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Enhancing Onion Productivity through Integrated Crop Management Practices

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ABSTRACT
Onion (Allium cepa L.) is one of the most important bulb crops in India, which plays a major role in supplementing the income of small and marginal farmers of Kalaburagi district in Karnataka state. One of the major constraints of onion farming is low productivity due to non adoption of recommended package of practices. With objective of improving onion productivity in North Eastern dry zone of Karnataka, a study was conducted to examine key characteristics associated with high yielding of onion crop through a comparison between an integrated crop management (ICM) and farmer's practice (FP). Field experiment was conducted in 10 farmer's field in Jewargi and Chittapur taluk of Kalaburagi district during 2016-17. Ten farmers were selected and demonstration being done in 0.2 ha. each, totally 4 ha. was covered with local control. The improved technologies consisting of use of improved variety Bheema Super, seed treatment with Azospirillum, PSB and Trichoderma, balanced nutrient application and integrated pest management. The demonstration plot was compared with farmer's practice. Demonstration results revealed that there was 11.30 per cent increase in onion bulb yield over local.
Key words: *Onion, Bulb yield, Demonstration, ICM, Technology, Productivity.*

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INTRODUCTION

Onion (*Allium cepa* L.) is one of the important commercial vegetable crops produced in India for both domestic consumption and export. Popularly it is also known as "*Poor man Kasturi*". In India it is grown over area of 10, 87,000 ha. with production of 175,11,000 MT and productivity of 16.1 t/ha [1]. In Karnataka onion is grown in an area of 1,32,165 ha. with a production of 18,99,535 MT and with a productivity of 14.37 t/ha [2]. The yield of onion crop in Karnataka is decreasing due to several abiotic and biotic factors. Among abiotic factors, crop nutrition and among biotic factors insect pests like thrips (*Thrips tabaci*) and disease like purple blotch (*Alternaria porii*) are the major constraints to enhancing production and productivity of onion crop. The technological breakthrough right from mid sixties has no doubt recorded in greater strides in augmenting agricultural production and productivity. Yet, the same has to be continued further to meet the demands of growing population in a geometric ratio. The most feasible way by which this could be achieved is by demonstrating the recommended improved technology on the farmer fields through integrated crop management practices with the objectives to work out the input cost and monetary returns between ICM demonstration and farmer's methods, to identify the yield gaps between farmer's practices and ICM demonstrations to estimate the adoption of improved technology and to identify the reasons responsible for non adoption of proven technologies.

MATERIAL AND METHODS

This Integrated Crop Management (ICM) package in onion was demonstrated with the farmer participation during Rabi 2016-17 at ICAR- KVK, Raddewadagi (UAS, Raichur) under irrigated condition. Each demonstration was conducted in an area of 0.2 ha. and adjacent to the demonstration plot a check plot (farmer practice) of 0.2 ha. was maintained for the comparison. The demonstrations were conducted in 10 farmer's field. Prior to the implementation of programme, all selected farmers were trained on Integrated Crop Management in onion and these selected beneficiaries were provided with all the essential inputs. Data yield and yield parameters were recorded from both the demonstrated and check plot for the comparison. The technologies intervened are ICM-Integrated Crop Management practices: includes improved onion variety like Bheema Super, seed treatment with bio-fertilizer – *Azospirillium,* PSB and *Trichoderma,* balanced nutrient application including micronutrients, IPM and IDM practices. The data collected from the farmers regarding production cost, inputs used and monitory returns etc. for working out the economic feasibility of the recommended technology at the experimental station to work out the technology and extension gaps, technology index, the following formulae have been used [3].

i) Technology gap = (Potential yield) - (Demonstration yield)

ii) Extension gap = (Demonstration yield) - (Farmers yield)

iii) Technology index (TI) (Yi* - Yi) = X 100 Yi*

Where, Yi* - Potential yield of i th crop Yi - Demonstration yield of i th crop The lower the value of the index higher the level of adoption of technology.

