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ECONOMICS OF ANTHURIUM FLOWER CULTIVATION IN NORTH EASTERN INDIA

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Abstract
As the anthurium flower is by nature long lasting, it can be transported to distant market destinations without much loss of quality. Thus, there is a good opportunity of its commercial cultivation for geographically isolated states of North Eastern India. Its commercial cultivation has started in the region with the onset of Technology Mission, 2001-02, as one of the centrally sponsored schemes. According to the record of National Horticulture Board (2013) this region has accounted for more than 90 percent of the total production of the country during 2012-13. Among the North Eastern States, the contribution of Mizoram is highest at around 44 percent. This study observed that this flower is cultivated in an organized basis by the growers where the government is the main facilitator on its cultivation, while growers' organizations are the agents that facilitate its marketing. The existence of favourable institutional factors has enhanced the success of its cultivation and scope for expansion in the future. However, the requirements of high initial investment for equipment, planting materials, etc posed serious threat to its sustainability in the long-run.

Key words: Benefit-Cost Ratio, Efficiency, Growers' Society, Market Channel

INTRODUCTION

Anthurium is an evergreen, tropical herbaceous plant cultivated for its colourful spathe and unusually attractive foliage and is also known as 'Flamingo Flower'. The name anthurium is derived from the Greek *anthos*, flower and *oura*, tail, referring to the spadix. It is native to tropical parts of South America, mainly Columbia (Kumar, et. al., 2008). Genus anthurium comprises of about 500-600 species (Singh, 2006). A typical commercial anthurium plant is a low-growing perennial, herbaceous plant that thrives best under 60 to 80 percent shade at temperatures of 18^0 to 24^0 C and relative humidity of 60-80 percent (Higaki *et al.*, 1984). It is a shade plant and therefore, has to be protected against too much direct light, radiation and wind (van der Leeden, 2001). Though the optimum temperature for development is 20^0C, it thrive best with day temperature of 25-28^0C and night temperature of 18-20^0C, and its economic lifespan is around 6-8 years (Singh, 2006). According to Higaki *et al.*, (1984)**,** increased shade promotes longer internodes, while high light produces shorter internodes regardless of cultivar.

In India, anthurium is commercially grown in Kerala, Karnataka, Tamil Nadu, West Bengal, Maharashtra and the North Eastern states. The hybrid varieties being cultivated in India are mainly imported from the Netherlands. It is one of the thrust floriculture crops identified for Mizoram because of many advantages, such as increasing demand, ideal agro climatic conditions, availability of group of progressive farmers having land and other infrastructure facilities to take up this activity. It is now one of the most important flowers with a promising future for the state of Mizoram (Lalnunmawia and Nuchhungi, 2006).

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. The total annual expenditure for the assistances of flower growers under this Mission has increased from Rs.28.97 lakhs in 2002-03 to Rs.158.68 lakhs in 2005-06 and Rs.198.35 lakhs in 2009-10. At the same time, the number of unit assisted under the Mission has increased from 24 in 2002-04 to 155 during 2009-10. Selected grower were assisted by the government with a provision of planting material, shade net, coco peat, fertilizer, garden tools etc.

Since it is long lasting flower (NCAEP, 2010), anthurium flower can be transported to distant market destinations without much loss of quality, and thereby, enabling opportunity for the entry of geographically isolated hill states of North Eastern India. As per the record of National Horticulture Board (NHB, 2013), the country's production of anthurium cut flower during 2012-13 was 320270 MT and more than 97 percent of this quantity was contributed by the North Eastern states. The five anthurium producing states with their percentage contribution in the total production of the country during 2012-13 are Mizoram (44.11 percent), Arunachal Pradesh (36.22 percent), Nagaland (15.99 percent), Karnataka (2.28 percent) and Sikkim (1.41 percent). This paper attempted to evaluate the economics of cultivation and marketing of anthurium flowers in North Eastern India using Mizoram State, the largest producer as a case.

METHODOLOGY

a) Data Source : The study is based on both primary and secondary data. The main strategy adopted for the collection of primary data is an interview of growers and various stakeholders for floriculture development. Firstly, the basic data pertaining to the economics and socio-economic dimension of anthurium cultivation were obtained from an interview of sample growers by canvassing a pre-determined schedule of enquiry. It may be noted that flower cultivation on a commercial scale is only one of the nascent livelihood activities in the state where most of the growers undertake the cultivation as a subsidiary occupation normally within their residential houses. At the same time, some of those who registered under the growers' organization were practically out of its business when they were visited, while some unregistered growers were doing very well. Thus, it is therefore very difficult to prepare comprehensive sampling frame in such situations. Consequently, it was decided to include only those growers who actually cultivating the flower and were willing to furnish the required information of the field survey. Thus, we have come up with 68 sample growers.

