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Moth bean Cultivation under Rainfed Conditions of Nagaur District of Rajasthan

H R Choudhary, Gopichand Singh and Bhawana Sharma

Krishi Vigyan Kendra, Athiyasan, Nagaur-I
Agriculture University, Jodhpur, Rajasthan (India)

ABSTRACT

Front line demonstrations on rainfed crop management in Moth bean was conducted by Krishi Vigyan Kendra, Athiyasan, Nagaur-I during *kharif* 2019 and 2020 in Mandeli, Teetari, Didiya Kalan and Jhadeli village of the Nagaur district on an area of total 40 ha with the objective to demonstrate the improved technologies meant for proving production potential of Moth bean. The improved technologies consisted use of improved variety, soil treatment by *Trichoderma viride,* seeds treatment with Carbendazim @ 2.0 g/kg seed and inoculated with Rhizobium @ 10 g/kg seed and PSB @ 10 g/kg seed and weed management by Imizathapyr. The yield was found 5.60 q/ha in demonstration plot as compared to farmer's practice (4.33 q/ha) which reveals 25.17 per cent higher yield by use of improved technology. The higher net income (Rs. 20437/ha) and benefit cost ratio (2.30) was realized in demonstration of integrated crop management practices. The lower net income (Rs. 11702/ha) and benefit cost ratio (1.83) was recorded in farmer's practice.

Key Words: Front line demonstration, Moth bean, Improved technology, *Trichoderma viride,* Imizathapyr.

INTRODUCTION

Pulses play a vital role in Indian Agriculture. In India, total production of pulses is 23.95 Mt (Anon, 2017-18). The arid regions of Rajasthan are privileged to have Moth bean as a traditional crop. In Rajasthan, with an area of 9.78 lakh ha and production of 2.23 lakh t, the crop exhibits the productivity of 228 kg/ha (Anon, 2018-19). Pulses are rich source of protein for a majority of the Indian population. Moth bean (*Vigna acontifolia*) is a native crop of hot and dry region of western Rajasthan and is used as a source of food, feed, fodder, green manuring and green pasture. Green pods are delicious source of vegetables. Farmers used to cultivate of Moth bean under rainfed condition especially during kharif season immediately after receiving rainfall without any preparatory tillage and addition of manures. The front line demonstration (FLD) is an important method of transferring the latest package of practices in totality to farmers (Bezbaruah and Deka, 2020). Due to improper management practices, imbalanced and indiscriminate use of pesticides farmers getting low yield and income. The present study was undertaken to evaluate the difference between demonstrated technologies vis-a-vis practices followed by the local farmers in Moth bean crop.

MATERIALS AND METHODS

Front line demonstrations on rainfed crop management in Moth bean was conducted by Krishi Vigyan Kendra, Athiyasan, Nagaur-I during *kharif* 2019 and 2020 in hundred farmers holdings of Nagaur district in Mandeli, Teetari, Didiya kalan and Jhadeli villages. The soil of the district is generally sandy loam soil with low-medium fertility status under Moth bean/Cluster bean–Cumin/Fallow cropping system. Each demonstration was conducted on an area of 0.4 ha and the same area adjacent to the demonstration plot was kept as farmer's practices. The package of improved production technologies included improved variety

*Corresponding Author's Email: hariram.agrian@gmail.com

Table 1. Details of gap analysis in Moth bean.

Sr. No.	Technology	Recommended Practice	Farmer's practice
1.	Variety	RMO 435, RMO 257, CAZRI Moth 3 and CAZRI Moth 2	RMO 40, local seed
2	Soil treatment	Soil treatment by *Trichoderma viride* @ 2.5 kg/ha (mixed with 100 kg FYM)	5% application
3.	Seed Treatment	Carbendazim @ 2.0 g/kg Seed	20-35% application
4.	Seed rate	10 kg/ha	15 kg/ha
5.	Fertilizers (kg/ha)		
	N	10	No application
	P	20	No application
	ZnSO4	25	No application
	Bio-fertilizer	*Rhizobium* (600g/ha), PSB (600g/ha)	No application
6.	Weed management	Use of Imezathapyr @ 50g a.i./ha at 15-20 DAS Followed by a hand weeding at 30 DAS	50% Hand weeding / herbicide application
7.	Plant protection		
	Aphid/Jassid/White fly	Malathion 50 E.C./Dimethoate 30 E.C. @ 1000 ml/ha, Imidacloprid@ 150ml/ha	40% application
	Pod borer	Malathion 50 E.C./Quinolphos 25EC @ 1000ml/ha at the time of flowering and pod formation	20% application
	Termite	Fipronil @ 10kg/ha, Chloropyriphos 20 EC@4 l/ha	20% application

