



PDFSR

Newsletter



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किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

AgriSearch with a human touch

**Project Directorate for Farming Systems Research
(Indian Council of Agricultural Research)
Modipuram, Meerut-250 110, Uttar Pradesh**

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PDFSR

Mandate

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

Agricultural Education Day

The Agricultural Education day was celebrated on 25 July 2012 in order to make awareness about scope of agriculture among the students of local schools and colleges, and to sensitize them about the prospects of agricultural education in India. In his introductory address, Dr. B. Gangwar, Project Director stressed the need to spread the agricultural education among the masses, particularly the youth.



Dr. Arvind Kumar, DDG (Education), ICAR was the chief guest of the day. In his address, Dr. Arvind Kumar called upon the students to choose the field of agricultural education as it is the need of the hour to serve more than 60 per cent of our population who are dependent on agriculture. He also highlighted the need to conserve the natural resources through judicious use of inputs for ensuring sustainable agricultural production. The inaugural session was followed by debate

competition in which 11 students from 4 colleges/ universities of Meerut participated.



There were two topics for debate and the participants were asked to speak in for or against the topic “Agricultural education in India has failed to cater to the needs of the farmers” and “Farming system approach is the only solution for livelihood security to small farmers”. The debate was followed by quiz competition for school students. A team of 2 students of 9-12 standards were invited to participate in the quiz competition which covered questions on agriculture, environment and current affairs. There were 16 students from 8 schools of Meerut who participated in the quiz competition.



These competitions were followed by valedictory session in which prizes were distributed to the winners of different events. The chief guest distributed the prizes and certificates to the winners of debate and quiz competitions. A total of 12 prizes were given, 6 each in the debate and quiz.

Dr. Anil Kumar, Principal Scientist (Agricultural Extension) co-ordinated the event.



66th Independence Day & Afforestation

The directorate celebrated 66th Independence Day on 15 August 2012. Dr B. Gangwar, Project Director hosted the national flag. In his address to the staff of directorate, he narrated the achievements of past one year and called upon the staff to pursue the research and development in farming systems perspective which is considered to be the way forward for the future of Indian agriculture. The event was attended by the children’s, family members, staff of the directorate and media persons.



The occasion was marked by afforestation programme in the campus of directorate. All the staff of directorate has actively participated in the planting of saplings in farm road side.



Parthenium Awareness Week

Parthenium awareness week was celebrated during 16-22 August 2012 by the directorate through lectures and awareness to staff of directorate on 18 August 2012 in which problems caused by the weeds, its effect on future generations and health hazards were explained. Dr B. Gangwar, Project Director inaugurated the week by leading the staff to uproot the grass in the campus.



All the staff of directorate was involved in removing the parthenium grass in the entire campus of the directorate with a view to minimize the menace in the campus.



Scientists of the directorate have also demonstrated the ill effects of parthenium in the nearby villages with the involvement of farmers, self help organizations etc. A Kisan gosthi was also arranged in which open discussion with farmers were held on the topic of "Losses and control of parthenium in crops". Kisan gosthi was followed by removal of parthenium grasses by farmers in their field. Control of parthenium by application of Glyphosate was also demonstrated to farmers.



Biological control of parthenium using *Trichogramma* (Tricho cards) insect pathogen has been demonstrated and sufficient quantity of tricho cards were also distributed to farmers. The directorate is organizing the event continuously for the past three years which led to the awareness of people about the congress grass and its hazardous effect on crops, animals and human. Dr Anil Kumar, Principal Scientist (Agricultural Extension) coordinated the event.

हिन्दी चेतना पखवाड़ा

निदेशालय में दैनिक कार्यों में हिन्दी के अधिकाधिक प्रयोग को प्रोत्साहित करने एवं कर्मियों के मध्य राजभाषा के उपयोग के प्रति अभिरुचि पैदा करने के उद्देश्य से दिनांक 14-27 सितम्बर 2012 तक हिन्दी चेतना पखवाड़े का आयोजन किया गया। पखवाड़े के दौरान हिन्दी से संबंधित विभिन्न कार्यक्रम/प्रतियोगिताओं जैसे – अन्त्याक्षरी, निबन्ध, आशुभाषण, टिप्पणी/प्रारूप लेखन, इमला एवं प्रश्नोत्तरी प्रतियोगिता का आयोजन किया गया। इन सभी प्रतियोगिताओं में निदेशालय कर्मियों ने रुचि पूर्वक भाग लिया तथा प्रथम, द्वितीय एवं तृतीय स्थान प्राप्त करने वाले एकल/टोली प्रतिभागियों को पुरस्कार स्वरूप नकद ६ हजार प्रदान की गयी। इस अवसर पर निदेशालय द्वारा प्रकाशित राजभाषा पत्रिका "कृषि प्रणाली आलोक" के प्रथम अंक का विमोचन भी परियोजना निदेशक डा० बाबूजी गंगवार के करकमलों द्वारा किया गया। पखवाड़े के सफल आयोजन के उपरान्त, समापन के अवसर पर सभी ने कार्यालय में यथासंभव अधिकाधिक हिन्दी का उपयोग करने का संकल्प लिया।

3rd International Agronomy Congress

The Directorate participated in the 3rd International Agronomy Congress on “Agriculture Diversification, Climate Change Management and Livelihood” held at IARI, New Delhi during 26-30 November 2012 through involvement in convening a session on Integrated Farming Systems, oral and poster presentation by scientists and putting up exhibition stall to display the technologies and publications developed by the Directorate. Dr B. Gangwar, Project Director was the convener of “Integrated Farming Systems” session and he presented a lead paper “Climate resilient crop-fish farming systems”.



