicul- ture	-	
	Horticulture + dairy (2-3)	0.35	4	Coconut	-	-	Cow (2-3)		Coconut	Banana	-	Cow (2-3)	Kitchen - gar- dening, Pisicul- ture	-	
	Horticulture + poultry (26-27)	0.34	12	Coconut	-	-	Poultry (26-27)	-	Coconut	Banana	-	Cow (Poultry (56-57)	-do-	-	
Gujarat Plains and Hills															
Adiya (Gujarat)/ GJ-4/ North Gujarat Zone / Arid to semi-arid / 15 rainy days / 972 mm rain	Field crops + dairy (3-4)	0.90	24	Cotton/Clus- terbean/ Guar/ blackgram / greengram/ Castor/ fodder sorghum	Wheat/mus- tard/lucerne/ Cumin	Pearlm- illet / fodder sor- ghum	Cow (0-1) + Buffalo (3)	Ghee making	Cotton/ Cluster- bean/ Guar/ blackgram / greengram/ Castor/ fod- der sorghum	Wheat/ mustard/ lucerne/ Cumin/ Fennel	fodder sor- ghum	Cow (0-1) + Buffalo (3)	-	Production technology of oilseed crops and livestock manage- ment	

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 63 % 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

Farming System	Notation	Module name	Details
	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 1.87 ha in various farming systems. During 2017-18, study involved 312 households with mean holding size of 0.85 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 2019-20, 12 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.

Western Himalayan

Udham Singh Nagar (Uttarkhand): Two farming systems viz; field crops + dairy, field crops were found, and both the farming systems were found dominant. Diversification of existing systems resulted in significantly higher return in both the system but not profit in case Field crop+ Dairy system because of increase in cost of cultivation in Dairy with diversification.

Eastern Himalaya

Goalpara (Assam): Five farming systems viz; field crops + poultry + fishery + piggery, field crop + goat + poultry, field crop + poultry + piggery, field crop + dairy + poultry + piggery and field crop + dairy + poultry were found among which field, crops + dairy + poultry + piggery was found dominant based on number of households (29 %) adopting the system. Diversification of cropping

and livestock components resulted in significant improvement in profit from field crop + poultry + piggery and field crop + dairy + poultry + piggery farming systems. Among the systems, higher profit was obtained from field crops + poultry + fishery + piggery (Rs 2,15,750 from 0.89 ha).

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. Diversification of existing systems resulted in significantly higher return in both the system but not profit because of increase in cost of cultivation or home consumption.

Eastern plateau and hills

Kanker (Chhattisgarh): Four farming systems namely field crops + dairy + fishery + piggery, field crop + goat + poultry, field crop + poultry and field crop + dairy + goat + piggery were found among which field crops + poultry system was practiced pre-dominantly by 45 % of households having mean area of 0.94 ha. In all the farming systems, significant improvement in production, marketable surplus and return was observed due to diversification. Highest profit resulted by diversification in Field crop+ Poultry (Rs 46,586 from 0.94 ha).

Keonjhar (Odisha): Three farming systems namely field crop + horticulture + poultry +goat, field crop + horticulture + poultry and field crop + dairy + horticulture + poultry + goat were found among which 58% households were having field crops + horticulture + poultry + goat with mean area 0.75 ha. Diversification resulted in higher production, marketable surplus, return and profit in all the farming systems. Among the systems, higher profit was observed in of field crops + dairy + horticulture + poultry + goat system after diversification (Rs 55,507 from 0.75 ha).

Annupur (Madhy Pradesh): Two farming systems namely field crop + dairy + poultry and field crops + dairy was found with mean area of 0.92 and 0.86 ha respectively and both the systems were found dominant. Diversification made in field crop + dairy resulted in significant improvement in profit (Rs 23,934 from 0.90 ha) due to diversification.

Central plateau and hill region

Umaria (Madhya Pradesh): Field crops + dairy farming systems were practiced by all the study households with mean area of 1.22 ha. Diversification resulted in higher production, marketable surplus, return and profit. Trough diversification increase in profit in Field crop+ dairy (Rs 51,920 from 1.22 ha) was recorded at the centre.

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 field crop + dairy and field crops + goatry farming systems after diversification. Only Field crop + sericulture not performed well after diversification and reduction in returns observed. Among the farming systems, field crops + goatry resulted in higher profit of Rs 4,26,807 from 0.86 ha after the interventions.

Satara (Maharashtra): Four farming systems namely field crop + dairy + goat, field crop + dairy + goat + poultry, field crop + dairy + poultry and field crop + dairy was found among which field crop + dairy + horticulture and field crop + bullock was practiced by 29 % households each. Among

the systems, higher profit was observed in of field crops + dairy system after diversification (Rs 1,10,248 from 0.55 ha).

Southern Plateau and hills

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 + poultry recorded higher profit of Rs 19,74,265 from 1.87 ha after diversification.

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 + goat resulted in significant improvement in profit (Rs 47,175 from 0.90 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 of field crop + dairy + horticulture and horticulture + dairy systems. Among the systems, Field crop + horticulture + dairy farming system recorded higher profit of Rs 1,85,928 from 0.49 ha due to multistoried cropping.

Gujarat plains and hills

Patan (Gujarat): Field crops + dairy farming systems were practiced by all the study households with mean area of 0.90 ha. Although improvement in production was observed due to diversification, but it could not result in improvement in profit probably due to increase in cost of cultivation.

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 Goalpara (Assam) followed by 4 systems in Kanker (Chhattisgarh), Hingoli, Satara and Nagpur (Maharashtra). Existence of single farming systems was observed in Umari (Madhya Pradesh) and Adiya (Gujarat).
- Field crops + dairy was found to be the common farming system at all locations in marginal households and it is the dominant system (32 % of households) practiced in 7 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 46 % households whose mean profit was found to be Rs 84,954 from 0.82 ha in the benchmark. Due to the diversification interventions in cropping systems, livestock, and capacity building in the third year, profit could be enhanced to Rs 99050 from 0.82 ha which is 116 % higher 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 7.4.2.2 Production (on equivalent basis of base crop), marketable surplus and economics of existing and improved farming systems in marginal households (For 2019-20)

Farming System	Area (ha)	No. of Households	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved							
			Producible (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Production (kg)	Marketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)		
Udham Singh Nagar																		
FC	0.40	14	4524 (842)	3648 (789)	36142 (2883)	31723 (10936)	18586 (10121)	4955 (235)	3941 (245)	36034 (2066)	38286 (2601)	23082 (3113)	<0.001***	0.035**	0.391	0.020**	0.173	
FC+D	0.40	10	7122 (996)	6231 (934)	49153 (3441)	57672 (12940)	44309 (11976)	9913 (278)	7764 (290)	91012 (2445)	57678 (3077)	25454 (3683)	0.084*	0.106	0.002***	0.106	0.625	
Overall FS																		
CD [P = 0.05] FS1 vs FS2	2704	2536	9263	35137	32518	755	786	6639	8356	10000				0.055*	0.209	0.003***	0.643	0.513
Goalpara																		
FC+F+PI+Po	0.895	4	2129 (419)	2071 (419)	22624 (4359)	2926 (3053)	2226 (3322)	22008 (1798)	19541 (1528)	16513 (1408)	247583 (21322)	217976 (18066)	0.125	0.125	0.250	0.125	0.125	
FC+G+Po	0.73	4	1953 (419)	1837 (419)	28109 (4359)	-4669 (3053)	-6069 (3322)	6765 (1798)	5926 (1528)	18250 (1408)	62931 (21322)	52864 (18066)	0.125	0.125	0.125	0.125	0.125	
FC+P+Po	0.77	4	1725 (419)	1725 (419)	12063 (4359)	8638 (3053)	8638 (3322)	22049 (1798)	16386 (1528)	13688 (1408)	250903 (21322)	182940 (18066)	0.125	0.125	0.125	0.125	0.125	
FC+D+PI+Po	0.79	7	2490 (317)	2414 (317)	27171 (3295)	2709 (2308)	1795 (2511)	16844 (1359)	12935 (1155)	17714 (1064)	184410 (16118)	137506 (13656)	0.016**	0.016**	0.016**	0.016**	0.016**	
FC+D+Po	0.81	5	2436 (375)	2363 (375)	32050 (3899)	-2818 (2731)	-3698 (2971)	2863 (1608)	2796 (1367)	13900 (1259)	20457 (19071)	19648 (16158)	0.063*	0.063*	0.063*	0.063*	0.063*	
Overall FS																		
CD [P = 0.05] FS1 vs FS2	1241	1241	12902	9037	9832	5322	4523	4167	63113	53474			<0.001***	<0.001***	<0.001***	<0.001***	<0.001***	
CD [P = 0.05] FS1 vs FS3	1241	1241	12902	9037	9832	5322	4523	4167	63113	53474								
CD [P = 0.05] FS1 vs FS4	1100	1100	11436	8011	8715	4718	4009	3693	55944	47400								
CD [P = 0.05] FS1 vs FS5	1178	1177	12240	8574	9327	5049	4291	3953	59874	50730								
CD [P = 0.05] FS2 vs FS3	1241	1241	12902	9037	9832	5322	4523	4167	63113	53474								
CD [P = 0.05] FS2 vs FS4	1100	1100	11436	8011	8715	4718	4009	3693	55944	47400								
CD [P = 0.05] FS2 vs FS5	1178	1177	12240	8574	9327	5049	4291	3953	59874	50730								
CD [P = 0.05] FS3 vs FS4	1100	1100	11436	8011	8715	4718	4009	3693	55944	47400								
CD [P = 0.05] FS3 vs FS5	1178	1177	12240	8574	9327	5049	4291	3953	59874	50730								
CD [P = 0.05] FS3 vs FS4	1100	1100	11436	8011	8715	4718	4009	3693	55944	47400								

Farming System	Area (ha)	No. of Households	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] FS3 vs FS5			1178	1177	12240	8574	9327	5049	4291	3953	59874	50730							
CD [P = 0.05] FS4 vs FS5			1028	1028	10684	7484	8142	4407	3745	3450	52262	44281							
Fatthapur																			
FC+D	0.72	12	11787 (1166)	9460 (1086)	53270 (4657)	88168 (10588)	60244 (9596)			13123 (1025)	9661 (980)	68186 (4726)	89285 (8318)	47742 (7958)	0.339	0.733	0.034**	0.791	0.569
FC +D+H	0.65	12	13409 (1166)	11126 (1086)	66050 (4657)	94863 (10588)	67462 (9596)			14159 (980)	10166 (980)	73315 (4726)	96598 (8318)	48676 (7958)	0.569	0.850	0.233	0.970	0.151
Overall FS															0.365	0.724	0.031**	0.880	0.074*
CD [P = 0.05] FS1 vs FS2			3420	3185	13659	31055	28143	3007	2875	13861	24397	23341							
Kanker (Chhattisgarh)																			
FC+D+F+Pi	0.93	5	10830 (1479)	9649 (1483)	74837 (7469)	55127 (11800)	40947 (12862)			22419 (3938)	10669 (2103)	48496 (6663)	220534 (41167)	79535 (19329)	0.063*	1.000	0.063*	0.063*	0.188
FC+G+Po	0.89	4	8598 (1654)	6626 (1658)	52331 (8351)	50843 (13193)	27185 (14381)			15117 (4403)	6216 (2351)	31284 (7449)	150121 (46026)	43314 (21611)	0.250	0.875	0.250	0.125	0.375
FC +Po	0.94	11	5700 (997)	4160 (1000)	43613 (5036)	24791 (7956)	6303 (8672)			11927 (2655)	6949 (1418)	30494 (4492)	112633 (27754)	52889 (13032)	0.003***	0.004***	0.014**	0.001***	0.001***
FC+D +G+ Pi	0.97	4	11728 (1654)	10222 (1658)	60196 (8351)	80537 (13193)	62471 (14381)			21635 (4403)	10419 (2351)	37215 (7449)	222407 (46026)	87809 (21611)	0.125	1.000	0.125	0.125	0.375
Overall FS															<0.001***	0.083*	<0.001***	<0.001***	<0.001***
CD [P = 0.05] FS1 vs FS2			4628	4640	23370	36923	40246	12321	6580	20848	128808	60481							
CD [P = 0.05] FS1 vs FS3			3721	3731	18790	29687	32359	9907	5290	16762	103565	48628							
CD [P = 0.05] FS1 vs FS4			4628	4640	23370	36923	40246	12321	6580	20848	128808	60481							
CD [P = 0.05] FS2 vs FS3			4028	4039	20341	32137	35030	10724	5727	18146	112113	52642							
CD [P = 0.05] FS2 vs FS4			4879	4891	24634	38920	42423	12988	6936	21975	135775	63752							
CD [P = 0.05] FS3 vs FS4			4028	4039	20341	32137	35030	10724	5727	18146	112113	52642							
Kendujhar (Odisha)																			
FC+H+Po	0.77	16	5598 (826)	4136 (892)	33221 (4415)	39559 (6796)	20548 (7896)			12871 (867)	9214 (744)	50490 (3682)	116837 (8125)	69287 (6757)	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***

Farming System	Area (ha)	No. of House-holds	Existing System				Improved (Diversified System)				P value Significance - Existing vs Improved			
			Produc- tion (kg)	Mar- ketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Produc- tion (kg)	Mar- ketable Surplus (kg)	Cost (Rs)	Return (Rs)	Profit (Rs)	Cost (Rs)	Return (Rs)
FC+H+Po+G	0.73	3	6019 (1907)	4888 (2059)	31278 (10196)	46965 (15696)	32264 (18235)	12712 (2003)	8150 (1719)	50731 (8503)	114529 (18763)	55221 (15605)	0.250	0.250
FC + H + Po + G + D	0.75	5	8689 (1477)	4833 (1595)	57818 (7897)	55137 (12158)	5013 (14125)	13703 (1551)	9554 (1331)	63676 (6587)	114458 (14534)	60520 (12088)	0.125	0.125
P value Significance - Existing vs Improved														
Overall FS														
CD [P = 0.05] FS1 vs FS2	4322	4666	23105	35570	41325	4539	3895	19271	42521	35365			<0.001***	<0.001***
CD [P = 0.05] FS1 vs FS3	3520	3800	18816	28966	33653	3696	3172	15693	34626	28799				
CD [P = 0.05] FS2 vs FS3	5017	5416	26820	41288	47968	5269	4521	22369	49356	41050				
Hingoli														
FC+Se	0.65	4	21898 (5256)	2887 (3263)	27009 (8102)	367151 (91051)	24949 (52290)	9059 (3416)	8907 (3403)	42582 (7420)	120473 (58993)	117750 (58719)	0.375	0.375
FC+H	0.82	4	2963 (5256)	2786 (3263)	31809 (8102)	21524 (91051)	18342 (52290)	23382 (3416)	23333 (3403)	36348 (7420)	384532 (58993)	383648 (58719)	0.125	0.125
FC+G	0.86	9	4378 (3504)	3997 (2175)	41977 (5401)	36822 (60701)	29973 (34860)	29434 (2277)	28222 (2268)	51218 (4946)	478594 (39329)	456780 (39146)	0.004***	0.004***
FC+D	0.86	7	13659 (3973)	12457 (2466)	57996 (6124)	187863. (68828)	166232 (39527)	29768 (2582)	28503 (2572)	59676 (5609)	476143 (44594)	453378 (44388)	0.031**	0.016**
P value Significance - Existing vs Improved														
Overall FS														
CD [P = 0.05] FS1 vs FS2	15506	9624	23900	268601	154255	10078	10038	21888	174029	173222			<0.001***	<0.001***
CD [P = 0.05] FS1 vs FS3	13178	8179	20311	228267	131091	8565	8530	18601	147896	147211				
CD [P = 0.05] FS1 vs FS4	13745	8531	21185	238090	136732	8933	8898	19402	154260	153545				
CD [P = 0.05] FS2 vs FS3	13178	8179	20311	228267	131091	8565	8530	18601	147896	147211				
CD [P = 0.05] FS2 vs FS4	13745	8531	21185	238090	136732	8933	8898	19402	154260	153545				
CD [P = 0.05] FS3 vs FS4	11051	6859	17033	191431	109937	7182	7154	15599	124030	123455				
Satara														
FC+D+G	0.63	7	12483 (2927)	10679 (2940)	130169 (16562)	94519 (54845)	62057 (55518)	12043 (1084)	10343 (1013)	83724 (10356)	133056 (15831)	102451 (12775)	0.813	0.578
FC+D+G+P	0.69	6	14458 (3161)	12262 (3176)	165138 (17890)	95102 (59239)	55575 (59966)	13874 (1171)	11635 (1094)	97449 (11186)	152274 (17099)	111980 (13799)	0.844	0.313

Farming System	Area (ha)	No. of Households	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+P	0.84	7	19521 (2927)	18131 (2940)	138320 (16562)	213056 (54845)	188032 (55518)	12731 (1084)	11064 (1013)	105218 (10356)	123935 (15831)	93939 (12775)	0.297	0.297	0.109	0.578	0.469
FC+D	0.55	4	7625 (3872)	6500 (3890)	121315 (21910)	15941 (72553)	-4324 (73444)	12153 (1434)	10586 (1340)	84633 (13700)	134130 (20942)	105924 (16900)	0.125	0.125	0.625	0.125	0.125
Overall FS																	
CD [P = 0.05] FS1 vs FS2	8987	9029	50854	168398	170466	3328	3111	31799	48607	39226			0.399	0.357	<0.001***	0.565	0.613
CD [P = 0.05] FS1 vs FS3	8634	8674	48859	161792	163778	3198	2989	30552	46700	37687							
CD [P = 0.05] FS1 vs FS4	10124	10172	57293	189718	192047	3750	3505	35825	54761	44192							
CD [P = 0.05] FS2 vs FS3	8987	9029	50854	168398	170466	3328	3111	31799	48607	39226							
CD [P = 0.05] FS2 vs FS4	10427	10475	59003	195382	197781	3862	3609	36895	56396	45511							
CD [P = 0.05] FS3 vs FS4	10124	10172	57293	189718	192047	3750	3505	35825	54761	44192							
Umaria																	
FC+D	1.22	24	5804 (438)	4207 (380)	42492 (2068)	44565 (5093)	20607 (4199)	9678 (440)	7688 (411)	42793 (2317)	102377 (4633)	72527 (4037)	-	-	-	-	-
Overall FS																	
P value Significance - Existing vs Improved																	
Salem																	
FC+D+G+Po	1.60	3	12680 (17796)	12298 (17788)	85265 (26810)	104932 (247135)	99212 (247047)	16766 (100818)	14989 (94633)	106022 (32326)	145468 (1502857)	118819 (1409999)	0.250	0.250	0.250	0.500	0.250
FC+D+G	1.80	5	14965 (13785)	14517 (13779)	102514 (20767)	121967 (191430)	115245 (191362)	10971 (78094)	7328 (73303)	82804 (25040)	81758 (1164108)	27109 (1092181)	0.813	0.125	0.188	0.813	0.313
FC+D+Po	1.87	6	13026 (12584)	12584 (12578)	79958 (18958)	115434 (174751)	108801 (174688)	157146 (71289)	145034 (66916)	92443 (22858)	2264749 (1062680)	2083066 (997020)	0.063*	0.156	0.219	0.094*	0.219
FC + D + G + S + Po	1.48	10	25913 (9747)	25650 (9743)	87745 (14685)	300953 (135361)	297004 (135313)	34794 (55220)	30736 (51833)	169238 (17706)	352679 (823149)	291805 (772288)	0.106	0.131	0.004***	0.131	0.131
Overall FS																	
P value Significance - Existing vs Improved																	
CD [P = 0.05] FS1 vs FS2	46955	46936	70740	652080	651847	266015	249696	85294	3965376	3720366			0.272	0.310	0.005***	0.300	0.344
CD [P = 0.05] FS1 vs FS3	45464	45445	68494	631373	631148	257568	241767	82585	3839459	3602228							
CD [P = 0.05] FS1 vs FS4	42325	42307	63764	587777	587567	239783	225073	76883	3574341	3353492							
CD [P = 0.05] FS2 vs FS3	38933	38917	58655	540676	540483	220568	207037	70722	3287916	3084764							
CD [P = 0.05] FS2 vs FS4	35216	35202	53055	489060	488885	199511	187272	63970	2974032	2790274							

Farming System	Area (ha)	No. of Households	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] FS3 vs FS4																	
Erode																	
FC+D+P	0.92	12	18646 (3890)	17918 (3813)	93149 (13156)	242485 (63099)	229368 (61741)	20874 (2002)	19151 (2007)	162665 (10506)	213067 (31519)	182049 (31867)	0.622	0.791	0.001***	0.850	0.733
FC +D+P+G/Sh	0.90	12	19893 (3890)	19201 (3813)	124488 (13156)	233581 (63099)	221133 (61741)	24884 (2002)	22575 (2007)	138045 (10506)	309859 (31519)	268308 (31867)	0.233	0.569	0.677	0.266	0.622
Overall FS																	
P value Significance - Existing vs Improved																	
CD [P = 0.05] FS1 vs FS2	11409	11184	38585	185062	181079	5870	5885	30812	92442	93464							
Vellayani																	
FC+D+H	0.49	8	20404 (5012)	19573 (5051)	108224 (9580)	197834 (67028)	185370 (67705)	51680 (8033)	48775 (7960)	360326 (27922)	414881 (102614)	371298 (101864)	0.008***	0.008***	0.008***	0.008***	0.008***
H+Po	0.34	12	8838 (4092)	9143 (4124)	50789 (7822)	81788 (54728)	86355 (55281)	28762 (6559)	22138 (6499)	205776 (22798)	225648 (83784)	126296 (83172)	<0.001***	<0.001***	<0.001***	<0.001***	0.077*
H+D	0.35	4	32024 (7088)	31131 (7143)	118670 (13548)	361687 (94792)	348288 (95749)	60780 (11361)	58209 (11257)	369143 (39487)	542564 (145117)	503987 (144057)	0.125	0.125	0.125	0.125	0.125
Overall FS																	
P VALUE SIGNIFICANCE - EXISTING VS IMPROVED																	
CD [P = 0.05] FS1 vs FS2	13456	13561	25720	179954	181772	21568	21371	74964	275494	273481							
CD [P = 0.05] FS1 vs FS3	18053	18194	34507	241434	243873	28937	28672	100574	369614	366914							
CD [P = 0.05] FS2 vs FS3	17020	17153	32533	227626	229926	27282	27032	94822	348475	345930							
Patan																	
FC+D	0.90	24	32562 (7882)	30584 (7823)	168818 (16439)	319614 (103754)	289940 (102863)	33490 (3518)	29896 (3442)	237377 (26774)	264974 (28678)	8560 (377)	-	-	-	-	-
Overall FS																	
P value Significance - Existing vs Improved																	
Annupur																	
FC+D	0.86	19	4768 (342)	3324 (346)	43316 (1068)	37748 (5212)	13191 (5365)	6171 (249)	5389 (291)	54480 (2057)	50427 (3725)	37125 (3501)	<0.001***	<0.001***	<0.001***	0.018**	0.001***
FC+G+Po	0.92	05	7945 (666)	6901 (674)	45099 (2082)	89962 (10160)	72227 (10458)	11691 (484)	7793 (568)	61877 (4010)	136869 (7262)	70607 (6824)	0.063*	0.813	0.063*	0.125	1.000
Overall FS																	
P value Significance - Existing vs Improved																	
CD [P = 0.05] FS1 vs FS2	1553	1571	4852	23682	24376	1129	1324	9347	16926	15906							

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 on 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 on 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 144 farm households were covered during the year. The average holding size of households in the study locations ranged from 0.90 to 2.00 ha for small households, but in Goalpara (Assam) the mean holding size was found be higher than 2 ha.

Locations: During 2017-18, a total of 12 districts in 7 agro climatic where in programme were 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.

