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Performance of Different Production Technologies of Kharif Crops in Northern Transitional Zone of Karnataka under IVLP

A.T.YARAGATTIKAR, R.A.BUDIHAL AND S.A.PATIL

University of Agricultural Sciences, Dharwad - 580 005

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Abstract: Problems of crop production and their solutions at micro farming situations with participation of farmers under technology assessment and refinement through institution village linkage programme were studied. Production technologies of kharif sorghum, soybean and drill sown rice were assessed through verification trials/ on farm testing. The HYVs were found superior over farmers choice of respective crop varieties over the locations. Integrated nutrient management practices in kharif sorghum recorded increase in grain and fodder yield with additional returns of Rs.2300 per hectare. Maintaining of optimum plant population in soybean yielded 28.7 per cent higher grain yield with Rs. 14.7 additional income per additional rupee spent. Low cost and eco-friendly technology of rice + sunhemp under drill sown conditions in low lands in 10:1 proportion did not hamper the growth of rice, on the other hand, helped in efficient management of weeds and improving soil fertility.

Introduction

India is having about 69 per cent of its net sown area as rain dependent. The complex, diverse and risk prone agriculture is mostly practiced in rainfed areas by small and poor household with less purchased inputs. These farming systems are relatively complex with high environmental diversity and high risk of production stability. Farm research manpower over the years have generated wealth of scientific information to serve farmers in different agro-eco systems. However, it is estimated that about 70 per cent of the available technologies are not adopted by the farmers. Among other factors, the most important reasons for low acceptance of technologies lie in the fact that they are not economically viable, not operationally feasible, not stable, not matching with farmers needs and not compatible with overall farming system (Anon.,1995).

Rainfed agricultural development is based more on efficient resource management. Therefore, it is increasingly ralise that, for alignment of research objectives with local resource management practices through participatory approach is need of the day and for wider adoption of technologies farmers participation in the stages of technology generation is essential. Thus, it is necessary to develop farmer oriented appropriate technologies especially for the farmers belonging to risk prone, diverse and low-income categories.

The project entitled, "Technology Assessment and Refinement of Nutritive cereal based Rainfed Agro-eco system through Institution Village Linkage Programme (IVLP) for Northern Karnataka region" is being implemented from 200-01 by University of Agricultural Sciences, Dharwad (UAS). The IVLP project emphasizes in identifying the problems and their solutions of micro farming situations through participation of farmers. This help is enhancing the production and profitability of production system and also imparts stability and sustainability in the agro eco-system.

Material and Methods

Villages namely Mugali, Madanbhavi and Hosatti of Dharwad taluk and district of

Karnataka, which are free from influence of urbanization were selected for implementation of IVLP from 2000-01. They are situated in the northern transitional zone with mean annual rainfall of 750 mm and the rainfall during kharif-2000 was normal. The important crops grown during kharif season are sorghum, little millet, drill sown rice and maize under cereals, soybean, greengram, peas under pulses and groundnut as oilseed crop.

The information about climate, soil, cropping pattern and requirements of farmers was obtained through Participatory Rural Appraisal (PRA) tools. Based on these technology modules were formulated in consultation with farmers. During kharif-2000 season, totally six production technologies two each of sorghum, soybean and drill sown rice were implemented through verification trials/on farm testing under farmers field conditions involving 64 farmers.

Results and Discussion

The details of various on farm technological interventions implemented during kharif 2000 and their performance are presented in table 1,2, 3 and Fig.1. Kharif Sorghum problem(s) identified : The dry fodder yield of sorghum hybrids generally grown by the farmers is low. They have to purchase hybrid seeds every year. Further, kharif sorghum faces the problem of diseases. Farmers are exclusively depending on chemical fertilizers to meet the nutrient requirements of kharif sorghum. Further, chemical fertilizers are being used in imbalance way year after year. This has resulted in low soil fertility leading to lower yields of kharif sorghum.

Technologies Identified- Introduction of high yielding, dual purpose (grain and fodder) and multiple disease resistant variety.

