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Impact and Economic on Front Line Demonstration (FLD) of Good Horticultural Practices in Anthurium

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ABSTRACT: The present study was carried out by Krishi Vigyan Kendra (KVK) in Aizawl district Mizoram to evaluate the improved technology with scientifically sound on production technology and profitability of anthurium. The established and flowering times of the conventional technique of cultivation are too long, and the quality of the end product is also subpar. FLDs of improved production technology on anthurium were conducted in order to increase the number of spathes per plant with greater sizes and economic returns. A total of 40 farmers have been selected to FLDs on anthurium in selected villages. Data on the average yield of demonstration plots and control plots were collected after harvest to assess the impact of FLDs intervention on anthurium crop yield. The extension gap, the technological gap and the technological index were calculated as follows: 1305 numbers of spathes (flower), 2575 numbers in an area of 100 m^2 and 42.92 per cent, respectively. The demonstrated field yielded a higher average gross yield Rs. 24150 and average net yields Rs. 19150 whereas the practices of the farmers had an average net yield Rs. 11040 in 100 m^2 area. An average cost-benefit ratio of 3.8 recorded for demonstration compared to the cost-benefit ratio of 2.9 under local controls. The results demonstrated that the yield and economics of anthurium can be improved through adoption of the recommended technology.

Keywords: Anthurium, yield, frontline demonstration, INM, net return, technology gap, extension gap.

INTRODUCTION

The word "anthurium" refers to the spadix and is derived from the Greek words "anthos" for "flower" and "oura" for "tai (Thanga James and Rohmingliani 2015). Anthurium (*Anthurium andreanum* Lind) is grown for its colourful spathes and alluring leaves. 600 species of the genus Anthurium are spread all over the world. It is cultivated for various purposes amongst them *Anthurium andreanum* is popular for cut flower. (Shiva and Sujatha 2008). It is native to the tropical regions of South America, predominantly Columbia (Kumar *et al.*, 2008). Anthurium is a tropical, stemless plant that needs to be grown in shade. The spathe (modified leaf) and spadix of anthurium are brilliant and spectacular in contrast to other commercial flowers. Since it has a long vase life of about 13 to 15 days, it is frequently used for indoor decoration, bouquet production, and flower arrangements. The demand for anthurium potted plants for interior landscaping is enormous (Seemanthini and Chandrasehkar 2018).

It thrives in a variety of climates with temperatures between 21 and 24 °C, relative humidity between 60 and 80 %, low to medium light intensities between 20000 to 25000 lux, and 50 to 80 % shade. The world's principal producers are the Netherlands, Mauritius and Hawaii. Asia is the fastest growing marketplace for Anthurium (Nataraj *et al.*, 2019). Anthurium ranks 9th in the world flower business and having a decent price for both its cut flower and the entire plant.Anthurium ranks ninth in the global flower trade and commands a respectable price both for its cut flower and whole plant. Currently, the Netherlands is the world's most important producer and exporter, followed by Mauritius. (Islam *et al.*, 2013). In India, growing anthurium, which was first and foremost a hobby, is turning into a commercial activity. It is primarily grown in the coastal belts of Southern India, Eastern and Western Ghats and the North Eastern Hilly region. The commercial cultivation of this flower started in Mizoram with the onset of Technology Mission in 2001-02 and the state has become one of the major producing states in the country (Lalbiakthangi Margaret 2020). Since 2006, the Anthurium Festival has been held in September at the vacation destination in Reiek Village, Mizoram, as a celebration in the midst of nature during the magnificent and unique anthurium blossom's peak season. (https://www.thehindu.com/news). Ample scope and market aspect is there in Anthurium cultivation. The traditional method of cultivation it takes too much time

to establish and flowering as well as produce inferior quality. In order to increase the number of spathes per plant with larger sizes and economic returns as well as to identify the barriers to enhanced production technologies in the cultivation of anthurium flowers, FLDs of improved production technology on anthurium were carried out.

