

## Floriculture in Northern West Bengal of India- A Dream Sunrise is on Wait

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**Received:** September 18, 2018; **Published:** January 29, 2019

### Abstract

Floriculture occupies an important position in the Darjeeling hills of West Bengal. Darjeeling hills are the natural abode for countless orchids like *Cymbidium*, *Vanda*, *Dendrobium*, *Paphiopedilum*, *Lycaste*, *Odontoglossum*, *Phaius* and *Arundina*. Almost for the past three and half decades, there has been a visible trade in cut flowers. Besides gladioli and anthuriums, orchids particularly *Cymbidium*, bulbous flowers of lilies, *Ornithogalum* and other flowers like gerberas, carnations, and greens like ferns have been added to the export items. Due to diminishing flower-quality and inadequate quantity of production in these endemic areas, export has been affected to such an extent that it hardly guarantees her stake in the both domestic and foreign market. Appropriate science and technology inputs and delivery are required for the development of floriculture in these regions. Entrepreneurship development, infrastructure, and appropriate information communication system hold the keys for desired development. There should be entrepreneurs to produce sufficient quantity of improved disease-free seeds and planting materials with proper transportation facilities; for transfer of technology for cultivation, storage, processing and marketing, production of bio-fertilizers, plant, soil and water health clinics and certifying agencies. For tapping the unlimited revenue-resource in the present multi-billion dollar floriculture industry, these hills present the most congenial place to lead India in the foreign trade sector. We dream for that sunrise.

**Keywords:** Floriculture; Darjeeling Hills; *Cymbidium*

Darjeeling hill area of northern West Bengal is exceptional from the angle of environmental Eco-perception. There are different climatic zones with idiosyncratic features. Tista, Great Rangit, Mechi, Balason, Mahananda, Lish, Gish, Chel, Ramman, Murti and Jaldhaka are the important rivers of Darjeeling. The region has long been recognized as a nucleus for growing and collection of diverse economic plants. The region is exceptional because of outstanding variations in climatic conditions that are appropriate for growing a wide variety of high value, quick returning flowers like gladioli, hybrid gerbera, carnation, anthurium, orchids, liliun (Asiatic, oriental, ester, calla and others), marigold, tuberose and rose (indigenous and Dutch varieties) [1,2]. There are only a few other places on the planet where-in a small geographical area is able to host such an amazing variety of flowering plants.

The soils that have developed in the Kalimpong area of the Darjeeling Himalaya are predominantly reddish in color. Occasional dark soils are found due to the extensive existence of phyllites and schists. Soils in the highlands stretching from the west to the east of the district along most of the interpluvial areas are mainly mixed sandy loam and loamy, while those on the southern slopes of Mirik and Kurseong are mainly clayey loam and reddish in color. Sandy soils are mainly found in the east of the river Tista. Besides seasonality, another climatic feature in the Darjeeling hills is created by an aerographic factor; causing the vertical zonation of temperature and decline of precipitation. Thus the mountain front is exposed to heavy rainfall, especially the middle parts of the southern hills. The mean annual temperature fluctuates from 24°C in the plains and drops below 12°C on the ridge. During summer month the temperature reaches 16°C - 17°C on the ridge and during winter drops at 5°C - 6°C. There is no distinct relation between total rainfall and altitude. The southern slopes of the ridges get much higher (4000 - 5000 mm) precipitation than the leeward sides (2000 - 2500 mm). The next main ridge with Tiger Hill gets 3000 mm while to the north the Great Rangit valley receives about 2000 mm of rainfall. The annual total rainfall in Darjeeling town fluctuates between 1870 - 3690 mm.

The major portions of the forests are today found at elevations of 2000m and above. The area located in between 1000-2000 m is cleared either for tea plantation or cultivation. Darjeeling hills are also the natural home for countless orchid species of genera like *Cymbidium*, *Vanda*, *Dendrobium*, *Paphiopedilums*, *Lycaste*, *Odontoglossum*, *Phaius*, *Arundina* etc. the list is endless.

