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RESEARCH PAPER

Effect of integrated crop management on brinjal yield and economics through frontline demonstration at farmers field

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Abstract : The studies were conducted on effect of integrated crop management on brinjal yield and economics through frontline demonstration at farmers field of Tumkuru district, Karnataka state during the year 2009-10 to 2011-12. The data revealed that the total yield gap between potential yield and actual yield of brinjal was 53.67 per cent, in which 16.92 per cent of yield gap between demonstration plot and actual farmers plot yield and 36.75 per cent of technological gap. The maximum number of farmers were adopted recommended spacing (88.33 %) followed by seed treatment (83.33 %), timely irrigation (81.67 %) and weed management (81.67 %). The increased in adoption level of package of practices were found to more in raising and selection of quality seedling from nursery (50.00 %) fallowed by selection of high yielding hybrid variety (46.67 %) and application of vegetable special (50.00 %). Whereas, the package of practices *viz.*, plant protection measures to control pest and diseases (21.67 %), application of recommended dose of fertilizer (25.00 %) and seed treatment (26.67 %) were found to less increase in adoption level after frontline demonstration. There was significantly increased in brinjal yield (36.51 %), net return and B:C ratio after conduct of frontline demonstrations as compared to farmers practice. The adoption of package of practices even though after demonstrations programme, which shows positive impact of integrated crop management on brinjal yield and economics through adoption of demonstrated technology.

Key Words : Adoption, Brinjal, Frontline demonstration, Integrated, Net return

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INTRODUCTION

Brinjal (*Solanum melongena* L.) is an important vegetable crop occupies an area of 7.11 lakh hectares with production of 135.58 lakh tones and productivity of 19.10 t/ha in India. West Bengal, Odisha, Gujarat, Madhya Pradesh, Bihar, Chhattisgarh, Andhra Pradesh and Karnataka are leading states in brinjal cultivation in India. Karnataka occupies with an area (0.158 L ha) and production (4.02 L tones) during 2013-14 (Anonymous, 2015). The brinjal is cultivated all season of the year in Tumkuru district, which gives good returns to the

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Table A : Demonstrated package of practices and farmers practice for ICM in brinjal

Sr. No.	Package of practices	Frontline demonstration (Demonstrated package)	Farmers practice (Local check)
1.	Selection of high yielding variety /hybrid	Arka Anand – Bacterial wilt resistant hybrid variety	Local or unknown private hybrid/variety, no information.
2.	Seed treatment	Seed treated with fungicide/ Trichoderma or carbendizim	Not known
3.	Raising the seedling in nursery	Pro-tray method of raised seedling in 50 % shade nethouse and covers sides with 50 mesh insect proof nylon net and selected good quality seedling	Purchased seedling from pro-tray method of raised seedling in private shadenet house without nylon mesh and selected unknown poor quality seedling
4.	Spacing	90 cm x 60 cm	120 cm x 60 cm
5.	Application of farm yard manure (Approximately)	Applied FYM 25 t/ha before 3 week of transplanting	Applied FYM 3 tractor load or 15 t/ha during ridges and furrow preparation (2-3 day before transplanting)
6.	Application of recommended dose of fertilizer	125 kg N + 100 kg P_2O_5 + 50 kg K_2O per ha (50 % N + 100 % PK at the time of transplanting and applied remaining 25 % N at 6 week + 25 % N at 10 week after transplanting)	After transplanting, applied 19:19:19 NPK + 20:20:0 NPK mixed chemical fertilizer (Approx. 10-12 g/plant) 2- 3 times during croping period
7.	Application of vegetable special/ micro-nutrient	Foliar spray of vegetable special 75 g + 15 L water + 1 lemon + 1 shampoo (Rs.1) at 30, 45 and 60 days after transplanting	Not applied any micro-nutrient.
8.	Irrigation	Drip or furrow method of irrigation at once in a 4-6 days interval depend upon soil condition	Furrow method of irrigation once/twice in a week
9.	Weed management	Pre-emergence herbicide butachlor @1.5 L/ha, followed by hand weeding depend upon weed intensity	Hand weeding 3 to 4 times
10.	Application of Neem cake	*Neem* cake @ 250 kg/ha, two split - at the time of transplanting and 30 days after planting.	Not applied any Neem cake
11.	Plant protection measures for control of insect pest and diseases	Need based application of plant protection bio-pesticides and chemical for control: Fruitfly, mites and sucking pest - Spraying with diamethoate (30 EC) 1.7 ml/L of water. Shoot and fruit borer: Apply *Neem* cake @ 250 kg/ha, spraying quinalphos 2 ml/L of water. Leaf curling – spraying with imidaclopride 0.3 ml/L of water for vector control. Powdery mildew – spraying of carbendizim 1g/L of water Fussarium wilt – Drenching with copper oxy-chloride (COC) 3 g/L of water. Bacterial wilt - Drenching with streptocycline 0.5 g/L of water.	Not followed, irrespective of disease and pest used plant protection chemical combined together with growth regulator without knowing compatibility of chemicals and not identified pest and disease for spraying.
12.	Harvesting	Manual	Manual