MATERIALS AND METHODS

In accordance with front line demonstration guidelines, FLD of good horticultural practices in Anthurium were demonstrated at farmer's fields of KVK's adopted village from 2017–2018 to 2019–2020. KVK professionals extensively supervised the setup of the demos. 40 farmers in all were chosen to organise FLDs on anthurium in the selected localities. To evaluate the effect of FLDs intervention on the yield of anthurium crops, the average yield data of demonstration plots and control plots were gathered after harvest. A personal interview with the beneficiary farmers was carried during demonstration period utilising a systematic and pre-tested interview schedule in order to get information from them regarding adoption, tissue-cultured planting materials, sterilised bedding media, economic impact, and technological index of adoption. The Team of KVK Aizawl have organised and conducted different training, interaction, awareness before demonstration programmes on Anthurium cultivation and its management among the anthurium beneficiaries. The team has also help in cultivation practices, time to time during study periods with proper IPM/ IDM/ INM and irrigation using gravity base mini sprinkler system. 75% shading is provided using shade netting. It was preferred to utilise two nets, one fixed net that provided 60% shade and another moveable net that provided 25% shade. The moveable net was closed during dry spells and in the middle of the day to prevent the peak light intensity. The 40-50 cm space kept between the bed, which ranges in width from 0.8 to 1.0 m, allows for simple cultural operations and uprooting the seedlings without gone inside the bed. The beds were filled in one by one, layer by layer, with4inch brick pieces, 3 inch charcoal, 2 inch coconut husk and an amount of coco peat, soil and vermicompost in a 3:1:1 ratio. The treated/sterilized media must be added to the beds once they are prepared for planting. Growing medium should be well cleaned and as well as treated with biopesticides/ organic fungicides before adding the bed. The dose of organic/biopesticides such neem-based or *Trichoderma@* 2.5ml/litre of water and *Trichogramma@* 2g/litre of water. The brick media should be rinsed with water two or three times before being utilised in bed meida. A tissue cultured anthurium planted at aspacing of 30 × 30 cm with good horticultural practices as per given in (Table.1). A brief of the practises used by farmers and the practises that were demonstrated.

Table 1: Details of package and practices for anthurium cultivation.

Sr. No.	Technology intervention	Farmers practices	Recommendation practices
1.	Bed preparation for planting	Generally followed without proper gap between two beds.	The 40-50 cm space kept between the bed, which ranges in width from 0.8 to 1.0 m to allows for simple cultural operations and uprooting the seedlings without gone inside the bed
2.	Bed materials	Uses of conventional inputs without sterilization	Sterilized planting media. The bed comprised of4 inches brick pieces, 3 inches charcoal, 2 inches coconut husk and small portion of coco peat, soil and vermicompost in a 3:1:1 ratio used in the beds one after another in layers.
3.	Treatment of planting materials	Not used of treated planting material	Bio pesticides like neem based and trichoderma @ 2.5ml/litre of water along with trichogramma @ 2g/lit of wate was used for treatment of planting materials.
4.	Planting time and spacing	No used of standard spacing	Row to row distance is 30 cm, while plant to plant distance is 45 cm, and the plants are always planted in beds that are 1.0 metres long and 0.8 metres wide.
5.	Fertigation	Manually irrigation through pipe at 3-4 days intervals and broadcasting of fertilizer	At least 5 litres of water was used for fertigation per square metre of bed. Before watering, the fertigation solution's pH and EC were measured. With 5.7-6.2 and 1.2-1.3 respectively, the optimal pH and EC were maintained..
6.	Pruning and removal of suckers	Non regular trimming of leaves & suckers	Vertical leaves are more cost-effective than horizontal ones. Generally, each plant is allowed to retain 4 to 5 mature, healthy leaves as well as 2 to 3 suckers at any given time.
7.	Insect pest and disease management	Spraying of fungicides and insecticides without first identifying the ailmentor pest	According to the detected problem, a combination of organic and biopesticides was applied.

The yield and economic data that were acquired were processed, tabulated, categorised, and analysed in terms of mean percent scores and ranks in the context of the study's goals. The disparities between potential yield and demonstration plot yield (Yield gap-I), between potential yield and actual yield (Total yield gap), and between demonstration yield and actual yield (Yield gap-II) as well as the effects of adoption and horizontal area spread were calculated using these data. Using the formula proposed by Samui *et al.* (2000), the extension gap, technology gap, technology index, impact of adoption, and horizontal area spread were calculated.

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

Extension gap (yield gap II) =Demonstration – Actual yield (Farmers plot yield practice)
Total yield gap = Potential yield – Actual yield.
Technology index (%) = Technology gap/Potential yield × 100
Impact on adoption (% change) = Number of adopters after FLD.- Number of adopters before FLD × 100 Number of adopters before FLD.