Darjeeling hill areas in general and Kalimpong in particular, has almost a century old tradition in floriculture. Historically, Kalimpong has always played a pioneering role in developing floriculture in India. The private nurseries in Kalimpong (around 40 in number) were among the first to export floricultural products to USA, UK, Japan, Holland and other European countries. However, due to lack of infrastructure and certain other factors this region could not keep pace with the developments in other parts of India and world. Even in this scenario, these nurseries are generating a turnover of INR (Rs) 30 million per annum of which Rs 15 million is from exports (FOB value). The survival of these nurseries through so many decades, speaks volumes on the inherent strength and potential of this region.

#### Factors supporting development of floriculture in the Hills and adjoining sub-Himalayan Plains of northern West Bengal

The northernmost district of the state of West Bengal is Darjeeling which covers an area of 3254.7 km<sup>2</sup>. The hilly region covers 2320 km<sup>2</sup> and the remaining 934.75 km<sup>2</sup> of the area fall under terai and plains. The altitudinal variations of the district range from 150m at Siliguri to 3636m at Sandakphu-Phalut with a sharp physiographic contrast between the plains and mountainous regions. The geographical area of Darjeeling district is 3.5% of the state area with 355500 ha under agriculture. This region supports nearly 1.8 million populations that include both Terai region of Siliguri sub-division and the hills. The climatic condition of Darjeeling is sharply totally different from that of the plains. Overcast and partly cloudy days, > 25 days per month, of the Darjeeling hill station are spread across five months, from May to September. In the last five years, the average precipitation in the Darjeeling town in the month of May, June, July, August, and September is 166, 468, 710, 529 and 375 mm respectively. The rainfall varies at different altitudes and hill situations. Overall, it is a high rainfall area. The variation in climate is powerfully related to the variation in altitude. The Kalimpong Hill is rather rugged in topography and is dissipated by radically descending gullies and streams that contribute to the Teesta and Jaldhaka river system. As the climate varies throughout the year so does the flora. The dullness of winter disappears with the dawn of spring during the month of March and April. The Rhododendrons (24 species), Magnolias and the Michaelis bloom during spring in the Darjeeling hills.

The farming system i.e. agriculture including horticulture (floriculture) is mainly dependent on some factors viz. the composition of the soil, position of the field (its relative height above the mean sea level), slope aspects, presence/absence of irrigation, and density of the population. The principal economy of the Darjeeling Hill area depends on tea production, horticulture, agriculture and forestry. The major part of the forests is located at heights of 2000m and above. The area located in between 1000 - 2000m is cleared either for tea plantation or cultivation. Darjeeling hills are also the likely abode for several species of *Cymbidium*, *Vanda*, *Dendrobium*, *Paphiopedilum*, *Lycaste*, *Odontoglossum*, *Phaius* and *Arundina*. Due to diverse agro-climatic zones available in the hilly terrains, a large number of ornamental plants are successfully grown under natural conditions. There is a small yet growing enthusiasm for overcast and high precipitation- optimized (May - September) or winter-optimized (November-February) greenhouses for commercial floriculture. These greenhouses demand innovation, as they should be designed specifically to operate during the coldest times of the year (but sunlight is not limiting; > 15 days sunny/winter month) or during the cloudy, overcast, and high rainfall months. In order to maximize the amount of sunlight entering the greenhouse during May-September, it is important to look at a sun path chart for latitude, along with a current magnetic declination map to determine 'solar south' for the desired latitude. These priorities will influence the structure, design, and size of the greenhouse, as well as the planting schedule, number of people required to maintain the greenhouse, and the way in which the greenhouse fits into existing infrastructure. In general, growers optimizing for overcast and cloudy months should orient their greenhouse in an east-west direction, meaning that the longer, glazed side of the greenhouse should face south, with the shorter ends facing east and west. Having a clear goal or priority for the greenhouse from the beginning and dedicating effort to monitoring will undoubtedly save time and money in the long-run.

#### Quanta of floricultural products of Darjeeling Hills

Data on floricultural products are largely dispersed. However, an attempt was made to put this into quantitative terms in the following table (Table 1) where block-wise production of certain flowers and ornamentals in the order of production have been presented.

