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# Effect of Integrated Crop Management Practices on Yield and Economics of Brinjal in Seoni district of Madhya Pradesh

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## ABSTRACT

The studies were conducted on impact of frontline demonstrations in adoption of production technology and economics of brinjal at farmers' field of Seoni district, Madhya Pradesh state during the year 2017-18 to 2019-20. Prevailing farmer's practices were treated as control for comparison with demonstrated technology. The main objective was to demonstrate newly released crop production and protection technologies at the farmer's field under different agro-climatic regions and farming situations. The extension gap ranged between 74.94 to 111.21 q/ha, whereas the trend of technology gap ranged between 203.74 to 220.34 q /ha. The benefit cost ratio (B:C) was recorded higher i.e. 2.35 to 2.77 under demonstrated practice, while it was 1.95 to 2.17 under check practice. Besides this, the demonstrated plots gave higher gross return, net return with higher benefit cost ratio when compared to farmer's practice. The results clearly showed the positive impact of front line demonstrations over farmers practice towards increasing the productivity of brinjal in Seoni district of Madhya Pradesh. On an average 34.11 per cent yield increase was observed in demo plots over farmers' practice. Demonstrated technologies proved more remunerative and economically feasible to the brinjal growers than their conventional methods.

**Key Words:** Brinjal, Economics, Extension gap, Technology gap, Technology index, Yield.

## INTRODUCTION

To cater the needs of farmers and for transfer of technology from lab to land, Krishi Vigyan Kendras (KVKs) have been established in all the states. One of the main mandated activities of KVKs is organizing front-line demonstrations of newly released crop production and protection technologies and its management practices in the farmers' field under different agro-climatic regions and farming situations for the benefit of farmers. It is a long term educational activity conducted in a systematic manner in farmers' field to show worth of a new practice/technology Seeing is believing is the basic philosophy of field demonstration.

Madhya Pradesh with its huge geographical area and diverse agro-climatic conditions favours growing of large number of vegetable crops. Brinjal (*Solanum melongena* L.) is an important vegetable crop occupies an area of 7.30 lakh hectares with production of 128.01 lakh tones and productivity of 17.50 t/ha in India. West Bengal, Odisha, Gujarat, Madhya Pradesh, Bihar, Chhattisgarh, Andhra Pradesh and Karnataka are leading states in brinjal cultivation in India. Madhya Pradesh occupies with an area of 51350 ha and production of 1073630 tones and average productivity being 20.91 tons / ha which is 19.48 per cent higher than the national average of 17.50 t /ha during 2017-18 (Anon, 2018). The brinjal is cultivated all season of the year in Seoni district, which gives good returns to the farmers. In recent years the brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenne has become very serious problem in the district which affect considerable yield loss of 50 to 70 per cent. Krishi Vigyan Kendra, Seoni conducted integrated crop management on brinjal yield and economics

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through frontline demonstration at farmers' field. The main objective of frontline demonstration was 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. Therefore, a study on effect of integrated crop management practices on yield and economics of Brinjal in Seoni district of Madhya Pradesh was conducted during 2017-18 to 2019-20

