LR-5130
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RESEARCH ARTICLE Legume Research- An International Journal

Enhancing Production of Berseem through Integrated Crop Management Practices in Haryana

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ABSTRACT

Background: Berseem plays an important role as fodder, in the health and nutrition of a large livestock population in India. The productivity of green fodder per unit area could be increased by adopting recommended scientific and sustainable packages and practices.

Methods: Farmers' participatory front line demonstrations on integrated crop management (ICM) practices and traditional method of sowing as farmers' practice (FP) were conducted during Rabi (2016-17 to 2018-19) under CCS, HAU, Krishi Vigyan Kendra, Fatehabad and Jhajjar, Haryana.

Result: The study reveals that on an average 744 q/ha green fodder yield of berseem (var. HB 2) was recorded under ICM as compare to 659 q/ha in FP which was 12.9 per cent higher over that of the FP. The pooled value of extension gap, technology gap and technology index was to the tune of 85, 36 q/ha and 4.6 percent, respectively. The data on economic parameters reveals that a net return of Rs. 30441 per ha was recorded under ICM compare to Rs. 20065 per ha in FP. The benefit-cost (B:C) ratio was figured 1:1.50 and 1:1.33 in ICM and FP, respectively, suggesting its higher profitability and economic viability of the technology demonstrated. Cluster Front line demonstration also helped in replacement of local varieties with improved recommended varieties.

Key words: B:C ratio, Berseem, Economics, Fodder yield, Gap analysis, Integrated crop management.

INTRODUCTION

Berseem (*Trifolium alexandrinum* L.) is an annual leguminous fodder crop and has been rightly described as the king of fodders. It is highly esteemed fodder which has a special place in animal husbandry programmes throughout the country. It is one of the most suitable fodder crops for areas below 1700 m altitude with irrigation facilities. It remains soft and succulent at all the stages of growth. It can be grown without irrigation in areas with high water table and under water-logged conditions. Berseem forms a major part of the animal diet from November to April months in the central and northern western parts of India. Owing to its high demand in milkshed areas and it has wider adaptability, high regeneration capacity, quick growth, high out turn of green fodder, high palatability, easy digestibility and easy cultivation practices and the economic returns of this crop are more than other fodder crops. It has been observed that imbalanced feeding with special reference to green fodder has tarnished the production potential of animals which in turn, affects the interest of dairy farmers due to low margin of profit leading to a nasty cycle. Therefore, to increase the production of dairy animals a reality, the availability of sufficient and economically balanced feed and fodder needs utmost attention as it affects both the quantity and quality of milk. Marginal farmers may have limited opportunities to cultivate green fodder, particularly during the lean season, where owning livestock is an alternate income generator (Sahu and Jha, 2022). The efficiency of milch as well as drought animals largely depends upon the supply of quantity and quality of fodder in which green fodder plays a vital role. In the recent years, shortage of fodder has remained the burning problem of the state which calls for the attention of scientists to initiate efforts that can ensure regular fodder supply for development of dairy farming consequently improving cattle wealth. The agronomic information regarding suitability of varieties and their responses to nutrient and water is lacking in central part of India. The productivity of green fodder per unit area could be increased by adopting recommended scientific and sustainable packages and practices using a suitable high yielding variety (Khadda *et al*., 2015). The frontline demonstration is one most important and powerful tools of extension because, farmers are generally motivated by the belief that 'Learning by doing' and 'Seeing is believing'. It is the new concept of field demonstration evolved by the Indian Council of Agricultural Research (ICAR) with the inception of

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How to cite this article: Satyajeet, Kumar, A., Dhanda, S.K., Pareek, A., Bhardwaj, S. and Kannoj (2023). Enhancing Production of Berseem through Integrated Crop Management Practices in Haryana. Legume Research. DOI: 10.18805/LR-5130.

Submitted: 09-03-2023 **Accepted:** 26-08-2023 **Online**: 12-09-2023

the technology mission on oilseed crops during mid-eighties. The main objective of front line demonstrations (FLDs) is to demonstrate newly released crop production and protection technologies and its management practices in the farmers' field under different agro-climatic regions and farming situations. In view of the above factors, front line demonstrations were undertaken in a systematic manner on farmer's field to show the worth of a improved practices and convince the farmers to adopt integrated crop management practices of fodder berseem and to find out the yield gap, economics and impact assessment study in Haryana.

MATERIALS AND METHODS

Farmers' participatory front line demonstrations on integrated crop management (ICM) practices in berseem (Variety, HB 2) as demonstrated technology and traditional method of sowing as farmers' practice (FP) were conducted at ten locations selected from the cluster villages covering an area of 0.1 hectare at each location under demonstration and same area was also devoted under farmers' practice during *rabi* (2016-17 to 2018-19) under CCS HAU, Krishi Vigyan Kendra, Fatehabad and Jhajjar, Haryana.The soils of the experimental locations were sandy loam in texture which was low in available N, medium in P and K with slightly alkaline in reaction (pH-8.0 to 8.2). Recommended ICM practices *viz.* fertilizer dose, improved variety, seed rate @ 20 kg/ha, seed treatment with fungicide (Bavistin @ 2 gm/kg seed) and *Rhizobium* culture and timely management of insect-pest and diseases. The data on yield and other observations were recorded from time to time at farmers' field as well as feedback was taken from the farmers. The economics and benefit cost (B:C) ratio was worked out by simple tabular analysis. To estimate the technology gap, extension gap and technology index following formulae used by Verma *et al.* (2014) have been used:

Extension gap (kg/ha) =

Demonstration yield - Farmer practices yield.

