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Impact of Front Line Demonstrations on Productivity of Brinjal cv. Nunhems BE-707 in Bharatpur District of Eastern Rajasthan, India

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A B S T R A C T

The Present study was carried out at Bharatpur district of Eastern Rajasthan during Kharif 2014. Brinjal is one of the most important vegetable crops of the country. The development of the Agriculture is primarily depends on the application of the scientific technologies by making the best use of available resources. One of the major constraints of traditional brinjal farming is low productivity because of non-adoption of advanced technologies like micronutrients. There was deficiency of zinc in most of the soils of the area. To increase the production, productivity and quality of agricultural produce, front line demonstrations are being conducted at various farmer's field. All the recommended practices were provided to the selected farmers. The data related to the cost of cultivation, production, productivity, gross return and net return were collected as per schedule and analyzed. Result of the present study revealed that the high yielding variety of brinjal cv. Nunhems BE-707 with the application of zinc sulphate @ 0.25% at 30 and 45 days after transplanting recorded the higher yield (405 q/ha) as compared to farmers practice (368 q/ha) traditionally adopted by the farmers. The percentage increase in the yield over farmers' practice 10.05was recorded. The technology gap in terms of productivity (45 q/ha.) was computed. The technology index values 10% was recorded. The result of the study indicated the gap existed in the potential yield and demonstration yield is due to soil fertility and weather conditions. By conducting front line demonstion of proven technologies, yield potential of brinjal can be increased upto great extent. This will substantially increase the income as well as the livelihood of the farming community.

Introduction

Brinjal (*Solanum melongena* L.) is cultivated as one of the leading vegetable crops grown in India. It is popularly known as eggplant belongs to family solanaceae and India is it's center of origin and diversity Saravaiya *et al.*, (2010). It is highly productive and usually finds a place as "poor man's crop". It is highly nutritive and possesses excellent medicinal properties. It is a good source of minerals like phosphorus, iron and vitamins especially the B complex. Eggplant is reported to stimulate intrapeptic metabolism of blood cholesterol resulting in marked drop in blood cholesterol level. The decholestrolization action is attributed to presence of polyunsaturated fatty acids namely linoleic and linolenic acids and minerals like magnesium and potassium. White eggplants are good for diabetic patients (Dhaliwal, 2014). It is used in a variety of culinary preparations since ancient times. It is hardier than the other solanaceous vegetables. It is sensitive to frost. In India during 2015-16 it was cultivated in 0.63 million hectare area with a production of 12.51 million tonnes and productivity of 18.90 tonnes/ha. In Rajasthan during 2015-16 it was cultivated in 6080 hectare area with a production of 25790 tonnes and productivity of only 4.24 tonnes/ha. Productivity was the highest in Uttar Pradesh (34.34 tonnes/ha) (Anonymous, 2017). It can be grown in almost all states of India except in higher altitudes. Major states growing brinjal are West Bengal, Orissa, Bihar and Gujarat and Uttar Pradesh etc. Now a day demand for brinjal as a fruit vegetable is increasing rapidly among the vegetables consumers in view of its better fruit colour, size and taste.

Average productivity of brinjal crop is quite low and there exists a good scope to improve it's average productivity in India and Rajasthan also to fulfil both domestic and national needs. The growth, yield and fruit quality of brinjal are largely dependent on number of interacting factors. On the other hand eggplant is a long duration crop with high yield which removes large quantities of nutrients from the soil. Like macronutrients, micronutrients are equally significant in plant nutrition. There is a need to go for balanced fertilization of both macro and micronutrients since micronutrients play a profound role in various metabolic functions of plant. Zinc is an essential component of a number of enzymes i.e. dehydrogenase, aldolase, isomerise, proteinase, peptidase and phosphohydrolase (Mousavi, 2011). It is directly involved in the synthesis of indole actic acid and proteins. The principal function is a metal activator of enzymes in plants. Zinc deficiency may be related to weather conditions, as it increases in cold and wet weather, which might be due to the limited root growth in cool soils, or reduced activity of microorganisms and release of zinc from organic material. Due to zinc deficiency leaves are small and distorted, the shoot length become shortened, giving the leaves a clustered arrangement near the growing tip. Its deficiency symptoms appear generally on younger leaves starting with interveinal chlorosis as well as an overall paleness of the whole plant. Flowers may drop off and fruit fail to set. Its deficiency occurs at soil pH above 7.5 and below 5.0. Nutrients can be applied either by conventional methods or by foliar application but the major advantage of foliar application is the instant availability of nutrients to plants.

A field trial was carried out at the four farmer's field at Bharatpur district of Rajasthan comes in Agro-climatic zone of Rajasthan III B Flood Prone Eastern Plane. Here, generally in winters minimum temperature goes to 2-3^{o} and in summer maximum temperature reaches to 47^{o}C, annual rainfall is 600-650 mm per year. There is lot of scope of brinjal growing in this area.

The main objective of Front line Demonstration (FLD) is to introduce suitable agriculture practices like high yielding varieties, seed treatment, spacing, timely sowing, nutrient management including micronutrients, pest and disease management etc. among the farmers accompanied with organizing extension programmes (field day) for horizontal dissemination of the technologies. FLD is playing a very important role for transfer of technologies and changing scientific treatment of the farmers by seeing and believing principle. In order to have better impact of the demonstrated technologies for farmers and field level extension functionaries, Front Line Demonstrations was conducted in a cluster of one hectare land.