RMO-435, fertilizer 10:20 kg/ha Nitrogen and Phosphorus and also applied $ZnSO^4$ at the rate of 25 kg/ha as per schedule. Seeds were treated with Carbendazim @ 2.0 g/kg seed and inoculated with Rhizobium @ 10 g/kg seed and PSB @ 10 g/kg seed. Seed sowing was done in July every year with a seed rate of 10 kg/ha in line sowing with row to row spacing of 30 cm and 10 cm between plants. Optimum plant population was maintained in the demonstrations. Recommended dose of fertilizer was applied through DAP as basal application and spray of NPK ratio (18:18:18) @ 2.5kg/ha for nutrient management. Use herbicide of Imizathapyr @ 50 g a.i./ha at 15-20 day after sowing followed by one hand weeding was done at 35 day after sowing for control of weeds. Use of Neem oil @ 2.5kg/ha, Fipronil (0.3%GR) @ 12.5kg/ha, Emamectin Benzoate (5%SG) @ 250g/ha and Dimethoate (30%EC) @ 3litre/ha for integrated pest management. The crop was harvested during October after the leaves turn yellow and start dropping. The benefit cost ratio was calculated based on gross return. The yield data were collected from both the demonstration and farmers' practice and their technology gap, extension gap and technology index were worked out (Samui *et al*, 2000).

RESULTS AND DISCUSSION

The key differences were observed between demonstration package and farmer's practices about

Table 2. Yield performance, technology gap, extension gap and technology index of Moth bean under Farmer's Practice and Cluster Front Line Demonstrations

Variety	Yield (q/ha)		Per cent increase	Tech gap (q/ha)	Ext gap (q/ha)	Tech Index (%)	Cost of cultivation (Rs./ha)		Gross returns (Rs./ha)		Net Returns (Rs./ha)		Additional net return over local check (Rs./ha)	BC Ratio	
	Demonstrated plot	Local Check plot					Demonstrated plot	Local Check plot	Demonstrated plot	Local Check plot	Demonstrated plot	Local Check plot		Demonstrated plot	Local Check plot
RMO-435	5.15	3.99	29.07	2.85	1.16	35.63	15775	13650	33521	26063.8	17746	12413.8	5332.2	2.13	1.91
RMO-435	6.05	4.67	29.55	1.95	1.38	24.38	15850	14695	38977.09	25685	23127.09	10990	12137.09	2.46	1.75
Average	5.60	4.33	29.31	2.40	1.27	30.00	15813	14173	36249	25874	20437	11702	8735	2.30	1.83

recommended varieties, soil and seed treatment, sowing method, time of sowing and fertilizer dose. Table 1 shows that under the demonstrated plot only recommended varieties and bio-agents were used which were given to farmer by the KVK and all the other package and practices were timely performed by the farmer itself under the direction of KVK scientist. Under farmer's practice, they sow seed of Moth bean variety RMO 40 and local seed at higher seed rate with 5% application for seed treatment. As a result, the farmers selected under CFLD programme on Moth bean were provided seed of Moth bean variety RMO 435. These findings were in the conformity of the results of study carried out by Meena and Dudi (2018). It was also observed that under farmers' practice, sowing of Moth bean is done earlier to escape from water shortage for irrigation, thus leading to reduction in yield. Regarding the method of fertilization under demonstration, all fertilizers were drilled at the time of sowing, whereas under farmer's practice, broadcast method of fertilization was used.

Grain yield

Results indicated that average yield 5.15 and 6.05 q/ha were found in demonstration plot of variety RMO-435 as compared to 3.99 and 4.67 q/ha in local check plot during Kharif-2019 and Kharif-2020, respectively in the same village (Table 2). The improvement in yield might be due to soil and seed treatment, use of bio fertilizers, timely sowing, application of recommended dose of fertilizers, proper and timely weed management and integrated pest management practices.

Extension gap, technology gap and technology index

Results revealed that the technology gap 2.85 and 1.95 q/ha, extension gap 1.16 and 1.38 q/ha and technology index 35.63 and 24.38 per cent was recorded in demonstration plot (Table 2) during 2019 and 2020, respectively. The technology index showed the practicability of evolved technology at the farmer's fields. Higher technology for

transferring to farmers and insufficient extension services for transfer of technology.

Economics

The performance of Moth bean under demonstrations and farmers practice was observed. The net returns of demonstration plot was Rs. 17746/- & Rs. 23127.09/- per ha and for local check plot Rs. 12413.8/- & Rs. 10990/- per ha during 2019 and 2020 ,respectively. Benefit-cost ratio for demonstration was 2.13 and 2.46 and control was 1.91 and 1.75 during 2019 and 2020 respectively (Table 2). The results indicated that the cluster frontline demonstrations have good impact over the farming community of Nagaur district as they were motivated by the new agricultural technologies applied in the FLD plots (Table 1). Findings of the study were in line with the findings of Patil *et al* (2015) in green gram and in black gram by Sahare *et al* (2018). Similar results have been reported earlier by Poonia and Pithia (2011), Sharma *et al* (2013) in chickpea and coriander, respectively. It was concluded that the CFLD programme is an effective tool for increasing the production and productivity of Moth bean and changing the knowledge, attitude and skill of farmers. The per cent increment in yield of Moth bean to the extent of 29.07 to 29.55 over the farmer's practice (Table 2) created greater awareness and motivated the other farmers to adopt the improved package of practices for pulses.

CONCLUSION

It was concluded that the yield of the Moth bean crop and income of the Moth bean growers were significantly increased by the cultivation of RMO 435 variety of Moth bean along with integrated crop management practices in rainfed condition. The farmers were impressed with the performance of improved variety and encouraged the other farmers to adopt the same at large scale.

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