Enhancing the productivity of Horse gram through demonstration of integrated crop management practices

ABSTRACT

A frontline demonstration was conducted to establish the integrated crop management practices in ten farmers' holdings of Dharmapuri district during Rabi season of 2020. The crop was grown with integrated crop management practices and compared with the farmer's practice. The integrated crop management practices consisting of horse gram variety CRIDA 18R, seed treatment with *Trichoderma viride* followed by rhizobium and phosphobacteria, soil application of TNAU pulses micronutrient mixture @ 7.5 kg ha^{-1}, spraying of pulse wonder @ 5 kg ha^{-1} during flowering stage and integrated plant protection measures. The results of the demonstration indicated that the demonstration of horse gram variety CRIDA 18R with integrated crop management practices recorded the higher number of pods per plant (40.6) and grain yield (7.15 q/ha). Farmers practice recorded the lower number of pods per plant (34.3) and grain yield (5.55 q/ha). The per cent increase in yield under demonstration over farmers practice was 28.8. The higher net income (Rs. 12450/ha) and benefit cost ratio (1.77) was realized in demonstration of integrated crop management practices. The lower net income (Rs. 9450/ha) and benefit cost ratio (1.74) was recorded in farmer's practice.

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Keywords: *Horse gram; Demonstration; Grain yield; Net income and Benefit cost ratio*

1. INTRODUCTION

Horse gram [*Macrotyloma uniflorum* (Lam) Verdic] is an important grain legume crop cultivated in Dharmapuri district. It is grown during rabi season under rainfed condition as pure crop and as intercrop in mango orchards. It can be grown well under poor and marginal soils. It has the ability to reclaim wastelands. It can also be grown as green manure or cover crop. It is tolerant to drought [1] and salinity [2] stresses. Moderately warm, dry climatic conditions are suitable for its optimum growth. It is a climate resilient crop, can be cultivated up to an altitude of 1000 m above the sea level. The temperature range of 25-30°C and relative humidity between 50 and 80 per cent is optimum for its growth. Heavy rains during the initial stages of crop growth affect nodule formation owing to poor aeration in the soil. A well-distributed rainfall of about 800 mm is sufficient for its successful cultivation, but it performs well even under low rainfall areas.

Horse gram is a multipurpose legume known for its nutritious human food as dal and animal feed for cattle. Horse gram is an excellent source of protein (17.9–25.3 %), carbohydrates (51.9–60.9 %), essential amino acids, phosphorus, iron and vitamins such as

carotene, thiamine, riboflavin, niacin and vitamin C [3]. Besides, its nutraceutical properties were quoted in ancient ayurvedic medicine which serves as a remedy for many diseases [4]. In Indian traditional medicine, horse gram seeds are used for treatment of urinary diseases and piles [5] and act as astringent. The cooked liquor of the horse gram seeds with spices is considered to be a potential remedy for the common cold, throat infection, fever [6].

In Dharmapuri district, horse gram has been cultivated in a 12000 hectares area in every year. Farmers used to cultivate the horse gram crop with their own seed with less care and poor management practices thereby attaining lower yield. In this context, a frontline demonstration on high yielding varieties with integrated crop management practices has been taken up in the farmers holdings to create awareness among the horse gram growers.

Literature

2. MATERIALS AND METHODS

To create awareness among the horse gram growing farmers, frontline demonstration on integrated crop management in horse gram was conducted by Krishi Vigyan Kendra, Dharmapuri during *Rabi* 2020 in ten farmers' holdings of Dharmapuri district. In the demonstration, Horse gram variety CRIDA 18R was grown in 0.2 ha area with integrated crop management practices and the farmers practice in 0.2 ha area for comparison. The integrated crop management practices including CRIDA 18R Horse gram variety, seed treatment with *Trichoderma viride* @ 4g/kg followed by rhizobium and phosphobacteria each @ 25g/kg, soil application of TNAU pulses micronutrient mixture @ 7.5 kg ha^{-1}, spraying of pulse wonder @ 5 kg ha^{-1} during flowering stage and integrated pest and disease management strategies were demonstrated (Picture 1). The horse gram variety CRIDA 18R introduced under frontline demonstration was released from Central Research Institute for Dryland Agriculture, Hyderabad during 2009. It was developed by mutation breeding with gamma rays irradiation. It matures in 85-87 days, brown seeded variety and having synchronized maturity. It is tolerant to yellow mosaic virus, powdery mildew and mites.

The technological interventions followed in farmers practice and demonstration is given in Table 1. Before initiating the demonstration, the beneficiary farmers were imparted with skill training on various technological interventions to be followed in horse gram cultivation. The performance of crop was periodically observed by the scientists of Krishi Vigyan Kendra and advisory recommendations were followed. During harvest, yield data was

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An overview of Horse Gram, including its botanical description, distribution, nutritional value, and economic importance, could be valuable.