Dr S.S.Pal, Dr K.K. Singh, Dr Prem Singh, Dr V.K. Singh, Dr N. Ravisankar, Dr R.S. Yadav, Dr N. Subash, Dr V.P. Chaudhury, Dr R.P. Mishra, Dr N.K. Jat and Dr Mohd. Shamim have also participated in the congress and presented their papers in different sessions. Dr M.P. Singh, Principal Scientist made the display of publications and technologies in the stall of the exhibition.



Felicitation and Farewell

The Directorate felicitated Dr A.K. Singh, DDG (NRM) on 13 October 2012 upon his selection as Vice Chancellor, RVSKVV, Gwalior, Madhya Pradesh. Dr A.K. Singh also delivered the lecture on “Conservation Agriculture: strategies and trends-A system approach” in the ICAR sponsored winter school organized by the Directorate.



The Directorate gave bid-adieu-farewell to Dr J.C. Dagar, Assistant Director General (Agronomy & Agroforestry) on 23 October 2012 on his superannuation from council in the month of October 2012. Dr J.C. Dagar also delivered the lecture on “Role of agro forestry in conservation agriculture for enhancing farm income” in the ICAR winter school organized by the Directorate.



Trainings

MTC on IFS

A Model Training Course (MTC) sponsored by Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India on “Integrated Farming Systems” was organised during 3-10 September 2012 where in 27 participants from 8 states participated. All the participants were in the category of development officers related to various sectors such as agriculture,

horticulture, sericulture and livestock. The training programme comprised of lectures by experts, practicals, interactions, on-station and on-farm visits to innovative farming situations in and around Meerut region.



Thoughtful deliberations in a participatory and interactive mode were made on the topic of farming system approach and its relevance by Dr B. Gangwar, Course Director. The other important aspect which were covered in the training are; development of IFS models, multiple use of water, feed and fodder management for animals, fisheries, secondary agriculture and appropriate extension approach for transfer of IFS technology. Besides class room lectures, the participants were appraised with the latest technological development in farming system approaches through on-farm and on station field visits.



Participants were also exposed to vermicompost unit at Kinanagar village and fish seed production at Lawad village.

Besides this, they were taken to “Anusandhan Gaon ki Aur”; a project carried out by PDFSR at Madarpur and Alipur villages and they have interacted with farm families. Every day morning session was started with “New Word/ Concept in Brief” related to agriculture in which principles, concepts, prospects were highlighted. These were integrated farming systems, precision farming, nano

technology and permaculture etc. At the end of the training programme, a practical exercise to develop their region specific IFS models was also carried out by the trainees. Dr J.C. Dagar, ADG (Agronomy and Agro forestry) and Dr B. Gangwar, Project Director and Course Director, jointly distributed the certificates to all the participants. Merit certificates were given to three participants based on their general attitude towards learning and interaction with lecturers. The participants were highly satisfied with the kind of training imparted as expressed in the concluding session by some participants. Dr J.P. Singh, Principal Scientist and Programme Facilitator (IFS) co-ordinated the training programme.



Winter School

Winter School on “System based Conservation Agriculture for Sustained Productivity and Soil Health” was organized during 03-23 October, 2012. There were 26 participants from various disciplines belonging to 12 states. The winter school covered the energy and cost efficient system based conservation agriculture technologies for improving system productivity, profitability, soil health and environmental quality; with



Sitting 1st row (Left to right): Sh. Pawan Nandoo Gahbhiye, Dr. Tejendra Rao Kottana, Dr. Arjun Singh Jat, Dr. Ram Lal Choudhary, Mr. Hardev Ram, Dr. Jacob D.
 Sitting 2nd row (Left to right): Dr. R.P. Mishra, Dr. N. Ravishankar, Dr. K.K. Singh, Dr. B. Gangwar (Course Director), Dr. V.K. Singh, Dr. S.S. Pal, Dr. Samrath Lal Meena
 Standing (Left to right): Dr. Shiv Kumar Lohan, Dr. Sanjeev Tripathi, Dr. Mitesh Kumar, Dr. Ram Nagina Singh, Mr. Akhlesh Sah, Dr. Dhakar Mahanta, Mr. Dharminder, Dr. Arvind Kumar, Dr. Arvind Kumar Girdharbhai Patel, Dr. Meharban Singh Kahlon, Dr. Bhikubhai Jwambhai Patel, Mr. Bhagwanbhai Vajjibhai Hirpara, Dr. Vijay Khajuria, Mr. Subhash Awast, Dr. Prashant Shindas Solanki, Dr. Pramod Bhanoo Jagtap, Dr. Surendra Kumar, Dr. Anil Saroha, Dr. Baldev Ram

efficient use of irrigation water; besides improving work efficiency and welfare of labours.

In total, there were 73 lectures/ practical/ group discussions delivered to the participants. DDG (NRM), ADG (A&AF), two representatives of international organizations, four directors of ICAR Institutes, one head of division, two retired Professors / Principal Scientists and seven guest lecturers from other organizations addressed the participants with reference to the latest knowledge about Conservation Agriculture in different crops/ cropping systems. The exposure to GCMS, Gas chromatography, Atomic Absorption Spectrophotometer, Root Image Analyzer, CHNS analyzer, different laboratories (soil chemical, physiology, microbiology, and Agril. Meteorology) was also given. The participants were also given the demonstration about the use of second-generation machinery for making efficient management of crop residue, to conserve the natural resources and soil nutrients, to reduce the cost of production and making the system eco-friendly.