Secondly, market data such as market volume, prices, marketing cost and marketing margin, etc were collected from interview of various marketing stakeholders. The stakeholders are the marketing agencies, growers' organizations or societies, wholesalers, retailers and buyers within the state as well as in the major market destinations outside the state. The official and personal records of these stakeholders were also evaluated in the course of data collection. Thirdly, some of the knowledgeable officials of the Horticulture Department were also interviewed while evaluating the cost of initial investments and the role of government in promoting floriculture development in the state.

Secondary data are obtained from two broad sources: (1) the published and unpublished records of various Departments of the Governments, like Horticulture Department, Directorate of Economics & Statistics, State Planning Board, Indian Horticulture database, National Horticulture Board and Indian Council of Agricultural Research, Export-Import Bank of India, Reports of National Centre for Agricultural Economics and Policy Research (NCAEPR), etc., and (2) Other Sources, like documents of Zo-Anthurium Grower Society, Zopar Exports Pvt. Ltd, Anthurium Growers Society of Kolasib, research papers published in journals and books, unpublished research works, etc. The required data, primary and secondary, was collected during January to June 2014.

b) Analytical Tools: The data collected from primary and secondary sources were analyzed using suitable statistical tools, mostly descriptive statistics. At the same time, there are some instances where regression and certain test statistics had been used. Firstly, the frequently used descriptive statistics are average, percentage and standard deviation. Secondly, test statistics like t-test and z-test have been used to test some hypotheses that are needed to make statistical inferences. Thirdly, attempt was made to examine the status of benefit-cost ratio which reflects the economic viability of anthurium cultivation. Lastly, attempt was also made to study the efficiencies of various market channels using Modified Acharya Method of Marketing Efficiency.

FINDINGS AND INTERPRETATIONS

a) Economics of Cultivation: The exotic anthurium variety suitable for Mizoram requires huge amount of initial investment in the form of planting material, shade nets, irrigation, etc. Its cultivation is biased towards the relatively well-off section of the society because poor families have little access to it. More than 98 per cent of the growers lived above poverty line, while only 1.47 per cent belongs to the category of BPL. At the same time, 97.06 per cent of the growers lived in owned house and 72.06 per cent of them are living in pucca houses, while 26.47 per cent are semi-pucca and only 1.47 per cent lived in kutcha house. Study on the levels of education among the growers showed that 97.06 per cent are literates; while 30.88 per cent completed high school and 22.06 per cent are graduates. In addition, anthurium cultivation is found to be a subsidiary business in nature that it was observed as more than 94 percent per cent of the sample growers undertook the cultivation as a subsidiary source of livelihood mostly by women. Further, 80.88 percent of the sample growers have kitchen garden and 70.59 percent have non-residential land.

The average size of cultivated areas among the selected growers turned out to be 9740.57 square feet at the beginning, which increased to 12000 square feet at present. At the same time, the average number of flower plants per growers was 1450 at the beginning and 3238.24 presently. The calculated t-statistic for the difference of the two means are found to be significant, which shows that there has been significant growth of area under cultivation as well as the average number of flower plants among the growers. Thus, it may be concluded that anthurium cultivation has recorded a significant growth in terms of number of plants and areas in Mizoram.

The state's Horticulture Department has been the main facilitator for the growth of floriculture in Mizoram as it provides the growers with inputs as planting materials, shade nets, coco peat and other garden tools. The field survey observed that more than 95 percent of the growers received planting materials free of cost from the government, while 63.2 percent received fertilizer from the same. At the same time, 77.94 percent, 72.05 percent and 75 percent of the growers received water sprayers, shade net and plastic crates, respectively from the Government. Though the success of the cultivation of this flower greatly depends on the adoption of modern technology, anthurium cultivation in the study area is still characterized by lack of modern watering and irrigation methods. It was observed that more than 88 percent of the growers depend on rain water and 85.29 percent of them were reported to be watering their flower plants manually, while only 13.24 percent and 1.47 percent used sprinkler and drip irrigation system respectively.

Excluding imputed cost of family labour, on an average, 128 mandays of labour were hired per year by the growers of which male labour constitute 57.03 per cent, while 42.97 per cent belong to female labourer. Cultivation of this flower is at the hands of female members of the families in most of the cases. It was observed that 77.94 per cent of the garden are owned and managed by housewives, while only 11.76 per cent are owned by household heads (males), 8.8 per cent are owned by other female family members with only 1.47 per cent being owned by other male members. Accordingly, 86.76 per cent of ownership belongs to female family members. The difference of the proportion of managerial and ownership status between male and female is found to be significant at 1 per cent level. The result can be interpreted as the significant contribution of floriculture on female empowerment in the family as well as in the society.

