

Impact of Frontline Demonstration on Integrated Crop Management Practices in Brinjal in Arunachal Pradesh

Formatted: Font: 17 pt

Abstract

The twenty numbers of frontline demonstrations on integrated crop management practices in Brinjal were demonstrated in selected villages of Tirap district, Arunachal Pradesh during Rabi season, of 2017-18 and 2018-19, respectively. Before conducting the demonstration; field level surveys were conducted in selected villages to know the farmers practices. As per result of survey; there was huge gap between scientific practices and farmers practices. On the basis of surveys, Krishi Vigyan Kendra (KVK) Tirap, Arunachal Pradesh conducted the demonstrations. During both the years the extension gap was recorded during in the demonstration plot as 40 & 59 q/ha, respectively while the yield was: 238 & 246 q/ha, B:C ratio: 3.63 & 3.54 as compared control (198 & 187 q/ha, and 2.37, & 2.12, respectively).

Key words: Frontline demonstration, integrated crop management, brinjal

Introduction

With its vast geographic area and varied agro-climatic conditions, Arunachal Pradesh is well suited for growing a variety of vegetable crops. In India, the significant and important vegetable crop, brinjal (*Solanum melongena* L.) is grown over an area of 7.43 lakh hectare and produces

128.01 lakh tonnes with a productivity of 17.50 t/ha. India's major states for brinjal production include West Bengal, Odisha, Gujarat, Madhya Pradesh, Bihar, Chhattisgarh, Andhra Pradesh and Karnataka. The states of West Bengal, Odisha, Gujarat, Madhya Pradesh, Bihar, Chhattisgarh, Andhra Pradesh, and Karnataka are the leading producers of brinjal in India. In comparison to the national average of 17.16 tons/ha, Arunachal Pradesh state has an area of 330 ha, produces 1790 tonnes and has an average productivity of 5.42 tons/ha (NHB data base, 2020-21) which is very low as compared to nation's productivity.

Formatted: Font color: Red

Formatted: Right: -0.33", Space Before: 1.95 pt

Formatted: Font color: Red

Formatted: Font color: Red

Comment [W71]: Reference missing

In the Tirap district, brinjal is grown throughout the year, and provides substantial profits to the farmers with significant profits. The brinjal's shoot and fruit borer of brinjal has developed caused a very serious problem in the district recently, resulting in a significant yield loss of between 20% and 40%. Taking into account of the above considerations, Krishi Vigyan Kendra, Tirap conducted integrated crop management on brinjal yield and economics 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 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 Tirap district of Arunachal Pradesh was conducted during Rabi season of 2017-18 and 2018-19 respectively.

Materials and Methods

The frontline demonstrations were conducted on brinjal crop (Variety: GB/Abu) at farmers' field of Tirap district, Arunachal Pradesh during Rabi season of 2017-18 and 2018-19, respectively, in nine villages namely Deomali, Namsang, Makat, Noitong, Soha, Doidam, Turret, Khela and Panidurya. The total twenty (20) numbers of demonstrations having 0.1 ha plot size were demonstrated during the both years. The critical inputs were supplied to farmers and applied as per the package of practices for brinjal crop recommended by Assam Agricultural University- Jorhat. 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 of brinjal. The difference between the demonstration package and existing farmers practices are mentioned in below's table-

Table 1. Package and Farmers' Practices demonstrated in Brinjal FLD.

Particular	Technological intervention	Existing practices	Gap
Variety	GB(Abu)	Local or unknown Private hybrid/variety	Full gap
Seed rate	145 g /ha	200 g /ha	Partial gap
Seed treatment	Seed was treated	Not treated	Full gap
Transplanting method	Transplanting on raised bed	Flat bed	Full gap
Spacing	90cm x60 cm	60cm x30 cm	Partial gap
Application of recommended dose of manure	5kg/ meter ²	Nil/without recommendation	Partial gap
Application of Bio fertilizer	Soil application of Azospirillum & PSB @ 2kg/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 for control: Fruit fly, mites and sucking pest -	Not followed, any type of spray	Full gap

Comment [u2]: Write name of fungicide

Comment [W73]: Which manure?