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collected from both the demonstration and farmers' practice. At the end, cost of cultivation, net income and cost benefit ratio were worked out.

Table. 1. Details of the integrated crop management practices followed for horse gram under farmers practice and frontline demonstration

S.No.	Integrated crop management practices	Farmers practice	Demonstration (Recommended integrated crop management practices)
1	Farming situation	Rainfed	Rainfed
2	Variety	Local	CRIDA 18R
3	Time of sowing	Third week of October	Third week of October
4	Seed treatment	Seed treatment practice not followed	Seed treatment with *Rhizobium* and *Phospho bacteria* @ 25 g/kg; *Trichoderma viride* @ 4 g/kg
5	Method of sowing	Broadcasting of seeds	Line sowing by following a spacing of 30 x 10 cm
6	Nipping	Nipping of terminal bud not followed	Nipping of terminal bud at 30 days after sowing
7	Fertilizer application	Application of fertilizers was not followed.	Recommended INM practices Soil application of FYM @ 12 t/ha and recommended dose of NPK fertilizers i.e., 12.5:25:12.5 kg /ha Basal application of pulses micronutrient mixture @ 5 kg/ha as EFYM Foliar spray of pulse wonder @ 5

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			kg/ha at peak flowering
8	Weed management	Not practiced	One hand weeding on 20-25 days after sowing
9	Plant protection	Not followed	Need based usage of plant protection chemicals

Picture 1. Demonstration of integrated crop management practices in horse gram

3. RESULTS AND DISCUSSION

3.1 Growth and Yield Attributes

The data on growth and yield attributes of horse gram under demonstration and farmers practice was given in Table 2. Results indicated that, the demonstration of horse gram variety CRIDA 18R with integrated crop management practices recorded higher plant height (43.6 cm), number of branches per plant (6.33) and number of pods per plant (40.6). The lower plant height (35.3 cm), number of branches per plant (4.66) and number of pods per plant (34.3) were recorded in farmers' practice. The 100 seed weight was higher in demonstration (3.46 g) and lower in farmers practice (3.28). Similar findings were reported by Manpreet kaur *et al*. [7]; Chander *et al*. [8]; Astha *et al*. [9]; Paramjit *et al*. [10] in gram and moong.

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Table 2. Performance of integrated crop management practices on growth and yield attributes of horse gram

S.No.	Parameter	Farmers practice	Demonstration (Recommended integrated crop management practices)
1.	Plant height (cm)	35.3	43.6
2.	Number of branches per plant	4.66	6.33
3.	Number of pods per plant	34.3	40.6
4.	Colour of grain	light brown	brown
5.	100 grain weight (g)	3.28	3.46

3.2 Grain yield and economics

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Demonstration of integrated crop management practices recorded the higher grain yield (7.15 q/ha) and farmers practice recorded the lower grain yield (5.55 q/ha). The per cent increase in the grain yield of demonstration over farmers practice was 28.8. The yield improvement in the demonstration might be due to the combined effect of high yielding ability of variety and adoption of integrated nutrient, pest and disease management practices. Similar results of yield enhancement in frontline demonstration have been reported earlier by Meena and Singh [11] in greengram, Raghav *et al*. [12] in pigeonpea, Sangeetha *et al*. [13] in chickpea and Kamala Bai *et al*. [14] in field bean.

Table 3. Performance of integrated crop management practices on grain yield and economics of horse gram

Grain Yield (q/ha)		Economics of demonstration (Rs./ha)				Economics of check (Rs./ha)			
Demo	Check	Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
7.15	5.55	16150	28600	12450	1.77	12750	22200	9450	1.74

The data on economic indicators indicated that, the higher cost of cultivation (Rs.16150/ha) was involved in demonstration as compared to farmers practice (Rs. 12750/ha) (Table 3). The front-line demonstration plots fetched higher net income of Rs. 12450/ha as compared to Rs. 9450/ha with farmers' practice. On an average Rs. 12325/ha as additional income is attributed to the higher yield obtained in demonstration. The higher benefit cost ratio (1.77) was realized in demonstration and lower benefit cost ratio (1.74) was realized in farmers' practice. It showed the economic viability of the technological interventions demonstrated through the frontline demonstration. The results confirm with the finding of Front Line Demonstration on blackgram and cluster bean by Dwivedi *et al*. [15]; Singh and Sharma [16] and Jain *et al*. [17].

Success of the frontline demonstration was disseminated to the other farmers through conducting field day programme (Picture 2).

Picture 2. Field day on Horsegram variety CRIDA 18R

4. CONCLUSION

Results of the frontline demonstration indicated that the grain yield and net income of the horse gram growers were significantly increased by the cultivation of improved variety along with integrated crop management practices. The farmers were impressed with the technological interventions followed in the demonstration and encouraged the other farmers to adopt the same in large scale.

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