The average annual cultivation expenditure of the growers for all sizes of cultivated areas is Rs 13520.00 of which around 63 per cent goes to wage bills. The average number of flower harvested per grower turned out to be more than 14000 per annum, which directly varies with the increase in the size of cultivated land. At the same time, average monthly income from sales of cut flowers was Rs.12340.64 per growers which shows high degree of variation (i.e. standard deviation is Rs.9076.35).

The study observed strong institutional linkages of the growers in the form of growers association and society. More than 91 per cent of the sample growers affiliated themselves in one of the growers' organizations or the other. Of these affiliated members, 62.90 per cent of them were affiliated at the state level organization, while 37.10 per cent of the growers were affiliated at district level. The most prominent state level growers' organization is Zo-anthurium Grower Society (ZAGS). There are some district and sub-divisional level organization as well. However, the study did not observe strong linkages of the growers to institutional credits. It was observed that 38.20 per cent of the sample growers have availed loan for cultivation of anthurium, and 69.23 per cent of these loanees get loan from State Bank of India followed by Mizoram Rural Bank (19.23 per cent) and Mizoram Cooperative Apex Bank (11.54 percent). These institutional loans are mostly used for land preparation, construction of poly house and purchase of cultivation materials.

The study observed the requirement of heavy initial investment for planting materials and other equipments (shade nets, poly house, etc) which is estimated to be more than Rs.54 lakhs per acre at the existing market price. Poor farmers cannot afford to pay for such huge amount of initial investment, and thus, the growth of anthurium cultivation is practically infeasible without government subsidy. The government, through the funding under Technology Mission, 2002, had imposed heavy subsidy to the tune of more than 82 percent, on an average, to promote anthurium cultivation in Mizoram. The estimated Benefit-Cost (B-C) ratio, based on the subsidised prices of equipment, has consistently increased from -0.79 in the first year to 2.08 in the 4^{th} year and started declining gradually afterward and reached 1.56 in the 8^{th} year. In the meantime, the estimated total net present benefit (i.e. net income) during the 8 years of cultivation turned out to be more than Rs.21 lakhs, while the B-C ratio at present value terms for the entire 8 years is positive at 0.706. These B-C analysis suggested anthurium cultivation being a profitable venture subject to the availability of government subsidy. However, the B-C ratio analysis did not project profit which justifies the initial expenditure for equipment and planting materials without subsidy intervention by the government.

The calculated t-statistic for the analysis of the sensitivity of net income (benefit) to the changes in the cost of cultivation and market price of the flower are found to be significant. Thus, the benefit accrued to growers is significantly dependent on the reduction of cultivation cost, and increase in flower price. Further, as 1 percent reduction in the cost of cultivation resulted in more than 1 percent increase in the benefit of the growers, it can be concluded that reduction of cultivation cost fetches more than proportional benefit to the growers of anthurium flowers in Mizoram.

b) Economics of Marketing : There are three major business organizations that act as facilitators or marketing institutions of anthurium flowers in Mizoram. They are (1) Zopar Export Private Limited (ZEP), (2) Zo-Anthurium Growers Society

(ZAGS), and (3) Anthurium Growers Society, Kolasib district (AGSK). While ZEP is the incorporated body or agency dealing with flower export to the other parts of the country and abroad, ZAGS and AGSK are basically farmers' societies which are working as marketing facilitators for their respective members. The growers can avail the facilities of any of these organizations or institutions simultaneously to sell their produce. More than half (58.58 per cent) of the total monthly market volume of 83009 cut flowers were found to be dealt with by these three marketing institutions, i.e. ZEP (15.19 percent), ZAGS (28.93 percent) and AGSK (14.42 percent). Wholesale purchase by the retailers occupied 19.32 per cent while direct sale by the producer contribute 20.97 per cent. Since the quantities procured by the three main marketing institutions are mostly sold outside the state, one can conclude that more than half of the cut flowers produced by the state are sold outside the state or exported.

Four major marketing routes or channels for anthurium cut flower of Mizoram had been identified in the study. They are

Channel-1: *Producer---ZEP/ZAGS---Wholesaler/Retailer in major cities or export*
Channel-2: *Producers---AGSK---Retailers in Guwahati (Assam)*
Channel-3: *Producer---Retailer---local Consumer*
Channel-4: *Direct sale by the growers to the local consumers.*

Channel wise contributions in the total market volume are 44 percent, 14 percent, 19.32 percent and 20.79 percent in Channel-1, 2, 3 and 4 respectively. The produce disposed along the first two channels are normally of better quality, while flowers sold through the last two channels are comparatively of inferior quality in nature and showed wide fluctuation in prices.