Integrated Nutrient Management (INM) in kharif sorghum

The average grain yield recorded by DSV-2 variety was 36.76 q/ha as against 35.91 q/ha in sorghum hybrids and the difference was non-significant. However, DSV-2 recorded significantly highest straw yield of 67.38 q/ha compared to straw yield of 54.49 q/ha recorded in sorghum hybrids. The increase in straw yield in DSV-2 was 23.6 per cent. Further, it was opined that, the grain quality is slightly superior compared to hybrids.

By adopting INM practices, there was increase in grain and dry fodder yield of kharif sorghum to the tune of 7.28 and 10.97 per cent compared to farmers practice (41.46 q/ha grain and 72.0 q/ha dry fodder), respectively. It was observed that kharif sorghum crop grown under INM was dark green in colour, healthy and vigorously growing as compared to that grown under farmers practices. Farmers were convinced about the use of bio-fertilizere as one of the cheaper components of INM and application of balanced dose of fertilizers from soil health point of view.

Farmers expressed that, as DSV-2 variety grow tall, there is possibility of its lodging in light soils. Though dry fodder yield of this variety is good, it becomes brittle compared to dry fodder of local sorghum varieties. Further research in this aspect is needed. INM practices were found to be better from productivity of kharif sorghum and long term soil health point of view. Hence these practices are to be popularized in similar agro-climatic conditions.

Soybean Problem(s) identified : Farmers were growing local varieties of soybean having low productivity from their own source year after year. Further, they were not using bio-fertilizer, which is one of the important components of INM. Usual practice of farmers is to sow soybean in wider row spacing, resulting in use of low seed rate, thereby low productivity per unit area.

Table 1. Details of various on farm technological interventions implemented and their performance during kharif - 2000

Crop	Technological inteventions	No.of farmers	Treatments	Yield Q/ha	% increase in yield	Additional return (Rs/ha)	Remarks
Kharif sorghum	Testing of improved dual purpose genotype	21	T_1: DSV-2 variety of Kharif sorghum T_2: Hybrid sorghum of farmer's choice	36.76 (G) 67.38 (F) 35.91 (G) 54.49 (F)	2.3 (G) 23.6 (F)	1629	hybrid seed costlie than variety hence no incremental cost
	Assessment of Integrated Nutrient Management	5	T_1: RDF (100:75:40 NPK Kg/ha+10t FYM/ha)+ FeSo4 (0.5%) foliar spray DAS + Azospirullm seed treatment (375 g/ha) T_2: Farmers practice (50:30 kgNP/ha	44.48 (G) 79.90 (F) 41.46 (G) 72.00 (F)	7.2 (G) 10.9 (F)	2300	1.95 additional returns/ Rs. spent
Soybean	Testing of High Yielding Variety and integrated nutrient management	23	T_1: Soybean variety (JS-335)+ seed treatment with bio-fertilizer (Rhizobium Japonicum) T_2: Farmers own seeds (local with out seed treatment	22.55 19.10	18.62 -	3186	4.03 additional returns/Rs. spent
	Testing of optimum plant population	5	T_1: Recommended seed rate (62.5 Kg/ha) sown with seed drill (30 cm X 10 cm spacing) T_2: Recommended seed rate (62.5 kg/ha) sown with seed dril (37.5 cm X8 cm)row spacing T_3: Farmer's practice (45-50 Kg seed rate sowm with seed drill of 37.5 cm row spacing	23.95 24.14 19.75	27.7 28.7	4680 4851	14.1 14.7 additional retuns/Rs. spent
Drill sown rice	Testing of improved variety and integrated nutrient Management	5	T_1: Abhilash variety of drill sown rice with Azospirullum seed treatment (375 g/ha) T_2: Farmer's practice of growing local variety.	27.6 24.3	13.5 -	1650 -	5.46 additional returns/Rs. spent
	Evaluation of rice + green manure crop (sunhemp) mixed cropping system.	5	T_1: Drill sowing of rice + sunhemp seed mixture (10:1) with in situ incorporation of sunhemp at planking operation (Hodata) T_2: Sole drill sown rice (Farmer's practice)	25.80 26.02	- -	- -	Saving in labour cost towards weed control