During the school period, trainees were exposed to practical field demonstrations at PDFSR, Modipuram; SVBP University of Agriculture & Technology, Modipuram; CPRI Campus, Modipuram and few selected farmers field. Overall, the knowledge passed on the trainee, skill development about the use of sophisticated instruments/ appliances/ machinery proved excellent and this winter school came up to the expectation of the trainees. All the participants were very much satisfied with the winter school which would prove of immense help in their research / extension programme as well as in teaching the undergraduate and post graduate students. The trainees were fully contented with the out-come which they explained in the valedictory function. Every day, one new word/concept was explained by scientists of the Directorate for improving their knowledge and skill.

New Initiatives

Regional Workshop cum Training

As discussed in the group meeting held at Port Blair during 27-29 December 2011, the directorate organized the first regional level workshop cum training on "Methodology for OFR experiments with special emphasis for ON-Farm Integrated Farming Systems" for Agronomists, Associated Scientists and Field Assistants of On-Farm Research (OFR) centres from Southern region comprising of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu during 23-25 August 2012 in collaboration with OFR centre, Paiyur at Hosur, Tamil Nadu.



The training cum workshop was conducted strictly as business meeting. Dr. B. Gangwar, Project Director, PDFSR straightway initiated proceedings by briefing about the AICRP-IFS and objectives of training to the field assistants of OFR. Being one of the oldest programme, started during 1952-53 as simple fertilizer trial, later on as on-farm experiments, then cropping system research and currently Integrated Farming System research with the changing mandate and priorities. He emphasized that,



we have the unique opportunity in the OFR programme to contribute significantly in the form of good publications such as research papers, popular articles, leaflets, pamphlets etc. He also informed that this training cum workshop is first of its kind exclusively for field assistants working in OFR programme along with concerned agronomists and economists. The objective is to have a discussion on wholistic approach in conducting the field experiments in farming systems perspective, reporting of data, characterization of existing farming systems, upscaling of technologies and impact assessment of programme along with imparting of practical idea for implementation of different modules under on-farm IFS experiment.



During workshop cum training, exercise on learning by doing, seeing as believing, work and appreciate, confusion solving agenda and training involving the gross root level workers were carried out.

Field visits to Krifafed Agro Service at Kamandoddi, nutrient response and IFS experiment at Samanapalli village, crop diversification/intensification experiment at in Keeranapalli village, Precision farming at Pillekothur and TANFLORA Polyhouse were also made in which all the field assistants got the first hand information about the OFR experiments.



The following points very clearly emerged which can be of use to other centres working on the similar lines.

- Input supply registers should be kept for all the OFR experiments in which date, name, quantity of input supplied should be mentioned clearly and signature of farmer followed by field assistant and agronomist should be made.
- Data register should be kept at farmer, field assistant and agronomist levels in order to improve the data quality of OFR. All the above note books/ registers should be produced at the time of monitoring visits.
- Maximum interventional cost for each module of on farm IFS is fixed at Rs.10,000/household.
- Centres should prepare at least one leaflet/ pamphlet in local language per year from on farm experimental results.
- All the centres, should organize one field day in each season at right time when the experiment is in significant stage.
- Inventory of technical (knowledge) inputs given/ adopted by individual farmer should be maintained separately.
- Only low cost/ no cost interventions should be given emphasis in each module of on farm IFS experiment.
- GPS data of each experiment should be reported compulsorily and should be recorded from the centre point of the experimental field.

In fact, the experience of this training cum workshop conclusively revealed that there is need to organize such activities every year for different regions which can provide a strong way forward for pursuing the livelihood improvement in farming systems perspective.

International Project: AgMIP

Agricultural Model Intercomparison and Improvement Project (AgMIP) consortia has approved the PDFSR led project entitled “*Strengthening simulation approaches for understanding, projecting and managing climate risks in stress prone environments across the central and eastern Indo-Gangetic Basin*” with ICAR-NEH, BARC, NARC and CIMMYT-Nepal as partners through competitive call basis. The DDG(NRM) signed an agreement on behalf of ICAR with ICRISAT for implementation. The total budget of the project will be \$ 40,00,00 USD for a period of two years ending 29th February, 2014. The project will apply crop Simulation tools in the major production ecologies of the central and eastern Indo-Gangetic Basin (India, Nepal, Bangladesh) in order to better understand the linkages between climate risks and agricultural productivity. It will also assess the value of adaptation strategies under current and projected climatology by considering whether simulation tools and approaches and adequately capture the potential of different strategies for building resilience. The effort aims to fortify an existing network for agricultural simulation modeling while broadening it to include stronger linkages to climate and socioeconomic scientists. The Project is led by Dr. B. Gangwar, Project Director as Team Leader, Dr. N. Subash, Senior Scientist as Principal Investigator and Dr. Harbir Singh, Principal Scientist as Co-Principal Investigator at the directorate. The kick-off Workshop was held at Colombo, Sri Lanka during 12-16th November, 2012 with an aim to build cohesiveness within and among regional AgMIP teams to achieve success across each region where in directorate team participated.



