Impact of Farming System Diversification - AICRP Project

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Article Summary:

To cope up with increasing food demand of the nation, adaption of integrated farming system approach instead of single cropping can be highly beneficial under Indian farming conditions. A fairly extensive programme on farmers' field is in operation under All India Coordinated Research Project on Integrated Farming Systems (AICRP on IFS) located at ICAR-Indian Institute of Far..

Impact of farming system diversification at farmers' field under All India Coordinated Research Project (AICRP) on Integrated Farming Systems

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Introduction

Considering that India is projected to be the world's most populous country by 2025, surpassing China, meeting the food need of people is going to be the biggest threat of the country. This rise in demand has to be met through intensive agriculture. To ensure enhanced production under the constraint of reduction of cultivated area, efficient technologies are to be developed and adopted.

2. Why On-Farm?

Agricultural research has traditionally been undertaken at research stations where facilities of experimentation are excellent and accessibility to researchers is favourable. Any conclusions based on the results of a group of experiments at research stations cannot be immediately recommended for general adoption under actual farming conditions. This may primarily be due to (i) The number of experimental station is small (ii) The fertility of soil and the level of management at research stations are superior to those in cultivator's field. Before giving the promising results from agricultural research stations to extension workers for adoption by the farming community, it is necessary to test these results under farming conditions. On-farm research provides the key to the generation of location and situation specific crop production technologies for achieving sustained productivity. It takes into account the biological socio-economic and technological constraints operating at farmer's level. It provides a multidisciplinary approach with farming system perspectives and also helps in maintaining a direct link between on-station and on-farm research and is thus a first-hand source for feedback.

A fairly extensive programme on farmers' field is in operation in India under the aegis of All India Coordinated Research Project on Integrated Farming System Research (AICRP on IFS) located at (Indian Institute of Farming System Research (ICAR-IIFSR), Modipuram. Collaboration of ICAR-Indian Agricultural Statistics Research Institute (ICAR-IASRI) with IIFSR is since 1960s. ICAR-IASRI is primarily held responsible for planning, designing and statistical analysis of data generated at ON-Farm Research (OFR) experiments consisting of 32 On-farm research centres located at various places all over India. Now, ICAR-IASRI is a recognized voluntary centre of this project.

In On-Farm Research, small and marginal farmers are the targets who are extremely variable in socio-economic parameters and are subjected to enormous bio-physical constraints. For this reason the selection of farmers and fields should be done so as to be representative of the most realistic situation in which a production technology is to be tested and conclusions are drawn on the basis of stratification with reference to agro-climatic zone, soil and fertility levels, rainfall pattern, bio-physical constraints, management levels and socio-economic parameters of the farmers. For this reason not only the data on the production technology should be collected but the full description

of the climate, soil, farm, farmer and their management practices of the trial site should be made to be able to analyze and correlate the information for working out the appropriate recommendations.

3. Selection Procedure

As a first step it is necessary to define the area where trials are proposed to be taken. Presently country has been divided into different agro-climatic zones under National Agricultural Research Project (NARP) for the purpose of developing location specific research and development strategies for increasing agricultural production. It would thus be appropriate to develop the technology for these zones separately. Once the target area is selected the methodology adopted for selection of sites involves the combinations of some basic techniques of experimental designs and sample survey. A multistage random sampling design was suggested for the selection of ultimate sites where proposed trials are conducted.

Each NARP zone will be stratified into various agriculturally homogenous farming situations by suitable combination of contiguous tehsil/talukas taking into consideration the homogeneity to the extent possible in respect of soil, cropping pattern and availability of irrigation water etc. In each farming situation under a NARP zone, most predominant farming systems based on diagnostic survey should be identified. Predominant farming systems may be different or there is a possibility of having same farming system. Two to three farming situations will be selected at random for the study during the year. The availability of field staff and area under specific farming situation will determine the number of farming situations to be covered. Having worked for 3-4 years in the selected farming situations, the experimental programme will be taken in other farming situations of NARP Zone for the subsequent period of study. Farming situation should be further divided into number of blocks/ pockets and the list of blocks/pockets for each of the selected farming situation for study during a particular year should be prepared. Of these, two blocks/pockets are to be randomly selected in each selected farming situation such that total number of blocks /pockets so selected in the zone will be equal to the number of field staff.

For each block/pocket selected, four villages are selected at random and in each selected village, three farmers are selected randomly where different types of experiments are carried out. The household selected in first season (Kharif) will continue in the second (Rabi) and third (Summer) season also. As such in the three selected fields of three selected farmers in a village, three different types of experiments will be conducted. Preferably, the number of cultivators chosen may be kept same for all the villages, in the blocks/pockets of the farming situation. It is necessary that a selected household should be persuaded to take up the experiments in his fields by explaining the importance of the scheme, and the benefits he will get by way of free fertilizer, seed, plant protection measures etc provided his field is suitable for conducting experiment.

4. Experiment No.2: Intensification/diversification of the existing cropping system

Studying the impact of farming system diversification at farmers' field is the main objective of Experiment No.2 which has been conducted from 2013-14. Existing as well as diversified farming systems vary from centre to centre depending on factors like climatic conditions, soil characteristics, rainfall and irrigation facilities, availability of fertilizers, man power and machinery. For comparing existing and diversified data (with respect to production, marketable surplus, cost, return and profit), paired t-test has been carried out for all the centres for 2015-16 data. The results are summarized in Table 1 given below:

Table 1. P values - Existing vs Improved farming systems

Kanpur	<0.0001***	<0.0001***	<0.0001***	<0.0001***	0.1084
Kolar	0.0006***	0.0007***	0.0006***	0.0013***	0.0014**
Purnea	<0.0001***	<0.0001***	-	<0.0001***	<0.0001***
Dindori	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
Kendrapara	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Seetampeta	0.009***	0.1363	<0.0001***	0.0093***	0.1403
Udaipur	0.1748	<0.0001***	<0.0001***	<0.0038***	<0.0001***
Warangal	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Amritsar	<0.0001***	-	<0.0001***	<0.0001***	-
Aurangabad	0.0006***	0.0049***	0.0004***	0.1078	0.0827*
Gadag	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Kangra	<0.0001***	0.1617	<0.0001***	<0.0001***	0.1617
Katni	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Pakur	0.0001***	0.0001***	0.0001***	0.0349**	0.0001***
Amrawati	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0004***
Kakdwip	0.0304**	0.0309**	0.0582*	0.0178**	0.0233**
Mehsana	0.0001***	0.0001***	0.0001***	0.0028***	0.0442**
Ambedkarnagar	0.0018***	0.004***	<0.0001***	0.0413**	0.4338
Angul	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Derol	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Kamrup	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Thane palghar	0.0013***	0.0190**	0.1161	0.0004***	0.0113**
Thiruvalla	<0.001***	<0.001***	<0.001***	<0.001***	0.013**
Kawardha	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Jeolikot	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Samba	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Paiyur	0.0009***	0.001***	0.0003***	0.0174*	0.0495**
Pune	<0.0001***	<0.0001***	<0.0001***	<0.0001***	<0.0001***
Sirsa	-	0.0001***	<0.0001***	<0.0001***	0.0037**

* Significant at 10% level of significance

** Significant at 5% level of significance

*** Significant at 1% level of significance

It can be seen that for most of the centres, diversification has brought significant impact on farmers' income in terms of production, marketable surplus, cost, return and profit. Hence, adaption of integrated farming system approach instead of single cropping can be highly beneficial under Indian farming conditions.

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