(G) and (F)* indicates grain and dry fodder yield respectively

Table 2. Biometric observations and grain yield of kharif crops as influenced by variety under on farm condition (mean over locations)

Particulars		Kharif sorghum	
		DSV-2	Hybrid
Plant height (cm)		215.2	162.8
Earhead length (cm)		27.2	25.2
Earhead girth(cm)		15.2	11.6
Green leaves at grain filling stagte		10.2	8.0
	Bottom	6.6	4.4
Stem girth (cm)	Middle	6.0	3.7
	Top	3.9	3.0
Grain yield(q/ha)		36.76	35.91
Dry fodder yield(q/ha)		67.38	54.49
Particulars		Soybean	
		JA-335	Local variety
Plant height(cm)		33.8	30.6
No.of branches/plant		3.7	2.9
No.of pods/plant		37.8	28.0
Test weight(100/g)		13.71	12.96
Grain yield (q/ha)		22.55	19.01
Particulars		Drill sown rice	
		Abhilash	Local variety
Grain yield(q/ha)		27.6	24.3

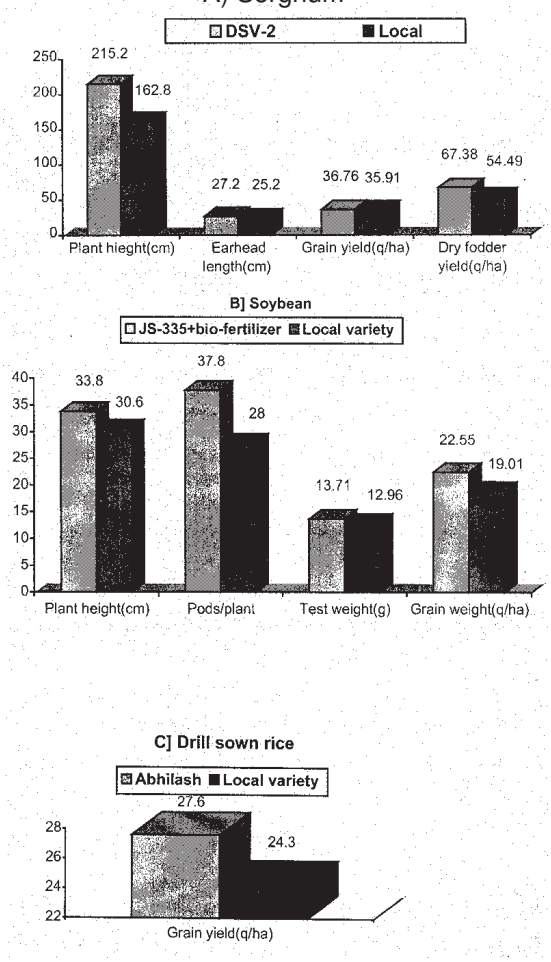
Table 3. Biometric observations and grain yield as influenced by various treatments (mean over locations)

Treatments	Soybean			
	Grain yield (kg/ha)	Plant height (cm)	No.of pods/ plant	Test weight (100/g)
T_1:Recommended seed rate (62.5 kg/ha) sown with seed drill (30 cm X 10 cm spacing)	2395	45.7	31.6	12.74
T_2:Recommended seed rate (62.5 kg/ha)sown with seed drill(37.5 cm X 8 cm row spacing)	2414	44.7	34.3	12.99
T_3:Farmers' practice (45 - 50 kg seed rate sown with seed drill of 37.5 cm row spacing)	1975	42.8	35.3	12.93
S.Em $\pm$	31.72	0.77	1.24	0.13
C.D.at 5%	91.87	2.23	NS	NS

Drill sown rice

Treatments	Grain yield (q/ha)
T_1 : Drill sowing of rice + sunhemp seed mixture (10:1) with in situ incorporation of sunhemp at planking	25.8
T_2: Sole drill sown rice (Farmers practice)	26.0

Fig. 1 Performance of kharif crops under on farm conditions



Technology (ies) identified: -HYV of soybean having high productivity and use of rhizobium bio-fertilizer through seed inoculation.