Meetings

Quinquennial Review Team

The report finalization meeting of fourth Quinquennial Review Team (QRT) of the directorate including AICRP on Integrated Farming Systems was held at the Directorate during 11-12 August 2012. The QRT team led by Prof. Panjab Singh, Ex-Secretary DARE & DG, ICAR as Chairman with Dr K. Pradhan, Ex-Vice Chancellor, OUAT Bhubaneswar, Dr Gyanendra Singh, Ex-Vice Chancellor MGGU Chitrakoot, Dr CL Acharya, Former Director, IISS, Bhopal, Dr D.M. Hegde, Ex-Project Director, DOR, Hyderabad, Dr W.S. Dhillon, Director, Post harvest technology centre, PAU, Ludhiana and Dr Anjani Kumar, Pr. Scientist, NCAP, New Delhi as members and Dr. Kamta Prasad, Pr. Scientist (Agronomy) as Member Secretary have finalized the report for the period of 2007-2012. The committee felt that in spite of scientific staff limitations; the directorate has significantly contributed to the knowledge and science of cropping/ farming systems research for the larger benefit of farming community and the performance of the directorate was rated as “VERY GOOD”. The directorate has enabled and empowered the coordinated and network centres of farming systems/ organic farming for development of location specific technologies. The PDFSR has potential to further improve its performance provided the limitations given in the report are overcome with adequate support. The report has been submitted to the Director General, ICAR, New Delhi on 15 September, 2012 for further consideration.



Institute Management Committee

The 30th meeting of Institute Management Committee (IMC) was held on 12 September, 2012 under the chairmanship of Dr B. Gangwar, Project Director. Dr. A.K. Bakshi, Vice Chancellor, SVBPUA&T, Modipuram, Shri K.K. Sharma, Ex- President District Board, Bulandshahar (UP), Dr. P.C. Bhatia, EX- ADG-ICAR, Dr S.S. Pal, Principal Scientist, PDFSR have attended the meeting as members of IMC while Dr Panjab Singh, Ex- Director General, ICAR and Chairman, QRT of PDFSR, Dr. Kamta Prasad Principal Scientist and Sh. Anil Kumar Agrawal, F&AO and Shri H.S. Chauhan, AAO attended the meeting as special invitees. At the outset, Dr. B. Gangwar, Project Director and Chairman of the committee welcomed Hon'ble chairman of QRT, special invitees and all the respected members on behalf of the Directorate. The Action taken report of 29th meeting was presented by Shri Sushil K. Singh, SAO and Member Secretary, IMC and it was accepted in toto. Shri Anil K. Agarwal, F & AO presented the budget and utilization under the head Plan and Non Plan along with other projects for the current financial year of the directorate. The chairman presented the progress and achievements since last IMC meeting which included infrastructure development, human resource development, publications besides research accomplishments. The members of the committee appreciated the efforts and progress made. Dr Panjab Singh, Chairman, QRT briefed the members about the report of five yearly assessment of the directorate by the committee. He emphasized that HRD and capacity building in IFS needs special focus at national level. The issues related to purchase of lab equipments, furniture and fixtures for the financial year 2012-13 are discussed and necessary recommendations were given. Shri Sushil K. Singh, SAO and Member Secretary proposed the vote of thanks.

XXX Biennial Workshop

The XXX Biennial Workshop of AICRP on Integrated Farming Systems was held at ICAR Research Complex, Goa during 16-19 November 2012. A pre-workshop interaction meeting was organized on 16 November 2012 in which progress was reviewed in two separate sessions for on-station and on-farm programmes.



The workshop was inaugurated by chief guest Shri Shripada Yesso Naik, Hon'ble Member of Parliament (North Goa) on 17th November, 2012 in the presence of Dr N.P. Singh, Director, ICAR RC, Goa and Dr B. Gangwar, Project Director, PDFSR.



At the outset, Dr. N. P. Singh, Director, ICAR- RC, Goa welcomed all the participants from different parts of country and highlighted the glory of Goa, the land of 3'S, Sea, Sun and Scenic beauty which enthalls all. He briefed about the farming system scenario of Goa which is mainly horticulture based. Cashew and Arecanut occupy the major portion of horticulture based systems. He emphasized that sensitization is needed for ensuring livelihood security of the farming community through farming system approach. Dr. B. Gangwar, Project Director, PDFSR, Modipuram in his introductory remark briefed about the journey of PDFSR and highlighted about the predominance and prevalence of farming system research and stressed that future of

farming system research is bright as we have to meet the demands of households from shrinking land holdings. He also briefed about the future work plans of PDFSR through farming system approach.



On this occasion 4 publications of PDFSR, viz. 'PDFSR at a Glance (English)', 'Samanvit Krishi Pranali Pravandhan (Hindi)', 'Sarankshan Krishi Apnaye, Kheti Ka Bhabishya Banaye (Hindi) and 'Annual Report of AICRP on IFS' were released by chief guest.



Hon'ble chief guest, Shri Shripada Yesoo Naik, gave his inspiring speech explaining the needs and usefulness of farming system for livelihood security of households and emphasized that findings of research should reach to the farmers specially the poor.

Dr. B. L. Manjunath, Senior Scientist of ICAR-RC, Goa proposed the vote of thanks. All the AICRP centres participated in the workshop.