Eastern Himalaya

Goalpara (Assam): Three farming systems namely field crops + dairy +piggery + poultry + fishery, field crops + goat + piggery + poultry and field crops + dairy + goat + poultry was found. Interventions made in crop, livestock, processing and optional module in field crops + goat + piggery + poultry resulted in significantly higher improvement in profit (Rs 72,952 from 2.12 ha).

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 + horticulture resulted in higher profit of Rs 92,967 from 1.07 ha after the interventions.

Trans Gangetic plains

Fathehabad (Haryana): All the households were having only one farming system of field crops + dairy with mean area of 0.91 ha. Interventions in crop, livestock, processing and optional modules result in significant change in production, marketable surplus and profit, trough intervention from 0.91 ha area Rs 87,048 increase in profit recorded.

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 1,10,223 from 1.92 ha.

Keonjhar (Odisha): Three farming systems namely field crops + horticulture + goat + poultry, field crops + horticulture + goat + poultry + fishery and field crops + dairy + horticulture + goat +

poultry with mean holding area of 1.13, 1.22 and 1.05 ha respectively. Interventions made in crop, livestock, processing and optional modules resulted in significantly higher production, marketable surplus and profit in all the systems. Among the three farming systems, after interventions, field crops + horticulture + goat + poultry system resulted in higher profit of Rs 74,843 from 1.13 ha.

Kalahandi (Odisha): All the households were having only one farming system of field crops + dairy with mean area of 1.52 ha. Trough intervention almost no change in production and marketable surplus but due reduction in cost of cultivation by recycling increase in profit (Rs 8260) from 1.52 ha area recorded.

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 + goatry+dairy resulted in significant improvement in profit (Rs 28,411 from 1.2 ha) due to diversification.

East Singhbhum (Jharkhand): Two farming systems namely field Crop + Poultry and field Crop + Goatery + Poultry was found with mean area of 1.29 and 1.11 ha respectively. Diversification made in field Crop + Goatery + Poultry resulted in significant improvement in profit (Rs 64,530 from 1.1 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 + Dairy resulted in significant improvement in profit (Rs 42,756 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 Crop + Hort + Sheep resulted in significant improvement in production, marketable surplus and profit (Rs 2,59,080 /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 + poultry recorded higher profit of Rs 3,79,839 from 1.34 ha.

Gujarat plains and hills

Dahod (Gujarat): Two farming systems namely field crops + dairy and field crops + dairy + poultry were found with mean area of 1.60 and 1.06 ha, respectively. Diversification made in field Crop + Dairy resulted in slight improvement in profit (Rs 1,696 from 1.6 ha).

The results across the locations are summarized as below:

- The number of farming systems in different districts ranged between 1 (Fatehabad and Kalahandi) to 3 (Goalpara, Kanker, Keonjhar and Hingoli).
- Among all the farming systems, field crops + dairy was found to be the dominant farming system based on number of households in 6 districts (28 % of total households) with mean

area of 1.28 ha. Due to diversification, the production on equivalent basis improved by 11 % while profit by 9%.

- 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 45% of study households with mean holding size of 1.24 ha whose production and profit improved by 18.9 and 27.3% respectively.
- Three component systems such as field crop + dairy + fishery, field crop + dairy + horticulture, field crops + dairy + poultry, field crops + dairy + goat/sheep, field crop + dairy + vegetables were practiced by 28 % of study households with mean holding size of 1.22 ha whose production improved by 72 %.
- In general, at all the locations, constraint-based interventions in crop, livestock, processing and optional modules resulted in improvement in production (1.48 times).

Table 7.3.1. 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				Pro-cess- ing mod- ule	Op-tional mod- ule	
				Crop (s)/Cropping system (s)		Livestock / household (including fish- eries if any)	Prod- uct diversi- fication	Crop (s)/Cropping system (s)		Livestock /house- hold (including fisheries)			
				Kharif	Rabi			Sum- mer	Kharif				Rabi
Eastern Himalaya													
Goalpara(As- sam) / AS-3/ Central Brahmaputra Valley Zone / (14-15) Per humid to humid /63 rainy days/ 1687 mm rain	Field crop + dairy (2)+goat (3)+poultry (14-15)	3.53	4	Rice	Rice/mus- tard	Cow (2)+goat (3) + Poul- try(14-15)	-	Rice/ Areca- nut	Toria	Cow (2-3) + goat (3)+ Pig (0-1) + Poultry(14-15)	Are- cunut fruit	NKG	
	Field crop + dairy (1-2) +poultry (14-15) + piggery (1- 2) + fishery	1.70	4	Rice	-	Cow (2) + poul- try (14- 15)+ piggery (1-2)		Rice/ Areca- nut	-	Cow (2-3) + poultry (17-18)+ piggery (1-2) + goat (0-1)	-do-	- do-	
	Field crop +goat(1-2) +poultry (16-17) + piggery (1)	2.12	4	Rice	Mustard	tur- meric	Cow (2-3) + goat (3-4)+ poultry (13-14) + Piggery (1-2)	Rice/ Areca- nut	Banana/ Rabi Veg- etables	Cow (1) + pig (1)+poultry (7)+ fishery	-do-	- do-	
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 / cauliflow- er/sesame	Rice/ jute/pump- kin/ sesa- me	Cow (1.6)+ fishery	-	Rice/ Mustard / lentil / Lathyrus/ Spinach/ Cauli- flower	Gourd Chaiti/ boro rice/ jute	Mus- tard see- dOil extrac- tion	NKG	
	Field crops + dairy (3) + horticulture	1.01	6	Rice	Rice / mustard / Coriander/ banana/ onion	Rice / jute/ okra/ sesa- me/ banan	Cow (3) + fishery	Rice / banana	Corian- der /mus- tard / banana/ pea	Cow (3) + fishery	-Do-	-Do-	

District (state)/NARP zone/soil type/rainfall (mm)/rainy days	Farming System (s)	Area (ha)	No. of Farm households	Existing components (As per benchmark, 2017)				Improved /diversified model				Processing module	Optional module
				Crop (s)/Cropping system (s)		Livestock / household (including fisheries if any)	Production diversification	Crop (s)/Cropping system (s)		Livestock /household (including fisheries)			
				Kharif	Rabi			Summer	Kharif		Rabi		
Livestock /household (including fisheries if any)													
Fatheadabad (Haryana) / Semi-arid to Dry sub-humid /561 mm rain	Field crops + dairy (1)	0.91	12	Rice / sorghum	Wheat/ barseem	-	Cow (0-1) + Buffalo (1)	-	Rice	Wheat	-	Cow (0-1) + Buffalo (1)	NKG
Eastern Plateau and Hills													
Kankar (Chhattisgarh)/ CG-1/ Chattisgarh Plain Zone / Moist sub-humid to dry sub-humid /1369 mm rain	Field crop + vegetable-dairy(2)+ fish + piggy (34) +poultry (19)	1.93	4	Rice / pigeonpea / maize / brinjal	Wheat / chickpea / cauliflower /brinjal	-	Cow (2)+ fishery + piggy (34) +poultry (19)	-	Rice/ black-gram/ Vegetable	Wheat / chickpea /maize/ lathyrus/ field pea / vegetable		Cow (2) + buffalo (1-2)+ goat (25-26) + pig (4)	Pigeonpea Dal
	Field crop + dairy (2-3) + goat (5) + poultry (3)	1.29	3	Rice / okra / maize	Wheat / lentil / brinjal / chickpea / Pearl Millet	-	Cow (2-3) + goat (5) + poultry (3)	-	Rice/ black-gram / vegetable	Linseed / fieldpea / chickpea / lathyrus / vegetable		Cow (8) + goat (4-5) +poultry (39-40)+ pig (2-3)	Pigeonpea Dal
	Field crop + poultry (9)	1.14	5	Rice / kutki / finger millet	Maize/ lentil / brinjal/ chickpea/ wheat / pearl millet	-	Poultry (9)	-	Rice/ black-gram / vegetable	Maize / chickpea /sunflower / vegetable		Cow (4-5) + buffalo (1-2) + poultry (20-21)+ pig (1)	- do-
East Singhbhum (Jharkhand)/ JH- JH-3 / South-eastern Plateau Zone/ Moist sub-humid to dry sub-humid / 58 rainy days / 1125 mm rain	Field crop + goat/ sheep (3-4) + poultry (8)	1.25	12	Rice / tomato / brinjal	-	-	Goat/ sheep (3-4) + poultry (8)	-	Rice	Wheat/ Mustard		Goat/ sheep (3-4) + poultry (8)	-

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)	Prod- uct diversi- fication	Crop (s)/Cropping system (s)		Livestock /house- hold (including fisheries)	Pro- cess- ing mod- ule	Op- tional mod- ule
				Kharif	Rabi			Sum- mer	Kharif			
Annupur (Madhya Pradesh)/ Eastern Plateau And Hills Region (VII)/ North Hill Zone of Chattisgarh (MP-3)/ 1226 mm rain	Crop+Dairy- +Pigs+Fish- ery+Poul- try+Veg.	1.92	4	Rice/ Soya- bean/ Maize	Wheat / Gram	-	-	Cow (1-2) + Buffalo (1)				Mus- room/ Fruit plant
	Crop + Dairy+ Goa- try+ Poultry	1.29	3									Mus- room/ Fruit plant
	Crop + Poultry	1.14	5									Mus- room/ Fruit plant
Kalhandi (Odisha) Eastern plateau and hills Gujrat Hills, Dan- dakaranya and Eastern Ghats hot moist sub humid eco sub-region / 1331 mm rain	Field crops + dairy	1.52	24	Rice	Wheat	Cow	-	Buffalo	-	-	-	-
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)	Prod- uct diversi- fication	Crop (s)/Cropping system (s)		Livestock /house- hold (including fisheries)	Pro- cess- ing mod- ule
				Kharif	Rabi			Kharif	Rabi		
Hingoli(Ma- harashtra)/ MH-7/ Cen- tral Mahar- ashtra Pla- teau Zone, Semi-arid (wetter region) /32 rainy days / 709 mm rain	Field crops + dairy (2)	1.13	3	Soya- bean/ cotton/ pigeon pea / turmeric / green- gram	Wheat/ chickpea/ sorghum	Buffalo (2)	-	Cotton/ soya- bean/ black- gram / green- gram / turmeric	Chickpea /wheat / sorghum	Buffalo (2)	Milk pro- cess- ing
	Field crops + goat(7)	0.92	5	Soya- bean/ cotton/ pigeon pea / green- gram	Chickpea/ sorghum	Goat (7)	-	Cotton/ soya- bean/ black- gram / green- gram	Chickpea / sor- ghum	Goat (6-7)	-
	Field crop + sericulture	1.13	4	Soya- bean/ cotton / turmeric	Wheat / sorghum	Cow (1)	-	Cotton / mul- berry / green- gram / sor- ghum/ sugar- cane/ termuric	Wheat / sorghum /chick- pea	-	-
Southern 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				Pro- cess- ing mod- ule	Op- tional mod- ule
				Crop (s)/Cropping system (s)		Livestock / household (including fish- eries if any)	Prod- uct diversi- fication	Crop (s)/Cropping system (s)		Livestock /house- hold (including fisheries)			
				Kharif	Rabi			Sum- mer	Kharif		Rabi		
Yeth- pur(Tamil- Nadu)/NWZ/ Bimodal rain- fall/Start of deccan pla- teau/50 rainy days/869 mm rain	Field crop + dairy (2-3)	1.08	4	Rice/ banana /cotton/ maize/ ground- nut	Tapioca	Coco- nut	-	Rice/ banana /cotton/ maize/ sor- ghum / cowpea	Rice / horse- gram/ sor- ghum / gingelly	Cow (3-4) + buffa- lo (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/ sugar- cane / ragi / ground- nut /tap- ioca / turmeric / black- gram / beans	Rice / chickpea / sorghum / coriander / beans	Coco- nut	Cow (2-3) + goat / sheep (10-11)+ poul- try (22-23)	-	Rice / cotton/ maize/ Finger millet/ sor- ghum / Chry- santhe- mum / Mul- berry/ Fodder grass/ ground- nut / Lab Lab	Sugar- cane/ / Finger millet/ sor- ghum / gingelly/ ground- nut/ cowpea / tapoica	Cow (2-3) + goat (8-9)+ poultry (17-18)	-	NKG
East Coast Plains and Hills													
Bhavanis- agar(Tamil- Nadu) / TN-3 /Western Zone / Semi-ar- id /36 rainy days/ 775 mm rain	Field Field crop + dairy (4-5) + goat/sheep (8-9) + poul- try (7)	1.34	3	Tur- meric / Sugar- cane / / Coconut	Maize / banana	Cow (2) + buffalo (3-4) + goat / sheep (8-9) + poultry (7)		fodder sor- ghum	Rice / sugar- cane/ turmeric /ground- nut/ fodder grass	Cow (1-2) + buffalo (3-4) + goat (11)+ poultry (12-13)	Grad- ed seed	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)	Prod- uct diversi- fication	Crop (s)/Cropping system (s)		Livestock /house- hold (including fisheries)	Pro- cess- ing mod- ule	Op- tional mod- ule		
				Kharif	Rabi			Summer	Kharif				Rabi	Summer
Gujarat Plains and Hills	Field Field crop + dairy (4-5) + poul- try (16-17)	1.15	9	Sugar- cane / turmeric / topio- ca/Co- conut	Rice/ brinjal	Cot- ton	Cow (3-4) + buffalo (1) + poultry (16-17)	Sugar- cane / turmeric / F. sor- ghum	Rice / gingelly // F. sor- ghum	Cotton / coconut	Cow (4) + buffalo (1-2) + poultry (14)	Grad- ed seed	NKG	
	Dahod (Gujarat)/ GJ-3/ Middle Gujarat Zone / Semi-arid /23 rainy days /1086 mm rain	Field crops + dairy (2-3)	1.61	6	Rice/ maize/ pigeon pea	Maize/ wheat / chickpea	-	Cow (1-2) + Buffalo (1-2)+ goat (7) + poultry (2)	Rice / maize / pigeon- pea	Wheat/ chickpea	-	Cow (1-2) + Buffalo (1-2)	-	NKG
	Field crops + dairy (2- 3)+ poultry (2)	1.06	6	Rice/ maize/ pigeon pea	Maize/ wheat / chickpea	-	Cow (1-2)+ Buffalo (1-2) +Goat (9-10)+ poultry (2)	Rice / maize / pigeon- pea	Wheat/ chickpea	-	Cow (0-1)+ Buffalo (1-2) +poultry (9)	-	NKG	

Table-1 : Yield potential of different cropping systems under researcher and farmer managed conditions - Year 2019-20
Report for Grain Yield - Year 2019-20

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recommended Dose/ Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status				Yield(kg/ha)										Yield gap 3(kg/ha)									
				pH	OC	N	P	K	Control	N	NP	NK	NPK	NPK	F. Pract. (d)	SE (d) (M)	CD	CV	RF	RF + Mic. Nut.	Yield gap 1(kg/ha)	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yield gap 4(kg/ha)			
				(%) (kg/ha) (kg/ha) (kg/ha)								-5%				vs Control				vs vs vs vs							
Rice-rice																											
Kerala	Southern Zone - Vellayani/ Vellayani/ 24	Not Available	Uma/ 90- 45 -45 / ZnSO4(20) 98-50-41	4.6	2	446	35	148	1544	2044	3314	3027	4989	5635	5364	0	0	0	0	3445	646	-375	271				
Kerala	Southern Zone - Vellayani/ Vellayani/ 24	Not Available	Uma/ 90- 45 -45 / 0 101-48-43	-	-	-	-	-	1554	2201	3238	3014	4589	5118	4982	0	0	0	0	3035	529	-393	136				
Telangana	Southern Zone Medak/ 24	Not Available	MTU1010 120-60-40- / ZnSO4(50)						2007	3041	4162	4837	5393	6045	5257					3386	653	136	789				
Telangana	Southern Zone Medak/ 24	Not Available	MTU1010 120-60-40 / 50	-	-	-	-	-	2177	3324	3844	4327	5395	5796	5234					3218	400	161	561				
Rice- Wheat																											
Punjab	Central Plain Zone III/ Patiala-PB/ 24	Not Available	PR-126/ 120- 30 -30 / ZnSO4(25) 150-3-8-0	7.7	0.4	250	31	142	4531	5651	6177	6613	6514	7044	6648					1982	530	-134	396				

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recommended Dose/ Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status										Yield(kg/ha)										Yield gap 3(kg/ha)							
				pH	OC	N	P	K	Control	N	NP	NK	NPK	NPK	F. Pract.	SE (d)	SE (M)	CD	CV	RF	RF + Mic. Nut.	RF	RF + Mic. Nut.	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yield gap 4(kg/ha)	Yield gap 5(kg/ha)				
(%) (kg/ha) (kg/ha) (kg/ha)										-5%										Control		vs	vs	vs	vs						
										M.Nut.										RF		FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
Punjab	Central Plain Zone III/ Patiala-PB/ 24	Not Available	PBW725	-	-	-	-	-	3806	4044	4296	4504	4707	5300	5135					901.0	592.7	-428.1	164.6								
			120- 30- 30 / MnSo4(5)																												
			150-60-0																												
Uttarakhand	Bhabar and Tarai Zone - Pantnagar/ Udham singh nagar/ 24	Alluvial	HKR 27	6.3	0.7	275	18	170	2815	3652	4343	4659	5320	5861	5451					2505	541	-132	409								
			150- 60-40/																												
			148-50-25																												
Uttarakhand	Bhabar and Tarai Zone - Pantnagar/ Udham singh nagar/ 24	Alluvial	HD 2967/	6.3	0.7	275	18	170	3067	3942	4564	4988	5466	6009	5545					2398.4	543.3	-79.4	463.9								
			150- 60-40/																												
			127-43-33																												
Uttar Pradesh	Central Plain Zone- Kanpur/ Daleep Nagar (Kanpur Dehat)/ 24	Not Available	PHB - 71	7.9	0.4	188	13	142	2859	4126	5355	4962	6290	6778	5222	-	-	-	-	3431	488	1068	1556								
			150- 60- 40 / ZnSO4(25)																												
			199- 64-0																												

Annual Report 2020-21

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recommended Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status										Yield(kg/ha)										Yieldgap 3(kg/ha)			
				pH	OC	N	P	K	Control	N	NP	NK	NPK	NPK	F. Pract. (d)	SE (d)	CD (M)	CV	RF	RF + Mic. Nut.	RF	RF + Mic. Nut.	gap 1(kg/ha)	gap 2(kg/ha)	gap 3(kg/ha)	gap 4(kg/ha)	
(%) (kg/ha) (kg/ha) (kg/ha)										+ M.Nut.										-5%		vs vs					
																				Control		RF		FP			
																				2735		442		33			
Haryana		Not Available	PB-1121	1968	4191	4450	4251	4702	5144	4670	-	-	-	-	-	-	-	-	2735	442	33	475					
	Fatehabad 24	150- 60 -60 / ZnSO4(5)																									
		150-60-0 (0)																									
Haryana		Not Available	WH-2967	1292	3668	4885	4694	5282	5832	5249	-	-	-	-	-	-	-	-	3990.4	549.6	32.9	582.5					
	Fatehabad 24	150- 60 -30/ ZnSO4(0)																									
		150-0-0 (0)																									
Madhy Pradesh		Not Available	JRH-19	1736	3374	4029	3509	4978	5307	3553	-	-	-	-	-	-	-	-	3242	329	1425	1754					
	Central Highland, Hot Sub humid																										
	Umaria 24	120- 60 -40 / ZnSO4(25)																									
Madhy Pradesh		Not Available	JW3211	1692	3079	3810	3481	4385	4653	3501	-	-	-	-	-	-	-	-	2693.1	268.2	883.9	1152.1					
	Central Highland, Hot Sub humid																										
	Umaria 24	120- 60 -40/ ZnSO4(25)																									
Madhy Pradesh		Not Available	MTU1010	2005	2157	2844	2621	3738	4359	2811	-	-	-	-	-	-	-	-	1733	621	927	1548					
	Central Highland, Hot Sub humid																										
	Annupur 24	120- 60 -40 / ZnSO4(25)																									
Madhy Pradesh		Not Available	JW3211	2082	2652	3219	2957	3748	4104	3028	-	-	-	-	-	-	-	-	1665.8	355.9	719.5	1075.3					
	Central Highland, Hot Sub humid																										
	Annupur 24	120- 60 -40/ ZnSO4(25)																									

State	NARP Zone/	Soil Type	Variety/	Initial Soil Status										Yield(kg/ha)										Yieldgap																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
				Center/	pH	OC	N	P	K	Control	N	NP	NK	NPK	NPK	F. Pract.	SE (d)	CD (M)	CV	RF	RF + Mic. Nut.	RF	Yield gap 2(kg/ha)	Yield gap 3(kg/ha)	Yield gap 4(kg/ha)	Yieldgap 3(kg/ha)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
No. of Trials	FP(Fert. Dose)		(%)	(kg/ha)	(kg/ha)	(kg/ha)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

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 3(kg/ha)		Yield gap 4(kg/ ha)	
				pH	OC	N	P	K	Control	N	NP	NK	NPK	NPK	F. Pract. (d)	SE (d)	CD (M)	CV	RF	RF + Mic. Nut.	Yield gap 2(kg/ ha)	Yield gap 3(kg/ ha)	RF	RF + Mic. Nut.	Yield gap 4(kg/ ha)	Yield gap 3(kg/ha)	
(%) (kg/ha) (kg/ha) (kg/ha)										-5%										Control	RF	VS	VS	FP	FP		
Andhra Pradesh	North Coastal Zone - Anapalle/ Vizianagaram 24	Red Sandy	NK 6607/ 200 - 80-80/ control 172-71-54	-	-	-	-	-	2810	4106	4843	5523	6515	7209	6015							3705	693	500	1193		
Maharashtra	North Konkan Coastal Zone Thane 24	Not Available	Karjat-3 100- 50-50 ZnSO4(25) 80-25-0	0	0	0	0	0	2771	3180	3531	3376	4184	4440	3339	33	23	45	3.47	1413	257	845	1102				
Maharashtra	North Konkan Coastal Zone Thane 24	Not Available	Phule Vimukti 100- 50-50 ZnSO4(25) 50-25-0	-	-	-	-	-	13563	14892	16122	15812	17871	18500	16493	5	4	8	3.65	4308	629	1378	2007				
Rajasthan	Humid Southern Plain / Dungarpur/ 24	Clay	DHM-117/ 90- 35-30 / ZnSO4(25) 70-20-0	6.8	0.6	303	19	214	358	796	1058	954	1340	1429	677	0	0	0	0	981	90	663	752				
Rajasthan	Humid Southern Plain / Dungarpur/ 24	Clay	Raj-4079/ 120- 40-30 / control 70- 15-0	6.8	0.6	303	19	214	1402	2440	3179	2844	3485	3690	2471	0	0	0	0	2083	204	1015	1219				

State	NARP Zone/ Center/	Soil Type	Variety/ Recom- mended	Initial Soil Status										Yield(kg/ha)										Yieldgap 3(kg/ha)															
				pH	OC	N	P	K	Control	N	NP	NK	NPK	F. Pract. (d)	SE (d)	CD	CV	RF	RF+ Mic. Nut.	RF	gap 2(kg/ ha)	gap 3(kg/ ha)	Yield	Yield gap 4(kg/ ha)	Yieldgap 3(kg/ha)														
No. of Trials	Fertilizer Dose/ Micro. Dose/	FP(Fert. Dose)																																					
Himachal Pradesh	Sub-mountain and low hills sub-tropical zone / Bilaspur (H.P.)/ 24	Submon- taneous	Hybrid; Kanchan/ 90- 45 -30 / ZnSO4(25 Kg) 76.7-0-0	0	0	0	0	0	1622	2241	2836	2623	3247	3438	2156	0	0	0	0	1625	191	1091	1282																
Himachal Pradesh	Sub-mountain and low hills sub-tropical zone / Bilaspur (H.P.)/ 24	Submon- taneous	HPW-368/ 80- 40-40/ ZnSO4(25 Kg) 72.6-5-2.5	-	-	-	-	-	1566	2201	2699	2498	3077	3290	2114	0	0	0	1510	214	962	1176																	
Maize-Maize																																							
Tamil Nadu	NWZ 12		NK6240 250-75-75 ZnSO4(37.5 210-50-60 NK6240 250-75-75 ZnSO4(37.5 165-40-55	6.9	0.8	198	20	244	2879	3486	4265	4932	5122	5614	4869	0	0	0	2243	493	253	745																	
Tamil Nadu	NWZ 12		NK6240 250-75-75 ZnSO4(37.5 165-40-55	-	-	-	-	-	2822	3637	4559	4773	5155	5635	4686	0	0	0	2333	480	469	949																	
Maize-Toria																																							
Odisha	Odisha keonjhar 12	Not Available	OMH 14-27 120-60-60 ZnSO4(25) 59-46-23	1944	3164	4018	3800	5051	5328	3678	-	-	-	-	-	-	-	3107	277	1373	1650																		