-Adoption of recommended row spacing and seed rate.

By growing of HYV (JS-335) and adopting INM practices there was significant increase in grain yield of soybean compared to farmers' practice. The increase in grain yield of JS-335 soybean was 18.62 per cent over local. Further, plant characteristic data like height, no. of braches, no. of pods and test weight were superior in JS-335 variety compared to local. The improved variety being non-shattering type, there was minimum loss of grains during harvesting, transporting and threshing. It was observed that few of the beneficiary farmers could not attend harvesting in time due to personal reasons and /or climatic conditions. However, due to non shattering of soybean pods in JS-335 variety these farmers were benefited as against the loss of yield in local variety. Farmers expressed that JS-335 variety have bold seeds compared to local. Farmers were satisfied about the performance of new variety and benefit of bio-fertilizer use. Further, it was observed that majority of the beneficiary farmers have reserved seeds of JS-335 soybean variety for next season sowing on their own. It was opined that some times it is not possible to treat the seeds with bio-fertilizer due to busy and short sowing period. They asked for alternate method of bio-fertilizer application i.e., through soil application.

In the optimum seed rate trial of soybean, grain yield data indicated that, T_1 and T_2 recorded significantly higher soybean yield compared to T_3 (Farmers' practice). However, the grain yield recorded in T_1 and T_2 were on par. Further, there was additional yield of 520 Kg/ha in T_1 and of 539 Kg/ha in T_2 over T_3 corresponding to 27.7 and 28.7 per cent increase respectively. Plant height of soybean was significantly higher in closure row spacing (T_1) compared to farmers practice (T_3). However, data on number of pods per plant and test weight of soybean were non-significant among various treatments. Farmers faced problem of inter cultivation in the standing soybean crop sown with closer row spacing (30 cm), as their hoes are suitable for wider spacing (37.5 cm). They opined that, wider spacing is useful in controlling weeds and conservation moisture through bullock drawn inter cultivation operations.

Though soybean cultivation and its productivity are satisfactory in the selected villages farmers are treating soybean as a another commercial crop and market their entire produce. There is a need to introduce soybean as source of food to meet the daily dietary requirements of the family, as it is rich source of protein and edible oil.

Farmers expressed that though yield of soybean is good, performance of succeeding crop of rabi sorghum is poor when compared to that grown after green gram/peas.

An average farmer usually keeps only 1-2 seed drills and inter-cultivation implements suited for the crops grown by him. Therefore, optimum plant population with existing implements needs to be popularized /studied further in soybean.

Drill sown rice Problem(s) identified : In low lands, farmers are growing long duration local varieties of drill-sown rice, which have low productivity, susceptible to blast disease and prone to lodging due to tall growing nature. Further, farmers are depending exclusively on chemical fertilizers for nutrient supply. During early growth stages of drill sown rice, farmers face problem of weed management. In general, the rice fields are less fertile. The resource poor farmers can not afford to go for chemical weed control method and use of inorganic fertilizers. Due to this yield of drill sown rice are low.

Technology identified -Use of improved variety having drought tolerance, blast resistance, comparatively short duration and high yielding characters in low land drill sown conditions and use of bio-fertilizer.

- Drill sowing of seed mixture of rice + sunhemp in 10 : 1 proportion and *in-situ* incorporation of sunhemp at planking operation (Hodata).

The Abhilash variety recorded on an average 3.3 q/ha higher grain yield accounting for 13.5 per cent increase compared to farmers' practice of growing local varieties. Further, there was no lodging at later growth stages in Abhilash and it matured 8-10 earlier compared to local ones. Incidence of blast disease was noticed in local varieties which was absent in test variety. The grain yields of drill sown rice were slightly lower (0.2 q/ha) in mixed cropping compared to sole cropping system. This indicated that, sunhemp in 10:1 proportion did not hamper the growth of rice. On the other hand, this technology helped in efficient management of weeds and improving soil fertility.

Abhilash variety and INM practices can be adopted under kharif rainfed low land situation in drill sown rice. Seed mixture of rice + sunhemp under drill sown conditions in low lands is a low cost and eco-friendly technology.

References

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