Action taken report of the previous workshop was presented by Dr Kamta Prasad. The research highlights



of programmes were presented by Dr Kamta Prasad, Dr J.P. Singh, Dr S.S.Pal, Dr K.K. Singh, Dr Harbir Singh and Dr N. Ravisankar from the directorate. In the special session, Dr. J.C. Bhatt, Director, VPKAS, Almora spoke on "Integrated horticulture in the farming systems of rainfed hill agriculture- possibilities and priorities" in which he explained the physiographical and climatological aspects of the hill agriculture. He said, agriculture in plain and valley areas is highly productive whereas the situations are reverse in case of hilly and sloppy areas. Detailed discussions held to transform the on-going experiments in to farming system perspective. Finally, few experiments were concluded or partially modified besides finalizing new experiments with technical programme and sampling protocols. All the experiments of on-farm programme stands transformed to farming systems perspective. The plenary session was held on 19 November 2012 in which session wise recommendations were discussed and finalized. The workshop ended with vote of thanks proposed by Dr Kamta Prasad, Programme Facilitator, Co ordination Unit.



Major recommendations

On-station

- The area allocation under IFS should include the efficient cropping systems identified in experiment 1 (a) with a view to produce more with less.
- Experiment details on conservation agriculture are to be worked out in a separate meeting by involving few willing centres representing different states.
- Continuation/ modification of LTINM experiment (2a) is already under review by a high power committee under the chairmanship of DDG (NRM). However, in the meantime, find out the modalities for generating the data with respect to nutritive value of produce (grain and straw) so that data may be linked with human and animal health under chemical and integrated nutrient management systems.
- In coastal waterlogged areas, new experiment on the lines of 'raised and sunken beds' or 'broad-bed and furrow' systems can be thought of in farming systems perspective.

On-farm

- The characterization of existing farming systems will be taken up as a new experiment with focus on NARP zone of different states.
- The OFR experiment on nutrient response in different cropping systems stands modified to On-farm crop response to plant nutrients in predominant cropping systems and their impact on crop-livestock-human continuum. The synthesis will be made to focus the results in farming system perspective.
- The experiment of "On-farm evaluation of new diversified cropping systems under irrigated/rainfed conditions" is to be concluded in 2012-13 and a new experiment in farming systems perspective entitled "Diversification of existing

farming systems under marginal households" will be taken with focus on marginal farmers in different agro-climatic regions.

- All the experiments of on-farm programme stands transformed in to farming systems perspective with the changes/modifications.
- New protocol for selection of blocks, villages and experimental households for OFR experiments should be followed strictly as per the guidelines. Those who have made interventions already in OFR 3 experiment; they can continue for 2 years and then change to new protocol.
- Regional trainings for OFR staff of all the zones should be organized before initiation of new OFR 2 experiment in farming systems perspective.
- Technical programme of new experiment of OFR-2 for each centre in farming systems mode should be finalized in April 2013 by convening the meeting of OFR Agronomists.

General

- Volunteers who have opted for synthesis of information on different aspects should visit PDFSR at least for a week to help the core group.
- There should be a separate review meeting for Soil Scientists and Economists working in the programme.
- Zone-wise review and monitoring meetings should be conducted for on-station and on-farm programmes. The same are proposed to be held at Coimbatore/ Raichur, Jabalpur, Bhubaneswar and Patna.
- Launching workshop of TSP for north-eastern states is to be organized by Umiam centre in which eminent persons, who are having the expertise on different aspects of agriculture of NEH region, should be invited for discussion.
- In future, cluster approach needs to be focussed for better visibility.

Research Highlights

Freshwater fish culture technology for IFS

J.P. Singh, A.K. Prusty, Sanjeev Kumar and D.K. Pandey

As a part of developing an integrated farming system model for small farm holders of western plain zones of Uttar Pradesh, freshwater fish farming experiment was carried out by allocating an area of 0.1 ha land. A mix of fish species including rohu, catla, mrigal, common carp, silver carps and grass carp were stocked @ 10000 fingerlings per hectare in the ratio of 20:20:20:10:20:10. A production of 241.5 kg fish was achieved and sold @ Rs.50 per kilogramme generating revenue of Rs. 12075. Keeping in view the economic condition of poor farmers representing small land holders of the region, low input based management system, relying on enhancing the fertility of pond through maintaining sufficient feed in terms of phytoplankton and zooplankton in the pond for entire growth phases, locally available inputs such as raw cowdung and supplementation of rice polish mainly during the early growth phase were used. For enriching natural fish feed and keeping pond water clean and safe, inorganic fertilizer NPK and lime were also used periodically. Periodic water exchange was carried out for maintaining optimum dissolved oxygen level in the pond.



All the pond dykes were utilized for different type of plantations like lemon, guava, sesbania, leucenea etc which not only protected the slopes of the dykes against soil erosion but also provided additional income in the form of fruits, fodder, fuel and Green manure. Besides cash income, the vegetation on dykes also served as feed for herbivorous fish species like grass carp. Higher growth rate was recorded for catla followed by rohu and mrigal among Indian major carps. Among exotic carps, grass carp recorded faster growth rate as compared to other two exotic carps.

Effect of climate change on productivity of rice-wheat cropping system

Mohammad Shamim, K.K. Singh and B.Gangwar

To assess the effect of climate change on productivity of rice-wheat cropping system and calibration and validation of DSSAT model for different genotypes of rice and wheat, a field experiment was conducted with two wheat genotypes viz, PBW 343 and BW 226 with two levels of Nitrogen (60 Kg ha⁻¹ and 150 Kg ha⁻¹) sown on three different dates viz, D₁ (4th week of October), D₂ (4th week of November) and D₃ (4th week of December). Panicle initiation was significantly early in PBW 226 fertilized with 60 Kg N ha⁻¹ and sown on D₃ (32.0 DAS). Days taken to flowering were 64.3 to 48.3 DAS across the treatments. Significantly lower maturity days were reported in PBW 226 fertilized with 60 Kg N ha⁻¹ and sown on D₃. Grain yield was higher in D₁ sowing fertilized with higher dose of nitrogen (150 Kg N ha⁻¹) in both wheat genotypes. Higher grain yield (6.03 t ha⁻¹) was recorded in PBW 343 cultivar fertilized with 150 Kg N ha⁻¹ and sown on D₁ whereas, lower grain yield (3.79 t ha⁻¹) was observed in PBW 226 fertilized with 60 Kg N ha⁻¹ and sown on D₃ among all the treatments. Heat use efficiency (HUE, Kg/ °d) was relatively higher in PBW 343 than PBW 226 irrespective of treatments.