farmers.

Krishi Vigyan Kendra are grass root level for application of technology through assessment, refinement and demonstration of proven technologies under different 'micro farming' situations in a district (Das, 2007). KVK, Konehalli, Tiptur conducted integrated crop management on brinjal yield and economics through frontline demonstration at farmers' field. The main objective of frontline demonstration is to demonstrate newly released crop production, protection technologies and its management practices at the farmer's field under different agro-climatic regions and farming situations and

also convincing farmers and extension functionaries together about the brinjal production technologies for further wide scale diffusion. Keeping in view of an effective extension approach of frontline demonstrations for dissemination of integrated crop management of brinjal production.

Main objective :

– To study the extent of adoption of integrated crop management in brinjal production as package of practices before and after conduct of frontline demonstration.

– To study yield gap identified in brinjal production in tumkuru district.

– To study the yield and economics of brinjal production before and after frontline demonstration.

MATERIAL AND METHODS

The frontline demonstrations were conducted on integrated crop management (ICM) in brinjal at farmer's field of Tumkuru district, Karnataka state during the year 2010-11 to 2012-13. Selected 120 farmers for demonstrating the ICM in brinjal through FLDs at Tiptur, Turvekere and C.N.Halli taluks of Tumkuru district under ICAR and RKVY-IFSD project. The critical inputs were supplied to farmers and applied as per the package of practices for brinjal crop recommended by University of Agricultural Sciences, GKVK, Bengaluru (Anonymous, 2015). Demonstrations at farmer's fields were regularly monitored by scientists of Krishi Vigyan Kendra, Konehalli, Tiptur from sowing to harvesting and marketing. Randomly twenty farmers from each taluk were selected to making a total sample size of sixty. Basic data of the respondents were collected before and after frontline demonstration by personal interview with the help of interview schedule developed for the study. The interview schedule was developed through discussion with experts, scientist and extension officers of horticulture department in the district. 60 farmer's field with an area of 12 ha was selected under these FLDs. The information on demonstrated package of practices and farmers practices followed as mentioned in Table A. The data were analysed with appropriate statistical procedures.

Data collected on potential yield of the brinjal in a given situation. Besides this, demonstrated plot yield was obtained using the data from frontline demonstrations conducted in the farmers field under the close supervision of scientists from Krishi Vigyan Kendra, Konehalli in different locations of the district. Further, information on actual yield obtained by the farmers on their farms under their own management practices was collected. Using these data the differences between potential yield and demonstration plot yield (Yield gap-I), difference between demonstration plot yield and actual yield or yield under existing practice (Yield gap- II) and difference between potential yield and actual yield (Total yield gap) were worked out.