The data shown above is an approximate data and also not exhaustive. Kalimpong Horticultural Society has made a survey in 1996 on the production of various flowers and ornamentals in Darjeeling Hills. The flower production statistics of the six districts of northern West Bengal have been summarized for the year 2013-14 (Table 2A and 2B), from the data of the Department of Food Processing Industries and Horticulture, Government of West Bengal (<https://www.wbfpih.gov.in/download?id-N..>).

Block	1	2	3	4	5
Kurseong	<i>Gladioli</i> ≈35000	<i>Begonia</i> ≈11500	<i>Cymbidium</i> ≈11500	<i>Gloxinia</i> ≈9225	Other ornamentals, flowering plants and Bonsai - ≈5750
Mirik	<i>Cymbidium</i> ≈150500	Other ornamentals, flowering plants (including <i>Eucharis</i> ) and Bonsai -≈42500	<i>Gerbera</i> ≈10550	Other bulbous plants ≈9150	<i>Camellia</i> ≈5575
Jorebunglow-SukhiaPokhori	Other ornamentals, flowering plants and Bonsai ≈31150	<i>Cymbidium</i> ≈15150	<i>Eucharis</i> ≈13575	<i>Gladioli</i> ≈8750	<i>Begonia</i> ≈8800
Darjeeling - Pul-bazar (Headquarter: Bijanbari)	<i>Gloxinia</i> ≈29000	<i>Gladioli</i> ≈27675	<i>Gloriosa</i> ≈20150	<i>Begonia</i> ≈19650	<i>Cyclamen</i> ≈16150
Rangli-Rangliot (Takdah)	<i>Gladioli</i> ≈85575	<i>Gerbera</i> ≈16200	<i>Cyclamen</i> ≈15375	<i>Begonia</i> ≈11815	<i>Gloxinia</i> ≈9525
Kalimpong-I	<i>Gladioli</i> ≈1600000	Other ornamentals, flowering plants and Bonsai. ≈85750	<i>Lilium longifolium</i> ≈58475	<i>Chincherinchee</i> ≈46100	<i>Anthurium andrea-num</i> ≈27750
Kalimpong - II	<i>Gladioli</i> ≈1050000	<i>Eucharis</i> ≈85700	<i>Freezia</i> ≈33700	<i>Gloriosa</i> ≈22000	Ester lily ≈20,500
Gorubathan	<i>Zephyranthes</i> ≈515500	<i>Haemanthus</i> ≈412525	<i>Eucharis</i> ≈216050	<i>Caladium</i> ≈125100	<i>Gladioli</i> ≈150500

Table 1: Block-wise relative abundance (in decreasing order, 1 - 5) of Floricultural products in the Darjeeling Hills (2007 - 2012).

District	Area in X '000 ha	Production in X '000000 (INR)	Productivity in X '00000/ha
Rose			
Darjeeling	0.045	1.428	3.173
Jalpaiguri	0.000	0.000	0.000
Coochbehar	0.000	0.000	0.000
Uttar Dinajpur	0.026	0.340	1.308
Dakshin Dinajpur	0.005	0.046	0.920
Malda	0.000	0.000	0.000
Chrysanthemum			
Darjeeling	0.055	1.700	3.091
Jalpaiguri	0.002	0.033	1.650
Coochbehar	0.000	0.000	0.000
Uttar Dinajpur	0.000	0.000	0.000
Dakshin Dinajpur	0.001	0.023	
Malda	0.000	0.011	1.100
Gladiolus			
Darjeeling	1.373	21.805	1.588
Jalpaiguri	0.128	1.899	1.484
Coochbehar	0.032	0.450	1.406
Uttar Dinajpur	0.050	0.370	0.740
Dakshin Dinajpur	0.003	0.023	0.767
Malda	0.008	0.099	1.238
Tuberose			
Darjeeling	0.000	0.000	0.000
Jalpaiguri	0.000	0.000	0.000
Coochbehar	0.030	0.327	1.090
Uttar Dinajpur	0.0320	0.580	1.813
Dakshin Dinajpur	0.005	0.054	1.080
Malda	0.010	0.150	1.500

Table 2A: Cut flower production in six districts of northern West Bengal (2013-14).