Technology gap (kg/ha) =

Potential yield - Demonstration yield.

Technology index =

$$\frac{\text{Potential yield - Demonstration yield}}{\text{Potential yield}} \times 100$$

RESULTS AND DISCUSSION

Fodder yield

The perusal of data (2016-17 to 2018-19) in Table 1 reveals that green fodder yield of berseem ranged from 725 to 763 q/ha and 641 to 676 q/ha under integrated crop management (ICM) practices and farmers' practice (FP), respectively during the study period. The technological intervention thus gave yield enhancement to the tune of 12.5 to 14.8 % over FP. The yield of any crop plant depends upon the source sink relationship and is the cumulative function of various growth parameters and yield attributing components of sink *viz*. growth and dry matter content *etc*. The pooled data (2016-17 to 2018-19) indicated that average green fodder yield of berseem was to the tune of 744 q/ha in ICM as compare to 659 q/ha in FP, which was 12.9 % higher than that of FP. It was the impact of the use of high yielding improved variety, optimum seed rate, recommended fertilizer, seed treatment and control of insect-pest and disease at economic threshold level. More and less similar yield enhancement in different crops in front line demonstration has amply been documented by Singha *et al.* (2020) and Patel and Patel (2020).

Gap analysis

The extension gap of consecutive three year study presented in Table 1 was estimated to be 87, 83 and 84, respectively with a pooled value of 85 q/ha during the study period. Gap analysis is a parameter to know the yield differences between the demonstrated technology and farmers' practice where as technology gap is a measures difference between potential yield and yield obtained under improved technology demonstration. Technology gap ranging from 17–55 q/ha was found between ICM and FP during the different time line. There exists a gap between the potential yield and demonstration yield. Technology gap is of great significance than other parameters as it indicates the constraints in implementation and drawbacks in our package of practices, these could be environmental or varietal. This may be due the due to numerous resources which affect the crop yield like weather condition, less application of inputs *etc*. The pooled technology index of fodder berseem was found to be 4.6 % during study period. Technology Index shows the feasibility of the technology at the farmers' field. The lower the value of the technology index more is the feasibility. These results are in conformity with those reported by Khadda *et al*. (2021); Jain *et al*. (2019).

Table 1: Effect of ICM on fodder yield and gap analysis of berseem (Pooled data 2016-17-2018-19).

Year	Yield (q/ha)		% increase over FP	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
	ICM	FP				
2016-17	763	676	12.9	87	17	2.2
2017-18	743	660	12.5	83	37	4.7
2018-19	725	641	14.8	84	55	7.1
Pooled	744	659	12.9	85	36	4.6

Table 2: Effect of ICM on economics of fodder berseem (Pooled data 2016-17-2018-19).

Year	Economics (Rs) of ICM			Economics (Rs) of FP		
	Gross returns	Net returns	B:C ratio	Gross returns	Net returns	B:C ratio
2016-17	91584	31134	1.52	81096	20646	1.34
2017-18	90658	30208	1.50	80593	20143	1.33
2018-19	90650	29980	1.49	80075	19405	1.32
Pooled	90964	30441	1.50	80588	20065	1.33

Economic analysis

The input and output prices of commodities prevailed during each year of demonstration were taken for calculating cost of cultivation, gross returns, net returns and benefit cost ratio. The pooled data pertaining to economics presented in Table 2 shows that average gross returns and net returns was Rs. 90964; 30441 and 80588; 20065 under ICM and FP, respectively. Economic returns were observed to be a function of grain yield and market sale price of the commodity which varied along different years. The higher additional returns under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. Benefit to cost ratio (B:C) from ICM practice were comparatively higher than the FP during all the years of the study. In the quick view of the data the average B:C ratio of three consecutive years of study was figured 1:1.50 and 1:1.33 under ICM as compared FP, respectively (Table 2). This may be due to higher yield obtained under recommended practices compared to farmer's practices. The results are in are in consonance with the findings of Prajapati *et al.* (2019), Patel and Patel (2020) and Khadda *et al*. (2021).

CONCLUSION

The results of front line demonstrations convincingly enlighten that the green fodder yield of berseem could be increased by 12.5 per cent to 14.8 per cent with interventions on improved technologies. Based on the observation on various aspects it may be concluded that the fodder berseem was found to be superior in terms of green fodder yield and fetched higher economic returns under integrated crop management practices over farmers' practice. Frontline demonstrations were effective in changing attitude of farmers towards fodder cultivation. Cultivation of demonstrated plots of berseem with ICM practices has increased the skill and knowledge of the farmers.

Conflict of interest: None.

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