Identification of site specific climate resilient nutrient management practices for rice-rice system

N. Subash and B. Gangwar

Long term experiments on integrated nutrient management in rice-rice cropping systems yield datasets were used to investigate the relationship of variability in rainfall, temperature and Integrated Nutrient Management (INM) practices in rice-rice cropping system being used for last 21 years in 3 different agro-ecological regions of India. Twelve treatments with different combination of inorganic (chemical fertilizer) and organic (farmyard manure, green manure & paddy straw) were compared with farmer's conventional practice. Since intra seasonal variations in rice yields are largely driven by rainfall during *kharif* rice and temperature during *rabi* rice, the half of the standard deviation from the average monthly as well as seasonal rainfall during *kharif* rice and 1 °C increase or decrease from the average maximum and minimum temperature during *rabi* rice have been taken as the classification for higher, normal and low yield groups. Yield trends over 21 years of rice-rice cropping indicated that no uniformity exists among the study sites on system productivity. In sub-humid coastal region at Bhubaneswar, highest increasing trend of system productivity of the order of 321 kg/ha/year has been

observed with the application of 50 % green manure followed by 304 kg/ha/year with the application of 25 % crop residue incorporation along with inorganic fertilizers. At Bhubaneswar and Rajendranagar, 100 % NPK through chemical fertilizers during both *kharif* and *rabi* and application of 50 % and 25 % N through green manure in combination with inorganic fertilizers sustained the rice-rice system more than the other treatments while substitution of 25 % N through straw treatment sustained at Jorhat representing humid region. At Bhubaneswar, the application of 50 % recommended NPK through chemical fertilizers and 50 % N through green manure resulted an overall average higher increase of 5.1 % in system productivity under both excess and deficit rainfall years and also during the years having seasonal mean maximum temperature e^{35} °C. Application of 50 % and 25 % organic manure along with inorganic fertilizer treatments found secondary and tertiary climate resilient integrated nutrient management practice for Bhubaneswar. Similarly, the primary, secondary and tertiary climate resilient integrated nutrient management practice for Jorhat and Rajendranagar also identified. Thus, this study highlights the adaptive capacity of different integrated nutrient management practices to rainfall and temperature variability under rice-rice cropping system in humid, sub-humid and semi-arid ecosystems.

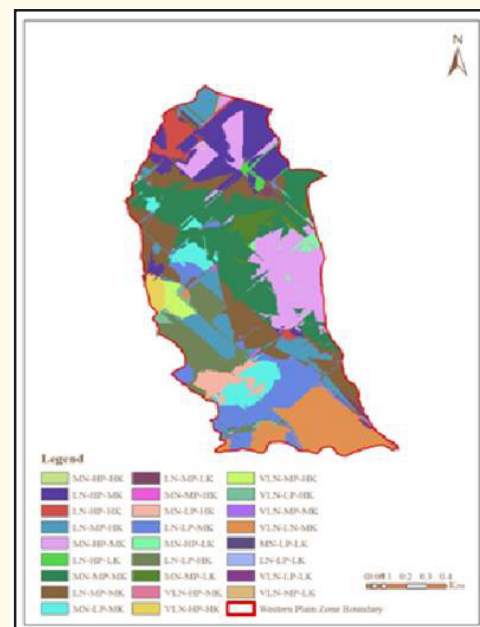
Precision nutrient management through GIS based spatial variability mapping for Upper and Middle Gangetic Plains

V.K. Singh

The work on assessment of spatial variability in soil fertility status in the Western Plain Zone (WPZ) was taken up by identifying first, second and third predominant cropping systems in the zone and soil and irrigation water samples, representing these cropping systems were collected following 'proportionate area method'. Information on demographic and socio-economic parameters, input use, productivity level, disposal of crop residues etc was also collected simultaneously using a pre-designed questionnaire. Estimating K recycling under cropping systems, highest K recycling through irrigation water was under sugarcane-ratoon-wheat (112 kg K ha⁻¹) followed by rice-wheat system (79 kg K ha⁻¹). The fertilizer use was in general skewed in favour of N (68-71%), whereas nutrients like K, S and micronutrients were generally neglected indicating that fertilizer management practices of the region are highly imbalanced and may not sustain high productivity of the crops in the long run.

Soil samples were analysed for macro- and micro-nutrients, revealed marked variability across the districts and cropping systems. Such variability in soil fertility

status was also mapped using Ordinary Exponential Kriging with the help of ArcGIS 10.1. In the view of developing precision nutrient management zone for different cropping system domain in Western Plain Zone using soil fertility parameters (N, P and K), surface maps were generated. In order to generate these homogenous fertility management zones, different fertility parameters were classified into low, medium and high categories using the user defined ranges. The ranges used for classification of N, P and K in low, medium and high classes were < 120, 120-160 and > 160 for N, <13, 13-16 and > 16 for P and <150, 150-250 and > 250 for K, respectively. Based on the developed homogenous fertility zones (fig), the fertilizer recommendations can be developed for its practical significance for farmers and policy makers in the recommendation domain.