Potential yield - Demonstration plot yield = Technological gap (yield gap-I)

Demonstration plot yield - Actual yield (Farmers practice) = Extension gap (yield gap- II).

Potential yield - Actual yield = Total yield gap.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Yield gap in brinjal production:

The yield gaps are presented in Table 1. The potential yield of brinjal was found to be 60.00 t/ha and the demonstration plot yield obtained through frontline demonstrations was 37.95 t/ha. The actual yield obtained by the farmers on their farm with their own resources and management practices was 27.80 t/ha. The magnitude of technological gap (yield gap-I) was 22.05 t/ha, which was 36.75 per cent lesser than the maximum

Table 1 : Yield gap identified in brinjal production

Particulars	Yield (t/ha)	Percentage gap
Potential yield	60.00	--
Demonstration plot yield	37.95	--
Actual yield (Farmers practice)	27.80	--
Technological gap (Yield gap I)	22.05	36.75
Extension gap (Yield gap II)	10.15	16.92
Total yield gap	32.20	53.67

attributable yield. Extension gap (yield gap-II) refers to the difference between demonstration plot yield and actual yield and it was 10.15 t/ha. There was 16.92 per cent reduction in yield as compared to demonstration plots yield. A sizable total yield gap of 32.20 t/ha was observed and it accounted for 53.67 per cent. These findings are in agreement with that of Kaur *et al.* (2013) and Mitra and Samajdar (2010).

The causes for such a large total yield gap may be attributed to environmental differences between research stations, extension worker and farmers fields and non adoption of production technology (Mishra *et al*., 2007 and Kiran, 2003). It could be reduced through considerable co-ordination between researchers, extension workers and farmers. These findings are similar with those of Hiremath and Hilli (2012) and Jadav and Solanki (2009).

Adoption level of package of practices in ICM brinjal :

The data presented in Table 2. indicated that more number of farmers were adopted recommended spacing (88.33 %), seed treatment (83.33 %) followed by timely irrigation (81.67%) and weed management (81.67%). Whereas lesser adoption such as plant protection measures to control pest and diseases (46.67%), application of vegetable special and *Neem* cake (53.33 %) and recommended dose of fertilizer (56.67 %). This is due to that simple production technology adopted more number of farmers compared to complicated technology. Similar results were reported by Alagukannan *et al*. (2015); Singh *et al*. (2014) and Changadeya *et al*. (2012).

The increased in adoption level of package of practices were found to more in raising and selection of quality seedling from nursery (50.00 %) fallowed by

Table 2 : Adoption level of package of practices in ICM brinjal **(n = 60)**

Sr. No.	Package of practices	Adoption level				Increased in adoption level	
		Before		After			
		No.	Per cent	No.	Per cent	No.	Per cent
1.	Selection of high yielding variety hybrid with pest and disease resistance/tolerance	19	31.67	47	78.33	28	46.67
2.	Seed treatment	34	56.67	50	83.33	16	26.67
3.	Raising and selection of quality seedling from nursery	18	30.00	48	80.00	30	50.00
4.	Recommended spacing	37	61.67	53	88.33	16	26.67
5.	Application of recommended quantity of FYM (Approx.)	15	25.00	38	63.33	22	36.67
6.	Application of recommended dose of fertilizer	19	31.67	34	56.67	15	25.00
7.	Application of vegetable special/ micro-nutrient	05	8.33	32	53.33	27	45.00
8.	Timely irrigation	25	38.33	49	81.67	24	40.00
9.	Weed management	30	50.00	49	81.67	19	31.67
10.	Application of *Neem* cake	06	10.00	32	53.33	26	43.33
11.	Plant protection measures to control pest and diseases	15	25.00	28	46.67	13	21.67
12.	Harvesting at right stage	29	48.33	48	80.00	19	31.67