Comment [W74]: In how much FYM?

	Spray of 5 % NSKE		
Harvesting	Manual	Manual	No Gap

Three different types of agroclimatic zones are prevalent in Arunachal Pradesh. In Arunachal Pradesh three types of Agro-climatic zones are prevails. The Tirap district falls under Eastern Himalayan Region (Zone II), Sub region-: Per Humid Hyper Thermic Foothills; where hot climate and humidity is very common characteristics. The rains start from End of February and continue up to September. Intermediary dry spells, which are hot and humid, frequently occur. ~~The intermediary dry spells are often occurs which are very heat and humid.~~

Table No- 2 The weather data during the research period

Month	Rainfall (mm)		Temperature °C				Relative Humidity (%)			
	2017	2018	2017		2018		2017		2018	
			Max.	Min.	Max.	Min.	M	E	M	E
April- 2017	247	186.0	34.4	12.2	35.2	13.2	82	67	81	65
May- 2017	327	117.5	35.6	14.6	36.7	15.1	86	73	89	75
June-2017	241	433.4	36.8	16.5	37.7	17.2	91	80	93	82
July-2017	347	336.6	34.2	18.4	35.4	18.9	93	83	95	81
August- 2017	493	277.3	33	19.1	34.2	20.1	87	85	89	87
September- 2017	371	186.2	32.3	18.8	33.6	20.1	88	84	91	86
October- 2017	162	118.0	26.5	17.2	27.4	18.4	89	90	92	92
November- 2017	7.6	15.4	25.1	12.3	25.9	14.1	87	82	89	88
December- 2017	0	0	25.8	9.4	26.2	10.2	85	83	86	87
January- 2018	12.2	12.7	25.4	8.6	26.2	9.1	85.7	88	84.9	88
February- 2018	69.6	69.0	26.1	7.9	26.9	8.3	88	90	83	92
March-2018	138.2	123.0	28.7	8.8	29.1	9.2	85	81	82	83

Where Max. denotes maximum, min. denotes minimum, M denotes Morning, E denotes evening

Use of high-quality seeds of the improved variety GB (Abu) obtained from AAU, Jorhat were sowed in nurseries and transplanted in raised beds with the use of organic manure in demonstration plots. The customary ways were seen as a local check. The output data were

gathered from FLD plots and control plots and then the extension gap, technology gap, and technology index; demonstration and economics, as well as the benefit cost ratio, were calculated. The shown trials were continuously observed and all relevant information regarding the essential characteristics of the new types was gathered. Also, information on the farmers' customary methods of production was gathered. The formulas presented by Samui et al. (2000) and Dayanand et al. (2012) were used to calculate the technology gap, extension gap, and technology index as shown below:

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

2. Extension gap = Demonstration yield (kg/ha) - Farmers yield (kg/ha)

3. Technology index =
$$\frac{\text{Potential Yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$$

4. Impact on yield =
$$\frac{\text{Yield of demonstration plot} - \text{yield of control plot}}{\text{Yield of control plot}} \times 100$$

(% increase over control)

Results and Discussion

The productivity of brinjal in the Tirap area was reported to range from 247 to 228 q/ha with better production technology, with a mean yield of 238 q/ha, which is 25% higher than farmers' custom (Table-3). It implies that proved technologies were widely used even after FLD. These results were consistent with the work of [Yadav et al. \(2004\)](#), ~~Yadav and colleagues (2004)~~. The high yielding potential variety, soil type, proper crop management and need-based application of a biocontrol material to control insect pests were the key contributors to the increased fruit yield of brinjal (Singh NK, 2020). The aforementioned findings concurred with those of Singh *et al* (2011) and Kale (2020). The 40 q/ha extension gap that was computed throughout the study period highlights the need for farmers to be educated about adopting improved agricultural production practices in order to buck the trend of a huge extension gap. The farmer's participation in putting out such a demonstration with good results was reflected in the trend of the technology gap of 112 q/ha. Kishore (2018) had also justified the similar results. Ramkrishnana *et al.* (2007) has mentioned that training and awareness programmes are the vital factors for creating awareness among farming community. The difference in weather and soil fertility status may be the cause of the observed technological gap. The technology index (32%) demonstrates the viability of the

presented technology. Rajhansa KC *et al.* (2021) and Shalini (2016) also revealed that improved package of practices can enhance the brinjal productivity at farmer's field.