RESULTS AND DISCUSSION

Sphathe (flower) yield: As a result of FLD of good horticultural practices, farmers productivity improved over previous farmer practice (Table 2& 3).Improvements in technology led to greater spathe yields in term of number 3200 and 3650 as compared to farmer practises of 1950 and 2290 per 100 square meters of area during 2018-19 and 2019-20, respectively.

Technology & extension gap and technology index: The difference in bed medium, soil fertility, pruning of leaves, and suckers' removal may be the cause of the reported technical gap (2350 and 2800 no. of spathe/100 m^2 area during 2018-19 and 2019-20, respectively). Therefore, it appears that location-specific technology package recommendations are required to reduce the suggested technology gap for yield level in countless circumstances. During demonstration period in 2018-19 and 2019-20, the extension gap was 1250 and 1360 no. of spathe 100 m2 area, respectively, with an average value (1305 no. spathe), which emphasized the importance of training the farmers on improved horticulture technologies. Technology index demonstrates the feasibility of advanced technology on farmer's fields. Technology is more feasible when its index value is lower. The technology index showed the feasibility of evolved technology at the farmer's fields. The lower value of technology indexes the more is the feasibility of technology. According to the data (Table 2), the technology index peaked in the first year (2018–19) at 46.67%, while subsequently declining (39.17%). In pearl millet, Parmar *et al*. (2017) reported similar results.

Economics: To calculate net return and benefit: cost ratio, inputs and outputs prices of commodities prevailed during the demonstration study. According to the data (Table 4) cultivation of anthurium under demonstrated technologies yielded a higher average net return of Rs. 11040/- than farmer's practices Rs.19150 in 100 square meter of area). Under demonstrated techniques, the benefit-cost ratio of anthurium cultivation was 3.8:1, but it was 2.9:1 in farmers' practises over the course of the study. This may be because demonstrated technologies produced more yields than local checks (farmers' practises). The results of Santosh Kumar *et al.* (2018) in broccoli and Kaur Ravneet *et al*. (2020) in marigold were in agreement with this finding.

The FLDs had a significant impact on the use of treated planting materials (244.44), fertigation (200), bed materials (163.44), pruning of leaves and suckers (135.71), and bed preparation for planting (61.90), with planting time and spacing (63.16) showing the lowest impact percentage (Table 4).

Table 2: Impact of CFLDs on extension, technology gap and yield index of anthurium.

Year	No. of Demos	Yield no. of spathe/100 m^2 area		Increase yield over the farmers practice	Extension gap	Technology gap	Technology index
		Improved practices	Farmer Practice				
2018-19	40	3200	1950	64	1250	2800	46.67
2019-20	40	3650	2290	59	1360	2350	39.17
Mean	40	3425	2120	61	1305	2575	42.92

Table 3: Frontline demonstrations' effects on the profitability of anthurium cultivation (Pooled data of 2 years).

Technology	Yield no. of flower/100 m^2 area	Cost of cultivation (Rs. / 100 m^2 area)	Gross Return (Rs. / 100 m^2 area)	Net Return (Rs. /100m^2)	B:C ratio
Demonstration	3425	5000	24150	19150	3.8
Farmers practices	2120	3800	14840	11040	2.9

Table 4: Adoption of anthurium production technologies impact by FLD.

Sr. No.	No. of adopters (N=40)		Change in No. of adopters	Impact change
	Before demonstration	After Demonstration		
Bed preparation for planting	21 (52.5)	34 (85)	+13	61.90
Bed materials	11 (27.5)	29 (72.5)	+18	163.64
Treatment of planting materials	9 (22.5)	31(77.5)	+22	244.44
Planting time and spacing	19 (47.5)	31 (77.5)	+12	63.16
Fertigation	9 (22.5)	27(67.5)	+18	200.00
Pruning and removal of suckers	14 (35)	33(82.5)	+19	135.71
Insect pest and disease management	16 (40)	24(60)	+8	50.00

Therefore, it can be stated that the proposed FLDs had a beneficial effect in raising the productivity of the anthurium crop and encouraging the development of floriculture as a business.

CONCLUSION

From the above finding it can be conducted that front line demonstration have shown the constant observation and management such as sterilized bed media and planting materials, fertigation, pruning the leaves, removing the suckers and adding coconut husk will boost the productivity of anthurium yield.

FUTURE SCOPE

The successes of its cultivation and the potential for future expansion have been strengthened by the presence of favourable institutional variables. However, the demands for a large initial equipment investment, long-term threats to its sustainability included virus free high quality planting materials, etc.

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Conflict of Interest. None.

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