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RESEARCH ARTICLE :

Farmer participatory seed production and adoption of rice-technology package by tribal farmers in Ranga Reddy district of Telangana

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SUMMARY : The "strategic extension campaign" (SEC) methodology developed by FAO emphasizes the importance of people's participation in strategic planning, systematic management, and field implementation of agricultural extension and training programmes. The Tribal-Sub-Plan Act formulated by the Government of India is to ensure, accelerated development of Scheduled Tribes (ST) with emphasis on achieving equality focusing on economic, educational and human development of Scheduled Tribes. The present study was undertaken in Rangareddy district of Telangana to analyse the socio-economic characteristics of tribal farmers, to disseminate and demonstrate the rice technology package among tribal farmers and to train the selected tribal farmers on seed production of improved rice varieties. A rice technology package was demonstrated on the selected farmers' fields of Ranga Reddy District, under the TSP scheme, which has benefitted the tribal farmers as the adoption resulted in a yield advantage of 16-25 per cent over the local checks. This may be attributed to the adoption improved rice varieties, training on the package of practices and seed production and weed management. Hence, efforts should be made to disseminate the improved rice varieties and information on good management practices in general and weeds management in particular.

KEY WORDS :
Rice Technology, Tribal

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BACKGROUND AND OBJECTIVES

The "strategic extension campaign" (SEC) methodology developed by FAO emphasizes the importance of people's participation (*i.e.*, intended beneficiaries such as small farmers) in strategic planning, systematic management, and field implementation of agricultural extension and training programmes (Adhikarya, 1994). Its extension strategies and messages are designed based on the outcomes of a participatory problem identification process on the factors responsible for partial or non-adoption of recommended technology. In the context of agricultural extension, a campaign is one of the methods of extension which can reach a large number of target beneficiaries in a short time period.

The focus of SEC activities is to create a demand through information and motivation approaches and to satisfy the demand through education and training for adopting the recommended technology package. The SEC method has been successfully implemented with FAO assistance in many countries for different crops, with topics such as line-sowing method of rice cultivation, maize production, cocoa cultivation, tick-borne disease control, contour tillage etc. A series of training programs were organized for tribal farmers to adopt a technology package comprising of improved rice varieties developed by the Indian Institute of Rice Research *viz.*, Improved Samba Mahsuri, DRR Dhan 42, DRR Dhan 44, DRR Dhan 46, and quality seed production. Moreover, in the present study the SEC was specifically utilised to create awareness about weed control measures.

The Tribal-Sub-Plan Act formulated by the Government of India is to ensure, accelerated development of Scheduled Tribes (ST) with emphasis on achieving equality focusing on economic, educational and human development along with ensuring security social dignity and promoting equity among Scheduled Castes and the Scheduled Tribes, by earmarking a portion, in proportion to population of Scheduled Tribes in the State, of the total plan outlay of the State as the outlay of the Tribal Sub-Plan (TSP) of the State. The State shall, in every financial year, earmark in such manner as may be prescribed, a portion of the total Plan outlays of the State which shall be proportionate to the Scheduled Tribe population of the State, to be called as Tribal Sub-Plan Fund. Thus, TSP is the Plan approved by the State Council for inclusion in the Annual Plan of the Department to bridge the gap in development of Scheduled Tribes and shall include the ST component of general schemes.

Many innovative schemes have been planned by the Tribal Welfare Department, Government of Telangana for the all-round development of tribal population in the State. To improve the delivery mechanism of Government Welfare Schemes, it is proposed to convert Tribal Thandas into Gram Panchayats. Many innovative schemes are being taken up as per the provisions of the Tribal Sub Plan Act, 2013, while preparing the Annual Plan.the Girijan Co-operative Corporation (GCC) undertakes procurement of minor forest produce (MFP) and agriculture produce from tribals at remunerative prices and also provides seasonal agricultural credit to ST farmers (TWD).

In Ranga Reddy district of Telangana, Scheduled Tribe population constitutes 5.63% of the total population of the district (Census 2011). The occupational composition indicates that 23.63% of the tribal farmers are cultivators, 30.46% agricultural labour, 2.92% household industry and 41% are employed in other categories (DES, 2015).

Lack of information of farming techniques, defective and faulty weighing, lack of adequate storage facilities, high seed cost, high marketing cost, high interest rate of private agencies, Delay in loan sanction from bankers, high labour cost, availability of marketing facilities, low support price by government, financial crisis in family were the constraints reported by tribal farmers of Khammam (Pavan Kalyan, 2013).

In this backdrop, the present study was conducted in Rangareddy district of Telangana during the year 2014-15, with the following objectives:

Objectives :

To analyse the socio-economic characteristics of tribal farmers.

To disseminate and demonstrate the rice technology package among tribal farmers.

To train the selected tribal farmers on seed production of improved rice varieties.