**Table 1. Adoption of Demonstration Package and Farmers' Practice in Brinjal FLD.**

| Particular | Technological intervention | Existing practices | Gap |
|---|---|---|---|
| Variety | Kashi Sandesh | Local or unknown private hybrid/variety | Full gap |
| Seed rate | 150 g /ha | 200 g /ha | Partial gap |
| Seed treatment | Seed was treated with carbendazim+ mancozeb @ 2.5 g /kg seed | Not Known | Full gap |
| Seedling treatment | Seedling root dip with Chlorantranilprole18.5 SC@ 0.5ml / L water for 30 min | Not Known | Full gap |
| Transplanting method | Transplanting on raised bed | Flat bed | Full gap |
| Spacing | 90 cm x 60 cm | 60 cm x 30 cm | Partial gap |
| Application of recommended dose of fertilizer | Fertilizer @ 125 kg N, 80 kg $P_2O_5$ and 80 kg $K_2o$ | Nil/without recommendation | Partial gap |
| WSF Spray | Foliar spray of 2% N:P:K 19:19:19 at 20,40,60 DAT | No application | Full gap |
| Application of Bio fertilizer | Soil application of *Azospirillum* & PSB @ 2 kg/ha mix with FYM | No application | Full gap |
| Plant protection measures for control of insect pest and disease | Need based application of plant protection bio-pesticides and chemical for control: Fruitfly, mites and sucking pest - Spraying with diamethoate (30 EC) 2.0 ml/L of water. Shoot and fruit borer: Installation of Pheromone trap @ 10/ha + Baveria Basiana @ 1 L/ha + Spray of 5 %NSKE, Spray of Emamectin benzoate 0.6 gm/L of water. Leaf curling – spraying with Imidacloprid 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 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 without compatibility of chemicals and not identified pest and disease for spraying. | Partial gap |
| Harvesting | Manual | Manual | No Gap |

## MATERIALS AND METHODS

The Front line demonstrations were conducted on brinjal crop at farmers' field of Seoni district, Madhya Pradesh state during the year 2017-18 to 2019-20 (three consecutive years) in three villages namely Chikhli ,Babai and Dheka. During these three years of study an area of 12 ha was covered under FLD with active participation of 30 farmers for demonstrating the yield potential in brinjal. The critical inputs were supplied to farmers and applied as per the package of practices for brinjal crop recommended by JNKVV, Jabalpur .Before conducting FLDs, a list of farmers was prepared from group meeting and specific skill training was imparted to the selected farmers regarding different aspects of cultivation. The difference between the demonstration package and existing farmers practices are mentioned in Table 1.

In demonstration plots, use of quality seeds of improved hybrid Kashi Sandesh procured from IIVR, Varanasi were sown in nursery and transplanted in raised bed with using balanced fertilization, timely application of herbicide and pesticides. The traditional practices were taken as a local check. The data on output were collected from FLD plots as well as control plots, and finally the extension gap, technology gap, technology index; economics of demonstration along with the benefit cost ratio were worked out. The demonstrated trials were regularly monitored and necessary data related to all necessary traits of the new varieties were collected. In addition to this, data on traditional practices followed by the farmers were also collected. Technology gap, extension gap and technology index were worked out as per formula suggested by Samui *et al* (2000) and Dayanand *et al* (2012) as given below:

1. Technology gap = Potential yield (kg/ha) - Demonstration yield (kg/ha);
2. Extension gap = Demonstration yield (kg/ha) - Farmers yield (kg/ha)

$$3.\ \text{Technology index} = \frac{(PI - DI)}{PI} \times 100$$

$$4.\ \text{Impact on Yield} = \frac{\text{Yield of Demonstrated plot} - \text{Yield of Control Plot}}{\text{Yield of Control Plot}} \times 100$$

(% increase over control)

## RESULTS AND DISCCUSION

It was observed that the productivity of brinjal in Seoni district under improved production technologies ranged between 379.66 to 396.26 qha with a mean yield of 387.78 qha. The percent increase yield under improved production technology ranged from 24.59 to 40.26 in respective years. 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 were in line with research of Yadav *et al* (2004). Increased fruit yield of brinjal was mainly because of high yielding potential variety, soil type and proper management of crop as well as need based application of pesticide to control insect pest. The result revealed the positive effects of FLD over the existing practices as it enhanced the yield of brinjal in Seoni district of Madhya Pradesh. The above findings were similar with the findings of Singh *et al* (2011). The extension gap ranging between 74.94 to 111.21 q/ha during the period of study emphasizes the need to educate the farmers through various means for the adoption of improved agricultural production to reverse the trend of wide extension gap. The trend of technology gap ranging between 203.74 to 220.34 q /ha reflected the farmer's cooperation in carrying out such demonstration with encouraging results in subsequent years. The technology gap observed may be attributed to the dissimilarity in soil fertility status and weather condition. Similar findings were also recorded by Singh *et al* (2016). The technology index shows the feasibility of the demonstrated technology at the farmers' field. The technology index of demonstration varied from 33.95 to 36.72 per cent. On an average technology index was observed 35.36 per cent under FLD programme