Generally, the agricultural technology is not accepted by the farmers as such in all respects. There is always gap between the recommended technology by the scientist and its modified form at the farmer's level which is major absentee in the efforts of increasing agricultural production in the country. It is need of the hour to reduce this technological gap between the agricultural technology recommended by the scientists or researchers and its acceptance by the farmers on their field. In view of the above facts, front-line demonstrations were undertaken in a systematic manner on farmer's field to show the worth of a new technology and convince the farmers to adopt in their farming system.

Materials and Methods

The present study was conducted in Bharatpur district of eastern Rajasthan during Kharif 2014. The genuine seed of brinjal cv Nunhems BE-707 was procured and distributed to four selected farmers. All the participating farmers were trained on various aspects of brinjal production technologies. The field was prepared by deep ploughing and harrowing. The seeds were sown in well prepared raised bed during first week of July. All the recommended practices i.e. seed treatment by carbandazim @ 2g/kg seed, transplanting of one month old seedlings, maintaining row spacing of 60cm and 60 cm spacing with in rows. Recommended dose of manure and fertilizers (10 tonnes FYM, N:P:K 60:60:60 kg/ha. respectively) as basal application before transplanting and remaining 40 kg nitrogen by three split doses 30,45 and 60 days after transplanting. Weed management, need based plant protection chemicals were used to manage the problem. Application of the application of zinc sulphate @ 0.25% at 30 and 45 days after transplanting was done additionally over farmers practice (control). The data related to cost of cultivation, production, productivity, total return and net return were collected in both treatments as per schedule from all selected farmers. An average of cost of cultivation, yield and net returns of different farmers was analyzed by the formula.

Average = [F_1+ F_2+F_3..........................Fn]/N

F_1 = Farmer
N = No. of Farmers (6)

In the present study, technology index was operationally defined as the technical feasibility obtained due to implementation of Front line Demonstrations in brinjal. To estimate the technology gap, extension gap and technology index following formula used by Samui *et al.*, (2000), Sagar and Chandra (2004) have been used.

Technology Gap = Pi (Potential Yield) – Di (Demonstration Yield)

Extension Gap = Di (Demonstration Yield) – Fi (Farmers yield)

Technology index – [(Potential Yield – Demonstration yield/potential yield) X 100]

Results and Discussion

Performance of FLD

A comparison of productivity levels between demonstration and farmers practice is shown in Table 1. During the period of study, it was recorded that front line demonstrations application of zinc sulphate @ 0.25% at 30 and 45 days after transplanting recorded the higher yield (405q/ha) than farmers practice (368 q/ha).

The Percentage increase in the yield (10.05) over farmers practice was recorded. Similarly, Yield enhancement in different crops in front line demonstration had apply been documented by Hiremath *et al.*, (2007), Mishra *et al.*, (2009), Kumar *et al.*, (2010), Surywanshi and Prakash (1993) and Dhaka (2010).

From these results it is evident that the performance of the technology demonstrated was found to be better than the farmers practice under same environment conditions. The farmers were motivated by seeing the results in term of productivity and they are adopting the technologies.

The yield of the front line demonstrations and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology index and Technology gap.

Technology gap

The technology gap shows the difference between potential yields over demonstration yield of the technology. The potential yield of the variety is 450 q/ha. The Technology gap 45 q/ha was recorded. The front line demonstration was laid down under the supervision of Krishi Vigyan Kendra specialists at the farmers field, there exist a gap between the potential yield and demonstration yield. This may be due to the soil fertility and weather condition. Hence, location specific recommendations are necessary to bridge the gap. These findings are similar to the finding of Sharma and Sharma (2004) in oil seeds at Baran District of Rajasthan.

Table.1 Yield, technology gap and technology index of demonstration

Variables	Yield (q/ha)	Increase (%) over farmers practice	Technology gap (q/ha)	Extension Gap (q/ha)	Technology index (%)
Farmers Practice	368.00	-	-	-	-
Demonstration application of zinc sulphate @ 0.25% at 30 and 45 days after transplanting	405.00	10.05	45.00	37	10.00

Table.2 Economics of front line demonstrations

Variables	Yield q/ha.	Cost of Cultivation (Rs/ha.)	Gross return (Rs/ha.)	Net return (Rs/ha.)	Benefit :cost ratio
Farmers practice	368.00	58000	182000	124000	1:3.14
Demonstration	405.00	60000	202500	142500	1:3.8
Additional in demonstration	37.00	2000	20500	18500	9.25*

*Incremental benefit: cost ratio.

Comparative high extension gap (37) indicates that there is need to educate the farmers and help them for optimizing the yield by adopting improved practices. More use of improved technologies by the farmers will subsequently change existing trend of extension gap.

Technology index

Technology index shows the feasibility of the variety/technology at the farmer's field. The lower the value of technology index, more is the feasibility of the particular technology. The result of study depicted in Table 1 revealed that the technology index value was 10. It means the technology is suitable for the Bharatpur district of Eastern Rajasthan. The result of the present study is in consonance with the finding and Hiremath and Nagaraju (2009) in onion.

Economics of frontline demonstrations

Economics of brinjal production under front line demonstrations was recorded and the results of the study have been presented in Table 2. The results of economic analysis of brinjal production revealed that front line demonstration recorded higher gross return (202500 Rs/ha) and net return (142500 Rs.) with higher benefit cost ratio (1:3.8) as compared to farmers practice. These results are in accordanc with findings of Hiremath *et al.*, (2007) and Hiremath and Nagaraju (2009), further, additional cost of Rs 2000 per ha. in demonstration has increased additional net return Rs 18500 per ha. with incremental benefit cost ratio 9.25 suggesting its higher profitability and economic viability of the demonstration. More and less similar results were also reported by Hiremath and Nagaraju (2009) and Dhaka *et al.*, (2010).

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