RESOURCES AND METHODS

A benchmark-baseline was undertaken to analyse the farmers' practices with respect to rice cultivation in the selected tribal hamlets of Ranga Reddy District of Telangana in 2014. A series of participatory appraisal exercises were conducted to identify, analyse and prioritize the constraints being faced by farmers in rice cultivation in the study area. The rice-technology package was jointly evolved by scientists-farmers and extension personnel as a participatory strategy.

To study the existing rice production practices being followed by farmers, a survey was undertaken and data was collected from 100 farmers of four tandas *viz.*, Dubbacherla, Kollapadakal, Kallamcheruvu and Nagireddypally Tandas of Rangareddy District of Telangana. The varieties being grown, inputs used and yield obtained were recorded. Out of the 100 sample farmers, based on the financial resources available, the inputs under TSP project were provided to 50 farmers and they were motivated to adopt the selected rice

technology package for achieving higher yields. Data were collected using structured questionnaires administered to rice farmers. Focus Group Discussions preceded data collection. Selection of rice farmers was done by random sampling.

Rice technology package :

The following rice-technology package of popularization of new rice varieties, farmers' participatory paddy seed production, labor saving technologies and weed management based on the need identification was jointly evolved by scientists-farmers and extension personnel as a participatory strategy.

Popularization of new rice varieties :

Since the SEC is aimed at increasing awareness/ knowledge level of the identified target beneficiaries, in the present study SEC was organized to popularize the new varieties developed by the ICAR-Indian Institute of Rice Research (IIRR).The varieties included, Improved Samba Mahsuri, a bacterial leaf blight resistant variety, DRR DHAN 42 and DRR DHAN 44 are drought tolerant varieties.

ICAR-IIRR has developed an improved, bacterial blight resistant, high yielding, fine grain variety possessing premium grain and cooking quality, named as Improved Samba Mahsuri (RP Bio-226), through the deployment of Marker-assisted selection for the first time in South India. DRR DHAN 42 variety has been released by ICAR-IIRR for cultivation in the states of Andhra Pradesh, Telangana, Chhattisgarh, Madhya Pradesh, Jharkhand, Puducherri and Tamil Nadu. The duration is 120-125 days with long slender grain type with a yield potential of 3.5-4.0t/ha under moderate drought 1.5 to 2.5t/ha,severe drought and 5.5 to 6.0 t/ha under normal conditions,is resistant to diseases like blast, moderately resistant to bacterial blight and brown spot. Whereas, DRR Dhan 44 has been released as an early duration, high yielding, long slender grain variety suited to transplanted and direct seeded aerobic cultivation with good weed competitive ability. It has tolerance to drought at reproductive stage and high nutrient use efficiency and has weed competitive ability and performs well under aerobic cultivation.

Farmers' participatory Paddy Seed production :

Seed is a critical and basic input for attaining higher crop yields and majority of farmers, especially small and marginal farmers suffer mainly because of poor quality and exorbitant prices of seeds. Training farmers in community-based seed production may have an impact on farmers' access to seed; therefore, it is imperative to train farmers to produce their own seed with stringent quality control and at a low cost. The Seed kits, small samples of seed of improved varieties, (improved samba mahsuri, DRR Dhan 42, DRR Dhan 44 and DRR Dhan 46) were distributed to selected farmers with information on steps to be followed for seed production. This can serve as one of the means to insert new varieties and quality seed into local seed systems, aiming at a faster diffusion of improved varieties through informal farmer-to-farmer exchanges.

Labor saving technologies :

Direct wet-seeding is an alternate method of growing rice instead of conventional transplanting. In this method, sprouted seeds are sown on well prepared puddled land. Direct seeding can be done either by hand broadcasting or by using Drum Seeder. Drum Seeder technology overcomes the problem of labour scarcity and saves costs compared to transplanted rice. The seed is dropped in rows @ 20 cm row to row spacing and the seed rate is about 25 – 37.5 kg / ha. In Direct seeding method the cost of cultivation is reduced by about Rs.10000 14000 per ha as the operations like nursery field preparation, rising nursery, nursery pulling and manual transplanting as done in traditional transplanting method are not required.

Weed management :

Weeds are a major problem as they compete for light, water and nutrients, lowering the rice crops productivity and reducing profit margins because of the high cost of control. Management practices that provide long-term solutions to weeds have been developed. However, adoption of these practices by farmers has not been widespread, as only a relatively small proportion of landholders achieve effective weed control. The challenge is to communicate information to, and motivate, the large proportion of smallholder farmers that are not controlling weeds effectively.The farmers were trained to identify the different weeds, the critical period of weed control and motivated to adopt the various methods of weed control *viz.*, cultural, chemical, mechanical and biological.

OBSERVATIONS AND ANALYSIS

Important socio-economic characteristics of sample households are presented in Table 1. The average family size of the surveyed households was five members per household. The average number of family labour involved was 3 per household. The average age of the sample farmers was 43.4 years indicating that majority of the farmers in the study area were middle aged, agile and were actively taking part in paddy cultivation.