**Table 2. Technology gap, Extension gap, Technology index and Productivity enhancement in Brinjal.**

| Year | Fruit yield (q/ha) | | | (%) Increase in productivity | Technology gap (q/ha) | Extension gap (q/ha) | Technology index (%) |
|---|---|---|---|---|---|---|---|
| | Potential | Demonstration | Control | | | | |
| 2017-18 | 600.00 | 379.66 | 304.72 | 24.59 | 220.34 | 74.94 | 36.72 |
| 2018-19 | 600.00 | 396.26 | 288.17 | 37.50 | 203.74 | 108.09 | 33.95 |
| 2019-20 | 600.00 | 387.43 | 276.22 | 40.26 | 212.57 | 111.21 | 35.42 |
| Average | | 387.78 | 289.70 | 34.11 | 212.21 | 98.08 | 35.36 |

which showed the efficacy of good performance of technological interventions. Lower technological index of the crops shows the more adoption of technological intervention and increased yield performance of the crop. The findings of the present study were in line with the findings of Mitra *et al* (2010) and Katare *et al*(2011).

**Economic of brinjal production**

In order to ascertain the economic feasibility of the demonstration technologies over and above the control economic impact of demonstrated brinjal production technology was worked out by calculating total cost of cultivation, gross return, net return and B:C ratio (BCR) of before FLD plot 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. It was found that the cost of production of brinjal under demonstration varied from Rs 80555 to Rs. 97644 /ha with an average of Rs 89246 as against Rs 78066 to 88964/ha with an average of Rs 82450/- under control. The additional cost increased in the demonstration was mainly due to more cost involved in balanced fertilizer, procurement of improved hybrid and IPM practices. This finding was in corroboration with the findings of Mokidue *et al* (2011) and Tomar (2010) The data revealed that the net return from the demonstration were substantially higher than control plots. B:C ratio was recorded to be higher under demonstration against control during all the years of study. Scientific method of brinjal cultivation can reduce the technology gap to a considerable extent, thus leading to increased productivity of brinjal in the district which in turn will improve the economic condition of the growers. Moreover, extension agencies in the district need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for better brinjal production in the district.

## 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. Yield of brinjal, net return and B:C ratio were found to increase in demonstrated plot as compared to farmers practice. The productivity gain under FLD over existing practices of brinjal cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of brinjal in the district. The demonstrated improved practices were superior compared to farmers' practice. The farmers expressed positive attitude towards the demonstrations through their perception on the technology. However the technology need to be popularized to decrease the extension gaps, technology gap, technology index, adoptions gaps and there by yield gap so as to increase the income of farmers. The economic details of the demonstrations give us a green signal to further popularize them among the farming community for large scale adoption.

**Table 3. Cost of cultivation (Rs/ha), net return (Rs/ha) and benefit: cost ratio of Brinjal as affected by demonstration and local practices control.**

| Year | Yield (q/ha) | | Cost of Cultivation (Rs/ha) | | Gross Return (Rs/ha) | | Net Return (Rs/ha) | | Benefit Cost ratio B:C Ratio | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Demonstration | Control | Demonstration | Control | Demonstration | Control | Demonstration | Control | Demonstration | Control |
| 2017-18 | 379.66 | 304.72 | 80555 | 78066 | 189830 | 152360 | 109275 | 74294 | 2.35 | 1.95 |
| 2018-19 | 396.26 | 288.17 | 89540 | 80321 | 237756 | 172902 | 148216 | 92581 | 2.65 | 2.15 |
| 2019-20 | 387.43 | 276.22 | 97644 | 88964 | 271201 | 193354 | 173557 | 104390 | 2.77 | 2.17 |
| Average | 387.78 | 289.70 | 89246 | 82450 | 232929 | 172872 | 143682 | 90421 | 2.59 | 2.09 |

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