Table 3 : Yield of brinjal before and after frontline demonstration **(n= 60)**

Average yield of brinjal (t/ha)		Per cent increase over local
Before FLD (Farmers practice)	After FLD (Demonstrated production)	
27.80 t/ha	37.95 t/ha	36.51 %

Table 4 : Economics of brinjal production before and after frontline demonstration

Sr. No.	Item	Before FLD	After FLD
1.	Cost of cultivation (Rs./ha)	78,560	76,680
2.	Yield of brinjal (t/ha)	27.80	37.95
3.	Gross return (Rs./ha)	1,66,800	2,27,700
4.	Net return (Rs./ha)	88,240	1,51,020
5.	B:C ratio	2.12	2.97

selection of high yielding hybrid variety (46.67 %) and application of vegetable special (45.00 %). Whereas, the package of practices *viz*., plant protection measures to control pest and diseases (21.67 %), recommended dose of fertilizer application (25.00 %), recommended spacing (26.67 %) and seed treatment (26.67 %) were found to less increase in adoption level after conduct of frontline demonstration. This might be due to that causes for major reduction of yield, simple production technology was adopted by more number of farmers compared to complicated technology (Mehta *et al*., 2012) and high cost of inputs of fertilizers and pesticides causes for adopted less number of farmers. These findings are in conformity with the results reported by Meena and Gupta (2015); Thakor and Patel (2006) and Aski and Hirevenkanagoudar (2010).

Impact on yield of brinjal :

The information regarding the impact of FLD on yield has been presented in Table 3. The data revealed that the yield of brinjal per hectare increased by 36.51 per cent in FLD plots. This yield indicated the significant difference in yield before and after conduct of FLD. It means that even after FLD, there was wider adoption of demonstrated technologies. These findings are in line with research of Yadav *et al.* (2004).

Impact on economic of brinjal production:

The economic impact of demonstrated brinjal production was worked out by calculating total cost of cultivation, gross return, net return and B:C Ratio (BCR) of before and after FLD plot. Total cost of cultivation was calculated by total sum of expenditure of land preparation, seed, manure and fertilizers, plant protection measures, irrigation and labour component. The data in Table 4. revealed that before FLD, the yield of brinjal was obtained 27.80 t/ha, while yield after FLD it was 37.95 t/ha. The farmers sold brinjal at farmer field was Rs. 600 per quintal and on that base profitability was calculated (Balaji *et al.*, 2013 and Samui *et al*., 2000).

The net returns from brinjal before FLD was Rs. 88,240/ha, while the net returns from brinjal after FLD was Rs.1,51,020/ha. The B:C ratio for before FLD was 2.12, which was increased to 2.97 after FLD. It was evident from the results that B:C ratio of brinjal FLD was higher than before FLD. This might be due to higher adoption of all the package of practices recommended for brinjal production in the region (Yadav *et al.*, 2004). However, increased in B:C ratio after FLD plot was due to adoption range from 21.67 per cent to 50.00 per cent increased in adoption of package of practices even after FLD programme. This might be due to good extension contact by FLD farmers with the scientist and extension workers. Similar results were reported by Patel and Patel (2014); Shinde (2011) and Sharma and Sharma (2004).

Conclusion:

Frontline demonstration was effective changing of farmers towards the adoption of integrated crop management in brinjal production. Most of the farmers became aware about recommended production practices of brinjal after conducting the frontline demonstration on farmers field. More number of farmers were found to increase in adoption per cent of package of practices such as raising and selection of quality seedling from nursery, selection of high yielding variety/hybrid and application of vegetable special/ micro-nutrient after conduct of FLD as compared to before FLD. Yield of brinjal, net return and B:C ratio were found to increase in demonstrated plot as compared to farmers practice. The adoption of package of practices even after demonstrations programme, which shows positive impact of integrated crop management on brinjal yield and economics through adoption of demonstrated technology. The concept of frontline demonstration may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the recommended practices to other members of the farming community.

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