Education plays an important role in the adoption of innovations/new technologies. The education level (average number of schooling years) was two years and 55 per cent of the respondents were illiterate. This high rate of illiteracy may be due to the reason that the majority of the sample farmers were middle aged. Twenty five per cent of the respondents had 1-5 years of schooling and 18 per cent had 6-10 years of schooling. Only two per cent of the respondents had more than 10 years of schooling. The average size of the farm was 0.42 hectares as all most all the farmers were with small and marginal holdings in the study area.

The number of years a farmer has spent in the farming business may give an indication of the practical knowledge he has acquired on how he can overcome certain inherent farm production and adoption problems. In order to have efficiency in crop management it is essential that farmers have experience in raising a particular crop (Onumadu and Osahan, 2014). The selected households had fairly long experience in rice cultivation (21 years).

Adoption of rice technology package by tribal farmers :

The DSR farmers used 8.75 kgha^{-1} more seed as compared to transplanted rice (Table 2). The main reason for using higher seeding rate in DSR is the fact that DSR requires higher seed rate than the transplanted method

Table 1: Socio-economic characteristics of the sample farmers

Sr. No.	Particulars	Number
1.	Age (Yrs)	43.4
2.	Education	
	Average years of schooling(yrs)	2
	Illiterate	55
	1-5yrs	25
	6-10 yrs	18
	>10 Yrs	2
3.	Farm size (ha)	0.42
4.	Family size (No.)	5
5.	Family labour (No.)	3
6.	Experience in rice cultivation (yrs)	21

Table 2 : Effect of drum seeding on seed input and yield compared to conventional transplanting method

Input	Increase (+) or Decrease (-) in amount (kg/ha)
Seed requirement	8.75
Weedicide (Rs./ha)	763
Yield	124

Table 3: Yield levels of demonstrated and check varieties

Sr. No.	Variety	Yield (t/ha)	Local check	Yield
1.	DRR Dhan 46	4.8	MTU 1010	4 (20%)
2.	Improved samba mahsuri	4.5	Tella hamsa	3.87 (16%)
3.	DRR Dhan 44	5.0	MTU 1010	4 (25%)
4.	DRR Dhan 42	4.7	IR 64	3.93(19.5%)

*Figures in parenthesis indicate percentage to the total

and also partly because of the fear of the farmers about the seed rotting which may occur due to rain after sowing. The labor costs for weeding were significantly higher for DSR than the transplanting method. This is due to combined effect of applying more herbicides and manual labor for weed management under DSR method of rice cultivation. Adoption of DSR has resulted in a yield advantage of 124 kgs/ha over the conventional transplanting method. Similarly, various extension methods were successfully used (Chandrasekhararao *et al.*, 2013) to popularize drum seeder technology through training programmes, front line demonstrations, group discussions, exposure visits, field days, kisan melas, news paper coverage, radio, TV and popular articles.

The improved varieties demonstrated on the selected fields of the tribal farmers had a yield advantage over the local checks (Table 3). An yield of 4 t/ha was realised in case of DRR Dhan 46 and DRR Dhan 44 over the local check MTU 1010 and Tella hamsa with a yield advantage of 20 and 25 percent, respectively. Improved samba mahsuri and DRR Dhan 42 had a yield advantage of 16 per cent and 19.5 percent, respectively over the local checks.

Training on seed production of improved samba mahsuri was imparted to the sample farmers. Seed production of improved samba mahsuri yielded 90 tons of seed and the smallholder farmers' requirements of seed was met through **i**nformal farmer-to-farmer exchange of seed. It is therefore, important to give due recognition to the informal sector which serves as a low-cost source of seed especially for resource-poor at affordable prices. The tribal farmers adopted the recommended herbicides based on severity of the infestation and could save money on labor as only one manual weeding was required subsequent to application of the recommended herbicides.

Thus, the training programs and SEC for popularization of new rice varieties has benefitted the tribal farmers. Similar results have been reported by earlier researchers. The training programs organized by KVK have benefited the farmers as trainees had more knowledge and extent of adoption of package of practices of wheat crop than non-trainees (Dubey and Shrivastava 2007). Tsado *et al*. (2014) based on the findings of their study recommended that training rice farmers should be given topmost priority to improve their skills on the adoption of improved rice packages to increase their productivity and consequently their income.

Conclusion :

The rice technology package disseminated and demonstrated under the TSP scheme has benefitted the tribal farmers of Ranga Reddy District as the adoption of rice technology package by the tribal farmers resulted in a yield advantage of 16-25 per cent over the local checks. This may be attributed to the adoption improved rice varieties, training on the package of practices and seed production and weed management. Hence, efforts should be made to disseminate the improved rice varieties and information on good management practices in general and weeds management in particular. Training farmers in community-based seed production may enhance the farmers' access to seed at low cost along with the assurance of quality as farmers face lot of problems of spurious seed which adversely affects the yield thereby the income. Thus, the farmer-scientist participatory evolved technology package was readily adopted by tribal farmers which resulted in higher yields.The SEC methodology enabled popularization of the new rice varieties among tribal farmers.

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