[illegible]

State	NARP Zone/ Center/ No. of Trials	Soil Type	Variety/ Recommended Dose/ Fertilizer Dose/ Micro. Dose/ FP(Fert. Dose)	Initial Soil Status				Yield(kg/ha)										Yield gap 3(kg/ha)				Yield gap 4(kg/ha)								
				pH	OC	N	P	K	Control	N	NP	NK	NPK	NPK	F. Pract. (d)	SE (M)	CD	CV	RF	RF + Mic. Nut.	RF	RF + Mic. Nut.	gap 1(kg/ha)	gap 2(kg/ha)	gap 3(kg/ha)	gap 4(kg/ha)				
				(%)				(kg/ha)				(kg/ha)				+ M.Nut.		-5%		Control	RF	FP	vs	vs	vs	vs				
				Soyabean-Jawar																										
Karnataka	Northern Transitional Zone Dharwad 2	DSb-21	0	0	0	0	0	0	966	1170	1372	1464	1640	1770	1446	0	0	0	0	674	130	194	324							
Karnataka	Northern Transitional Zone Dharwad 2	SPV-2217	-	-	-	-	-	-	590	770	980	1130	1370	1580	1160	0	0	0	0	780	210	210	420							
Pearlmillet-mustard																														
Rajasthan	Semi Arid Eastern Plain Zone Dausa, Rajasthan/ 24	Rasi-1827	7.4	0.5	222.4	22.4	226.6	989	1057	1174	1215	1243	1323	982	0	0	0	0	253	81	261	341								
Rajasthan	Semi Arid Eastern Plain Zone Dausa, Rajasthan/ 24	DRMRJU-31 (Giriraj)	7.4	0.5	222.4	22.4	226.6	1344	1337	1396	1499	1630	1753	1236	0	0	0	0	286	122	395	517								
Sorghum-wheat																														
Gujarat	North West Agro climatic Zone/ Adiya/ 24	GFS-5/	7.7	0.3	118	25	303	6802	7754	10532	8647	11314	12032	9687	0	0	0	0	4512	718	1627	2345								

State	NARP Zone/	Soil Type	Variety/	Initial Soil Status				Yield(kg/ha)																			
				pH	OC	N	P	K	Control	N	NP	NK	NPK	NPK	F	SE	SE	CD	CV	Yield				Yieldgap 3(kg/ha)			
																				RF	RF	RF	RF				
																									gap 1(kg/ha)	gap 2(kg/ha)	gap 3(kg/ha)
Center/		Recom- mended																									
No. of Trials		Fertilizer Dose/																									
		Micro. Dose/																									
		FP(Fert. Dose)																									
Gujarat	North West	Alluvial	GW-496/	-	-	-	-	-	1992	2316	3046	2508	3394	3743	2794	90	64	125	10.59	1402	349	600				949	
	Agro climatic																										
	Zone/		120- 60-30 /																								
	Adiya/		ZnsO4(15)																								
	24		96-28-0																								
Gnut-Finger millet																											
Tamil Nadu	NWZ		VRI 2	6.9	0.8	198	20	244	1122	1367	1665	1526	1852	2068	1752	0	0	0	0	730	216	100				316	
			20-50-75																								
	12		ZnSO4(10)																								
			23-41-61																								
Tamil Nadu	NWZ		GPU 28	-	-	-	-	-	1350	1609	2088	1831	2580	2796	2291	0	0	0	0	1230	216	289				505	
			60-30-30																								
	12		ZnSO4(12.5)																								
			58-21-23																								

7.4.4 Frontline Demonstration on Cropping Systems Involving Oilseeds

India occupies a premier position (fourth) with regard to oilseed production, covering 20% of the area and 10% of the production in the world. All the oilseed crops together are grown on an area of 25.3 million ha, which is next only to food grains. The oilseed crops have registered significant growth in area and production in last 30 years. However, compared to cereals like paddy and wheat, the growth rate of area and production of oilseeds is insignificant with wide variability in their yield in different states of the country. Farmers always searched for technological options and practices which brought them higher returns and readily responded to various economic incentives. Groundnut, rapeseed, mustard, sunflower, safflower, soybean, sesame and castor are the important oilseed crops. The production and productivity of these oilseeds have remained more or less stagnant but for a modest gain in selected crops following the launching of the technology mission on oilseeds. IIFSR through its 32 on-farm centres across the country undertaken FLD's as a part of crop diversification for obtaining improved income and oilseed crops are introduced in various existing systems. The results of the FLD's conducted in farmer's field's by OFR units of AICRP-IFS during 2020-21 are given in the report.

Objectives

To demonstrate the production potential and monetary advantages of well identified cropping and inter cropping systems under real farm situation involving oilseed as one of the component crops in various agro ecosystems.

Technical Programme

The FLD's were conducted at 7 OFR units of All India Coordinated Research Project on Integrated Farming Systems (AICRP on IFS) in four agro ecosystems viz., Arid, Semi-Arid, Sub humid and Coastal; covering seven states. Crops/cropping systems in which FLDs were conducted are given in Table 1. Total 12 FLD were conducted in Arid; 30 in Semi-Arid; 15 in Sub humid and 20 in coastal ecosystem. Out of total 77 demonstrations on oilseed based cropping systems, 32 were on cropping system involving mustard, 20 demonstration on sesame, 15 on groundnut and 10 on Gobhi sarson.. There were only two treatments taken for comparison, i.e. farmers practice (FP) and improved practice (IP). These treatments were applied on a time tested; well recognized oilseed based cropping systems of the location.

Table 7.4.1: List of centres of Front Line Demonstrations (FLD) on oilseed based cropping systems (2020-21)

Agro Ecosystem	Name of Centre (State)	Crop/cropping system (s)	Number of demonstrations
1. Arid	Dausa (Rajasthan)	Cluster bean-Mustard	12
2. Semi-Arid	Patiala (Punjab)	Gobhi-Sarson	10
	Fatehpur (Uttar Pradesh)	Rice-mustard	10
	Umaria (Madhya Pradesh)	Sesum	10
3. Sub humid	Vizianagaram (Andhra Pradesh)	Rice-Groundnut	15
4. Coastal	Thiruvananthapuram (Kerala)	Rice-greengram-Sesame	10
	Nadia (West bengal)	Rice-mustard	10
Total		77	

Crop varieties along with other management practices adopted in farmers and improved practice under various cropping systems are presented in Table 2. At all the centre latest improved varieties along with optimum seed rate and with nutrient management practices adopted. In general farmers have tendency to use local or old varieties with higher seed rate and imbalanced fertilizers which is one of the major reason that farmer not harvest desirable yield. Other than this incase of oilseeds crops application of sulphur fertilizers is very crucial for synthesis of oils in the plant so in the improved practices instead of using DAP suggested to apply phosphorous trough SSP so it will fulfill sulphur demand.

Table 7.4.2 Details of management practices adopted in farmers and improved practice

Crop	Location (ecosystem)	Improved Package
Mustard	Dausa (Rajasthan)	DRMRIJ-31; 30x15 Spacing; PRE (Pendimethalin @ 750-1000 gm/ha); RDF-60:40:0; Methyl Parathion dust 2%
	Fatehpur (Uttar Pradesh)	Improved varieties; 30x10 Spacing; PRE (Pendimethalin @ 750-1000 gm/ha); RDF-60:60:40
Gobhi-Sarson	Patiala (Punjab)	IV (GSC-7), 45cm*10 cm spacing, Use of SSP, Improved plant protection measures: Actara 25WG 1.0 liter/ha
Groundnut	Vizianagaram (Andhra Pradesh)	Improved Variety (Kadiri Lepkshi) with recommended production technologies
	Salem (TN)	Improved Variety (VRI-8)
Sesamum	Thiruvananthapuram (Kerala)	Improved Varieties (Kayamkulam-1)
	Umaria (MP)	TKG – 306; Thiram 2 g/kg + Carbendazim 1g/kg seed; 30x10 Spacing; RDF-30:30:20

Salient findings

Out of 77 demonstrations on oilseed based cropping systems, 32 were on cropping system involving mustard, 20 demonstration on sesame, 15 on groundnut and 10 on Gobhi sarson. Mustard evaluated at 3 centre sesame on two centre and groundnut and gobhi sarson on 1 centre only

Yield

At all the centre there was increase in yield recorded with the improved varieties and management practices it was slight in case of mustard and Gobhi sarso ranging from 10-20% it is moderate in case of sesame 35-52% and high in case of groundnut. In Groundnut, 114% increase in yield was observed at Vizianagaram (Andhra Pradesh) with improved variety of Kadiri Lepakshi + lower seed rate + balanced nutrient application changing the source of P from DAP to SSP. Average yield of mustard was recorded 1418 kg ha⁻¹ and with improved package 1673 kg ha⁻¹. Rabi groundnut in coastal area showing very encouraging results and farmers are feeling happy with an alternative crop after rice harvesting.

Gross returns

At all the centre there was increase in gross returns recorded with the improved varieties and management practices it was slight in case of mustard and Gobhi sarso ranging from 10-20% it is moderate in case of sesame 15-52% and high in case of groundnut. In Groundnut, 26% increase in gross returns was observed at Vizianagaram (Andhra Pradesh) with improved variety of Kadiri Lepakshi + lower seed rate + balanced nutrient application changing the source of P from DAP to SSP. Average gross returns of mustard was recorded 81291 Rs ha⁻¹ and with improved package

92261 kg ha⁻¹. Rabi groundnut in coastal area showing very encouraging results and farmers are feeling happy with an alternative crop after rice harvesting.

Net returns

At all the centre there was increase in net return recorded with the improved varieties and management practices it was slight in case of mustard and Gobhi sarso ranging from 20-40% it is moderate in case of sesame 1.5 to 2 times high and up to 17 times in case of groundnut. In Groundnut, 17 times increase in net return was observed at Vizianagaram (Andhra Pradesh) with improved variety of Kadiri Lepakshi + lower seed rate + balanced nutrient application changing the source of P from DAP to SSP. Average net return of mustard was recorded 52430 rs ha⁻¹ and with improved package 62630 rs ha⁻¹. Rabi groundnut in coastal area showing very encouraging results and farmers are feeling happy with an alternative crop after rice harvesting.



Plate 1: Glimpse of FLD activities across the country

Table 7.4.3: Influence of farmers and improved practices on grain or pod yield (kg/ha) of various crops under FLD (2020-21)

Agro Eco-system	Name of Centre (State)	Crop/crop-ping system (s)	Number of demonstrations	Yield farmer practices	Yield improved practices	per cent increase
1. Arid	Dausa	Mustard	12	1487	1805	21.4
2. Semi-Arid	Patiala (Punjab)	Gobhi-Sarson	10	1600	1785	11.3
	Fatehpur (Uttar Pradesh)	Mustard	10	1271	1490	10.8
	Umaria (MP)	Sesumum	10	264	401	52.1
3. Sub humid	Vizianagaram (Andhra Pradesh)	Groundnut	15	1255	2687	114.6
4. Coastal	Thiruvananthapuram (Kerala)	Sesame	10	524.5	387	35.0
	Nadia (West Bengal)	Mustard	10	1496	1726	15.3

Table 7.4.4: Influence of farmers and improved practices on gross returns (Rs/ha) of various crops under FLD (2020-21)

Agro Eco-system	Name of Centre (State)	Crop/crop-ping system (s)	Number of demonstrations	gross returns farmer practices	gross returns improved practices	per cent increase
1. Arid	Dausa	Mustard	12	-	-	-
2. Semi-Arid	Patiala (Punjab)	Gobhi-Sarson	10	43116	60951	10.9
	Fatehpur (Uttar Pradesh)	Mustard	10	81244	90650	12.1
	Umaria (Madhya Pradesh)	Sesumum	10	19272	29310	52.08
3. Sub humid	Vizianagaram (Andhra Pradesh)	Groundnut	15	59540	75375	26.5
4. Coastal	Thiruvananthapuram (Kerala)	Sesame	10	967527	131125	13.0
	Nadia (West Bengal)	Mustard	10	81338	93873	15.4

Table 7.4.5: Influence of farmers and improved practices on net returns (Rs/ha) of various crops under FLD (2020-21)

Agro Eco-system	Name of Centre (State)	Crop/crop-ping system (s)	Number of demonstrations	net returns farmer practices	net returns improved practices	per cent increase
1. Arid	Dausa	Mustard	12	-	-	-
2. Semi-Arid	Patiala (Punjab)	Gobhi-Sarson	10	14079	25418	44.1
	Fatehpur (Uttar Pradesh)	Mustard	10	55809	64844	16.2
	Umaria (Madhya Pradesh)	Sesumum	10	3307	8447	155.4
3. Sub humid	Vizianagaram (Andhra Pradesh)	Groundnut	15	3227	58999	1720.0*

Agro Eco-system	Name of Centre (State)	Crop/crop-ping system (s)	Number of demonstrations	net returns farmer practices	net returns improved practices	per cent increase
4. Coastal	Thiruvananthapuram (Kerala)	Sesame	10	48282	15794	205.0
	Nadia (West Bengal)	Mustard	10	49051	60416	23.0

*Due very small net return in FP huge increase observed in Net return

Achievement of large scale adoption

The cropping systems involving oilseeds promise to increase the production of oilseeds on the one hand and improve the profitability for farmers on the other hand. In all the FLDs, it was proved that yield and net returns can be increased by adopting improved package in place of farmers practice. The gist of the practices for various crops is given below for large scale adoption.

2020-21					
Crop	Location (ecosystem)	Number of FLD conducted	Improved Package	Increase in yield (%)	Increase in net returns (%)
Mustard	Dausa (Rajasthan)	12	DRMRIJ-31; 30x15 Spacing; PRE (Pendimethalin @ 750-1000 gm/ha); RDF-60:40:0; Methyl Parathion dust 2%	21.4	-
	Fatehpur (Uttar Pradesh)	10	Improved varieties; 30x10 Spacing; PRE (Pendimethalin @ 750-1000 gm/ha); RDF-60:60:40	11.6	16.2
	Nadia (WB)	10	Improved varieties (Punjab bullet) with balance fertilization 80-40-40-30(S)	15.4	23.2
Gobhi Sarson	Patiala (Punjab)	10	IV (GSC-7), 45cm*10 cm spacing, Use of SSP, Improved plant protection measures: Actara 25WG 1.0 liter/ha	10.8	44.6
Groundnut	Vizianagaram (Andhra Pradesh)	15	Improved Variety (Kadiri Lepkshi) with recommended production technologies	114.6	27.0
Sesamum	Thiruvananthapuram (Kerala)	10	Improved Varieties (Kayamkulam-1)	35.5	200.0
	Umaria (MP)	10	TKG – 306; Thiram 2 g/kg + Carbendazim 1g/kg seed; 30x10 Spacing; RDF-30:30:20	52.1	155.2

7.4.5 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 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 2019-20, the programme was undertaken in 10 districts in 9 states under SCSP. It includes 10 OFR centres namely, Bilashpur (Himachal Pradesh), Kanker (Chhattisgarh), Jammu (Jammu and Kashmir), Annupur (MP), Dausa (Rajasthan), Yethapur & Erode (Tamil Nadu), Medak (Telangana) and Chikkaballapura (Karnatka) Nadia (West Bengal).

Number of beneficiaries under SCSP: Total 198 farmers covered in 2019-20 from 24 villages and 173 men and 25 women benefited in the project across the country

Benchmarking of Farming System

Details	2019-20
Number of crops grown (field crops/ fodder)	13
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

Modules	Interventions made
Dairy	Cowmat, mineral mixture, Deworming, AI, balanced feeding, improved housing
Small ruminants /other component integration	Poultry (Kadakhnath, 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	2019-20	
	No. of SCSP farmers	Total quantity of input
Seeds (kg)	192	2512
Vegetable kit (kg)	139	134
Fertilizer (kg)	135	10004
Mineral Mixture (kg)	128	385
Vermibed (No's)	20	20
Bio-pesticides (litres/kg)	223	437
Earth worms (kg)	20	60

Non-recurring inputs distribution to SCSP beneficiaries

Inputs	2019-20	
	No. of SCSP farmers	Total quantity of input
Sprayer	16	16
Seed treatment drum	03	03
Dora (Bullock drawn Inter culture implement)	10	10
Chick case	20	20
Feed pot	20	20
Chaff cutters	20	20
Sheep /goat	18	32
Poultry chicks	62	1550
Cowmats	14	28
Milk cane		14
Brush cutter	14	4
Livestock sheds (participatory / portable)	24	24

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 37% and income enhancement was 44 per cent. At Chikkaballapura centre all three livestock intervention performed very well and recorded significant weight gain in short duration which helps to increase in profit.

Intervention	Number / farmer	Initial weight (kg/unit)	Present weight (kg/unit)	Lambs/ piglets/ chicks	Initial value (Rs.)	Present value (Rs.)
Bandur Sheep	5	14.2	29.2	2	17750	43800
Yorkshire piglets	9	8.5	65	0	40500	117000
Kadakhnath chicks	30		1.9	Eggs : 205		

Capacity building: Trainings

During 2019-20 total 13 training was organised in which 320 men and 242 women total 562 farmers get benefited farmers trained about Preparation of vermicompost and recycling of straw, Mushroom, Use of improved seed and RDF, Vegetable production, Components of Integrated farming System for enhancing farmers' income, Scientific banana cultivation, Scientific mustard cultivation, Importance of balanced nutrition for enhancing crop productivity and soil health, Principles of Integrated pest management in different crops, Water management in field and horticultural crops, Livestock management (sheep, goat, poultry management and fishery aspects) and Training on Silage preparation.





Intervention made under SCSP Component Salem



Intervention made under SCSP Component Chikkaballapura





Intervention made under SCSP Component Dausa and Jammu centre

8

GENERAL/ MISCELLANEOUS

8.1 LIST OF PUBLICATION

8.1.1 Research Papers

Authors	Title of Paper	Name of Journal	Volume number and pages	NAAS rating
A&N (port blair)				
Swarnam T P and Velmurugan A (2020)	Prospects of entrepreneurship development in integrated farming systems: Island perspective	J. Andaman Science Association	25(1):9-14	
Velmurugan, A., Varadan Jaya kumara, Swarnam, T.P., Zamir Ahmed S.K., Subramani T., Biswas T.K., Jaisankar I., and Perumal P (2020)	Impact of COVID-19 Pandemic on agricultural production and marketing systems of Andaman and Nicobar Islands.	J. Andaman Science Association	25(2):217-225	
AAU, Jorhat (Assam)				
Bora Sarat Sekhar, Sharma Karuna Kanta, Borah Karishma and Saud Ranjit (2020)	Opportunities and challenges of forage cultivation in Assam- A review.	Forage Res.	45(04):251-257	4.48
Sarma A, Saud R K Sharma K K and Bora SS (2020)	Nitrogen management in rye grass (<i>Lolium multiflorum</i>).	Forage Res	45(04) 295-297	4.48
Bora Sarat Sekhar, Sharma Karuna Kanta, Borah Karishma, Saud Ranjit and Borgohain Lekhika (2020).	Effect of Nitrogen Levels and seed rate on quality of Rye Grass (<i>Lolium multiflorum</i>) in Assam.	Forage Res	46(1) 54-57	4.48
Borah Monisha & Halim R.A.. (2020)	Sensitivity Analysis of Broiler Farming Enterprise under Changing Scenario of Costs, Prices and Yields in Assam.	International Journal of Current Microbiology and Applied Sciences	10(01): 1493-1509	5.38
B. Kalita, Bora S.S. and Gogoi Bhabesh. (2020).	Zeolite: A Soil Conditioner	International Journal of Current Microbiology and Applied Sciences	9(1): 2319-7706, 2020.	5.38

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Bhupenchandrl. a , Basumatary A , Datta S. , Singh L.K. , Bora S.S. , Devi S.H., Gogoi Bhabesh, Kalita P. , Das J. and Tamuli B.. (2020).	Micronutrient content in plant, its uptake, and crop yield in cauliflower–cowpea- okra cropping sequence as impacted by graded level of boron fertilization.	Communications in Soil Science and Plant Analysis	https://doi.org/10.1080/00103624.2020.1798989 .	6.77
ANGRAU, Gunture (Andhra Pradesh)				
K. Tejeswara Rao, D. Sekhar, M. Srinivas, A. Upendra Rao and G. Jogi Naidu	Evaluation criteria of cropping systems and farming system models	Rashtriya Krishi	15 (2): 53-58	3.25
AV Ramanjaneyulu, N. Sainath and M. Srinivas	Promotion of Organic Farming: Roles of Key Players	Biotica Research Today	Vol 2 (8): 731-734	ISSN 2582- 6743
M.M.V. Srinivasa Rao, D. Nagarjuna and K.V. Ramana Murthy	Productivity and profitability in dry direct sown rice through mechanization	International Journal of Chemical studies	2020 SP-9(1)	5.31
M.M.V. Srinivasa Rao, D. Nagarjuna and K.V. Ramana Murthy	Productivity Enhancement in Rainfed Sugarcane through Tillage and Moisture Conservation Methods	Journal of Pharmacognosy and phytochemistry	2020 9(6)	5.21
BAU, Sabour (Bihar)				
Gathala, M. K., Laing, A. M., Tiwari, T. P., Timsina, J., Islam, S., Bhattacharya, P. M., Dhar, T., Ghosh, A., Sinha, A. K., Chowdhury, A. K., Hossain, S., Hossain, I., Molla, S., Rashid, M., Kumar, S., Kumar, R., Dutta, S. K., Srivastwa, P. K., Chaudhary, B., Jha, S. K., Ghimire, P., Bastola, B., Chaubey, R. K., Kumar, U. and Gérard, B. (2020).	Energy-efficient, sustainable crop production practices benefit smallholder farmers and the environment across three countries in the Eastern Gangetic Plains, South Asia	Journal of Cleaner Production,	246, 118982. https://doi.org/10.1016/j.jclepro.2019.118982	13.25

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Dutta, S. K., Laing, A. M., Kumar, S., Gathala, M. K., Singh, A. K., Gaydon, D. S., &Poulton, P. (2020)..	Improved water management practices improve cropping system profitability and smallholder farmers' incomes	Agricultural Water Management,	242, 106411. https://doi.org/10.1016/j.agwat.2020.106411	10.02
SDAU,S K Nagar (Gujarat)				
N. V. Nisarata, Patel K. M., Muniya S. S., Chaudhari G. I. and Chauhan Z. Y. (2020)	Influence of Organic and Inorganic Sources of Nutrients on Growth and Yield of Coriander (<i>Coriandrum sativum</i> L.).	International Journal of Current Microbiology and Applied Sciences	11 pp. 2215-2223	5.38
Patel K.M., Patel P.K., Desai L.J., Patel K.N., Patel S.A. and Chaudhary H.L. (2020)	Integrated farming systems for livelihood security of small and marginal farmers.	Multilogic In Science	X, ISSUE XXXIII pp. 600-603	5.20
JAU,Junagadh (Gujarat)				
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 (<i>Allium cepa</i> 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 (<i>Triticum aestivum</i> 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 (<i>Sorghum bicolor</i> L. Moench).	International Journal of Chemical Studies.	7(5):2366-69	5.30
R. R. Palanjiya, R. M. Solanki and Arpita Meena	Fodder quality of rabi fodder sorghum (<i>Sorghum bicolor</i> L. Moench) as influenced by spacing and nitrogen levels.	International Journal of Chemical Studies.	7(6):592-594	5.30