District	Area in X '000 ha	Production in X '000MT	Productivity in Mt/Ha
<b>Marigold</b>			
Darjeeling	0.047	0.340	7.234
Jalpaiguri	0.036	0.291	8.083
Coochbehar	0.054	0.403	7.463
Uttar Dinajpur	0.096	0.650	6.771
Dakshin Dinajpur	0.020	0.124	6.200
Malda	0.066	0.507	7.682
<b>Jasmine</b>			
Darjeeling	0.013	0.017	1.308
Jalpaiguri	0.044	0.042	0.955
Coochbehar	0.000	0.000	0.000
Uttar Dinajpur	0.000	0.000	0.000
Dakshin Dinajpur	0.000	0.000	0.000
Malda	0.000	0.000	0.000
<b>Seasonal flowers</b>			
Darjeeling	0.073	0.107	1.466
Jalpaiguri	0.079	0.086	1.089
Coochbehar	0.040	0.040	1.000
Uttar Dinajpur	0.008	0.012	1.500
Dakshin Dinajpur	0.001	0.001	1.000
Malda	0.005	0.009	1.800
<b>Misc. flowers</b>			
Darjeeling	0.060	0.050	0.833
Jalpaiguri	0.012	0.016	1.333
Coochbehar	0.030	0.040	1.333
Uttar Dinajpur	0.035	0.047	1.343
Dakshin Dinajpur	0.002	0.002	1.000
Malda	0.031	0.046	1.484

**Table 2B:** Loose-flower production in six districts of northern West Bengal (2013-14).

Additional data (according to Kalimpong Horticultural Society Survey, 1996) is also presented in table 3.

Item	Total Production
Gladioli	2008725
<i>Zephyranthes</i> sp	449800
<i>Haemanthus</i>	359250
<i>Eucharis</i>	324210
Other ornamental, flowering and bonsai plants	146872
<i>Caladium</i>	139000
Other bulbous plants	96045
<i>Gloriosa</i>	83035
<i>Gerbera</i>	70305
<i>Lilium longifolium</i>	70305
<i>Begonia</i>	61220
<i>Achimenes</i>	60000
<i>Gloxinia</i>	52662
<i>Freesia</i>	48880
<i>Chincherinchee</i>	47400
<i>Cymbidium</i>	43000
<i>Cyclamen</i>	32930
<i>Anthurium andreanum</i>	29614
Ester lily	18500
<i>Lycoris</i>	17520

**Table 3:** Quanta of Floricultural products in the Darjeeling hills.

Several changes have taken place in recent years. Large scale plantation of Cymbidium, Asiatic lily, Phalaenopsis, gerbera has been made in Mirikand Jaldhaka (Gorubathan) respectively. Carnation plantation has been done in Poshyar Busty and Bara Mangwa in Kalimpong. These flowers are being separately grown and sold mostly in the local market. Due to its superior quality, these flowers have got demand in the national and international market as well [3].

The flower market in Siliguri is ever soaring with a demographic explosion. According to a market survey (conducted by COFAM, NBU), the annual turnover in Siliguri market is Rs. 8-11 crore. During 'season' (season here means the different celebration of pujas/Christmas and months during Hindu marriages take place) a huge amount of flowers are required every day. Following table (Table 4) shows the requirement of various flowers per day in Siliguri market during the season.

Sl. No.	Name of the flower	Average consumption per day
1	Gladioli	25000 - 27000 sticks
2	Gerbera	7000-8500 nos
3	Rose	30000 - 40000 nos
4	Tuberose	10000-15000
5	Marigold	40000-45000 chains
6.	Carnation	3000-4000
7.	Asiatic Lily	1500-2500
8.	Orchids (Mostly <i>Dendrobium nobile</i> , <i>Cymbidium</i> , and <i>Mokara</i> )	2500 - 3500
9.	<i>Anthurium</i>	700 - 1000

**Table 4:** Average daily consumption of various flowers in Siliguri market.

Demand is manifold higher in the national market [4-6]. Only a mere fraction (< 10%) of the total requirement of cut-flowers (particularly Gladioli, lily, orchids, and Anthurium) is supplied from North Bengal. Due to the lack of scale of production (quantity) and inconsistency in supply, the local traders used to buy most of these flowers (except gladioli) from Kolkata, Bangalore and other places. As a result of the high transport cost, the retail price goes higher.

