J Krishi Vigyan 2013, 2(1) : 23-25

Evaluation of Major Kharif Crop Varieties To Climate Variability in *Vertisols* of Hadoti Region of Rajasthan

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ABSTRACT

Demonstrations of improved technologies along with existing technologies were conducted at farmer's field during kharif 2011. The soils of selected demonstration plots were clay loam with medium in available nitrogen and phosphorus and high in available potassium. Short duration or drought resistant crop varieties of soybean (JS 9560, JS 9305 and RKS 24) and maize (PEHM 2), drought tolerant varieties of black gram (KU 963 and PU 31) and high water tolerant variety of sesamum (Ujjawal) were demonstrated at farmer's field along with their local check varieties. All the recommended cultivation practices were followed to raise the crop. Results revealed that the soybean variety JS 95-60 took minimum number of days for attaining maturity whereas variety JS 9305 took 13 days more to increase its yield by 0.70 q/ha from the variety JS 9560. The short duration maize variety (PEHM 2) performed better with 11.6 per cent increase in yield over the check variety. The drought tolerant black gram variety proved better for recording 35 per cent increase in yield over the check variety. The sesamum variety (Ujjawal) proved better for high rainfall situation with almost double the yield over the check variety. Selection of improved varieties for extreme weather conditions will help the farmers to cope with such extremes and taking good yields for better returns over the existing technologies.

Key Words: Demonstration , Kharif crops, Maize, Sesamum, Black gram,Soybean.

INTRODUCTION

The climate change impacts on agriculture are being witnessed all over the world, but India is more vulnerable in view of the huge population dependent on agriculture, excessive pressure on natural resources and poor coping mechanisms. Enhancing productivity of major kharif crops therefore, is critical for ensuring food security for all, particularly the resource poor small and marginal farmers who would be affected most. Some factors responsible for low productivity of kharif crops under rain fed conditions are, availability of long duration varieties, unawareness about high yielding varieties, scattering rainfall and early withdrawal of monsoon. Farmers of the area are facing the problem of failure of sown crop and long duration varieties are not performing well in that situation. At the same time, there is a scope to improve the resilience of agriculture by application of exiting knowledge and technologies at the farmers' field as a holistic package. This study was conducted to enhance the resilience of crops to climatic variability and climate change through development and using improved production and risk management technologies under rain fed condition of south-east Rajasthan.

MATERIALS AND METHODS

A set of demonstrations was conducted during kharif 2011 in selected village Choma Kot of Kota district of Rajasthan under National Initiative on Climate Resilient Agriculture (NICRA) Project to develop improved technologies through short term research and also demonstrate the existing technologies at farmers' fields for enhancing the

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resilience. The soils of the village fields were clay loam, heavy textured with pH ranging from 8.32 to 8.53, medium in available nitrogen (145-160 Kg/ha), phosphorus (23-34 Kg/ha) and high in available potassium (345-434 Kg/ ha). The average annual rainfall received during crop season was about 965 mm. Introducing of short duration crop varieties of soybean (JS 9560 and JS 9305) and maize (PEHM 2), introduction of drought tolerant new variety of black gram (KU 963 and PU 31) and introduction of new variety of sesamum in high rainfall situation i.e. Ujjawal were demonstrated at farmers' field. The existing varieties viz. JS 335, Navjot, T 9 and Pratap Til C 50 were used for soybean, maize, black gram and sesamum, respectively. Crops were sown in first week of July, 2011. Technology was demonstrated on 0.4 ha. area of each farmer. All the recommended cultural operations to raise the crop were followed as and when required. Crops were harvested manually in last week of September to first week of October, 2011. A net plot area of 25 m^2 from each demonstration was harvested for seed yield as measurable indicator of output and economics were workout and compared with farmers' practices.