Organic farming system practices for cropping systems

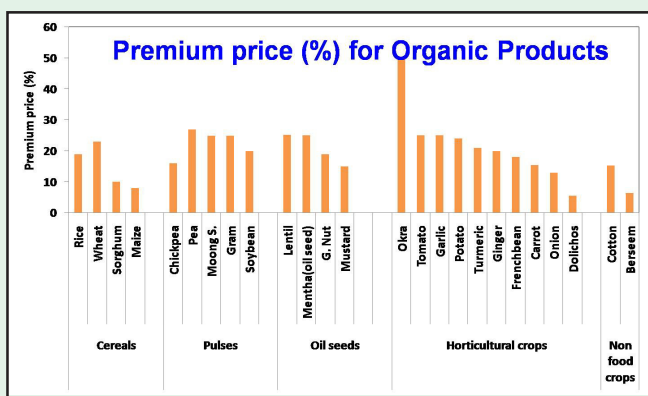
B. Gangwar, Kamta Prasad, N. Ravisankar and K.P. Singh

The experimental results of Network Project on Organic Farming revealed

- Rice-berseem at Jabalpur, chilli- onion and turmeric +onion at Coimbatore, groundnut-sorghum at Dharwad, cotton-wheat, maize-gram, , maize –potato-summer moong, rice-wheat- summer moong, sorghum - berseem, maize-berseem –bajra, maize-berseem – maize+cowpea and sorghum+ guar-oats-cowpea at Ludhiana, cauliflower-radish-tomato and cabbage-radish- capsicum at Bajaura, rice-wheat-

Sesbania and rice-pea (vegetable)- *Sesbania* at Pantnagar and rice-carrot at Umiam recorded > 20% increase in net returns with organic nutrient input system compared to inorganic system.

- Cabbage-radish-capsicum system at Bajaura increased the net returns to as high as 352.8% compared to inorganic system. The increase in net return of cotton-wheat and maize-potato-summer moong at Ludhiana is also higher as it recorded an increase of 153.3 and 96.7% respectively. Turmeric +onion at Coimbatore recorded an increase of 76% in net returns with organic nutrient input system.



- Organic carbon content of soils increased significantly in all the cropping systems with organic nutrient input systems except rice- groundnut and rice- maize systems at Karjat. An increase of > 20% organic carbon in soils was observed with many systems like rice-wheat at Modipuram, Jabalpur and Ranchi, maize- mustard- radish- green gram, rice-potato- radish, maize - potato- okra, baby corn-potato-greengram, sorghum (F)- pea-okra and rice – barley + mustard – green gram at Modipuram, cotton –wheat, rice-wheat- summer moong, maize- potato-moong (S), maize-gram, maize-wheat- cowpea (F) at Ludhiana and turmeric +onion at Coimbatore over a period six years. The increase in organic carbon content of soil was found to be up to 10% for all the other cropping systems experimented. Rice-groundnut and rice-maize at Karjat recorded reduction of 3.3 and 3.5% organic carbon respectively with organic nutrient input system.

Sprinkler irrigation in rice-wheat for improved water and nitrogen use efficiency

S.S.Pal, Kuldeep Singh, P. Kumar and P. K. Rai

An investigation was carried out in an *Ustochrept* of IGP having high infiltration rate in rice-wheat system for

improving water and nitrogen use efficiency using sprinkler irrigation system and five N doses viz. 0, 80, 100, 120 and 140 kg N ha⁻¹ along with full doses of P and K in large plots. The sprinkler was operated on the basis of daily crop water requirement and the discharge from sprinkler was calculated using the formula $q_s = 29.82 C_d D^2 \sqrt{P}$ where q_s = discharge (gpm) and latter converted into liters, C_d = discharge coefficient for the nozzle and sprinkler H^m 0.96, D = inside diameter of the nozzle (inches), P = water pressure at the nozzle (psi). The efficiency of sprinkler irrigation was compared with surface flood irrigation system. Highest mean grain yield (5.56 t ha⁻¹) of rice was recorded under surface irrigation compared to sprinkler irrigation with 140 kg N ha⁻¹, wherein the mean yield was (5.32 t ha⁻¹). The mean agronomic efficiency of N (AEN) was highest (30.76 kg grain/kg N) under surface irrigation compared to sprinkler irrigation (27.63 kg grain/kg N) with 80 kg of N. The water use efficiency (WUE) was highest (1.08 kg grain/m³ water) under sprinkler irrigation with 140 kg N ha⁻¹ compared to (0.92 kg grain/m³ water) under surface irrigation.



Mean highest wheat grain yield (5.52 t ha⁻¹) was recorded under sprinkler irrigation with 140 kg N ha⁻¹ compared to (5.37 t ha⁻¹) under surface irrigation. The mean AEN (31.06 kg grain/kg N) was highest under sprinkler irrigation with 100 kg N ha⁻¹ compared to (28.75 kg grain / kg N) under surface irrigation. The WUE was highest (3.05 kg grain / m³ water) under sprinkler irrigation with 140 kg N ha⁻¹ compared to (2.16 kg grain / m³ water) under surface irrigation. The net saving in water was 24.78 % under sprinkler irrigation compared to surface irrigation. From this study it is concluded that sprinkler irrigation can act as an alternative water saving device in rice-wheat system with comparable yield.