The estimated marketing cost incurred by the growers in the form of expenditure on cleaning, sorting, packing materials, etc is estimated to be Re.80 per stem, while the average packing cost for exporting the flower is estimated at Rs.2.74 per stem. The average air freight charge per stem is estimated to be Rs.4.8, while the marketing cost at the destinations is estimated as Re.1.91 for sorting, spoilage, loading/unloading, etc. Finally, the estimated landed cost (marketing cost incurred up to the destination) in Channel-1 are respectively Rs.19.23, Rs.24.83, Rs.24.83 and Rs.24.03 in Kolkata, Bangalore, Mumbai and Delhi. However, relatively higher amount have been incurred by the farmers as marketing cost in case of Channel-2. In this channel, the farmers have to pay for post-harvest handling cost, packing materials, box cost, etc, which turned out to be Rs.3.97 per stem; while cost at the market destination is only Rs.1.91 per stem. Thus, the total marketing cost up to the destination (i.e. Guwahati) is Rs.5.88 per stem. At the same time, the average prices per stem of cut flower in different destinations are as follows: Rs.25 in Kolkata, Rs.35 in Bangalore, Rs.34.7 in Mumbai, Rs.33.3 in Delhi, Rs.20 in Guwahati and Rs.11.5 in Aizawl, while the estimated producer's share in the consumer price in these destinations are 39.61 percent, 28.86 percent, 29.09 percent, 30.03 percent, 34.65 percent and 75.65 percent respectively.

The analysis of marketing efficiency revealed that Kolkata which have direct and regular air transport with Mizoram showed highest degree of efficiency among the outside destinations followed by Guwahati, which have direct air and road communication with the state. The estimated ratio of marketing efficiency is 3.11, 0.66, 0.53, 0.43, 0.41 and 0.41 for Aizawl, Kolkata, Guwahati, Delhi, Bangalore and Mumbai respectively. This indicated the effect of distance and availability of transportation facility on the level of marketing efficiency. To examine the extent of relationship between marketing efficiency and marketing cost, a log-linear regression equation of marketing efficiency on marketing costs incurred by various stakeholders in different channels was estimated. The estimated elasticity coefficient turned out to be -0.30, which is significant at 5 percent level, with R-square value of 0.59. Thus, the marketing cost has negative on marketing efficiency of anthurium flower in Mizoram.

CONCLUSIONS AND RECOMMENDATIONS

Floriculture has been recognized as a fast emerging competitive industry across the world. The state of Mizoram had also made significant progress through the initiative under Centrally Sponsored Technology Mission scheme since 2001-02. The initiative of the Government in introducing the commercial cultivation of exotic variety of anthurium flower through this Mission is positively responded to by the increasing areas under cultivation and production which help the state become one of the major producers of this flower in the country. The growers have earned significant amount of income from the sale of this flower and its cultivation has promoted gender empowerment in the family as well as in the society. However, the requirement of technology in its cultivation resulted in high cost of initial investment. The expected returns from sale of flowers failed to justify the initial expenditure on seeds, shade nets, irrigation, etc at the existing market prices. This compels the growers to seek government subsidy as those who are deprived of subsidy facility are basically out of its cultivation.

Given the poor financial position of the state government, it may not afford to continue the subsidy programme in the coming years. So, it is highly necessary to choke out a more sustainable strategy to promote floriculture development in the state.
In the light of the above observations, some policy recommendations are proposed here for the success and long-term sustainability of anthurium cultivation in Mizoram. *Firstly*, attempt should be made to bring down the huge cost required for its initial expenditure. For this, the following suggestions have been made: (i) it is necessary to establish *seed production centre* to ensure regular seed supply at affordable prices; (ii) efforts should be made to utilize locally available resources and skills in the development and creation of farming equipments like shade nets, poly house, irrigation system, etc since the locally produced materials would be much cheaper than the imported ones; (iii) it is necessary to institute credit with long repayment period through interest intervention policy.

Secondly, it is necessary to build capacity on the part of the growers to perform basic post-harvest activities like sorting, grading, packing, etc which has direct bearing on marketing efficiency. To this end, joint action of the state government and the existing organizations like ZEP, ZAGS and AGSK may be initiated, say, in the form of Public Private Partnership (PPP) mode. *Thirdly*, strong tie-up contract may be build between the growers and wholesale buyers with proper legal provision where the latter would supply packing materials. *Fourthly*, the emergence of cold storage facility readily available to the growers would greatly reduce distress sale among the growers. *Lastly*, effort should be made by the government to have direct air freight connection with major cities of the country, at least once a week.

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