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
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 (<i>Allium cepa</i> 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
CSKHPKV, Palampur (Himanchal Pradesh)				
Sharma S.K., Pathania Pawan, Katoch Mittu and Sharma Sanjay K..	Economics of diversification of existing Farming Systems under marginal household conditions in low hills zone of H.P. March-June, 2020.	Green Farming	11 (2 & 3): 278-280	4.38
Singh Akashdeep and Pathania Pawan.	Evaluation of different crop sequences for yield, crop duration, land use efficiency and per day food availability. 2020	Himachal Journal of Agricultural Research	46 (2) : 193-196	3.91
Shabnam and Sharma Sanjay K.	Long term cultivation effects on nitrogen dynamics in polyhouse and open field vegetable growing soils of North-Western Himalayas. 2020.	Journal of Environmental Biology.	41: 1719-1723.	6.56
Shambhavi, S., Bihari B., Kumar R, Verma G, Sharma SP, Sharma Sanjay K and Sharma RP.	2020. Fractions of copper in soil and their contribution to copper availability and uptake in maize–wheat cropping system under Typic hapludalfs.	Cereal Research Communications.	48:555–563.	6.71

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
CCSHAU,Hisar (Haryana)				
Jat, M.K, Yadav, P.K., Singh, R., Tikkoo, Abha and Dadarwal, R.S, 2020	Response of sesame (Sesamum indicum L.) to phosphorus nutrition in coarse textured soils of south west Haryana	Journal of Oilseeds Research	Vol. 37(1): 33	4.59
Jat, M.K., Yadav, P.K., Singh, R., Tikkoo, A., Yadav, S.S. and Dadarwal, R.S, 2020	Response of green gram (Vignaradiata L.) to potassium fertilization in coarse textured soils of Southern Haryana	Indian Journal of Environmental Biology	Vol. 41(6), 1621	6.78
Yadav, J.S., Satyajeet and R. S. Dadarwal, 2020	Castor (Ricinus communis L.) based cropping system for higher income in South-Western Haryana	Indian J. Oilseeds Research	(special issue): 271	4.59
SKUAST, Jammu (Jammu&kashmir)				
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, Archana, Bochalya Ranjeet Singh and Kumar Deepak 2020	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
UAS,Bangalore (Karnataka)				
N Ragavendra., M. T Sanjay., Murthy Kalyana, K.N., Dhanapal, G.N., Nagaraju N. And K. S Jagadish.,	Growth and yield of direct seeded rice as influenced by different weed management practices	Indian Journal of Plant Protection	48(1&2): 104-107	5.07
Kommireddy Poojitha, M. T Sanjay., Kalyana Murthy, K. N., Dhanapal, G. N., Nagaraju, N. And A Satish,	Bioefficacy and phytotoxicity of different new herbicide molecules on weed growth, crop growth and yield parameters of maize	Indian Journal of Plant Protection	49(1): 85-90	5.07
R Raghupathi1., G. S. Mahadevaiah, Gaddi G. M. And Kumar Anjan, M. J.	Cost Returns and Input use Pattern for French Bean Cultivation in Mysore District of Karnataka	International Journal of Current Microbiology and Applied Science	9(3): 1579-1585	5.98

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Kumar Anjan, M. J., R. Raghupathi, And Bhavya A.P.	Economic Efficiency of French Bean Production in Karnataka : An Economic Analysis	Current Journal of Applied Sciences and Technology	9(11): 2317-7706	5.98
Kumar Anjan, M. J., R. Raghupathi, AND Bhavya A.P.	Consumer Perception Towards Indira Canteen: A Study in Bengaluru	Current Journal of Applied Sciences and Technology	09(11): --	5.98
UAHS,Shimoga (Karnataka)				
KUMARA, O., VIJAY S. DANARADDI., RANJEETHA K., KIRAN EMMIGANUR. AND RAJASHEKHAR L.,	Integrated Farming System- An approach towards livelihood security, resource conservation and sustainable production of small and marginal farmers	Journal of pharmacognosy and Phytochemistry	8(2):2226-2230	5.30
Kumara,. o	NESA-Best scientist of the year 2020	National environment Science academy	Environmental sciernce	6.2
UAS, Raichur (Karnataka)				
Abhishek, N. and Basavanneppa, M.A. 2020,	Yield and economics of sweet corn (Zea mays L. Saccharata) as influenced by plant densities and nitrogen management in irrigated condition	International Journal of Chemical Studies,	8(2): 2138-2141	5.31
Abhishek, N. and Basavanneppa, M.A. 2020,	Effect of plant densities and nitrogen levels on cob yield and quality parameters of sweet corn (Zea mays L. Saccharata) in irrigated ecosystem,.	International Journal of Chemical Studies,	8(2): 2918-2921	5.31
Basavanneppa M.A. and Ashok Kumar Gaddi, 2020,	Productivity and profitability as influenced by rice based cropping system in Tungabhadra project area of Karnataka.	International J. Chem. Studies..	8(1):2483-2486	5.31
Basavanneppa M.A. and Ashok Kumar Gaddi, 2020.	Doubling the small farmers income through integrated farming system approach in irrigated ecosystem.	International J. Chem. Studies..	8(2):955-958	5.31

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Basavanneppa M.A. and Prakash H Kuchanur, 2020.	Productivity and profitability of maize as influenced by genotypes, spacing and nutrient levels under irrigated situation.	International J. Chem. Studies..	8(3): 1626-1629	5.31
Ashok Kumar Gaddi, Basavanneppa M.A. and prabhuling tevari, 2020.	Effects of long term use of organic and inorganic fertilizers on soil fertility and productivity under paddy- sesame cropping system..	Bangladesh J. Bot	.49(3): 585-591	6.0
Basavanneppa M.A. and Prakash H Kuchanur, 2020.	Productivity and profitability of maize as influenced by genotypes, spacing and nutrient levels under irrigated situation.	International J. Chem. Studies..	8(3): 1626-1629	5.31
Basavanneppa M.A. and Arun Kumar B., 2020.	Production and Economic Efficiencies as Influenced by Mustard Genotypes in Paddy Fallows of Tungabhadra Command Area of Karnataka.	Int.J.Curr.Microbiol. App.Sci.	9(6): 2376-2380.	5.38
Basavanneppa M. A, Ashok Kumar Gaddi, Biradar, D.P. and Basavarajappa R., 2020.	Effect of long-term of nutrient management on productivity and soil fertility of maize (Zea mays)-wheat (Triticum aestivum) cropping system in Tungabhadra command area.	International Journal of Chemical Studies. .	8(3):1034-1037	5.31
Kirana Kumara, K Narayana Rao, Veeresh H, Ashok Kumar Gaddi and Channabasavanna AS, 2020,	Influence of foliar application of micronutrient mixture on micronutrient uptake by the safflower..	International Journal of Chemical Studies,	8(3):243-248	5.31
Umesh, M.R., Basavanneppa, M.A., Shivakumar, Mallesh, Chittapur, B.M., Ajayakumar, M.Y., Desai B.K. and Ananda, N., 2020.	Optimization of nitrogenous fertilizers using leaf-colour chart for irrigated hybrid maize (Zea mays) grown in Vertisol of sub-tropical India	Indian Journal of Agronomy,	65 (1): 77-82	5.55

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
KAU, Karamana (kerala)				
Sajeena,A., Karthika, S.R., John, J., Sudha,B. and Meera, A.V.	Antifungal efficacy of phytoantifungal principles and management of rice sheath blight disease	Journal of Mycology and Plant Pathology	49(3): 217-225	5.79
Bashma,E.K and Sudha, B.	Integration of soil and foliar nutrition in influencing the yield related characters, yield and economics of nendran banana (MUSA AAB group) and the soil nutrient status of cropped field.	Journal of Crop and Weed	16(1): 127-132	5.28
Poornima, P.I., Manu, C.R., Sudha, B., and Saparia, S.	Influence of microbial inoculants on yield and disease incidence in yard long bean (<i>Vigna unguiculata</i>)	Journal of Krishi Vigyan	8(2): 191-194	4.41
Sajeena, A., Deepthi S. N., Teja Sri Peteti, T. S., John, J., Sudha, B., and Meera, A.V.	First report of basal stem rot and blight of yardlong bean (<i>Vigna unguiculata</i> subsp. <i>sesquipedalis</i>) caused by <i>Athelia rolfsii</i> in India.	Journal of Plant Pathology	https://doi.org/10.1007/s42161-020-00663-7	6.82
Sudha,B. , John, J., Meera, A. V and Sajeena, A.	INM in a rice based Integrated Farming System model for food security and enhanced productivity	Indian Journal of Ecology	47(3): 630-633	4.96
kumarChethan, P., Meera, A.V., John, J., and Leno, N.	Influence of diverse cropping systems on soil health and carbon pool at varied depths in a wetland riverine alluvial soil	International Journal of Chemical Studies	8(5):2092-2097	5.31
Bindhya,B.N and John, J.	Effect of fodder crops on weeds in summer rice fallow.	Journal of Agricultural Ecology Research International	21(9): 22-28	4.09
Bindhya,B.N and John, J.	Residual effect of fodders on the succeding rice crop	International Journal of Agrictlural Science Research	10(6): 1-6	4.13
Adarsh, S. and John, J.	Response of paddy (<i>Oryza sativa</i> L.) to pulses grown in summer rice fallows.	Research on Crops	21 (4): 659-665	4.75

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Sudha, B., John, J., Meera, A. V., and Sajeena, A.	Growth, nutrient uptake and yield of ginger as impacted by potting media, foliar nutrition and microbial inoculants.	Journal of Spices and Aromatic Crops	29 (2): 113-121	4.85
Sri, P. T., Sajeena, A., Johnson, J. M., John, J., and Radhika, N.S.	Factors influencing the incidence of basal stem rot and blight disease caused by <i>Sclerotium rolfsii</i> in vegetable cowpea and its management using botanicals	Journal of Biological Control	34(3): 215-222	4.99
Swathi, G., Meera, A. V., Thampatti, M. K. C., and John, J.	Physico chemical and biological properties of post flood soils in the south central laterites of southern Kerala	International Journal of Chemical Studies	8(5):1829-1835	5.31
Joseph Biju, Gladis, R., Aparna, B. and Bindhu J. S.	Amelioration of acidity and iron toxicity in lateritic lowland rice soil using non-conventional sources of calcium.	International Journal of Chemical Studies	8(4):2041-2044	5.31
Joseph Biju, Gladis, R., Aparna, B. and Bindhu J. S.	Assessment of iron toxicity in lateritic wetland soils of Kerala and management using non conventional sources of lime	International Journal of Current Microbiology and Applied Science	9(5):2139-2148	
JNKVV, Jabalpur (Madhya Pradesh)				
Nargave Girdhari, Sharma P. B., Sahu Rajendra Prashad, Singh Vikash and Patel Rajendra 2020	Influence of Varying Environment on Rice Varieties under Upland Condition of Madhya Pradesh, India.	Int.J.Curr.Microbiol. App.Sci	9(8): 1317-1323	5.38
Kumar, V., Upadhaya, V. B., Agrawal, S. B., Sahu, R. P., & Ahirwal, A. (2020)	Effect of Different Cropping Sequences on Soil Health under Irrigated Condition in Madhya Pradesh	Int. J. Pure App. Biosci.	8(6), 492-500	4.74
Khongwir Bankerlang, Sahu R.P. and Kewat M.L. 2020	Efficacy of post emergence herbicides on weed flora and yield in transplanted rice	Ann. Agric. Res.	New Series Vol. 41 (4): 349-354	4.01

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Jain Mahaveer, Sahu R.P. and Patel Chetan 2020	Economic Analysis Of Weed Control In Rice Crop [Oryza sativa L.]	Journal of Plant Development Sciences	Vol. 12(3) Ref-1615 171-175	4.57
Soni Rajul, Mondal Triptesh, Sondhia Shobha, Sahu Rajendra Prasad and Patel Hradesh 2020	Efficacy of pyribenzoxim herbicide in dry direct-seeded rice	Indian Journal of Weed Science	52(3): 227–231	5.17
Pradhan Y.K., Kurmavanshi S.M, Maurya B.M. and Singraul A 2020	Studies on bio intensive multiple cropping system in Kymore satpura plateau under irrigated condition	International journal of current microbiologyand applied science	9(11):2929-2935	5.39
Singraul A, Maurya B.M., Kurmavanshi S.M. and Pradhan Y.K. 2020	Weed management in rice garlic under organic production system	International journal of current microbiologyand applied science	9(11);1443-1449	5.39
RVSKVV, Indore (Madhya Pradesh)				
Singh Bharat, Pawar Shweta, Sharma Ashok, Thakur N.S. and Shrivas Rini. 2020.	Effect of organics and inorganics on soil properties – A step towards nutrient management in Vertisols of Malwa Region.	International Journal of Current Microbiology and Applied Sciences.	Special Issue-10:1-10.	ISSN: 2319-7706
Pawar Shweta, Singh Bharat, Thakur N.S., Sharma Ashok, and Shrivas Rini. 2020.	Integrated Nutrient Management – A remedy for enhancing the lives of Microbes in soil.	International Journal of Current Microbiology and Applied Sciences.	Special Issue-10:11-15	ISSN: 2319-7706
Pawar Shweta, Singh Bharat, Sharma Ashok, Thakur N.S. and Shrivas Rini. 2020.	Nutrient Management Practices for Enhancing Soybean Production in Rainfed condition.	International Journal of Current Microbiology and Applied Sciences.	Special Issue-10:16-23.	ISSN: 2319-7706
PAU, Ludhiana (Punjab)				
Gill Divya, , Sandhu K. K., , Kaur S. S., , Walia Samanpreet, , S. S. and Rana Mamta, (2020).	Assessing the performance of wheat cultivars under present and futuristic climatic conditions using DSSAT model	Journal of Agrometeorology	22: 149-154	6.47
Kaur Jaspreet, Gosal, S. K., Walia, S. S., Kaur J. and KhiplaNeha (2020).	Interaction of different carbon related microbial activities as influenced by green manure and bio inoculants in Kharif maize crop.	International Journal of Current Microbiology and Applied Sciences	9(2): 286-294	5.38

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Kaur, H., Gosal, S. K., Walia, S. S. and Kaur, J. (2020).	Effect of sulphur oxidizing bacterial inoculants on soil nutrient availability their uptake and growth of Brassica napus (Var GSC 7).	International Journal of Current Microbiology and Applied Sciences	9(8):753-763.	5.38
Mundi, W., Gosal, S. K., Walia, S. S., Kaur, J. and Kaur, J. (2020).	Effect of biofertilizers along with pesticides on soil biological properties and yield of wheat.	Chemical Science Review and Letters9	(35):714-721.	4.75
Saini, K. S., Brar, N. S., Walia, S. S. and Sachdev, P. A. (2020).	Effect of planting techniques plant densities on different depths of sowing on production, economics, water and sugar productivity of sugarbeet.	Journal of Crop and Weed	16(2): 190-196.	5.46
Walia, S. S., Singh, G. and Saini, K. S. (2020).	Effect of integrated nutrient management on microclimatic environment, quality and yield of baby corn (Zea mays) in North-Western India.	Indian Journal of Agronomy	65(1): 83-87.	5.55
SKN University, Durgapura (Rajasthan)				
Sammauria, R., Meena, O. P., Yadav, M.R., Gupta, K.C., Gupta, A. K and Yadav, H.L. 2020	Crop Diversification of Predominant Pearl Millet Based Cropping System for Higher Productivity, Resource-Use Efficiency and Profitability in Semi-Arid Rajasthan.	Legume Research	43(4):568-572	6.34
Sammauria R.,Kumawat S., Kumawat P, Singh Jogender, and Kumar Tarun. 2020	Microbial Inoculants: Potential tool for sustainability of agricultural production systems.	Archives of Microbiology	202, 677-93	7.88
Gupta,KC, Praharaj, CS, Jain, SK, Kumar, Vipin and Yadav MR. 2020	Crop, water productivity and economics in chickpea as influenced by application of hydrogel and foliar nutrition	Journal of Food Legumes	33(4): 252-256	4.82

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Singh Pratibha, Dwivedi M, Srivastava P C, Pachauri S P, Shukla A K and Singh A P. 2020	Boron Fertilization and Crop Production in India: A Review.	Indian Journal of Agricultural Sciences	90 (1): 9-16	6.25
Jain S. K., Sharma LD, Gupta KC, Kumar Vipin and Yadav MR. 2020	Principal Component and Genetic Diversity Analysis for Seed Yield and Its Related Components in the Genotypes of Chickpea (<i>Cicer arietinum</i> L.). Accepted	Legume Research. (LR 4489)	Published online	6.34
Jain S. K., Sharma LD, Gupta KC, Kumar Vipin and Yadav MR. 2020	Variability and character association for yield and quantitative traits under late sown conditions in Chickpea (<i>Cicer arietinum</i> L.). DOI:10.18805/LR-4432	Legume Research	Published online	6.34
Jain S. K., Sharma LD, Gupta KC and Kumar Vipin 2020	Association among yield and yield contributing characters in Chickpea (<i>Cicer arietinum</i> L.).	Journal of Food Legumes	33 (3):164-169.	4.82
Kumar Sudesh, Yadav MR, Gupta KC, Saxena R, Meena OP, Singh Jogendra, Yadav KC and Khrub AS. 2020	Amelioration of lodging in barley (<i>Hordeum vulgare</i>) using plant growth regulators.	Indian Journal of Agricultural Sciences	90(2):407-11	6.25
AU,Kota (Rajasthan)				
Bijarnia, A., Sharma, O.P., Tatarwal, J.P., Lal, B. and Kumawat, R.	Profitability and optimum dose of sesame (<i>Sesamum indicum</i> L.) as influenced by nitrogen and potassium fertilization under semi-arid conditions of Rajasthan.	Annals of Agricultural Research	2020, Vol. 41 (1): 92-96.	4.78
Kantwa, S., Jadon, C.K., Tatarwal, J.P., Ram, Baldev., Kantwa, S.R., and Yadav, R.K.	Effect of weed management practices on weed dynamics, yield attributes and yield of maize.	International Journal of Bio-resource and Stress Management	2020. Vol 11(5): 488-493.	5.11

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Kumawat, R., Shivran, A.C., Ram, Baldev., Tetarwal, J.P., Yadav, B.D. and Bijarnia, A.	Productivity and profitability of mustard (Brassica juncea) and lentil (Lens esculenta) intercropping system influenced by different levels of fertility. Annals of	Annals of Agricultural Research	2020. 41 (1): 1-6.	4.78
MPUAT, Udaipur (Rajasthan)				
Singh Hari, Meena, G.L and.Sharma, S.K and Ameta, K.D.	Economic Empowerment of Tribal Farmers through Integrated Farming Systems In Southern Rajasthan India	International Archive Of Applied Science & Technology Vol 11 [1] March: 85-94	2020	5.23
PJTSAU, Rajendranagar (Telangana)				
Reddy, G. K., Goverdhan, M., Pragathi, Kumari. CH, Latheef Pasha, MD., Ali Baba, MD and Rani, B.	Integrated farming system a promising farmer and eco friendly approach for doubling the farm income in India – A Review.	International Journal of Current Microbiology and Applied Sciences.	9(1): 2243-2252	5.38
Kumari Pragathi, Ch., Goverdhan, M., Reddy, G. K., & Sridevi, S.	Nutrient uptake and soil fertility status under different cropping systems for Integrated Farming Systems of Telangana State, India.	International Research Journal of Pure and Applied Chemistry	21(6), 1-10	5.40
Latheefpasha, Md., Reddy, G.K., Sridevi, K., Goverdhan, M., Ali Baba, Md and Rani, B.	Energy use efficiency and green house gas emissions from integrated crop-livestock systems in semi-arid ecosystem of Deccan Plateau In Southern India	Journal of Experimental Biology and Agricultural Sciences	8(2): 98 – 110	5.07
Goverdhan, M., Pragathi Kumari, Ch., Sridevi, S., Ramana, M.V and Suresh, K.	Evaluation of Integrated farming system model for small and marginal farmers of Telangana state.	Current Journal of Applied Science and Technology	39(10): 126-134	5.32
Pragathi Kumari, Ch., Suneetha Devi, K.B., Rekha, K.B., Sridevi, S and Narender Reddy. S	Weed dynamics in Bt cotton under moisture conservation and integrated nutrient management practices	Current Journal of Applied Science and Technology	39(15): 118-126	5.32

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Pragathi Kumari, Ch., Suneetha Devi, K.B., Rekha, K.B., Sridevi, S and Narender Reddy, S.	Effect of Land Configurations and Integrated Nutrient Management Practices on Productivity, Evapotranspiration and Water Use Efficiency of Bt Cotton.	Chemical Science Review and Letters	9(35): 651-659	5.31
Latheef Pasha, Md., Sridevi, S., Goverdhan, M., Reddy, G.K and Ali Baba, Md.	On-farm Evaluation of Rice-groundnut Sequence vis-a-vis Rice-rice Cropping System under Limited Irrigated Situations of Telangana, India.	Current Journal of Applied Science and Technology	39(23): 148-155	5.32
Pragathi Kumari, Ch., Goverdhan, M., Kiran Reddy, G., Knight Nthebere. Sharma, S.H.K., Aziz Qureshi, A., Alibaba, Md and Chiranjeevi, K.	Diversification of Cropping Systems for Different Integrated Farming System Models under Irrigated Situation of Southern Telangana Zone, Telangana, India.	Current Journal of Applied Science and Technology.	39(29): 51-60	5.32
Nthebere, K., Sharma, S. H. K., Pragathi Kumari, Ch., and Qureshi, A. A.	Different Cropping System Effects of Depth-Wise Distribution of Available NPKS in an Inceptisol of Southern Telangana Zone	International Research Journal of Pure and Applied Chemistry	21(17), 32-39	5.40
Pragathi Kumari, Ch., Goverdhan, M., Reddy, G. K., Nthebere, K., Sharma, S. H. K., Qureshi, A. A., Alibaba, M., and Chiranjeevi, K.	Different Cropping System's Effect on Available NPK Post-harvest and their Uptake on Sandy Loam Soil of Southern Telangana Zone, India	International Research Journal of Pure and Applied Chemistry	21(18), 56-65	5.40
Goverdhan, M., Pragathi Kumari, Ch., Reddy, G. K., sridevi, S., Alibaba, M., Chiranjeevi, K and Santhosh Kumar, M.	Evaluation of Integrated Farming System model for resource recycling and livelihood security of small and marginal farmers of Telangana state, India	Current Journal of Applied Science and Technology	39 (34): 17-26	5.38
Firdoz Shahana, Goverdhan, M., Sridevi, S. and Joseph, B.	Identification of Economically viable cropping systems for vertisols of Northern Telangana Zone.	Current Journal of Applied Science and Technology	39 (34): 17-26	5.38