RESULTS AND DISCUSSION

Yield of the ICM demonstrations and potential yield of the crop was compared to estimate the yield gap, which were further categorized into technology and extension gaps (Table 1). The average technology gap was highest in farmer practice (7.20 t/ha.) compared to ICM plot (5.20 t/ha.) with the extension gap of 1.00 t/ha. (Table 1). The technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions. This emphasized the need to educate the farmers through various means for the adoption of improved agricultural technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology. The technology index shows the feasibility of the evolved technology at the farmer's fields and lower value of technology index more is the feasibility of the technology. Similar results were also recorded by Swapnil Dubey and Dwivedi [4], Karbantanal *et al.* [5], and Hiremath and Nagaraju [6] in onion crop.

The adoption of technology in ICM demonstrations was studied through technology index. Data revealed that the average technology index was lower in ICM plot (36) compared to the check plot. The higher adoption index is due to fact that the beneficiaries were given pre season training provided with timely supply of inputs in time to the beneficiaries and regular visit, monitoring and advisory services management of pest and disease advice by the extension scientist to the demo farmers may be reason for higher adoption index. The results are in line with the results of Arun kumar *et al.* [7] who have reported that the adoption of recommended practices in ICM demonstration trials in oilseeds and in hybrid cotton have shown increased yield over respective check plot.

Onion bulb yield and cost economics

Average onion bulb yield in ICM was 12.80 t/ha. which was 11.30 per cent higher than farmer's practice plot. The total cost of cultivation was higher in demonstrated plots (Rs. 29600/ha.) compared to check plot (Rs. 32400/ha.). This is due to timely adoption of improved production practices. The comparative profitability of onion crop has been studied by estimating the net profit and benefit cost ratio (Table 2). Highest gross returns, net returns BC ratio were recorded in improved practices over farmers practice. Improved practice (ICM) recorded higher net profit of Rs. 84960 per ha. with benefit cost ratio of 3.87 as against farmer practice wherein, the net profit was Rs. 70480 per ha. with BC ratio was 3.18 for every rupee investment. In addition, bulbs harvested in the ICM plots were uniform, round and more attractive compare to the bulbs harvested from farmer's practice. The results are in line with Meena *et al.* [8], Ojha and Singh [9] and Hiremath and Hilli [10] in onion crop. It can be concluded from the study that increased onion bulb yield was due to the adoption of improved technology. The study further reveals that the fluctuation in yield is the major cause for the fluctuation in the output. Hence, the fluctuation in yield has to be controlled to bring in stability in the output.

Table 1: Bulb yield of onion, technology gap, extension gap and Technology index as influenced by improved practices (Average of 10 farmers)

Crop	Average bulb yield (t/ha.)	% increase over control	Potential yield (t/ha.)	Technology gap (t/ha.)	Extension gap (t/ha.)	Technology index (%)
ICM in Onion	12.80	11.30	20	5.68	1.0	36.0
FP	11.50	-	20	7.20	-	38.0

Table 2: Gross returns, cost of cultivation, net returns and BC ratio of onion cultivation as influenced by improved practice and farmer practices

Crop	Demo plot				Farmer's practice			
	Cost of cultivation(Rs/ha.)	Gross returns (Rs/ha.)	Net returns (Rs/ha.)	B:C ratio	Cost of cultivation (Rs/ha.)	Gross returns (Rs/ha.)	Net returns (Rs/ha.)	B:C ratio
Onion	29600	114560	84960	3.87	32400	102880	70480	3.18

CONCLUSION

By conducting demonstrations of improved scientific technologies, yield potential of onion can be increased to a great extent. This will substantially increase the income as well as the livelihood of the farming community. There is a need to adopt multi-pronged strategy that involves enhancing onion production through improved technologies in Kalaburagi district. This should be brought to the access of farmers through transfer of technology centers like KVKs AEECs, and NGOs etc.

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