Table 3. 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	350	238	198	20	112	40	32
2018-19		246	187	32	104	59	30

Formatted: Font: 11 pt
 Formatted: Font: 11 pt
 Formatted: Right: 0"
 Formatted Table
 Formatted: Indent: Left: 0.09", First line: 0"
 Formatted: Font: 11 pt
 Formatted: Font: 11 pt
 Formatted: Font: 11 pt

Table 4. 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	238	198	52,632	58,624	2,38,000	1,98,000	1,91,368	1,39,376	3.63	2.37
2018-19	246	187	54,214	59,829	2,46,000	1,87,000	1,91,786	1,27,171	3.53	2.12

Formatted: Indent: Left: 0.04", Hanging: 0.19"
 Formatted: Font: 11 pt
 Formatted: Indent: Hanging: 0.04", Right:
 Formatted: Font: 11 pt
 Formatted: Font: 11 pt

Calculating the total cost of cultivation, gross returns, net returns, and B:C ratio (BCR) of the before FLD plot and after FLD plot allowed researchers to determine the economic viability of the demonstration technologies above and above the control. The sum of the costs for labour, irrigation, plant protection measures, seed, manure, and soil preparation was used to

compute the overall cost of cultivation. It was discovered that the demonstration's cost of producing brinjal per hectare was Rs 52,632 as opposed to Rs 58624 under the control (Table-4). The technical gap can be significantly closed by using scientific brinjal farming techniques, which will increase the district's output and boost the producers' economic standing (Adowaker, 2019, Desai, 2016 and Kumar, 2016). Also, in order to close the extension gap and improve the district's output of brinjal, extension organizations in the area must offer the farmers sufficient technical assistance using a variety of educational and extension methods. Sumathi *et al.* (2018) has revealed that proper integrated pest management practices can enhance the yield of brinjal in the country. He further added that these integrated pest management practices have to be disseminated on ~~farmers~~ farmer's field for better outcome as well. Patra *et al.* (2016) and Srinivasan (2000) has mentioned that different types of biopesticides and insecticides are the best option to control major pest of brinjal like fruit borer, stem borer, fruit fly etc. He has proved that bioagents enhance the brinjal yield with environmental safety; which are the main concern in the era of global warming.

Conclusion

~~Farmers were successfully influenced by the frontline demonstration to adopt integrated crop management in the production of brinjal.~~ Following the frontline demonstration in the farmers' fields, the majority of the farmers were aware of the recommended brinjal cultivation procedures. B:C ratio, net return, and brinjal yield all increased in the demonstration plot compared to farmer practice. The increased productivity under FLD above current methods of brinjal growing raised awareness and encouraged other farmers in the district to adopt acceptable production techniques for brinjal.

References

Adawadkar, M.P.; Deshmukh, M.M.; Wadkar, S. B. 2019. Effect of Drip Fertigation with Different Fertilizer Levels and Traditional Method of Fertilizer Application on Growth and Yield of Brinjal. *Int. J. Curr. Microbial. App. Sci.* **8**(9): 2793-2800.

Formatted: Font: Bold

~~Anonymous (2021). Horticultural Statistics at a Glance. Horticulture statistics division. Department of Agriculture, Cooperation & Farmers Welfare Ministry of Agriculture & Farmers Welfare Government of India.~~

Dayanand V R K. and Mehta SM (2012). Boosting mustard production through front line demonstrations. *Indian ResJ Ext Edu* **12** (3): 121-123.

Formatted: Font: 12 pt, Bold

Desai, N.; Mamatha, B. and Prashant, J.M. 2016. Impact of frontline demonstration in

adoption of production technology and economics of tomato at farmers field of Tumakuru district **11**(2): 349-354.

