GLOBAL JOURNAL OF BIO-SCIENCE AND BIOTECHNOLOGY

www.scienceandnature.org

INTRODUCTION OF SORGHUM NEW VARIETY CSV-15 IN AGENCY TRACTS OF EAST GODAVARI OF ANDHRA PRADESH

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ABSTRACT
The study was carried out during Kharif, 2013-16 in twenty one villages of 11 agency mandals of East Godavari district of Andhra Pradesh. All the front line demonstrations were carried out in an area of 40 hectares in collaboration with Indian Institute of Millet Research, Hyderabad under the Tribal sub Plan.The improved technologies consisting use of improved variety CSV-15, seed treatment with thiram, recommended dose of fertilizer application and integrated pest and disease management. CSV-15 recorded higher yield as compared to local variety. The results indicated an increase in yield and yield attributes in the demonstration package compared to the farmers practice. Average net returns of Rs. 45000/- with a benefit cost ratio of 3:1 was obtained in demonstration compared to Rs.28000/- per hectare of farmers practice with a benefit cost ratio of 2:1 Thus, front line demonstrations are effective tools in introducing new technologies to the farmers on the basis of results obtained in other fields.

KEY WORDS: CSV-15, Sorghum, Yield attributes Yield potential.

INTRODUCTION

Jowar (Sorghum) is the fifth most important cereal crop after wheat, rice, maize and barley. The origin of sorghum is generally believed to be around the present day Ethiopia or East Central Africa. Sorghum was taken from East Africa to India during the first millennium. More than half of the world is growing sorghum in semiarid zones, where it is a staple food for millions of poor and hungry people. Cultivation of sorghum is mainly concentrated in Peninsular and Central India. Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Gujarat, Rajasthan, Uttar Pradesh (the Bundelkhand region) and Tamil Nadu are the major Sorghum growing states. Other States grow sorghum in small areas primarily for fodder. Despite of its multiple uses, the area under sorghum in India has declined from 18.61 m. ha in 1970 to 7.93 m. ha in 2008. However, its productivity has increased from 522 kg/ha to 981 kg/ha due to significant improvements made in research and development. There is wide gap between national productivity and yield potential of the improved sorghum technologies developed from the research institutes. The available agricultural technology does not serve the very purpose until it reaches and adopted by its ultimate users the farmers. Technology transfer refers to the spread of new ideas from originating sources to ultimate users (Prasad *et. al.*, 1987) Farming in agency areas has been characterized as a subsistence activity with farmers producing a wide array of crops (including multiple cultivars of the same crop) for their own consumption, using few purchased inputs. There is ample scope for the improvement of production and productivity of the crops for raising income level of the farming community of the agency area. Productivity of the crop can be enhanced by adopting the improved practices as recommended by the Agricultural Universities, Department of Agriculture and ICAR Research Institutes. Front Line Demonstration (FLD) is one of the important programmes to evaluate and demonstrate the production potential of the recently released crop cultivars in the farmers' fields. The aim of the front line demonstration is to convey the technical message to farmers that if they use recommended package and practices then the yield of the crop can be easily doubled than their present level. Besides, it enable to build-upconfidence of the farmers to adopt the latest technologies and also help to collect valuable feedback to modify the research programme, based-on their field experiences regarding performance of the technologies. This study was therefore designed with the objective of assessing the knowledge and adoption of improved practices by the farmers of the agency area.

MATERIALS & METHODS

The study was carried out during *kharif* 2013-16 at farmers' fields of twenty one villages covering 11agency mandals During the study, an area of 40 ha was covered under front line demonstration in each year. Before selection of farmers for FLD, a comprehensive list of all sorghum growers was prepared from group meeting and specific skill training was imparted to the selected farmers regarding different aspects of cultivation etc. were followed as suggested by Choudhary (1999) and Venkattakumar *et al.* (2010). During selection procedure, repetition of the farmers was completely avoided. Thus a total 300 farmers were included in the study. The area under each demonstration was 1 acre. Through survey, farmers meetings and field diagnostic visits during the cropping period, low yield of sorghum was conceived due to local varieties which are low yielding and having long duration, imbalanced use of nitrogenous fertilizer and indiscriminate practices to manage the stem borer. The demonstration comprising

new variety CSV-15 with good agricultural practices and followed the mixed cropping which was a recommended practice in agency area (Table 1)

During *kharif* seasons from 2013 to 2016 under rainfed farming condition, in light to medium soils with low to medium fertility status. Each demonstration was conducted in an area of 0.4 ha and adjacent to the farmer's fields in which the crop was cultivated with farmer's practice/ local variety. The package of practices included were improved variety, seed treatment maintenance of optimum plant population, recommended fertilizers dose, plant protection measures especially grass hopper management. The spacing followed was at 0.45 m x 0.15 m sown between third week of June to first week of July during the five years with the seed rate of 10 kg/ha. All the participating farmers were trained on all aspects of sorghum production management. To study the impact of front line demonstrations, a total of 100 farmers were selected as respondent through proportionate sampling in each year. Production and economic data for FLDs and local practices were collected and analyzed. The Extension gap, technology gap and technology index were calculated using the formula as suggested by Samui *et al*. (2000).

Extension gap (qha^{-1}) = Demonstration yield (qha^{-1}) – Yield of local check (qha^{-1}).

Technology gap (qha^{-1}) = Potential yield (qha^{-1}) – Demonstration yield (qha-1).

Technology index (%) = Potential yield (qha^{-1}) – (Demonstration yield / Potential yield) x100

Knowledge level of the farmers about improved production practices of sorghum before frontline demonstration implementation and after implementation was measured.