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
Geetha Sireesha, P.V., Padmaja, G., Venkata Ramana, M. and Rao, P.C.	Soil Enzymatic Activity under Different INM Practices in Rice-Rice cropping system.	International Journal of Current Microbiology and Applied Sciences.	9(6): 1073-1080	
Ramanajaneyulu, A.V., Sainath, N., Sravanthi, D. and Venkata Ramana, M.	Contour Farming Improves Soil Moisture and Dry Land Crop Productivity on Rainfed Alfisols	International Research Journal of Pure and Applied Chemistry	21(21), 60-69	5.40
Indudhar Reddy, K., Ramanjaneyulu, A.V., Nagesh Kumar, M.V., Sameer Kumar, C.V. and Venkata Ramana, M.	Performance of pigeonpea (Cajanus cajan. L) varieties under different spacings during rabi season.	Current Journal of Applied Science and Technology	39 (31): 61-66	5.32
Ramanjaneyulu, A.V., Indudhar Reddy, K., Nagesh Kumar, M.V., Venkata Ramana, M. and Suresh, G	Agro-economic evaluation of oilseed crops in rice fallow situation in Alfisols	Journal of Oilseeds Research	37(4): 272-277	5.02
Ramanjaneyulu, A.V., Madhavi, A., Nagesh Kumar, M.V., Neelima, T.L., Venkata Ramana, M. and Srinivas, A.	Standardization of fertigation schedule for rabi castor (Ricinus communis L.) under drip irrigation	Journal of Oilseeds Research	37(Special Issue): 155-156	5.02
Nalini, N., Ramanjaneyulu, A.V., Mamatha, K., Neelima, T.L., Anuradha, G., Venkata Ramana, M., Suresh, G. and Durga rani, Ch.V.	Best Management Practices for yield maximization in rainfed castor	Journal of Oilseeds Research	37(Special Issue): 94-95	5.02
TNAU,Coimbatore (Tamil Naidu)				
K Sathiyabama, Latha K.R, Vasuki V and Ravishankar N.	Prediction of green house gas emission in the integrated farming system model: Implication on soil environment.	Journal of pharmacognosy and phytochemistry	9(4)5.21. 2020	5.21
K Sathiyabama., V Vasuki and K.R Latha.	Impact of cropping sequences on soil fertility in the western zone of tamil nadu	International Journal of Agriculture Sciences	Volume 12, Issue 9, 2020, pp- 9825-9827.	3.96
K Sathiyabama, Vasuki V, Latha K.R and Ravishankar N	Studies on influence of different cropping systems on soil fertility sustenance in the vertic ustropept	International Journal of Chemical Studies	SP-8(4): 383-388.2020	5.31

Authors	Title of Paper	Name of Journal	Valume number and pages	NAAS rating
K Sathiya Bama, Vasuki V, Latha K.R and Ravishankar N	Climate change mitigation through cropping sequences by prediction of global warming gases	International Journal of Chemical Studies	8 (4): 3091- 3098. 2020	5.31
K Ramani,, Latha K. R., Tamilselvan N. and R Sivakumar,.	Influence of Sowing Time and Varieties on Growth and Yield of Horsegram (Macrotyloma uniflorum Lam.) under Rainfed Condition	Int.J.Curr.Microbiol. App.Sci. 9(11): 2214-2221	2020	
CSAU&T,Kanpur (UttarPradesh)				
Dubey Sauhard, Siddiqui M.Z., Rana Saurabh, Shukla Gaurav, Singh Dharmendra And Pandey Ashish Nath (2020).	Effect of integrated nutrient management on growth and development of mustard (Brassica juncea L.) in irrigated condition of upper Gangetic plains.	Journal of plant development science,2020	12(5): 289-295	4.57
Gyani Gurumukh, Khan Naushad, Ansari M.H., Siddiqui M.Z., Naz Huma, Moied Abdul and Kumar Anil.	Planting pattern and weed management practices on productivity of onion (Allium cepa L.).	Journal of Pharmacognay and Phytochemistry, 2020	9(5):2140-2144	5.11
Khan Naushad, Kumar Ajay, Dubey Vijay, Singh C.B., Kumar Sanjeev and Singh Shubham	Estimated Yield Forecasting of Rice and Wheat for Central Uttar Pradesh using Statistical Moda	International Journal of Current Microbiology and Applied Sciences, 2020	9 (8): 2490-2495	5.38
BCKVV, Kalyani (West Bengal)				
Saha S, Saha BN, Mohanty S, Ray M, Hazra GC, Chatterjee S, Mukhopadhyay S.K.	Identifying suitable soil quality indicators in an Indian rice-wheat system as influenced by long term (30 years) inorganic-organic fertilization	Archives of Agronomy and Soil Science (2020)	https://doi.org/10.1080/03650340.2020.1851684	8.14
Chatterjee Soumitra, Chakraborty Riya and Banerjee Hirak	Economic impact assessment of conservation agriculture on small and marginal farm households in eastern India	Agricultural Economics Research Review (2020)	33(Conference No) DOI: 10.5958/0974-0279.2020.00024.5) pp. 127-138	5.90

8.1.2 Paper presented in seminar/symposia

Author	Year	Date	Title of the Paper	Conference Name and venue	Organized by
Akola					
B.V. Saoji, B.S. Morwal, D.S. Kankal and P. H. Bansod		February 17-18, 2020	Identification of cropping system module for higher productivity, profitability and crop residue recycling under irrigated condition of Vidarbha region in Maharashtra	State level seminar on "Frontier technologies for climate resilient agriculture"	Dr. PDKV, Akola
Bhubaneswar					
T. R. Mohanty, Patra A.K., Paikray R.K., Garnayak L.M., Mishra K.N. and Swain S.K.	2020	January 28-29, 2020	Enhancement in productivity and economics of rice- groundnut cropping system through farmer participatory approach	National Seminar on Climate Smart Agriculture for Enhancing Farm Profitability	OUAT, Bhubaneswar
Bangalore					
Sanjay, M.T. and Mahin Sharif	2020	3 – 7 January, 2020	Integrated farming system modules for improving profitability and livelihood of small and marginal farmers of Chikkaballapura district, Karnataka	107th Indian Science Congress, "Science and Technology, rural development", UAS, GKVK, Bengaluru	UAS, GKVK, Bengaluru
Sanjay, M.T. and Mahin Sharif	2020	3 – 7 January, 2020	Farming system perspective for welfare of soliga tribals of BR hills, Karnataka	107th Indian Science Congress, "Science and Technology, rural development", UAS, GKVK, Bengaluru	UAS, GKVK, Bengaluru
Sanjay, M.T., Setty Prabhakara T.K., Veeresh Hatti and Raghavendra, N.	2020	5-7 February 2020	Weed management in maize with new herbicide molecules for higher productivity	Weed Management for Enhancing Farmers' Income and Food Security- ICAR - Central Coastal Agricultural Research Institute, Goa	Indian Society of Weed Science, Jabalpur and ICAR - Central Coastal Agricultural Research Institute, Goa
Kommireddy Poojitha, Sanjay, M.T., Kalyana Murthy K.N. and Dhanapal, G.N.	2020	5-7 February 2020	Bio-efficacy and phytotoxicity of new herbicide molecules on weed and crop growth and yield of maize	Weed Management for Enhancing Farmers' Income and Food Security- ICAR - Central Coastal Agricultural Research Institute, Goa	Indian Society of Weed Science, Jabalpur and ICAR - Central Coastal Agricultural Research Institute, Goa

Author	Year	Date	Title of the Paper	Conference Name and venue	Organized by
Veeresh Hatti, Ramachandrappa, B. K., Mudalagiri-yappa and Sanjay, M.T.	2020	5-7 February 2020	Studies on conservation tillage regimes and nutrient management strategies on weed and crop growth under rainfed Alfisols	Weed Management for Enhancing Farmers' Income and Food Security- ICAR - Central Coastal Agricultural Research Institute, Goa	Indian Society of Weed Science, Jabalpur and ICAR - Central Coastal Agricultural Research Institute, Goa
Nagarjun, P., Dhanapal, G.N., Sanjay, M.T. and Kamala bai, S	2020	5-7 February 2020	Integrated weed management in dry direct-seeded rice	Weed Management for Enhancing Farmers' Income and Food Security- ICAR - Central Coastal Agricultural Research Institute, Goa	Indian Society of Weed Science, Jabalpur and ICAR - Central Coastal Agricultural Research Institute, Goa
Coimbatore					
S.P.Sangeetha.		09.10.2020 to 10.10.2020	Effect of organic nutrient management on yield and soil fertility in rice- blackgram cropping system	5th National Conference on "Agricultural Scientific Tamil conference"	TNAU and Agricultural Scientific Tamil Society, New Delhi
Durgapura					
Singh Pratibha, Sammuria R and Gupta Shweta	2020	25 August	Study on effect of foliar feeding of Nano Nutrients on Groundnut Crop Performance and Soil Properties under semi-arid conditions of Rajasthan.	National Webinar on Recent Advances in Soil Microbiological Research with a Special Thrust to Biofertilizer Technology. BAU, Sabour.	BAU, Sabour.
Kalyani					
Saha Sushanta, Sk Md. S Asif, Mohanty, and S.K. Mukhopadhyay	2020	27 August, 2020	Inorganic-organic fertilization on yield and soil fertility after six cycles of different rice based cropping systems	Virtual National Seminar on "Agrochemicals for upkeeping environment"	Society for Fertilizers and Environment in collaboration with Bidhan Chandra Krishi Viswavidyalaya
Chatterjee Soumitra	2020	16-17 October, 2020	Lead Lecture on "Current Trends in Pulses and Oilseeds Production in India"	Modern Tools and Techniques for doubling the Pulse & Oilseed Production College of Agriculture Tripura	Department of Agronomy, College of Agriculture Tripura

Author	Year	Date	Title of the Paper	Conference Name and venue	Organized by
Chatterjee Soumitra, Chakraborty Riya and Banerjee Hirak	2020	16-18 December, 2020	Oral presentation on "Economic impact assessment of conservation agriculture on small and marginal farm households in eastern India"	28th Annual Conference of the Agricultural Economics Research Association (India) (AERA) New Delhi	Agricultural Economics Research Association (AERA) Pusa New Delhi
Karamana					
Bindhu, J. S. Girijadevi, L., Gladis, R., Raj, S. K., and Nair Linitha.	2020	20-22 January	Phenological studies in Grand Nain banana.	National seminar on Agrometeorological Interventions for Enhancing Farmers' Income" (AG-MET-2020), 20-22 January, 2020, Thirsur. Kerala Agricultural University, pp.202.	Association of Agrometeorologists, Anand and Kerala Agricultural University
Chijina, K., Latha, A., and Bindhu, J. S.	2020	20-22 January	Performance of vegetable cowpea (<i>Vigna unguiculata</i> (L.) Walp.) under open precision farming.	National seminar on Agrometeorological Interventions for Enhancing Farmers' Income" (AG-MET-2020), , 20-22, January, 2020, Thirsur. Kerala Agricultural University, pp.419.	Association of Agrometeorologists, Anand and Kerala Agricultural University
Anitroza Innacent, Jacob D. and Bindhu J.S., Joseph Brijith and Anith, K.M.	2020	16-17, August	Capturing diversity in integrated farming systems prevailing in marginal households through quantitative farming system Typology	National Web-Conference on Technological Approaches for Resource Conservation and Management for Environmental Sustainability	Academy of Natural Resource Conservation and Management (ANRCM)
Sajeena A., Jacob John, kumari Meena K. S., Sudha B., and Meera A. V.	2020	6-9, October	Arbuscular Mycorrhizal fungi – a potent beneficial microbe for yield enhancement and disease management in rice and vegetable cowpea.	International E-Conference on "Multidisciplinary approaches for plant disease management in achieving sustainability in agriculture	University of Horticultural Science, Bagalkot, GKVK, Bengaluru
Sajeena A., Jacob John, kumari Meena K. S., Joy M., Nair D. S., Sudha B., and Meera A. V.	2020	6-9 October	Identification of major diseases affecting vegetable cowpea cultivated in polyhouse and development of an integrated disease management strategy	International E-Conference on "Multidisciplinary approaches for plant disease management in achieving sustainability in agriculture	University of Horticultural Science, Bagalkot, GKVK, Bengaluru

Author	Year	Date	Title of the Paper	Conference Name and venue	Organized by
Sajeena A., Joy M., Jacob John, and Radhika N. S.	2020	6-9 October	Biofumigation, a novel approach for the management of basal stem rot and leaf blight of vegetable cowpea.	International E-Conference on "Multidisciplinary approaches for plant disease management in achieving sustainability in agriculture"	University of Horticultural Science, Bagalkot, GKV, Bengaluru
Dhanya M. K., Indhu P., Bisnamol, J., Murugan, M., kumar Ashok, K., Nimisha, M., and Sajeena A.	2020	6-9 October	Comparative account of some defense related biochemical in resistant and susceptible black pepper varieties/ cultivars in response to infection by Colletotrichum gloeosporioides	International E-Conference on "Multidisciplinary approaches for plant disease management in achieving sustainability in agriculture"	University of Horticultural Science, Bagalkot, GKV, Bengaluru
Sajeena, A.	2020	1-2 December	Rice chaff- glyricidia leaf mixture, a promising substrate for mass multiplication of Trichoderma viride Won second best oral presentation award	National Symposium (virtual) on Advances in Crop Health Management held at ICAR-IARI Regional Station, Wellington, The Nilgiris, Tamil Nadu	Indian Phytopathological Society
Kathalagera					
KUMARA, O. AND ABISHEK GOWDA, C. S.,	2020	5th to 7th February, 2020	Weed management in direct seeded rice under Bhadra command area of Karnataka	Indian society of weed science, Bi-ennial conference on "Weed management for enhancing farmers income and food security"	ICAR- Central Coastal Agricultural Institute, Goa
Kota					
Choudhary, G.R., Tatarwal, J.P. and Shivran, B.	2020	January, 30-31	Prospects of intensive vegetable farming-based cropping system.	National Seminar on Smart horticulture at CH&F, Jhalawar, Rajasthan	College of Horticulture and Forestry, Jhalawar, AU, Kota
Choudhary, G.R., Tatarwal, J.P. and Shivran, B.	2020	January, 30-31	Advanced insect-pest management under protected cultivation.	National Seminar on Smart horticulture held at CH&F, Jhalawar, Rajasthan	College of Horticulture and Forestry, Jhalawar, AU, Kota
Ram, Baldev., Meena, H.P., Narolia, R. S., Mathur, I. N., Yadav, R. K., Singh, Pratap, Tatarwal, J.P. and Meena, N. L.	2020	January, 30-31	Effect of land configuration and nitrogen fertigation on tuber yield, profitability and water productivity of turmeric-aonla intensified system.	National Seminar on "Smart-Horticulture" held on at College of Horticulture & Forestry, Jhalawar, Rajasthan	College of Horticulture and Forestry, Jhalawar, AU, Kota

Author	Year	Date	Title of the Paper	Conference Name and venue	Organized by
Ram, Baldev., Meena, H.P., Narolia, R. S., Mathur, I. N., Yadav, R. K., Tetarwal, J.P. and Singh, Pratap	2020	February, 03-05	Effect of sprinkler irrigation schedules, fertility levels and bioregulator spray on yield, water productivity and profitability of zaid mungbean.	National Conference on "Resource Conservation for Soil Security and Jalshakti: Farmers Perspective in Bundelkhand" held at ICAR-IISWC Regional Centre, Datia (MP)	ICAR-IISWC Regional Centre, Datia (MP)
Ram, Baldev., Punia, S. S., Tetarwal, J. P., Narolia, R. S., Meena, N. L. and Singh, Pratap.	2020	February, 10-12	Advances of weed management practices for enhancing productivity and profitability of pulses.	International Conference on Pulses the Climate smart Crops: Challenges and Opportunities held at ICAR-IIPR Regional Station (Minto Hall), Bhopal (MP)	ICAR-IIPR Regional Station, Bhopal (MP)
Ram, Baldev., Punia, S. S., Tetarwal, J. P. and Singh, Pratap.	2020	February, 10-12	Effect of fertilizers and biofertilizers on yield and economics of lentil under vertisols of Rajasthan.	International Conference on Pulses the Climate smart Crops: Challenges and Opportunities held at ICAR-IIPR Regional Station (Minto Hall), Bhopal (MP)	ICAR- IIPR Regional Station, Bhopal (MP)
Ram, Baldev., Meena, H.P., Narolia, R. S., Mathur, I. N., Yadav, R. K., Singh, Pratap, Tetarwal, J. P., Aswal, S. and Meena, N. L.	2020	March, 3-4	Effect of irrigation schedules and fertility levels on productivity, profitability and water productivity of nigella (Nigella sativa L.) in vertisols of Rajasthan.	National Workshop on "Medicinal and Underutilized Plant species for Health and Nutritional Security held on at Krishi Vigyan Kendra (Agriculture University, Kota), Anta, Baran (Rajasthan)	Krishi Vigyan Kendra, Anta, Baran, AU, Kota
Maruteru					
Manukonda Srinivas, Reddy C.V, Rao M Srinivasa, P.V. Satyanarayana and P. Munirathnam	2020	8-9 Dec, 2020	Performance of Rice Varieties under different crop establishment methods in Coastal Irrigated Ecosystem	International Conference on "1st Indian Rice Congress-2020"	ICAR-NRRI, Cuttack, Odisha
Manukonda Srinivas, C. Reddy Venkata, B. Anusha, P.V. Satyanarayana, P. Munirathnam and Naidu G. Jogi	2020	8-9 Dec, 2020	Response of Pre-Released Rice Varieties to Different Levels of Nitrogen in Coastal Andhra Pradesh	International Conference on "1st Indian Rice Congress-2020"	ICAR-NRRI, Cuttack, Odisha

Author	Year	Date	Title of the Paper	Conference Name and venue	Organized by
Reddy L. Rajashekara, Ashish M Latare, Manukonda Srinivas, Kumar Piyush and Reddy C. Venkata.	2020	8-9 Dec, 2020	Performance of Rice (Oryza Sativa L.) under different doses and combinations of Hydrogel	International Conference on "1st Indian Rice Congress-2020"	ICAR-NRRI, Cuttack, Odisha
Rajenderanagar					
Ch Pragathi Kumari,, Suneetha Devi K.B and Bhanu Rekha.K	2020	09-11-20 to 13-11-20	Productivity and Water Use Efficiency of Bt cotton as influenced by different land configurations and Integrated nutrient management practices	In American Society of Agronomy virtual International Conference	
Udaipur					
Sharma Shailza, Latika and Singh Hari	2020	6-8 may	Challenges and strategies for marketing of agricultural products during Covid 19 pandemic	National Webcon on Agricultural production & Support system managing Covid 19 pandemic	CSAUT, Kanpur
Sharma Shailza, Latika, Singh Hari, Anju and Choudhary Suraj	2020.	17-18 Oct	Value Chain Development in Perishable Commodities in India: A review	International e conference on Market led Extension Management Focus on Covid 19	(CCSNIAM) NIAM Jaipur

8.1.3 Popular articles

Bhubaneswar

Patra A K, Vermicompost: Production and Practices. . Compendium on Skill Development Training. 2 March – 4 April, 2020, ICAR-NRRI, Cuttack, pp. 129-134.

Patra A K, Vermicompost: Production and Practices. . Compendium on Skill Development Training. 2 March – 4 April, 2020, ICAR-NRRI, Cuttack, pp. 129-134.

Patra A K, Agroforestry: An Alternative Farming System. Compendium on Rice-based Integrated Farming System. 11-14 March, 2020, ICAR-NRRI, Cuttack, pp. 73-79.

Coimbatore

Latha K.R., S.P.Sangeetha and A. Renuka devi, Sustainable resource management for climate smart integrated farming system.2020

A.Renukadevi and B.Gokila, Harmful effect of top soil loss and control measures – Need of the hour Agrobios, December. 2020

Dr.A.Renuka devi ,Problem Soil Management in Training Manual on Agronomy

Durgapura

Singh Pratibha, Kumar Vijay, Malik Ankit and Arya Minakshi 2020 TikauKhetiKeliye Bhumi Ki Urvara Shakti Ka Prabandhan.Rastriya Krishi. 15 (1) 21-23.

Kumar Vijay, Arya Minakshi, Malik Ankit and Singh Pratibha,2020, Kisano Ki AayaBadane me Saksham MeethiMakka (Sweet Corn) Ki Kheti.Rastriya Krishi. 15 (1) 21-23.

डॉ जैन एस के, डॉ गुप्ता के सी, डॉ मीणा ओ. पी., नितिन चावला एवं डॉ कुमार विपिन चवला की उन्नत कृषि तकनीक, राजस्थान कृषि अनुसंधान संस्थान दुर्गापुरा, जयपुर

डॉ जैन एस के, डॉ गुप्ता के सी, डॉ मीणा ओ. पी., नितिन चावला एवं डॉ कुमार विपिन ग्वार की उन्नत कृषि तकनीक, राजस्थान कृषि अनुसंधान संस्थान दुर्गापुरा, जयपुर

डॉ जैन एस के, डॉ गुप्ता के सी, डॉ मीणा ओ. पी., नितिन चावला एवं डॉ कुमार विपिन राजस्थान मे चनाउत्पादन की उन्नत तकनीक”,हरितक्रांति, 25 अक्टूबर 2020

डॉ रिधि शंकर शर्मा, डॉ एस के जैन ,डॉ एल डी शर्मा, डॉ के सी गुप्ता बुवाई से पूर्व चने मे रोग प्रबन्धन’, हलधर टाइम्स. 02नवम्बर -08, 2020, अंक 52

डॉ के सी गुप्ता, डॉ रिधि शंकर शर्मा.कमल किशोर सैनी, राजेश कुमार बागड़ी चना” : किसान इंटरनेशनल, अक्टूबर - दिसम्बर,

डॉ एस के जैन ,डॉ एल डी शर्मा, डॉ के सी गुप्ता, डॉ विपिन कुमार एवम श्री नितिन चावला”चने की उन्नत खेती : एक नजर, कृषि जीवन अक्टूबर-दिसम्बर 2020 पेज न. 11 -13

Hisar

Kavita, R.S Dadarwal 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

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.

Karamana

John, J., Sudha.B., Meera, A.V. and Sajeena,A. Coconut based integrated farming system model -
success story. Indian Coconut J. LXIII(3): 5-9

Sudha, B. and Sajitharani, T. Arogyasamrakshanathinu cherudhanyangal" - Millets as healthy
foods. Krishiyankanam 3(2): 32-34

Sudha, B. Grow ginger in homesteads - Article in newsportal sarkardaily.com. <https://sarkardaily.com/grow-ginger-in-homesteads/>

Sudha, B Bhakshya surakshaykku purayidathottangal" - Homestead farming for food security.
VOICE, the official magazine of Teachers Organisation of Kerala Agricultural University

John, J., Sudha.B., Meera, A.V. and Sajeena,A. Covid kalathum karshika munnettavumai gaveshana
kendram. Kerala Karshakan. 65 (11): 46-47

John, J., Sudha.B., Meera, A.V. and Sajeena,A. Karshika keralam subhikshamakaan samyojitha
krishi - Towards a food secure Kerala through IFS. Kerala Karshakan. 65(12): 13-15.

George, A. M. and Sudha, B. Vaykolum Valamakkam (Biorecycling of rice straw as manures).
Krishiyankanam 3(3): 10-11.

John, J., Sudha.B., Meera, A.V. and Sajeena,A. Samyojitha krishiyiloode subhiksha keralathilekku
(Agricultural prosperity through IFS). Karshakanadam. 37-39.

Raj, A. B. and John, J. Durithakaalathil kaithangakan kizhangu varga vilakal. 66 (2): 18-19

John, J. Sthalam parimithamenkil lambakrishi (Vertical farming to overcome space constraints)-
Krishiyankanam. 26(12): 71.