Kale, K.D.; Nagalkar, D.D.; Pawarand, A.V. 2020. Effect of fertigation on yield of brinjal (*Solanum melongena*). *Bioinfolet - A Quarterly J. Life Sci.* **17**(3): 445-448.

Kishore, P. and Daniel, S. 2018. Effect of mulching on varietal influence of brinjal (*Solanum melongena*) in agroforestry system. *J. Pharmacognosy and Phytochemistry* **7**(4): 2466-2468.

Formatted: Font: 12 pt, Not Bold

Kumar, R.; Himanshu, Trivedi; Rahul, Yadav; Bhagwan, Das and Ankur Singh, Bist 2016. Effect of drip irrigation on yield and water use efficiency on Brinjal (*Solanum melongena*) cv. Pant samrat. *Int. J. Engg. Sci. Res. Technol* **5**: 7-17.

Patra, S., Thakur, N.S.A., Firake, D. M., 2016. Evaluation of bio-pesticides and insecticides against Brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee) in Meghalaya of north-eastern India. *International Journal of Bio-resource and Stress Management* **7**(5), 1032-1036.

Formatted: Font: 12 pt, Italic

Formatted: Font: 12 pt, Bold

Formatted: Font: 12 pt, Italic

Formatted: Font: Italic

Formatted: Font: 12 pt, Italic

Formatted: Font: 12 pt, Bold

Rajhansa KC *et al.* (2021). Impact of front line demonstration on brinjal in Korea district of Chhatisgarh. *Progressive Horticulture* **53**(1): 2249-5258.

Ramakrishnan K and Ramachandra Reddy D 2007. Impact of training on knowledge gain of TANWA trainees-critical analysis. *Journal of research ANGRAU*, **35**(2):52-53.

Samui SK, Maitra S, Roy DK, Mandal AK and Saha D (2000). Evaluation on front line demonstration on groundnut. *J Indian Soc Costal Agric Res* **18**:180-183.

Formatted: Font: 12 pt, Italic

Formatted: Font: 12 pt, Bold

Shalini, M.; Devaraja and Manjunath Gowda, M. 2016. Impact of Front line demonstrations on yield and economics of Tomato in Chikkaballapur district of Karnataka. *Int. J. Applied and Pure Sci. Agri.* **2**(7): 4-8.

Singh R, Soni R L, Singh V and Bugalia HL. (2011). Dissemination of improved production technologies of solanaceous vegetable in Hanswara district of Rajasthan through Frontline demonstration. *Rajsthan J Ext Edu* **19**:97- 100.

Formatted: Font: 12 pt, Italic

Formatted: Font: 12 pt, Bold

Srinivasan, G., Babu, P.C.S., 2000. Sex pheromone for Brinjal shoot and fruit borer, *Leucinodes orbonalis*. *Indian Journal of Entomology* **62**(2), 94-95.

Formatted: Font: 12 pt, Italic

Formatted: Font: 12 pt, Bold

Singh, N.K., Bisen, N.K., 2020. Effect of integrated crop management practices on yield and economics of Brinjal in Seoni district of Madhya Pradesh. *Journal Krishi Vigyan* **8**(2), 65-69.

Formatted: Font: 12 pt, Italic

Formatted: Font: 12 pt, Bold

Sumathi E, Manimaran R, Ilamaram M. 2018. Impact of integrated pest management strategies for shoot and fruit borer in brinjal. *Journal of Entomology and Zoology Studies.* **6**(2):266-269.

Formatted: Font: 12 pt, Italic

Formatted: Font: 12 pt, Bold

Yadav D B, Kamboj B K and Garg R B (2004). Increasing the productivity and profitability of sunflower through front line demonstrations in irrigated agro-ecosystem of eastern Haryana. *Haryana J Agron.* **20** (1&2): 33-35.

Formatted: Font: 12 pt, Italic

Formatted: Font: 12 pt, Bold

UNDER PEER REVIEW