Human Resource Development

International Training/Workshop

Dr. B. Gangwar, Project Director, Dr. N. Subash, Senior Scientist and Dr. Harbir Singh, Principal Scientist attended the AgMIP South Asia projects kick-off Workshop held at Cinnamon Lakeside Hotel, Colombo, Sri Lanka during 12-16th November, 2012.



National Training

- Dr Sunil Kumar, Scientist attended the Senior Certificate Course at IASRI, New Delhi during 18 June to 17 August 2012.
- Dr. Mohammad Shamim, Scientist attended the Summer School on "Forecast modeling in crops" at IASRI, New Delhi during 17th July to 6th August, 2012.
- Dr Brij Mohan, Technical Officer, attended the training on Agricultural Research Prioritization and Impact Assessment at IARI, New Delhi during 17 August to 6 September 2012.
- Shri G. Chetan Kumar, Scientist has been deputed for Professional training at IISS, Bhopal for 3 months from 9 November 2012.
- Shri Sanjeev Kumar, Scientist has been deputed for Professional training at CRIDA, Hyderabad from 14 November 2012 for 3 months.
- Shri Sumanta Kundu, Scientist (Agronomy) has been deputed by CRIDA, Hyderabad to undergo professional training in the Directorate for 3 months from 14 November 2012.
- Dr N.K. Jat, Scientist attended the National training on "Project formulation, risk assessment, scientific report writing and presentation" at IARI, New Delhi during 11-15 December 2012

New Joining

- Shri Sanjeev Kumar joined the directorate on 9 October 2012 as Scientist (Agronomy)
- Shri G. Chetan Kumar joined the directorate on 9 October 2012 as Scientist (Soils: Soil fertility/chemistry/microbiology)

Probation Clearance

- Dr N.K. Jat, Scientist (Agronomy) from 15 December 2011
- Dr Sonali Paul Mazumdar, Scientist (Soil: Soil fertility/chemistry/ microbiology) from 15 December 2011

Promotion

- Dr V.P. Chaudhary, Scientist (FMP) promoted as Senior Scientist (FMP) from 16 August 2010.
- Dr Poonam Kashyap, Scientist (Horticulture) promoted from RGP 6000 to 7000 from 7 January 2012.

Transfer

- Dr S.P. Singh, Principal Scientist (Agricultural Economics) relieved from the Directorate on 5 September 2012 to join as Director (Extension), NDUAT, Faizabad, Uttar Pradesh
- Dr Sonali Paul Mazumdar, Scientist (Soil science) relieved from the Directorate on 22 September 2012 to join at CRIJAF, Barrackpore, West Bengal.

Visitors

- Dr Arvind Kumar, DDG (Education) on 25 July 2012.
- Dr Panjab Singh, Ex Director General, ICAR and Secretary, DARE on 11-12 August 2012 and 12 September 2012.
- Dr D.P. Singh, Principal Scientist, Central Avian Research institute, Bareilly on 29 September 2012.
- Dr A.K. Singh, DDG (NRM) on 13 October 2012.
- Dr J.C. Dagar, ADG (Agronomy & AF) on 23 October 2012.
- Dr M.P. Arya, Principal Scientist from Directorate of Women in Agriculture, Bhubaneswar on 24 November, 2012.

WAY FORWARD



Synergising the land, water, human, animal and solar energy is need of the hour to make the climate resilient profitable multi-enterprise models in farming systems perspective. The Directorate is moving in the same direction and plans to characterize, create, study and refine the farming system models in all the agro climatic regions. The challenge before us is that achievements made in cropping systems research are to be translated in to farming systems in order improve the standard of living of small and marginal households which is expected to be more than 90 % in next 15 years. The initial result of farming systems research from various

locations suggests up to 70 % of nutrient requirement can be met with in the farm itself through recycling and various integrations. However, the farming system to be of self sustainable should aim to meet all the input and energy requirements within the boundaries of farm besides providing the household nutritional security. Since, it involves highly location specific and dedicated multi disciplinary team, development of self sustainable farming systems across the regions may consume time and resources, but once created, it will meet the long term goals of the nation such as reducing the poverty, unemployment and malnutrition. Modelling the farming systems under given constraints is the area which needs attention of researchers. Capacity building for all the stakeholders such as farmers, development departments, scientists and all those who are related in farming systems domain is also an important area to develop quality manpower. The Directorate has planned regional training cum workshops for the field staff of on-farm research units. Cluster based demonstration of successful IFS models through farmer participatory approach involving tribal dominant areas/villages will pave way for large scale adoption of the scientific farming system models. This requires change which is considered to be difficult, but change is must for moving ahead. Let us look forward to make small and marginal households as bountiful with concerted research and development efforts in farming system perspective.

B. Gangwar

Important Publications

1. PDFSR at a Glance (English)
2. Samanvit Krishi Pranali Pravandhan (Hindi)
3. Sarankshan Krishi Apnaye, Kheti K Bhabishya Banaye '(Hindi)
4. Annual Report of AICRP on IFS

Upcoming events

- | | |
|------|---|
| Jan | : 26 Institute Research Committee Meeting
Regional training for OFR staff at Raipur (CG) |
| Feb | : Annual Day
MTC on Good Agricultural Practices |
| Mar | : Regional training for OFR staff at Amravati (MH)
Stake holders interaction meet |
| Apr | : IFS outcome meet
Regional training for OFR staff at Palampur |
| May | : Agricultural Education Day |
| June | : Review of on-farm technical programme |

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