Chijina, K., Bindhu, J. S. and Asha, V. Pillai. Kule lands - A unique rice bowl of Kerala. Agriculture & Food:e-Newsletter 9(2): 381-383

Chijina, K. and Bindhu, J. S. Vertical farming for urban households: A revolutionary modern farming technique for future. Agriculture & Food:e-Newsletter 10(2): 381-383

Kota

तेतरवाल जगदीश प्रसाद, राम बलदेव, बिजारणियां अंजू, चौधरी मोनिका, चौधरी गोविन्द राम, गोस्वामी एवं कुमावत रोशन किनोवा—सुपर फूड से पोषण सुरक्षा। तकनीकी फोल्डर, कृषि अनुसंधान केन्द्र, (कृषि विश्वविद्यालय) उम्मेदगंज, कोटा। जनवरी, 2020, पेज संख्या 1—6

तेतरवाल जे.पी., राम बलदेव, बिजारणिया अंजू, चौधरी मोनिका, चौधरी गोविन्द राम, कनवाड़िया अंजू चिया मूल्य सर्वर्धन द्वारा पोषण सुरक्षा। तकनीकी फोल्डर कृषि अनुसंधान केन्द्र (कृषि विश्वविद्यालय, कोटा), उम्मेदगंज, कोटा। मार्च 2020, पेज 1—6।

राम बलदेव, तेतरवाल जे. पी., ढाका बी. एल., मीणा आर. के., कुमार राजेश एवं यादव एस. एल. . खरपतवारनाशी दवाओं के प्रयोग के समय नोजल का चुनाव, छिड़काव से पूर्व एवं छिड़काव के बाद से संबंधित सावधानियां। अभिनव कृषि: जून 2020, पेज संख्या 28—35.

यादव डी.एल., मीणा सी.बी., तेतरवाल जे.पी. एवं सिंह प्रताप ट्राइकोडर्मा फफूंदनाशक—जैविक खेती के लिए वरदान। अभिनव कृषि, वर्ष—02, अंक—02, जून 2020, पेज न. 29

तेतरवाल जगदीश प्रसाद, राम बलदेव, बिजारणियां अंजू एवं सिंह अरविन्द माइनर मिलेट्स की खेती को बढ़ावा देने की आवश्यकता। खाद पत्रिका, जुलाई 2020, 61(7): पेज न. 27—39.

तेतरवाल, अरविंद सिंह तेतरवाल जगदीश प्रसाद एवं घसवा रामधन खरीफ मूंगफली में कैसे करें फसल सुरक्षा। खाद पत्रिका, जुलाई 2020, 61(7): पेज न. 18—22.

Ludhiana

Neeraj Rani and Walia S S (2020). Organic manures. Punjab Agricultural University, Ludhiana. pp 1-24. (Punjabi) ISBN: 978-81-943305-7-8

Rani, Neeraj and Walia, S. S. (2020) Preparation of vermicompost from farm waste. Daily Ajit 02.08.2020.

Walia, S. S. and Kaur, T. (2020). Environment friendly organic agriculture. BahumantviKheti3(8): 16-17.

Walia, S. S. and Kaur, T. (2020). Grow bio-hedge Karonda and enhance income. BahumantviKheti3(9): 22-23.

Walia, S. S. and Kaur, T. (2020). Integrated Farming Systems for Carbon Sequestration (Chapter 6). In: Training Manual, Hands-on Training Workshop on 'Assessment Methods for Soil Carbon and Greenhouse Gas Emissions in Agriculture' by Dheri, G. S. and Choudhary, O. P., Department of Soil Science, Punjab Agricultural University, Ludhiana. pp 28-31.

Walia, S. S. and Kaur, T. (2020) Need of organic agriculture in present time. BahumantviKheti4(11): 15-16.

Maruteru

Manukonda Srinivas, Satyanarayana P.V. & Reddy C. Venkata Varisaguloyantrikarana. July, 2020. Annadata. Pp: 24-26

Manukonda Srinivas, B. Anusha, Reddy C.V. and Naidu G. Jogi Dalwa VariSagulo Melakuvalu. Oct, 2020. Annadata. Pp: 14-16

Manukonda Srinivas, B. Anusha and Kumar BNVS Ravi Dalwa (Rabi) varilovarinatlu – yeruvulayajamanyam. Nov, 2020. Dr. YSR. RythuBharosa. Pp: 15-16

Portblair

Subramani, T., Nanda B.K., Swarnam T.P. and Velmurugan A.. 2020 Future of island agriculture relies on rainwater harvesting.

In: The Echo of India dt.20.06.2020

Subramani, T., Kiran K.R., Swarnam, T.P. 2020 Green manure crops: The low cost bio-factories.In. The Echo of India dt. 25.06.2020

Rajenderanagar

Ch Pragathi Kumari,, Goverdhan, M., Reddy, G. K., Alibaba, M.D and chiranjeevi, K. Samagra vyavasayamlo vesaviki anuvina pasugrasa pantala pranalika. Vyavasayam (April). Pp 41-42

Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari,, Ali Baba, Md and Chiranjeevi, K. Vermicompost thayari – Upayogalu. Vyavasaya Padipantalu. 9(12): 35-36

Shobha, T., Rao, P.J., Kumar, T.S and Reddy, G.K. Pachirota pyru gilugatho chenuki cheva rhytuki rokam. Vyavasayam. 6(5): 24-25.

Ch Pragathi Kumari,, Goverdhan, M., Reddy, G. K., Alibaba, M.D and chiranjeevi, K. Samagra vyavasayamlo natukolla pempakham. Vyavasaya Padipantalu (April). Pp 48-49

Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari,, Ali Baba, Md and Chiranjeevi, K Thakuva nayatha gala netini ela vadukoali. Ritunestham. 15(7): 33

Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari,, Ali Baba, Md and Chiranjeevi, K. Samagra vyavasam lo gorrela pepakum. Vyavasayam. 6(3): 42-43

Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari,, Ali Baba, Md and Chiranjeevi, K. Thakuva nayatha gala netini ela vadukoali. Prakuthinestham. 7(1): 48

Ch Pragathi Kumari,, Goverdhan, M., Kiran reddy, G., Alibaba Md and Chiranjeevi, K. Samagra vyavasayamlo natukolla pempakam. Vyavasaya padipantalu magazine (April). 48-49

- Reddy, G.K., Goverdhan, M., Ch Pragathi Kumari,, Alibaba, Md., Chiranjeevi, K and Kumar, S.M. Varilo sulphide injury – nivarana. Padipanthalu. Sep: 44
- Pragathi Kumari, Ch., Goverdhan, M., Reddy, G.K., Kumar, S.M., Alibaba, Md and Chiranjeevi, K. Samagra Vyavasayam lo flatform paddhathilo gorrela pempakam - labhalu. Vyavasayam. October: 44- 45
- Ch Pragathi Kumari,, Goverdhan, M., Reddy, G.K., Kumar, S.M., Alibaba, Md and Chiranjeevi, K. Samagra Vyavasayam lo samarthamga vyarthala viniyogam. Vyavasayam, November: 42
- Reddy, G.K., Ramana, M.V., Ch Pragathi Kumari,, Ali Baba, Md., Chiranjeevi, K and Kumar, M.S. Importance of soil testing. Vyavasayam. March Page: 30

Sabour

- Sushant, Kumar, Sanjay and Pathak, S. K. 2020. Jalvaaue Parivatan ke paripecthya mein laabhkaari kheti ke liye Samekit Krishi Pranali. Smarika, Kisan Mela-2020. Pp 203-212.
- Pathak, S. K. and Sushant. 2020. Uttam seichai evam jal prabandhan dwara jalvaaue parivatan ke prabhav mei kami. Smarika, Kisan Mela-2020. Pp 121-127.
- Kumar, Sanjay, Dutta, S.K., Sushant and Shruti, Suman 2020. Jalvaaue anukulan ka uttam taknik. Smarika, Kisan Mela-2020. Pp 168-174.

S K Nagar

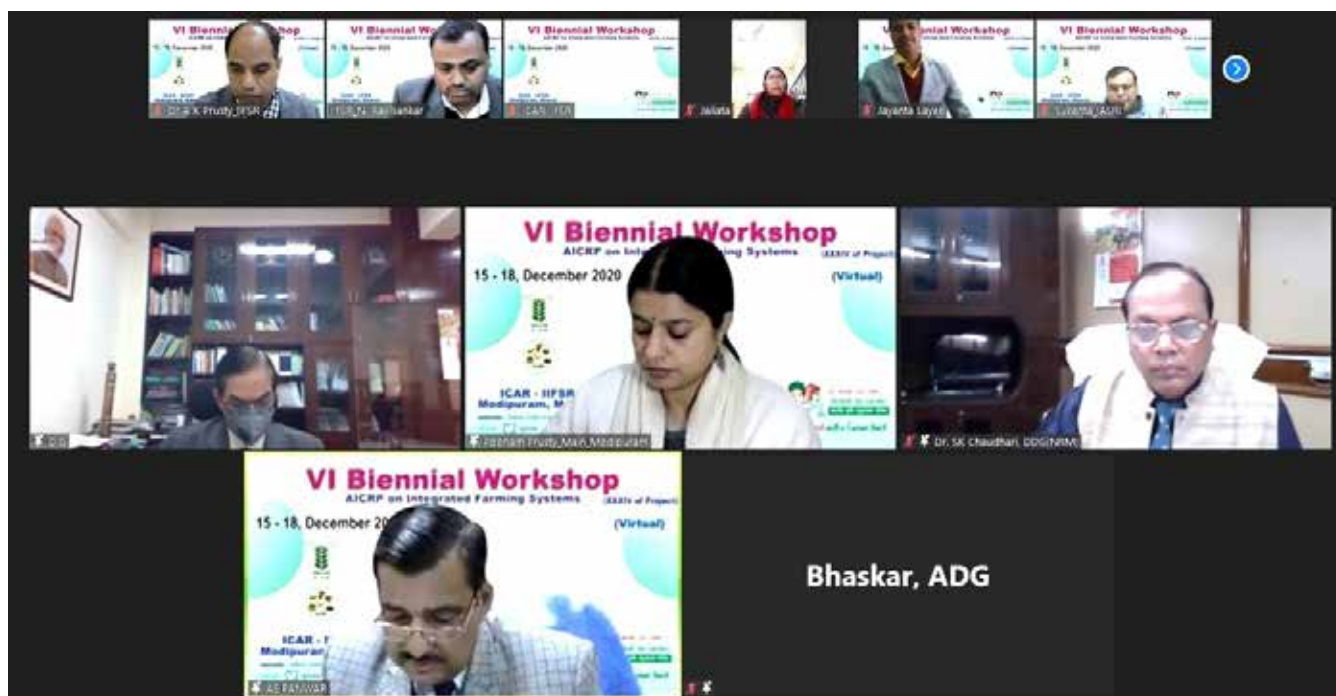
- Desai L.J., Patel Kashyap, Patel P.K., Chaudhary H.L. and Patel Vidhi 2020. Azolla cultivation) Leaflet SAU Publication No. 3:4:981 pp. 1-7
- Desai L.J., Patel Kashyap, Patel P.K., Patel Vidhi and Modi Krina (2020) Boundary plantation) Leaflet SAU Publication No. 3:4:998 pp. 1-7

Udaipur

- डॉ. सिंह हरि डॉ. शमा लतिकर्मा, एवं शैलजा न्यूनतम समर्थन मूल्य राजस्थान खेती प्रताप (नवम्बर, 2020)

8.2 TRAINING, GROUP MEETING, WORKSHOP ORGANIZED

The Biennial Workshop of ICAR-AICRP on Integrated Farming Systems was organized during 15-18 December, 2020 in Virtual mode at ICAR, IIFSR Modipuram 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 besides discussion on new programmes.



All the scientists of AICRP-IFS from on-station and on-farm centres participated besides scientists from ICAR-IIFSR and special invitees. Dr Trilochan Mohapatra, Secretary (DARE) and Director General, ICAR inaugurated the VI biennial workshop as Chief Guest while Dr S.K. Chaudhari, DDG (NRM) and Dr S. Bhaskar, ADG (AAFCC) participated as Guest of Honour and Special invitee respectively. Dr A.S. Panwar, Director, ICAR-IIFSR, Modipuram welcomed the guests and delegates. He briefly informed about research activities being carried out by the institute and the importance of farming systems research for enhancing the sustainability and income of the farmers. Dr N.Ravisankar, Principal Scientist and Programme Facilitator (Coordination Unit) presented the brief achievements of the scheme including details of 60 prototype IFS models developed, 31 bankable projects on IFS and 63 farmer participatory refined farming systems suitable to various States. He also highlighted, recent initiatives such as farming systems typology based targeted interventions and assessment of ecosystems services at limited scale. Dr S. Bhaskar, ADG (AAFCC) in his address emphasized on need to promote IFS in convergence mode besides developing value chain development and constant follow up for impact study. Dr S.K. Chaudhari, DDG (NRM) in his address as Guest of Honour underlined the importance of farming systems research and initiatives undertaken during last one year which includes dialogue with other ministries such as Ministry of Rural Development for scaling. He also highlighted that, landscape-based IFS models need to be developed, Dr.Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR) released the publications from the

scheme and congratulated all the Scientists involved in the scheme for their significant achievements especially development of IFS models. He informed that the scheme will be continued and needs to be further strengthened for undertaking new areas of research. Chief Guest in his address emphasized on taking up the analysis using available data for ecosystem services and its monetization, carbon trading and diversity analysis. Further emphasis on intensive interface meetings with States, NABARD are required to reap the benefits from the scheme for the use of common man. Proper analysis of economics of all the models with pre-cise defining of components and interactions are also essential. Value chain development including aggregation in the form of IFS clusters are also needs to looked in to besides training rural youth and NGOs. Convergence of among AICRP-IFS and NICRA programmes are also essential as both can complement each other.

Recommendation

Consolidated recommendations pertaining to research and General are given below.

On-Station Research

1. Identified cropping systems for family & livestock nutrition, soil health and income enhancement based on three years evaluation should be incorporated in the IFS model with standardized area for different category of farmers.
2. Oilseed should be given emphasis in IFS not only to meet the household demand but also to create sufficient marketable surplus to meet the deficit in production at country level.
3. Temporal, spatial and agro ecological region wise analysis of GHG emission from IFSs should be made and correlated with production and economics of IFS. Appropriate management strategies need to be identified for making emission positive IFS to neutral without compromising on yield and economics.
4. Partitioned Benefit: Cost analysis for each module and IFS model should be made with cost components such as purchased input including animal feed, family and hired labour and saving due to recycling.
5. New programme on “Scaling and impact assessment of integrated farming systems” should be initiated at on-station except sub centres. Activities under scaling should be done by all centres while impact assessment of IFS should be undertaken in Kerala, Tamil Nadu and Telangana with standard sampling, data collection and analysis methodology by Agricultural Economists in the Scheme.
6. A composite index with methodology needs to be developed for evaluation of IFS in holistic way. Composite index may combine several indicators such as ecological, economic efficiency, social equity, sustainability indices, water footprints, agro-biodiversity, energy ratio etc.
7. State specific publication on identified cropping and farming systems needs to be developed in common format and should be communicated with State agencies. Success stories at district and State level should be documented and shared among stakeholders.

On-Farm Research

8. A pilot study on “Model Value Chain development for Integrated Farming Systems” should be initiated at identified centres such as Vizianagaram (Andhra Pradesh), Dahod (Gujarat), Chikkaballapura (Karnataka), Palghar (Maharashtra), Kendujhar (Odisha) and Patiala (Punjab) to demonstrate the convergence, production, aggregation, processing, and marketing in alignment with State and Central Schemes. Sufficient Funding provision is to be made under STC, SCSP and General components depending on the need of the locations.
9. Publication on response of crops to applied nutrients should be made at 3 years interval based on the multi-location on-farm nutrient response study undertaken by centres.

- Web based application developed for online data submission and analysis of OFR experiments should be commissioned and training session including R-Studio/Software should be organized virtually.

General

- Revolving Fund Scheme (RFS) should be created at all the on-station IFS research centres including ICAR institutes to manage and add new modules in the existing systems. A suitable proposal as per the extant guidelines of ICAR should be submitted to council for approval.
- Capacity building on IFS involving rural youth, NGOs, KVKs and Progressive farmers needs to be given thrust. Separate provision under HRD sub head should be made in the next SFC.
- Creating Centres of Excellence on Integrated Farming Systems in selected States using the IFS models and infrastructure developed under the scheme may be considered in the next SFC period (2021-26) for basic research and human resource development.
- The centres should make efforts to have interface meeting with the state/line departments for converging IFS models into state action plans.

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

Packages and technologies identified from On-Station Research (OSR) for multi-location on-farm testing and validation

1. Cropping systems and component packages

Alternate cropping systems and component packages identified for 9 States for multi-location on-farm testing and validation.

State	Name of the centre	Name of the cropping system / component technology	Domain area	Existing practice	Description of the improved package/technology
Assam	Jorhat	Organic weed management practices for Rice- toria – rice system	Assam	One mechanical weeding and one hand weeding in rice and one hand weeding in toria	Stale seedbed + reduced spacing (up to 25%) + mulching with previous crop residues + one hand weeding for rice- toria – rice system
Chhattisgarh	Raipur	Raised and sunken bed	C.G. plain zone	Only rice cultivation during kharif season (rice-fallow)	Raised and sunken bed [rice in sunken bed and other remunerative upland crops like vegetable/maize/pulses in raised bed during kharif].
Himachal Pradesh	Palampur	Alternate cropping system	Himachal Pradesh/ Kangra	Maize + okra – wheat + pea/ chickpea	Okra-turnip-tomato
Karnataka	Siruguppa	Alternate cropping systems	Command area, Karnataka	Rice-rice-pillepesara	Sweetcorn -marigold - okra

State	Name of the centre	Name of the cropping system / component technology	Domain area	Existing practice	Description of the improved package/technology
Kerala	Karamana	Intensification of cropping system in rice-based IFS	Lowland rice fields of Thiruvananthapuram district	Rice - rice - fallow	Rice-rice- dhaincha + vegetables + maize
Madhya Pradesh	Indore	Alternate cropping system	Madhya Pradesh, Malwa Plateau	Soybean – wheat	Baby corn +brinjal (1:1) – onion – okra
Maharashtra	Parbhani	Alternate cropping system	Marathwada region	Cotton - Groundnut NMR Rs/ha 116239	Cluster bean-carrot - coriander NMR Rs/ha 225035
		Weed management	Marathwada region	One hoeing +one hand weeding	Stale seed bed + reduced spacing + 2 tonne of straw
		for organic production			+ one hand weeding at 25 DAS in soybean-chickpea
Odisha	Bhubaneswar	Alternative cropping system	Coastal Odisha	Rice-groundnut-okra	Rice-potato-okra Rice-sweet corn-bitter gourd
Uttar Pradesh	Faizabad	Alternate cropping system with cereal and vegetables	Ayodhya	Rice-wheat	Rice-potato- greengram Rice-Frenchbean- Greengram
		Weed management practices under organic production system		Hand weeding	Stale seed bed + reduced spacing (up to 25%) + mulching with previous crop residues + one hand weeding (50 DAT/ DAS) for rice-potato- okra

1. Farming System modules and model identified for on-farm testing and validation

Promising farming system modules and models identified for 12 States for on-farm testing in farmer participatory mode.

State	Name of the centre	Name of the technology / IF'S module	Domain area (State / district)	Existing practice	Improved package /technology
A & N Islands	Port Blair Alternate farming system	Land Configuration based farming system	Andaman	Rice- vegetables + dairy	Broad Bed and Furrow (vegetables + fodder on beds and rice, fish in furrows) + dairy
		Nicobar	Sole coconut + pig	Coconut + spices + pig	

State	Name of the centre	Name of the technology / IF'S module	Domain area (State / district)	Existing practice	Improved package /technology
Bihar	Patna	Module for IFSS	Patna, Nalanda, Gaya, Vaishali, Muzaffarpur, Champaran districts of Bihar	Rice- wheat	Modules for one- and two-acre IFSS
Gujarat	S K Nagar	IFS for marginal farmer	Gujarat/ Mehsana /Banaskantha	Pearl millet - potato - groundnut Or groundnut - potato - pearl millet + dairy	Groundnut-potato- groundnut + dairy (2 milch animal) + boundary plantation + vermicompost + azolla
Jammu & Kashmir	Jammu	Cropping system + dairy + poultry + mushroom	Jammu, Samba, Kathua	Crop (rice/ maize - wheat) + dairy	Cropping system + dairy + poultry + mushroom
Karnataka	Siruguppa	Alternate farming system	Bellari Dist in Karnataka	Crop+ dairy	Crop + horticulture + dairy + goat
Kerala	Karamana Vertical farming structure	Integrated terrace garden	Southern NARP zone comprising of Thiruvananthapuram, Kollam and Pathanamthitta districts	Limited cultivation under terrace garden	Vegetables, azolla, poultry and vermi compost
		Thiruvananthapuram district (Urban/ Periurban farmers)	Utilising the limited floor space in homesteads	Vertical farming structure with provision for wick irrigation	
Maharashtra	Parbhani	IFS model	Marathwada region of Maharashtra	Crop + Dairy/ goat	Crop + dairy (Two cow) +goat (10+1) + fodder(Napier and Lucerne)+Kagzi lime + boundary plantation (Anjan+ Moringa in alternate plant)
	Karjat	IFS model for small and marginal farmers	Maharashtra (Thane, Raigad and Palghar)	Rice – field bean + dairy	Rice – Vegetables + dairy, poultry, vermicompost

State	Name of the centre	Name of the technology / IF'S module	Domain area (State / district)	Existing practice	Improved package /technology
Odisha	Bhubaneswar	Alternate farming system	Coastal Odisha	Cropping system, horticulture mostly vegetables and dairy	Cropping system + horticulture + kitchen garden + dairy + poultry + fishery
Punjab	Ludhiana	Alternate farming system	Punjab	Rice-Wheat + dairy	Crops + horticulture + fishery + dairy + Agroforestry
Rajasthan	Durgapura	Preparation of mineral mixture	Rajasthan	Purchasing from market	Using under-sized grains of various cereals. legumes and oil cakes
Telangana	Efficient farming system	IFS for irrigated dry areas	All districts of Southern Telangana zone under irrigated dry conditions	Crop alone or crop + dairy	Cropping systems + horticulture + livestock + goat + backyard poultry
Uttarakhand	Pantnagar	IFS model for US Nagar and Haridwar region	Uttarakhand/ Udham Singh Nagar and Haridwar	Crops (rice-wheat) +dairy+ tree (poplar on boundary)	Crops + dairy + horticulture/ agroforestry + fisheries+ duck + vermicompost + biogas

Promising on-farm tested and validated packages for 7 States finalized for scaling through Central and State

Agencies

State	Name of the centre	Name of the technology	Domain area (State / district)	Brief description of existing practice	Brief description of the improved technology
Andhra Pradesh	Vizianagaram	Management package	Vizianagaram Andhra Pradesh	Long duration rice-normal Maize	Short duration rice - zero tillage maize
		Backyard poultry module	Vizianagaram Andhra Pradesh	Desi chicks and open rearing	Closed rearing with Rajshri, Kadakanath, Srinidhi

State	Name of the centre	Name of the technology	Domain area (State / district)	Brief description of existing practice	Brief description of the improved technology
Chhattisgarh	Kanker	Alternate cropping system	Uttar Bastar & Kanker	Rice-rice	Rice-wheat-blackgram Rice-maize
		Poultry module		Local poultry birds, no vaccination	Improved breed of poultry-Kadakhnath, feeding and timely vaccination
		Fish module		No proper ratio IMC and feeding	40:30:30 ratio of Catla, rohu and Mrigal, 3:2 ratio of rice grain husk and oil cakes feeding
		Pig module		Local breed of pigs	Breed of pig-Devar and feeding of butter milk during summer
Karnataka	Dharwad	Balanced nutrient management package for soybean-chickpea	Karnataka (Dharwad, Belagavi, Haveri)	Soybean 41-46 kg NP; Chickpea 31-46 kg NP	Soybean 40-80-25-12.5 kg NPK ZnSO ₄ and Chickpea 25-50 kg NP
		Balanced nutrient management for soybean – hybrid maize	Karnataka (Dharwad, Belagavi, Haveri)	Soybean 9-23 kg NP; Hybrid Maize 125-80 kg NP	Soybean 40-80-25-12.5 kg NPK ZnSO ₄ ; Hybrid Maize 150- 62.5-62.5-25-25 kg NPK ZnSO ₄ FeSO ₄
		IFS model	Karnataka Districts (Dharwad, Belagavi, Haveri)	Bt Cotton intercropped with Peas/Soybean + livestock (fodder shortage)	Diversified cropping systems (Soybean-Chickpea/ Hy Maize) + livestock (perennial fodder, Mineral mixture, Salt lake; Health management: Deworming, Medicines, Artificial insemination) + .