RESULTS AND DISCUSSION

Among the three soybean varieties, the variety JS 9560 took minimum number of days in attaining maturity (82 days) in comparison to farmers' practice (103 days) which attributed to their genetic characteristics. It matured 18, 20 and 23 days early from JS 335, RKS 24 and JS 9305, respectively (Table 1). The variety RKS 24 took the highest number of days (105 d) for attaining maturity, whose yield was more affected due to early withdrawn of monsoon (IInd week of September). The maize variety JS 9560 gave the maximum yield of 21.3 q/ha, with an average yield of 17.5 q/ha) where as variety JS 9305 recorded the highest average yield (18.2 q/ha), gross return (Rs 36,400/ha) with benefit cost ratio (2.52) closely followed by JS 9560 in demonstration as compared to check (JS 335). Increase in yield was 19.7, 16. 7 and 1.3 per cent, respectively under demonstrations over JS 335 and gave Rs 6,000/-, 4,600/- and 200/-ha additional returns to farmers. Average yield of maize variety PEHM 2 under demonstrations was 25.1 q/ha, whereas it was 22.5 q/ha under check (Navjot). The increase in yield was 11.6 per cent under demonstrations, and it gave additional returns of Rs 2,340/-ha over farmers' practice. Choudhary and Singh (2010) also noted similar finding in maize. Black gram variety PU 31 gave an average yield of 10.4 q/ha, with gross returns of Rs 34,320/-ha. and benefit cost ratio of 2.68, whereas variety KU 963 gave an average yield of 10.2 q/ha with gross returns of 33,660/-ha and benefit cost ratio of 2.63. Black gram varieties PU 31 and KU 963 gave 35.0 and 30.8 per cent higher yield under demonstrations over farmers' practice. Similar finding in black gram were reported by Sheoran *et al* (2010). Under excessive rainfall and continuous cloudy weather conditions, new variety of sesamum Ujjawal proved better and gave an average yield of 6.5 q/ha, which was 97 per cent higher with benefit cost ratio (3.0) and the additional net return (Rs 16,000/-ha) over check (3.2 q/ha). Low yield of check variety (pratap til C 50) was recorded in *Vertisols* of this region due to excessive rainfall and continuous cloudy weather condition and high incidence of diseases. These short duration varieties offers certain advantages like faster growing habit, early crop maturity by 15-19 days, less water requirement, mitigate early withdrawn monsoon effect, often higher yield, low production cost and more profit. Meena and Tomar (2010) and Meena *et al* (2012) also reported the similar findings.

CONCLUSION

On the basis of results, it was concluded that the output of these technology will help the district and regional farmers prone to extreme weather condition like drought, excessive rainfall, and dry spell etc. to cope with such extremes and also provide higher yield and benefit under climate variability in *Vertisols* of Hadoti region, Rajasthan.

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Table 1 : Seed yield and economics evaluation of demonstrations on climate resilient technology packages on farmers' field

Crop	Technology demonstrated/ variety	No. of farmers	Area (ha)	Measurable indicators of output yield(q/ha)				% increase in yield	Economics of demonstration (Rs/ha)		Economics of check (Rs/ha)		Days to maturity	Net returns over check (Rs/ha)
				Demo.			Check							
				Min.	Max.	Avg.			Gross Return	BCR	Gross Return	BCR		
Soybean	JS 93-05	38	15.2	14.5	21.0	18.2	15.2	19.7	36,400	2.52	30,400	2.18	95	6,000
	JS 95-60	15	6.0	15.0	21.3	17.5	15.0	16.7	35,000	2.43	30,000	2.15	82	4,600
	RKS 24	4	2.0	14.2	15.7	15.3	15.1	1.3	30,600	2.12	30,200	2.17	105	200
Maize	PEHM-2	36	10	20.0	35.7	25.1	22.5	11. 6	22,590	1.62	20,250	1.66	83	2,340
Black gram	KU 96-3	36	18	8.2	11.3	10.2	7.8	30.8	33,660	2.63	25,740	2.09	73	7,920
	PU 31	4	2	10.0	11.5	10.4	7.7	35.0	34,320	2.68	25,740	2.09	72	8,580
Sesamum	Ujjawal	21	10.5	6.0	7.5	6.5	3.3	97.0	32,250	3.0	16,250	1.56	90	16,000

FP: Farmers practice, BCR: Benefit: cost ratio

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Received on 10-11-2013 Accepted on 23-11-2013