TABLE 1: Comparison between farmers practice and demonstration

Observations	Farmers practice	Demonstration
Cropping pattern	Sorghum+redgram+cowpea+blackgram	Sorghum + Redgram (2:1)
Area	0.4 ha	0.4 ha
Farming situation	Podo/shifting cultivation	Improved management practice
Variety	Local	Sorghum CSV-15+ Redgram LRG-41
Seed rate	Equal proportions	8 kg+ 8 kg per ha
Sowing	Broadcasting	Line sowing with recommended spacing in 2:1 ratio
Duration	6 months	4 months
Seed treatment	Not followed	Carbendizm + imadachloprid
% Pest loss	15	3
% Disease loss	15	5
% loss due to Competition for nutrient & water	20	10
Weed management	Not followed	Manual weeding & thinning
Sorghum equalent Yield	2550	6441 kg/ha
BC Ratio	2.53	3.62

RESULTS & DISCUSSION

Frontline demonstrations are effective educational tools in introducing various new varieties to the farmers and its adoption by building confidence on the basis of results obtained on their fields. The demonstrations could convince the farmers of the respective localities that high crop yield is within their reach by adopting feasible package of practices. A comparison between the farmers practice and suggested scientific practices would indicate the technology gap in yield adoption (Table 2). A comparison of productivity levels between demonstrated varieties and local checks is shown in Table 2. During the period under study, it was observed that the productivity of sorghum in East Godavri district under improved variety ranged between 20-30 qha^{-1}with a mean yield of 25.0 qha^{-1}. This increased grain yield with improved production technologies was mainly because of high potential yielding variety CSV-15. The variation in the productivity was also caused unusual delay in sowing in some of the farmer's fields. In fields where delayed sowing was done because of prolonged dry spell in the month of July and delay onset of monsoon rains, the crop growth was restricted. The late sowing crop was subjected to relatively less time span available for plant growth and development. Similar yield enhancement in different crops in front line demonstration has amply been documented by Haque (2000), Tiwari *et al.* (2003), Nazrul Islam *et al.* (2004), Hiremath *et al.* (2007), Mishra *et al*. (2009), Kumar *et al*. (2010) and Sreelakshmi *et al*. (2012). From these results it is evident that performance of improved varieties was found better than the local check under local conditions. Farmers were motivated by results of agro technologies applied in the FLDs trials and it is expected that they would adopt these technologies in the coming years also. Yield of the front demonstration trials and potential yield of the different varieties of crop was compared to estimate the yield gaps which were further categorized into technology index. The technology gap shows the gap in the demonstration yield over potential yield and it was 25 qha^{-1}. The observed technology gap may be attributed to dissimilarities in soil fertility, salinity and erratic rainfall and other vagaries of weather conditions in the area. Hence, to narrow down the gap between the yields of different varieties, location specific recommendation appears to be necessary. Technology index shows the feasibility of the variety at the farmer's field. The lower the value of technology index more is the feasibility. Table 3 revealed that the technology index value was 200. The economic feasibility of improved technologies over traditional farmer's practices was calculated depending on the prevailing prices of inputs and output costs (Table 2). Front line demonstrations recorded higher mean gross returns (Rs.60000 ha^{-1}) and mean net return (Rs.45000 ha^{-1})with higher benefit ratio (3:1) under improved technologies of different improved varieties of sorghum as compared to local check (2:1). These results are in line with the

findings of Gurumukhi and Mishra (2003), Sawardekar *et al.* (2003). The results from the present study clearly brought out the potential of improved variety CSV-15 enhancing sorghum production and economic gains in rainfed farming situations conditions of this region of Agency area of Andhra Pradesh. Hence, sorghum production technologies have broad scope for increasing the area and productivity at each and every level.

TABLE 2: Performance of Sorghum demonstrations during Kharif 2013- Kharif 2015

Sl no	Year	Cost of cultivation (Rs/ha)		Gross returns (Rs/ha)		Net returns (Rs/ha)		BC Ratio		Grain yield (q/ha)	
		IP	FP	IP	FP	IP	FP	IP	FP	IP	FP
1	2013-14	5000	2000	50000	30000	45000	28000	3:1	2:1	25	15
2	2014-15	5000	2000	40000	20000	35000	32000	3:1	2:1	20	10
3	2015-16	5000	2000	60000	40000	55000	53000	3:1	2:1	30	20
	Mean	5000	2000	50000	30000	45000	28000	3:1	2:1	25	15

TABLE 3: Productivity of sorghum CSV -15, yield gaps and technology index (average over years)

Sl No	Season *Kharif*,	No of FLD's	Productivity (t/ha)						
			Potential	Improved technologies (demo)	Local check	Percent increase over local	Technology gap (t/ha)	Extension Gap (t/ha)	Technology Index (%)
1	2013-14	100	3.5	1.5	0.50	66.00	2.0	1.00	200
2	2014-15	100	3.5	1.4	0.80	42.00	2.1	0.60	210
3	2015-16	100	3.5	1.6	0.70	56.00	1.9	0.90	190
	Mean	100	3.5	1.5	0.67	54.67	2.0	0.83	200

CONCLUSION

The results of FLDs convincingly brought out that the yield of sorghum has increased with the intervention on balanced nutrition coupled with the disease and pest management in the East Godavari district. It can be concluded that frontline demonstration conducted under the close supervision of scientists is one of the most important tool of extension to demonstrate newly released variety CSV-15 and its management practices in the farmers' field under different agro-climatic regions and farming situations. FLDs are playing important role in motivating the farmers for adoption of improved agriculture technology resulting in increasing their yield and profits. Keeping in view of importance in transfer of technology, FLDs should be designed and conducted carefully and effectively and provisions should be made for other supportive extension activities such as field days, interaction meeting, etc. for speedy dissemination of demonstrated technology among farming community.

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