State	Name of the centre	Name of the technology	Domain area (State / district)	Brief description of existing practice	Brief description of the improved technology
	Chikkaballapura	Finger millet - tomato	Chikkaballapur a	Imbalanced nutrient application	Butter and biocomposting. + nutritional kitchen garden+boundary plantation.
					100:50:50:10 kg/ha NPK and ZnSo4 in finger millet 250:250:250 kg/ha NPK and 10 kg/ha Trichoderma viridae as biofungicide in tomato
Madhya Pradesh	Umaria	Vermicompost production	Umaria	FYM production in open heap	Production of vermicompost by use of worms (like Eisenia foetida etc.) in permanent vermi beds
		Value addition in farming systems	Umaria	Direct selling of pulse as full grain	Conversion of whole pulse grain into processed pulses
	Anuppur	Management package for rice-wheat	Anuppur, Mandla & Dindori	Use of local varieties	Paddy (MTU-1010), Wheat (JW-3211) with 100:60:40 kg/ha NPK + 25 kg Znso4
		Improved farming system	Anuppur, Mandla & Dindori	Crop + dairy	Rice-wheat, green fodder berseem & MP Chari for dairy

State	Name of the centre	Name of the technology	Domain area (State / district)	Brief description of existing practice	Brief description of the improved technology
Maharashtra	Karjat, Thane	Alternate cropping system	(Maharashtra Thane)	Rice –pulse	Rice-okra
		Poultry module	Thane	No poultry rearing	Kadaknath poultry breed
		Goat module	Thane	No goat rearing	Improved breed of konkan khanayal
	Nagpur	Alternate Farming System	Nagpur, Wardha, Amravati	Crop + Dairy + horticulture with traditional management practices	Crop + Dairy + Horticulture farming system with advanced management practices
	Satara	Improved farming systems	Satara, Sangli, A.Nagar Pune	Crop + Dairy + Poultry with traditional packages and practices	Crop + Dairy + Poultry farming with improved management packages and practices Crop + dairy + goat
Odisha	Kendujhar	Improved package for crop + dairy system	Kendujhar	Crop + dairy farming with traditional packages	Crop + dairy with improved management
	Kalahandi	Management package	Kalahandi	No application of micronutrients like Zn to rice and Mb to green gram	Application of N80P40K40 + ZnSO4 25 kg/ha to rice and N20 P40K 40 kg/ha + seed treatment with Sodium Molybdate @ 3g/ 10kg seed to green gram
Rajasthan	Dausa	Seed treatment in Pearl Millet & Mustard	Ralawas, Gavli Muslai, Kalyanpura, Lalsot, Dausa	No seed treatment practice	Seed treatment with bio-agents
Telangana	Medak	Balanced nutrient management	Medak	Imbalanced application (160kg/ha N, 80kg/ha- P2o5, 20 kg/ha - K2O) to rice	120kg/ha N, 60 kg/ha P2o5and 40 kg/ha k2o, 50kg /ha ZnSo4

9

APPENDIX

APPENDIX I: WEATHER PARAMETERS (MONTHLY AVERAGES RAINFALL) AT DIFFERENT FARMING SYSTEM CENTERS DURING 2019-20

Name of Centre	June	July	August	September	October	November	December	January	February	March	April	May
Akola	89.6	209.6	291.6	227.1	85.1	11.8	14.2	0	0	19.3	4.1	4.1
Ayodhya	24.0	396.5	123.2	396.0	10.0	0.0	22.0	35.4	53.0	79.0	12.0	48.6
Bhubneswar	144.6	341.7	319.4	406.5	312.6	5.3	0.0	12.7	94.2	56.5	107.9	157.1
Chiplima	217.8	241.3	357.9	116.5	0	0	0.4	0	0	13.4	2.4	5.7
Coimbatore	21.0	8.5	221.3	57.3	246.9	167.1	36.0	0.5	0.0	46.0	57.0	67.5
Durgapura	48	327.2	262.6	110.4	18	0	3	0	0	25.2	13.6	22.8
Hisar	105.1	120.4	96.1	29.9	2.6	12.3	4.5	10.4	10.9	95.2	5.3	36.2
Indore	136.9	395.2	441.2	428	164.1	0	0	0	0	0	0	0
Jabalpur	53.9	326.6	811.8	432.5	17.5	0	12.4	34.1	8.7	40.4	0	2.5
Jammu	24.2	322.8	172.7	168.2	30.6	77.4	83.8	81.6	29.2	135.6	25.8	22.2
Jorhat	328.6	403.5	194.4	370.1	251.7	11.5	1.3	29.6	11.1	6.4	107.2	236.4
Junagadh	131.8	187.4	420.7	502.7	234.0	15.6	0.0	0.0	0.0	0.0	0.0	0.0
Kalyani	108.8	104	289.2	184.2	98.8	70	20.4	21.6	1.3	74.7	33.8	244.2
Kanpur	40.0	346.0	255.0	245.0	24.0	3.0	10.0	81.0	2.0	36.0	32.0	80.0
Karmana	237.0	260.2	306.2	99.9	281.6	120.1	25.0	35.0	20.0	24.0	119.0	594.0
Kathalagere	98.8	89	202.3	89.9	274.7	31.0	4.0	0.0	0.0	8.0	4.5	93.0
Kota	60.3	506.6	632.5	172.7	52.0	0.0	0.0	3.9	0.0	20.0	3.2	0.0
Ludhiana	29.9	218.4	331.4	264.8	0.0	35.2	46.8	39.8	15.0	69.0	13.2	49.6
Maruteru	42.1	297.3	142.3	259.9	181.8	0.0	0.0	0.0	0.0	0.0	34.7	0.0
Modipuram	17.3	301.8	265.8	24.0	22.9	10.8	42.8	65.2	25.2	41.8	4.7	70.5
Navsari	262.0	491	535	750	95.0	37.0	0	0	0	0	0	0
Palampur	29.2	421.9	628.8	286.9	39.3	68.2	105.8	178.2	6.4	235.8	92.8	157
Pantnagar	257.0	257.0	488.3	140.4	0.0	29.2	29.0	88.4	53.0	46.1	70.8	128.5
Parbhani	91.1	135.1	187.9	287.8	248.9	11.8	4.4	3.4	1.3	52.4	5.0	13.0

Name of Centre	June	July	August	September	October	November	December	January	February	March	April	May
Patna	61.7	322.6	117.3	551.4	2.2	0	33	18.3	17.3	23.1	44.80	94.50
Portblair	691.0	165.6	1098.8	540.0	270.2	194.5	1.8	2.6	0.0	0.0	4.5	25.0
Powarkheda	58.2	565.1	510.1	638.9	16.6	1.8	9.8	2.0	0.0	12.8	2.8	2.8
Rahuri	75.6	108.4	99.8	170.2	205.8	26.4	4.2	0.0	0.0	23.4	4.0	0.0
Raipur	75.8	211.5	301.6	451.1	81.6	0	0.8	22.6	85.6	49	13.2	40.2
Rajendranagar	85	60.6	190.8	318.8	129	0	8.8	10.6	5	12.2	23.2	14.2
Ranchi	90	254.9	332	290.5	261.2	0	22.8	30.3	0.2	91	7.30	66.10
Rewa	40.6	364.4	484.4	335.6	98.6	0.0	30.6	24.5	22.6	9.4	30.1	40.1
Rudrur	150.0	126.0	301.0	123.0	0.0	0.0	16.0	0.0	0.0	8.2	0.0	16.0
Sabour	85	380.3	65.6	371.3	23.4	0	2.5	6	38.4	48	71.4	137.8
Siruguppa	40.5	67.1	48.2	306.0	83.4	0.0	0.0	0.0	0.0	0.0	2.1	69.7
SK Nagar	78.2	94.2	281.6	286.1	80.0	19.0	4.0	0.0	0.0	3.0	0.0	15.0
Thanjavur	32.1	222.1	155.2	117.1	144.1	112.8	320.1	245.8	0	0	12.3	82.8
Umiam	380.4	396.7	290.9	429.7	259.1	33.2	24.8	14.5	54.0	75.4	223.5	578.5
Varanasi	26.6	296.2	244.7	528	42.8	0.0	36.6	3.7	10.8	45.8	19.6	14.4

Appendix II: Maximum and minimum temperature (°C) (June 2019 to May 2020)

Centre name of AICRP on IFS	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
Akola	37.2	40.1	32.5	32.1	30.4	29.2	32.5	29.9	33.7	30.5	31.6	30.5	28.3	27.9	27.1	14.6	30.2	14.8	34.0	18.5	40.5	24.9	42.9	28.0
Bhubneswar	35.5	26.6	32.9	26.0	32.1	26.0	32.1	25.7	32.6	24.2	30.2	20.0	28.3	16.2	27.9	16.1	28.5	16.2	34.2	22.1	36.9	24.7	36.0	25.9
Chiplima	36.2	24.6	32.5	23.9	31.9	24.6	33.2	23.5	32.6	20.3	28.9	14.3	30.5	9.5	27.1	10.7	30.1	14.2	35.1	20.1	40.3	18.7	42.7	20.6
Coimbatore	33.5	32.1	31.8	23.7	30.0	23.1	30.9	23.4	30.7	22.7	29.7	22.2	27.8	21.2	30.8	20.4	32.4	21.7	34.8	23.8	35.2	24.2	34.9	25.0
Durgapura	40.5	28.1	34.5	25.3	31.9	24.3	33.2	23.8	32.6	19.0	28.6	16.2	21.6	6.4	21.0	8.3	25.5	11.4	28.5	15.7	35.8	21.9	40.1	25.8
Faizabad	38.9	26.0	33.6	26.1	33.0	26.3	31.1	25.2	30.7	20.1	28.5	14.2	19.7	8.7	19.1	8.6	23.4	9.1	28.4	16.7	35.3	19.5	26.4	23.0
Goa	32.5	21.5	29.7	22.9	29.4	22.8	29.9	21.7	32.6	18.3	34.3	19.7	34.1	20.4	33.4	18.1	35.2	20.1	34.4	22.6	35.5	25.3	36.3	26.7
Hisar	40.5	25.8	35.4	25.7	34.7	26.1	35.3	26.0	32.6	17.9	26.9	12.9	17.1	5.7	17.1	5.2	22.7	6.8	25.9	12.4	34.1	17.6	39.4	22.6
Indore	39.5	27.1	29.5	23.5	26.9	22.5	27.6	22.1	29.4	19.5	31.0	16.8	26.8	11.7	26.5	9.8	29.4	10.9	31.4	15.4	38.1	22.1	41.4	27.4
Jabalpur	40.3	26.6	32.1	24.2	29.5	23.2	30.4	23.0	29.3	19.0	29.2	12.4	23.7	8.5	22.7	9.5	25.7	9.5	30.8	15.9	38.0	22.4	40.4	24.4
Jammu	40.5	24.1	34.7	26.3	33.7	25.9	33.0	24.6	29.4	17.2	24.0	13.0	16.2	7.2	16.6	6.4	21.7	8.0	24.0	12.1	31.2	16.7	36.2	20.3
Jorhat	32.6	25.2	31.9	25.3	33.8	26.2	31.8	24.5	30.1	21.6	28.5	17.3	24.0	10.4	22.6	9.8	24.9	12.0	28.8	15.9	29.1	17.6	29.8	21.0
Junagadh	36.4	27.0	34.4	26.7	30.1	25.1	31.1	25.3	33.4	23.5	33.1	22.7	30.7	17.4	27.1	12.6	29.8	13.7	33.1	22.0	38.6	22.9	32.7	25.7
Kalyani	35.3	27.1	34.1	26.9	32.2	26.3	32.1	25.8	30.8	23.6	29.2	18.3	22.5	12.9	23.4	11.3	26.8	12.8	32.0	18.8	35.4	23.0	34.0	24.6
Kanpur	39.8	26.8	33.9	26.4	33.3	26.0	31.0	25.2	31.5	19.9	28.8	15.1	18.8	8.8	19.4	9.2	23.8	10.5	28.4	15.7	36.0	20.1	38.3	24.3
Karmana	30.9	25.1	30.3	24.0	29.9	23.8	31.8	24.3	30.9	24.4	31.3	23.8	31.5	23.9	32.1	22.9	33.0	23.2	32.4	24.1	32.7	25.4	30.6	26.6
Kathalagere	34.7	24.8	27.5	23.3	27.2	22.8	29.8	23.1	31.9	23.5	30.3	18.4	29.8	16.7	31.6	15.9	31.9	17.5	32.8	19.7	33.6	21.1	34.2	21.7
Kota	42.1	29.2	33.7	24.9	31.6	24.0	31.6	23.8	32.2	20.6	31.1	17.4	24.9	11.6	22.9	8.2	25.6	12.5	28.4	15.6	38.9	18.2	42.2	20.6
Ludhiana	40.4	26.8	34.0	26.7	33.8	26.1	33.1	25.5	30.6	18.4	25.6	13.4	15.8	7.5	16.6	6.7	21.5	8.5	24.5	12.9	32.8	17.7	36.9	22.3
Modipuram	38.8	24.9	33.7	24.5	33.2	25.0	33.4	24.0	31.2	18.3	27.0	12.4	17.7	7.3	17.2	6.9	22.6	7.9	27.0	13.7	34.1	18.6	36.6	21.9
Maruteru	35.0	21.6	31.8	21.5	30.4	21.7	31.4	27.6	31.2	22.6	31.0	22.6	29.7	23.4	29.7	23.6	30.4	23.9	32.2	25.4	32.8	24.7	35.2	25.1
Navsari	33.5	25.4	31.4	24.2	29.9	23.5	30.9	22.9	33.4	21.5	33.2	19.1	31.0	15.8	29.0	11.6	32.5	15.4	33.4	18.2	37.1	23.2	36.2	26.8
Palampur	32.2	20.0	27.7	19.8	26.8	19.4	26.6	17.7	24.1	11.9	20.3	9.0	16.1	3.4	13.9	3.0	18.1	5.4	19.0	7.1	24.5	11.8	27.8	15.4
Parbhani	37.6	24.7	32.4	22.7	30.3	21.9	23.5	21.4	15.3	20.1	30.5	15.6	27.4	14.7	28.7	13.7	31.1	14.3	34.8	17.7	39.4	21.5	41.7	24.9

Centre name of AICRP on IFS	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
Patna	38.5	28.6	33.2	27.1	33.3	27.1	31.5	26.2	30.2	23.0	28.6	17.1	20.4	11.2	19.4	10.4	23.6	11.6	29.0	17.0	24.6	21.4	34.4	24.7
Pantnagar	39.0	24.2	39.7	24.5	33.8	24.7	33.1	22.4	31.9	16.2	29.2	11.5	27.5	5.9	20.1	6.0	24.2	4.0	29.4	12.0	35.3	13.2	38.8	18.7
Portblair	29.9	24.2	30.8	25.1	28.8	24.0	29.1	24.1	31.6	24.9	31.0	24.7	30.3	24.9	30.2	24.2	30.7	23.6	31.5	24.1	32.9	26.4	32.3	25.9
Powarkheda	46.0	24.0	38.5	22.0	29.0	21.0	32.0	21.0	32.5	16.5	31.5	11.5	30.5	5.5	27.0	4.0	31.0	6.5	36.0	9.0	41.0	15.0	45.0	19.5
Rahuri	36.7	24.8	31.2	23.4	30.5	22.6	29.6	22.4	29.4	20.4	30.3	17.2	28.5	16.3	27.0	13.0	30.3	15.1	30.8	13.4	38.1	21.0	38.5	25.7
Raipur	40.5	28.2	32.4	25.6	30.4	25.2	31.0	24.9	30.6	23.0	30.2	17.2	27.0	13.8	26.6	13.0	27.1	13.7	32.4	20.2	38.3	22.8	40.9	25.3
Rajendranagar	36.8	20.0	31.8	18.3	29.9	17.4	29.7	16.7	30.0	16.6	29.9	17.7	27.8	15.8	29.3	16.1	31.4	15.6	34.3	19.9	37.5	22.5	39.6	24.7
Ranchi	38.3	24.5	32.2	23.3	30.2	23.3	30.2	22.6	28.0	19.7	27.0	12.8	23.5	7.3	21.2	4.7	19.3	9.3	27.9	14.9	35.4	21.9	30.0	17.3
Rewa	42.7	25.4	35.3	25.5	33.1	25.7	33.0	25.9	31.9	21.1	39.4	13.8	23.9	10.6	22.0	10.0	23.0	6.6	30.2	15.3	39.1	19.5	43.5	25.3
Rudrur	37.6	27.8	33.4	25.5	30.9	25.0	30.8	24.6	30.8	23.0	30.5	20.7	29.0	17.9	30.8	16.8	31.3	17.7	34.5	29.6	35.6	32.6	44.3	35.3
Sabour	37.9	25.5	34.2	25.1	34.7	26.6	32.6	26.2	30.8	21.7	28.9	16.2	21.2	9.3	21.9	8.8	24.1	9.7	30.5	16.8	33.1	20.2	33.9	23.7
Siruguppa	38.9	33.2	38.4	31.6	34.8	27.1	33.0	24.7	32.9	22.3	32.1	22.4	31.2	19.6	32.7	21.4	34.3	21.7	36.2	22.4	40.1	20.1	41.1	19.1
Thanjavur	38.2	32.0	36.6	31.8	35.3	29.6	33.3	29.2	32.3	30.1	31.4	29.7	28.8	27.4	30.8	NR	33.7	NR	36.0	NR	39.4	NR	38.0	NR
SK Nagar	39.4	26.2	36.7	25.6	31.6	24.8	32.5	24.6	34.8	20.4	31.9	18.4	26.9	10.4	28.1	8.6	31.2	10.3	34.1	14.5	41.8	21.5	41.9	24.4
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
Varanasi	40.6	26.2	33.1	23.9	32.2	23.2	35.3	24.4	30.0	18.7	28.8	13.2	19.7	10.6	20.8	10.4	23.6	11.5	28.2	16.4	24.2	12.8	37.7	24.9

APPENDIX III : CENTRE-WISE STAFF POSITION

1.AAU JORHAT (ASSAM)	
Main Centre, Jorhat	
Chief Agronomist	Dr.K K Sharma
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.IGKV,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, Devgad	
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 HPKV, 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, Bangalore (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.RMVSUA&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
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
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. Tatarwal
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 2019-20

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
Akola		OC	5.3	5.18	5.75	5.32	5.43	5.13	5.03	4.5	4.09	5.03
		Av. N	194.39	198.46	222.55	211.18	200.6	196.48	198.9	183.42	154.73	188.63
		Av. P	16.04	15.1	18.17	11.9	15.35	17.51	15.22	10.85	9.88	13.38
		Av. K	427.58	398.5	471.37	403.78	414.98	405.16	401.61	354.93	281.54	399.06
		Av. Zn	0.57	0.66	0.73	0.65	0.6	0.64	0.66	0.55	0.48	0.65
		Av. Fe	6.55	6.39	7.38	6.54	6.8	6.48	6.92	5.98	4.69	6.9
		Av. Mn.	12.39	14.37	16.73	13.87	14.02	12.54	13.29	11.41	9.4	11.8
		Av. Cu.	2.99	3.07	3.74	3.35	3.13	3.05	3.23	2.77	2.61	2.99
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	Summer	OC g/kg	7.1	7.2	7.6	7.6	7.3	7.3	7.3	7.2	7.2	7.3
		N	275	274	293	295	278	261	265	277	284	269
		P	11.3	11.8	12.6	12.5	12.5	11.5	12	12.2	12	11.7
		K	171	174	177	173	173	176	179	163	181	173
Chiplima	Summer	OC g/kg	6.46	6.42	6.35	6.44	6.24	6.55	6.28	6.62	6.5	6.47
		N	288	302	298	311	286	293	303	298	294	303
		P	13.8	14.2	14.5	13.9	14	15.7	14.3	13.9	14	14.1
		K	178	185	180	192	173	185	182	195	184	191
Coimbatore	Summer	O.C. g/kg	5.19	5.23	5.41	5.26	5.32	5.18	5.83	5.77	5.21	5.3
		N	227	219	243	232	231	210	263	267	224	222
		P	19.4	18.9	20.5	19.2	19.4	19.8	21	21.4	19.2	19.4
		K	639	604	658	607	635	627	638	645	607	620
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	230	235	234	240	225	232	238	241	242	233
		P	9.4	9.7	9.6	10.4	9.4	10.12	10.5	10.1	9.4	9.7
		K	305	307	308	308	306	307	312	307	308	309
Jammu	Summer	OC%	5.8	6.6	6.8	6.6	6.5	6.3	6.5	6.5	6.4	6.2
		N	220	238	245	225	232	230	235	232	220	215
		P	19.1	23.2	22.12	21.7	21.85	22.1	23.8	22.65	23.1	23.1
		K	122	130	135	128	126	132	131	128	122	118

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Junagadh	Summer	OC%	8.26	8.37	8.54	8.57	8.34	8.2	7.8	7.87	8.07	7.81
		N	234	233	236	240	234	229	233	233	233	234
		P	26.78	27.25	29.98	29.79	26.31	28.97	28.95	26.53	27.42	28.36
		K	232	236	236	237	234	233	228	229	230	234
Kanpur	Summer	OC%	0.442	0.457	0.495	0.48	0.442	0.472	0.45	0.442	0.465	0.435
		N	198.9	205.65	222.75	216	198.9	212.4	202.5	198.9	209.25	195.75
		P	13.36	13.5	13.58	13.54	13.4	13.52	13.48	13.38	13.46	13.36
		K	188.05	188.1	189.08	189.06	187.46	188.5	186.9	187.28	187.65	187.06
Karamana	Rabi	OC (g kg ⁻¹)	12.52	13.1	16.36	15.72	13.67	15.14	16.87	15.46	18.21	16.23
		Dehydrogenase*	22.52	24.33	25.98	29.22	28.08	31.32	26.58	25.58	30.21	29.43
		Urease [®]	75.25	80.69	87.07	92.4	82.3	85.8	82.91	85.91	85.69	89.46
		Acid phosphatase [®]	21.56	26.1	23.48	26.04	27.89	23.93	26.1	22	28.08	29.11
		B mg/kg	0.88	1	1.02	1.03	0.98	1	0.98	0.98	0.94	1
		N	313.6	319.8	351.2	342.8	321.9	324	328.2	324	340.8	326.1
		P	35.03	36.91	48.96	45.57	36.53	39.92	42.18	41.81	42.56	43.5
		K	163.9	166.5	192.8	184.9	176.6	167.5	169.6	168.8	179	176.8
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
Karjat	Kharif	OC%	1.07	1.08	1.01	1.01	0.99	0.98	1.01	1.01	1	1.02
		Cu (PPM)	1.24	1.39	2.18	2.56	2.42	2.26	1.78	1.76	1.71	1.96
		B (PPM)	0.23	0.29	0.42	0.45	0.39	0.37	0.34	0.32	0.32	0.35
Ludhiana	Summer	OC%	5.7	5.38	5.9	5.14	5.63	5.43	5.98	5.68	6.05	5.75
		N	208	235	260	286	251	216	260	223	236	251
		P	43	52	58	66	59	60	54	49	54	52
		K	110	117	124	135	123	130	131	120	119	140
		S	24	24	20	39	11	22	27	23	22	33
		Fe	11.64	11.16	6.5	6.56	9.43	9.82	5.64	5.71	4.64	4.42
		Mn	13.03	11.08	8.7	7.96	7.54	9.75	8.85	11.6	11.85	9.09
		Zn	2.95	2.84	3.09	2.93	2.27	2.22	2.69	2.67	2.78	2.76
		Cu	0.93	0.62	0.72	0.66	0.64	0.56	0.66	0.5	0.64	0.63
Navsari	Summer	OC%	0.443	0.427	0.43	0.449	0.432	0.443	0.44	0.415	0.442	0.414
		N	222.67	216.67	218	224	218	222.33	223.67	218	222.67	221
		P	30.44	29.94	28.77	32.37	31.49	29.88	32.08	31.32	31.01	29.21
		K	136.67	125	116	136	122	134.33	124.33	122	129.67	121.33

