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EFFECT OF INTEGRATED CROP MANAGEMENT PRACTICES ON YIELD AND ECONOMICS OF FODDER OAT IN HARYANA

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SUMMARY

Oat is highly palatable, nutritious and energy rich fodder and can be fed to animals either in the form of green fodder or after converting into good quality hay/silage. 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. The study reveals that on an average 584 q/ha green fodder yield of oat (Multi-cut fodder oat variety HJ 8) was recorded under ICM as compare to 526 q/ha in FP which was 11.03 per cent higher over that of the FP. The pooled value of extension gap, technology gap and technology index was to the tune of 58, 66 q/ha and 10 percent, respectively. The data on economic parameters reveals that a net return of Rs. 21346 per ha was in ICM compare to Rs.14940 per ha in FP. The benefit-cost (B:C) ratio was figured 1:1.49 and 1:1.34 in ICM and FP, respectively, suggesting its higher profitability and economic viability of the technology demonstrated.

Key words : Oat, ICM, green fodder yield, gap analysis, economics and BC ratio

Oat (*Avena sativa* L.) is a fast growing and high yielding winter fodder crop. Oat ranks around sixth in the world cereal production statistics following wheat, maize, rice, barley and sorghum. Oat grain has always been an important form of livestock feed. Oats remain an important grain crop for people in marginal ecologies throughout the developing world, and in developed economies for specialist uses. In many parts of the world oats are grown for use as grain as well as for forage and fodder, straw for bedding, hay, silage and chaff. Besides, it possesses high regeneration ability (Choudhary and Prabhu, 2016). 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 and improving our cattle wealth. The agronomic information regarding suitability of varieties and their responses to nutrient and water is lacking in central part of India. Front line demonstration may play a very important role in proper transfer of technologies and changing scientific temperament of the farmers. It is the new concept of field demonstration evolved by the Indian Council of Agricultural Research with the inception of the technology mission on oilseed crops during mid-eighties. The main objective of front line demonstrations 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. Front line demonstrations are conducted in a block of two or four hectares land in order to have better impact of the demonstrated technologies on the farmers and field level extension functionaries. 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 new variety and convince the farmers to adopt integrated crop management practices of fodder oat. Keeping the above facts in view, the present investigation was attempted to study the yield gap between front line demonstration trails and farmers' yield, extend of technology adoption and benefit cost ratio.

MATERIALS AND METHODS

Farmers' participatory front line demonstrations on integrated crop management (ICM) practices

(Multi-cut fodder oat variety, HJ 8) 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 soil of the experimental locations were sandy loam in texture, 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, high yielding variety, seed treatment with fungicide (Bavistin @ 2 gm/kg seed) and *Azotobacter* culture. 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 (BC) ratio was worked out by simple tabular analysis. To estimate the technology gap, extension gap and technology index following formulae used by Samui *et al.* (2000) have been used :

Extension Gap (kg/ha) = Demonstration yield - Farmer practices yield

Technology Gap (kg/ha) = Potential yield - Demonstration yield

Technology Index = Potential yield-Demonstration yield/Potential yield × 100

RESULTS AND DISCUSSION

Fodder yield

The perusal of data (2016-17 to 2018-19) in Table 1 reveals that green fodder yield of oat ranged from 573 - 595 q/ha under demonstration (ICM) as compared to farmers' practice (FP) 511 to 537 q/ha during the study period. The technological intervention thus gave yield enhancement to the tune of 10.4 to 12.1 % 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*. pods per plant and seeds per pod etc. The pooled data (2016-17 to 2018-19) indicated that average green fodder yield of oat was to the tune of 584 q/ha in ICM as compare to 526 q/ha in FP, which was 11.03 % higher than that of FP. It was the impact of the use of high yielding improved variety, balanced application of 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 Mitnala *et al.* (2018).

Gap analysis

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. The extension gap of consecutive three year study presented in Table 1 was estimated to be 55, 58 and 62, respectively with a pooled value of 58 q/ha during the study period. 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. Technology gap ranging from 66-77 q/ha was found between ICM and FP during the different time line. Technology Index shows the feasibility of the variety at the farmers' field. The lower the value of the technology index more is the feasibility. The pooled technology index of fodder oat was to found to be 10.2 % during study period. This may be due the due to numerous resources which affect the crop yield like weather condition, less

TABLE 1
Effect of ICM on green fodder yield and gap analysis of oat [Pooled data (2016-17 to 2018-19)]

Year	Yield (q/ha)		% increase over FP	Extension Gap (q/ha)	Technology Gap (q/ha)	Technology Index (%)
	ICM	FP				
2016-17	584	529	10.4	55	66	10.2
2017-18	595	537	10.8	58	55	8.5
2018-19	573	511	12.1	62	77	11.8
Pooled	584	526	11.03	58	66	10.2

application of inputs etc. Patel *et al*. (2013), Jain *et al*. (2019) and Rajput *et al.* (2016) also corroborated these findings.

Economic analysis

A thorough understanding of the pooled data (Table 2) shows that average gross return and net return was Rs. 64192; 23346 and 57787; 14940 under ICM and FP, respectively. Economic returns was 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 local check during all the years of the study. In the quick view of the data the average BC ratio of three consecutive years of study was figured 1:1.49 and 1:1.34 under ICM as compared FP, respectively (Table 2). The results are in conformity with the findings of Rajput *et al.* (2016) and Patel *et al.* (2013).

TABLE 2
Effect of ICM on economics of fodder oat (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	64207	21407	1.50	58135	15335	1.36
2017-18	65417	22617	1.53	59037	16237	1.38
2018-19	62953	20013	1.46	56188	13248	1.30
Pooled	64192	21346	1.49	57787	14940	1.34

CONCLUSION

The present study produced a significant positive result and give researchers an opportunity to demonstrate the productivity potential and profitability of the recent developed technology under real farming situation, which they had advocating for long time. The results of front line demonstrations convincingly brought out that the green fodder yield of oat could be increased by 10.4 per cent to 12.1 per cent with intervention on high yielding varieties. There is a need for analysis of factors affecting adoption and acceptance of ICM technology among the farmers. From the above findings, it could also be concluded that use of ICM practices of fodder cultivation would reduced the extension and technology gap to a great extent. This would sustainably increase the income as well as the livelihood of the farmers.

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