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Parbhani	Summer	OC%	0	0.6	0	0.62	0.57	0.62	0.51	0.64	0.67	0.66
		N	0	155	0	157.13	148.92	147	139.23	141.86	148	145.13
		P	0	15.92	0	16.4	15.37	15.52	14.9	15	14.97	14.8
		K	0	498.49	0	510.67	502.11	501.18	494.16	496.37	499.17	500.86
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	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 2019-20

Table A : Nutrient uptake N P and K kg/ha in exp no1(a) 2019-20

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
Bhubneswar	Kharif	N	78.1	70.5	81.5	81.3	74.7	69.1	72.3	65.7	58.0	61.0		
		P	20.5	21.2	23.6	22.8	21.4	20.9	22.0	19.7	16.9	18.2		
		K	83.9	84.6	102.0	98.1	93.6	85.9	90.3	79.8	67.0	70.2		
	Rabi	N	89.3	44.8	95.4	56.6	25.0	83.4	57.4	51.7	90.6	62.4		
		P	11.0	6.5	11.2	8.0	6.9	9.9	9.5	8.2	13.6	5.6		
		K	28.8	17.4	28.9	24.5	21.8	24.7	54.8	20.7	42.9	21.1		
	Summer	N	30.1	18.8	55.9	42.5	42.5	42.9	88.1	86.4	28.0	14.2		
		P	13.3	3.4	5.9	5.1	5.1	5.6	7.4	7.0	12.8	8.1		
		K	58.9	16.5	37.0	12.7	11.7	13.2	47.3	47.5	63.3	25.6		
Chiplima	Kharif	N	71.9	73.8	71.1	75.7	76.4	72.1	74.0	72.1	67.2	65.3		
		P	17.8	18.7	17.3	19.0	19.5	18.4	19.0	18.7	18.2	17.7		
		K	77.5	83.0	79.0	80.9	84.3	80.1	85.0	77.7	74.9	73.6		
	Rabi	N	84.7	48.5	95.7	63.8	24.7	84.4	66.2	60.2	99.6	67.0		
		P	10.2	5.9	11.2	8.7	6.8	9.5	11.7	10.4	14.2	5.9		
		K	25.7	18.1	28.0	26.4	20.9	24.2	56.1	22.8	47.1	21.5		
	Summer	N	36.8	18.2	62.6	41.3	45.3	44.6	106.5	107.2	34.0	15.7		
		P	15.5	3.2	6.4	4.4	5.3	5.5	9.5	8.4	13.6	8.2		
		K	74.7	15.4	41.0	12.9	12.2	13.7	50.2	52.4	74.1	26.5		
Indore	Kharif	N	96.5	95.7	128.5	118.6	68.1	90.4	101.2	106.5	98.5			
		P	9.5	8.2	18.2	15.6	6.9	7.9	12.4	14.7	12.4			
		K	97.5	99.7	136.4	123.9	57	80.1	108.5	117.2	91.5			
	Rabi	N	149.5	81.2	172	139.2	74.2	92.4	122.2	157.5	146.3			
		P	40.1	9.6	56	33.7	13.6	17.2	26.3	49.7	45			
		K	107.5	52.4	130.1	106.5	43.7	60.1	98.3	126.3	120.1			
	Summer	N	0	0	0	13.9	18.8	18.7	10.6	8.9	9.7			
		P	0	0	0	1.3	1.9	1.9	1.1	0.9	1			
		K	0	0	0	14.6	19.9	20.2	11.5	9.3	10.3			

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
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	Kharif	N	95.2	89.89	35.57	91.8	64.71	57.84	145.85	26.27	79.03	95.68		
		P	10	10.41	29.9	9.76	9.63	5.41	28.73	2.24	8	15.66		
		K	34.88	34.44	57.89	39.57	56.19	21.32	58.14	7.23	32	32.02		
	Rabi	N	106.19	40.71	22.25	60.97	32.6	79.45	9.37	33.1	10.72	22.84		
		P	20.75	9.35	3.73	11.34	13.57	10.46	6	7.25	1.94	4.39		
		K	74.73	74.36	17.41	46.59	47.27	55.2	14.64	27.85	3.56	43.33		
Karmana	Summer	N	0	47.4	44.11	83.56	40.01	19.01	32.09	47.32	14.04	27.8		
		P	0	35.71	7.28	56.43	8.76	2.6	6.33	18.33	2.38	7.42		
		K	0	49.58	21.71	88.9	42.68	16.7	18.45	39.92	13.95	26.64		
	Kharif	N	51.9	53.95	62.84	54.01	62.8	55.74	62.64	62.28	56.92	59.41		
		P	9.46	10.73	10.42	9.46	10.88	11.28	9.97	10.75	9.62	10.68		
		K	26.87	28.63	31.1	28.29	33.57	28.28	28.6	31.9	28.06	32.7		
Kathalagere	Rabi	N	0	33.91	39.18	41.2	35.57	38.17	16.86	35.53	3.54	4.26		
		P	0	4.47	7.33	5.42	3.45	4.13	2.91	7.81	0.76	0.93		
		K	0	6.41	21.52	6.95	36.97	37.92	12.81	33.13	2.95	3.78		
	Summer	N	0	0	0.49	2.58	7.71	0.5	90.51	33.77	11.75	2.91		
		P	0	0	0.02	0.15	0.78	0.03	7.49	6.2	0.79	0.13		
		K	0	0	0.19	0.97	8.22	0.19	59.96	57.92	11.92	1.15		
Kota	Kharif	N	80.98	64.23	79.86	73.88	77.81	62.12	72.75	62.08				
		P	26.36	28.41	27.63	26.61	33.58	27.63	27.07	29.07				
		K	50.32	31.57	42.56	35.94	41.37	27.66	38.02	24.71				
	Summer	N	61.19	61.62	41.33	57.49	39.02	87.51	32.63	60.06				
		P	32.56	16.28	55.47	14.25	92.4	19.45	26.64	28.58				
		K	92.3	95.87	33.86	69.07	28.33	133.84	39.86	63.55				
Kota	Kharif	N	91.86	98.85	127.87	62.58	67.2	128.78	57.84	78.96	53.58	54.77		
		P	11.98	12.28	16.63	10.75	15.21	17.54	6.81	26.82	18.28	13.42		
		K	46.5	51.1	74.42	104.47	111.9	112.36	40.74	85.89	60.63	101.32		
	Rabi	N	187.61	71.55	42.42	134.54	71.76	153.25	84.78	53.47	79.46	53.78		
		P	47.94	23.75	24.75	32.56	15.67	37.74	16	12.96	13.64	12.91		
		K	209.7	51.94	144.4	158.07	203.33	167.98	45.86	19.18	44.78	69.12		
Summer	Summer	N	0	38.32	31.06	26.09	0	0	41.63	0	19.96	0		
		P	0	5.76	3.6	3.42	0	0	5.86	0	9.27	0		
		K	0	28.18	21.96	18.08	0	0	27.98	0	12.26	0		

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
Ludhiana	Kharif	N	70.78	54.71	42.94	77.47	83.6	84.79			303.27	55.51		
		P	12.23	7.55	8.13	10.36	10.45	9.23			41.47	7.61		
		K	13.97	11.26	8.15	11.59	11.45	10.38				9.51		
	Rabi	N	75.01	129.08	20.73	21.46	300.81	211.08			560.34	324.09		
		P	19.57	18.52	17.06	6.96	65.11	50.33			72.69	73.82		
		K	19.81	18.36	16.96	6.91	54.58	50.34				43.45		
Navsari	Summer	N			16.43		63.11	15.34			10.22			
		P			4.82		17.42	4.48			3.25			
		K			3.87		17.54	4.45			5.14			
	Kharif	N	49.34	50.71	57.60	50.32	57.55	49.46	46.12	58.53	56.11	59.76		
		P	9.47	9.87	11.03	9.77	11.02	9.46	8.72	11.21	10.69	11.48		
		K	51.65	53.69	59.95	53.15	59.37	50.45	46.40	61.05	56.46	61.50		
Palampur	Rabi	N	68.12	28.08	54.86	0.00	32.82	36.63	77.49	30.90	46.37	47.77		
		P	9.33	7.78	8.72	0.00	11.50	5.28	16.50	13.42	7.68	15.15		
		K	47.69	31.20	43.24	0.00	26.72	28.50	113.90	60.85	99.61	76.42		
	Summer	N	0.00	48.64	53.67	53.42	108.53	47.32	41.69	38.60	34.73	97.87		
		P	0.00	7.45	10.79	8.08	22.74	6.71	8.88	5.93	7.35	19.66		
		K	0.00	38.17	53.54	41.28	122.39	29.72	65.20	53.11	49.43	20.61		
Parbhani	(Kh + Rb + Sum)	N	194.40	128.10	94.60	96.70	155.80	100.40	147.90	92.20				
		P	38.00	32.80	21.70	17.40	32.60	24.30	34.70	22.60				
		K	94.10	85.70	50.60	50.30	55.50	51.70	69.70	31.80				
	Kharif	N	175	149	38	204	50	187	46	85	97	92		
		P	32	34	2	37	13	23	15	13	8	20		
		K	136	144	37	157	83	116	73	106	53	117		
Pantnagar	Rabi	N	123	0	125	150	116	28	134	69	137	21		
		P	19	0	19	36	18	14	60	7	60	4		
		K	81	0	83	242	76	37	235	59	219	12		
	Summer	N	0	171	0	38	29	36	113	178	179	55		
		P	0	30	0	2	16	2	17	37	12	21		
		K	0	111	0	35	18	34	141	109	153	74		
Pantnagar	Kharif	N	110.78	101.61	75.52	107.26	81.19	102.43	64.37	123.35	74.94	71.64		
		P	37.06	32.71	25.88	40.62	28.27	42.93	54.01	75.75	24.72	24.82		
		K	156.27	102.74	91.3	172.56	91.58	152.41	101.48	175.19	88.37	102.88		
	Rabi	N	99.15	328.43	98.26	88.67	27.56	64.17	38.85	28.74	299.94	352.43		
		P	37.68	105.3	39.23	43.08	12.3	30.17	16.92	12.91	57.15	37.4		
		K	134.36	287.96	141.21	138.23	24.62	52.54	50.9	34.42	472.66	295.16		
Pantnagar	Summer	N	0	64.32	234.4	442.74	43	51.09	195.75	128.16	117.64	104.57		
		P	0	23.11	77.67	101.45	14.28	13.73	95.3	47.45	23.48	16.99		
		K	0	89.93	189.43	409.47	27.16	34.71	258.7	177.62	104.23	92.21		

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
Rajendranagar	Kharif	N	94.1	91.6	100.0	85.5	132.5	130.0	259.3	185.0	155.3	43.0		
		P	26.1	9.6	10.7	9.7	31.4	14.3	22.5	28.2	71.4	9.0		
		K	119.4	62.3	62.7	44.9	97.3	55.7	155.1	344.5	209.7	63.9		
	Rabi	N	71.7	0.0	62.1	32.0	64.2	63.1	24.5	229.1	187.2	97.2		
		P	30.7	0.0	7.3	6.7	7.3	8.7	4.7	12.9	23.5	14.4		
		K	83.0	0.0	16.6	14.2	17.3	23.0	30.0	154.4	94.5	91.8		
Rahuri	Kharif	N	136.18	149.37	139.87	177.6	150.5	166.82	173.38	168.68	180.85	189	192.97	105.31
		P	64.96	35.9	65.33	40.17	68.41	40.86	26.46	40.07	28.85	47.39	30.89	19.54
		K	113.63	80.44	116.08	92.47	121.09	92.71	71.24	90.52	75.87	113.07	81.21	119.2
	Rabi	N	186.39	85.09	35.07	140.76	73.71	218.32	238.89	191.67	45.04	42.2	76.41	143.27
		P	42.58	30.97	8.2	52.92	29.1	43.79	48.94	29.39	9.46	7.97	29.41	28.51
		K	36.25	58.98	30.61	154.52	91.34	43.11	45.22	132.12	37.1	35.41	94.25	99.1
Rudrur	Kharif	N	50.58	107.81	146	103.18	102.91	117.52	130.5	159.89	99.75	184.19	142.16	187.88
		P	13.96	31.91	34.14	11.04	35.55	29.52	30.98	21.84	34.39	36.76	46.74	17.09
		K	55.33	95.74	136.61	124.87	30.92	96.56	30.06	78.56	109.73	80.75	201.49	38.04
	Rabi	N	55.08	100.06	56.9	49.86	93.81	88.44	34.76	16.91	64.39	56.46	506.59	48.93
		P	16.69	21.01	14.9	7.71	18.51	12.65	6.52	4.22	12.42	14.45	80.11	7.03
		K	57.2	59.25	57.93	25.73	59.6	25.91	29.42	8.24	42.18	89.16	130.32	8.82
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	0	82	30.7	96.7	98.5	18.9	20.8	59.5	84.6	74.5		
		P	0	19.9	8.7	28.4	20.8	4.3	7.3	15.1	21.4	16.9		
		K	0	42.1	16	60.1	42.3	7.3	25	36.5	44.9	51.8		
	Rabi	N	90.2	103.3	95.5	86.6	101.3	119.4	117.4	115.4	111.8	118.4		
		P	24.5	31.7	29.1	26.3	28	32.3	33	31.5	31.5	31		
		K	119.9	143.2	128.4	126.7	139	154.4	135.4	156.6	147.9	164.8		
Siruguppa	Kharif	N	66.7	66.3	23.2	46.8	17.9	11.7	40.1	36.8	72.7	69.8		
		P	18.4	12.8	2.6	5.7	2	3.3	6.6	3.9	17	17.5		
		K	93.8	72.1	13	35.4	11.1	16.3	24.8	19.6	98.4	94.6		

Name of CSR centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
SK Nagar	Kharif	N	68.3	81.8	67	75.6	27.8	37.7	53.3	84				
		P	11.3	15.6	12.3	13.9	4.5	8.1	17	14.5				
		K	45.4	51.5	45.3	40.3	22.5	38.9	49.1	38.7				
	Rabi	N	105.4	0	103.6	70.4	100.6	78.5	100.9	104.5				
		P	41.53	0	25.2	17.169	22.86	16.56	41.28	20.9				
		K	109.4	0	78.2	57.1	46.5	37.1	110.3	76.4				
	Summer	N	79.9	38.4	46.4	27.1	0	0	93.4	51.6				
		P	22.2	5.9	6.4	7.7	0	0	13.7	9.3				
		K	23.7	28.9	31.7	24.6	0	0	51	47.3				
Thanjavur	Kharif	N	102.5	108.6	100.1	103.1	101.8	101.4	97.5					
		P	6.7	6.9	6.7	6.8	6.9	6.9	6.5					
		K	63.4	63.7	63.1	63.2	62.7	61.2	60.2					
	Rabi	N	41.5	40.5	44.2	48.4	47.1	44.7	46.5					
		P	8.4	8.0	9.2	10.1	11.5	11.8	9.8					
		K	58.3	58.4	60.6	61.5	64.2	61.2	66.1					
	Summer	N	22.4	17.9	64.1	103.5	46.7	36.8	-					
		P	2.3	2.5	7.8	13.8	6.4	3.3	-					
		K	44.0	46.4	85.0	402.1	133.4	91.9	-					

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), AI-CRP-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
			Dhananjay Tripathi, 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, Devgadhi Bariya, Dahod-389 380 (Gujarat)	Tel.: (Off.) 02676-235528;(Mob.)9825930039, Email: dahod.ofr@gmail.com
16		Sabarkantha (OFR)	Dr.J.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		Saraike-la-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), 1 st Floor, Directorate of Extn. Office Building, University of Agricultural Sciences, Hebbal Campus, Kolar, Bangalore-560024(Karnataka),	Tel.:(Off.)080-65325146,(- Mob.)09243075082, Email:chikka-ballapura.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, Thiruvananthapuram-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	Maharash- tra	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		Akola (Main centre)	Dr.J.P.Deshmukh , Chief Agronomist (AICRP-IFS), Department of Agronomy, Dr Panjabrao Deshmukh Krishi Vidyapeeth, Krishinagar, Akola-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 Agricultural Research Station, Karjat, Dist. Raigad -410 201 (Maharashtra)	Tel.: (Off.) 02148-222072, (Mob.) 08879247408, Email: karjat.main@gmail.com
40		Parbhani (Main centre)	Dr.A S Karle , Chief Agronomist (AICRP-IFS), Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani-431 402 (Maharashtra)	Tel.: (Off.) 02452-230089, (Mob.) 09423958309 Email: parbhaniifs.main@gmail.com
41		Rahuri (Main centre)	Dr.U.S.Surve , Chief Agronomist (AICRP-IFS), Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar-413 705 (Maharashtra)	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 (AICRP-IFS, Dapoli, Palghar) Regional Sugarcane Research Station, Palghar, Mahim Road Nandishalla, Palghar -401404 (Maharashtra)	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 (Maharashtra)	Mob: 7588581713 Email: hingoli.ofr@gmail.com
45		Madha Solapur (OFR)	Dr. M.N. Waghmare , OFR Agricultural AICRP-IFS, Agricultural Research Station Mohal, Distt. Solapur (Maharashtra)	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 Chipima, Dist. Sambalpur-768 025 (Orissa)	Tel.: (Off.) 0663-2460507, (Mob.) 07978929978 Email: chipima.sub@gmail.com
49		Kendujhar (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 Email:kendujhar.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 Agricultural University, 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, Krishi Vigyan 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 sa.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	Rajendranagar (Main centre)	Dr. M.Venkata Ramana , Chief Agronomist (AICRP-IFS), Professor Jayashankar Telangana State, Agricultural University, Diamond Jubilee Block, College of Agriculture, Rajendranagar, Hyderabad-500 030	Tel.: (Off.) 040-24017463, (Mob) 09440019029 Email:rajendranagar.main@gmail.com
58		Rudrur (Sub)	Dr.(Mrs) Firdoz Shahana , Agronomist (AICRP-IFS), PJTSAU, Regional Sugarcane & Rice Res. Stn., Rudrur-503188 (Telangana)	Tel.: (Off.) 09440404050, (Mob.) 09848373997 Email:rudrur.sub@gmail.com
59		Rangareddy (OFR)	Dr.Kodam Chiranjeevi Senior scientist (Agro) & Officer I/c OFR Centre Madak, AICRP on IFS, DJ block, College of Agriculture, Rajendranagar, Hyderabad, 500030	(Mob):083743304031 Email: medak.ofr@gmail.com
60	Tamil Nadu	Coimbatore (Main centre)	Dr. P. M.Shanmugam , Chief Agronomist (AICRP-IFS), Department of 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 (AICRP-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 University, Vagarai-624 613, Palani, Taluk, Dindigul 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), Department 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 (AICRP-IFS), Department of Agronomy, Acharya Narendra Deva University of Agriculture & Technology Kumarganj, 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 Tisui, 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 Rohitashv 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		Tarikheta 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 Swapn 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 2020-21

Crops	Price (Rs./q) 2019-20	Price (Rs./q) 2020-21	Cal./ 100 gm	Crops	Price (Rs./q) 2019-20	Price (Rs./q) 2020-21	Cal./ 100 gm
All Fodders**	195	200	16	Groundnut*	5090*	5275	567
All green manuring**	290	295	16	Knolkhol**	1200	1400	43
Amaranthus grain**	5100	5600	49	Ladyfinger**	1700	1850	35
Arhar/ Pigeonpea/* Redgram	5800*	6000	335	Lentil /Masur*	4800*	5100	343
Baby Corn**	3200	3400	125	Linseed**	4200	4400	530
Barley*	1525*	1600	336	Maize(Grain)*	1760*	1850	342
Beetroot**	550	625	25	Maize (green cobs)**	3.50/cob or 500/q	6.50/cob or 800/q	125
Berseem (seed)**	1700	1800	344	Maize Sweet Corn**	1900	2000	342
Bitter Gourd**	1100	1200	25	Marigold**	2500	2600	4
Blackgram/Urad*	5700	6000	347	Rapeseed& Mustard*	4425*	4650	541
Bottle gourd (Lauki)**	2200	2500	12	Gobi sarson/ Hayola**	2900	3000	541
Brinjal**	1700	2000	24	Niger Seed*	5940*	6695	515
Broccoli**	4200	4500	45	Oat**	1525	1750	374
Buck Wheat**	1200	1400	346	Onion (big)**	1700	1900	50
Cabbage**	700	1000	27	Pea*	6450	6500	315
Carrot**	1200	1400	48	Pea (veg.)**	2500	3000	93
Cassava**	1750	1800	134	Pearlmillet/ Bajra**	2000*	2150	361
Castor**	4700	4800	440	Potato**	1200	1500	97
Cauliflower**	1200	1500	66	Pumpkin**	1650	1700	25
Chillies(green)**	2550	2800	29	Radish (White)**	550	595	17
Clusterbean **	2300	2400	35	Ragi/ Fingermillet**	3150*	3295	328
Coleus**	2100	2200	86	Rice(coarse)*	1835*	1868	346
Coriander(S)**	5550	5700	288	Ricebean fodder**	210	215	16
Coriander(L)**	1500	1650	49	Ridge /Round gourd**	3000	3100	17
Cotton(F-4/1180)*	5255*	5515	332	Safflower**	5215*	5327	356
Cotton (H-1380)*	5255*	5825	332	Sesamum/ Gingely/ Til**	6485*	6855	563
Cowpea/ Lobia(S)**	2700	3000	323	Sorghum/ Jowar*	2550*	2620	349
Cowpea (Veg.) pod**	1600	1800	48	Soyabean (b)*	3000	3000	432

Crops	Price (Rs./q) 2019-20	Price (Rs./q) 2020-21	Cal./ 100 gm	Crops	Price (Rs./q) 2019-20	Price (Rs./q) 2020-21	Cal./ 100 gm
Cucumber**	800	1000	13	Soyabean (y)*	3710*	3880	432
Cumin/ SiyaZeera**	14000	1500	356	Sugar beat**	1000	1200	48
Fennel grain**	7500	7600	31	Sugarcane*	275	285	34
Fennugreek (seed)**	5200	5500	333	Summer Squash**	1500	1650	16
Fennugreek leaves/spinach**	1525	1600	49	Sweet Potato**	1550	1700	120
Field bean**	2900	2950	48	Tomato (green)	2000	2100	23
Fieldpeas/Veg. peas**	2600	2700	93	Toria/Raya/*	4425*	4500	541
Frenchbeans**	2100	2200	26	Turmeric**	7500	7800	349
Garlic**	5500	5700	145	Wheat*	1925*	1975	346
Ginger**	2200	2550	67	White gingely**	7200	7400	563
Gram/Chickpea/ Bengalgram*	4875*	5100	360	Rajmash/ Rajmah**	5800	5900	346
Greengram/ Moong*	7050*	7196	334	Sunflower seed *	5100	5327	620

* Minimum support price fixed by Government of India for 2020-21.

**Farm gate price at OFR centre.

ANNEXURE III

S. N	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 hirsutum 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
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 usitatissimum L.	Alsi

S. N	COMMON NAME	Botanical name	Hindi Name
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>

Arial View of Wet Land IFS Model developed
at On-Station Centre, RARS, Maruteru, AP



अखिल भारतीय समन्वित कृषि प्रणाली अनुसंधान परियोजना
AICRP on Integrated Farming Systems

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