#### Disadvantages and key elements for the development of floriculture in North Bengal

In spite of having such favourable climate and market demand, floriculture in North Bengal still remains the most potential yet most unorganized sector. Information gap regarding the economic potential of flowers, unavailability of technically sound manpower, lack of modern methods of production and protection, and total ignorance about the market are some of the important reasons that have made the growers reluctant to grow these non-conventional items [7]. The cultivation in the undulated hilly areas is burdened with lots of limitations. The hilly soils are marginal in fertility in most cases. Though they are sometimes rich in organic matters, but they are poor sources of the major nutrients like N, P and K. Also, they are shallow in depth with presence of hardpans in the upper horizons, thus can't provide a good base to the crop plants. Often, these soils are acidic and damaging to the crop plants. Owing to their undulating topography, the soils in these hilly areas were highly susceptible to erosion, especially due to the wrong cultivation practices such as Jhuming. The operational holdings in these areas were very small and thus the mechanization of floriculture has been very limited till date creating the requirement for labor force and hard work. Due to non-availability of the superior planting material along with other inputs such as fertilizers and pesticides, there have been low crop yields. Due to higher dependence on the monsoon rainfall, an only limited number of crops can be cultivated here and the crop diversification is of great need. In hills, the adoption as well as dissemination of modern technology by farmers is very poor as compared to plain as because of difficulty in transport and communications, leading to poor production and productivity, in addition to that farmers are forced to sell their produce in the price fixed by agents and middlemen. Sporadic attempts made by few wealthy growers are far from being sufficient. Even then, commercial floriculture in North Bengal is still practiced on small farms but the major constraints in flower production are poor access to quality planting materials and small range of varieties. The extension support in floriculture is weak. Due to stumpy quality consciousness of the domestic markets, investments in Guaranteed Asset Promotion (GAP) and quality certification is negligible. Implementation of Integrated Pest Management (IPM) is on the lower side. Post-harvest management of floricultural products is extremely poor in North Bengal. As because there is no established standards/grades for produce, the farmers follow the demands of the market. The packaging of floriculture produce is frequently unempirical and uses of paper cartons, bamboo baskets, jute bags are rampant. In the absence of organized market infrastructure for floriculture produce, the true potential of the market is not realized. However, flower growing is not gaining the popularity it deserves among the common farmers. The export orders require a voluminous and continuous supply of a particular flower. It will only be possible when the common farmer will realize the potential of flower growing and accepts it along with their traditional cultivation.

**Silver lines:** At present, the producers are having access to important commercial varieties in all major floricultural crops from leading breeders across the world. There has been fair enough access to production inputs of fertilizers (organic and inorganic) as well as plant protection chemicals. The use of formulations supplying trace elements as well as major nutrition elements, biofertilizers and biopesticides are on the increase. With the advent of protected floriculture, local companies got enthused in fabrication and installing greenhouses. Farmers are getting exposed to micro-irrigation (drip, sprinklers, and foggers). This is relevant learning and adoption as only 3.75% of the net cropped area is under irrigation in Darjeeling hills. Hence, rainwater harvesting should be a viable option for irrigation in the drier months. Drip-irrigation by gravity (Zero-energy irrigation) shall remain as the most sustainable method. The West Bengal Government has declared North Bengal as an export zone for flowers and vegetables and providing support for promoting floriculture.

### **Role of Center of Floriculture and Agribusiness Management (COFAM), NBU, towards entrepreneurship development in relation to floriculture industry in North Bengal**

India's performance in the global floriculture market is not up to the mark, rather microscopic, in comparison to several other countries. In 2017-18, India's export of floriculture produce to top five countries were USA (16.3 million USD), The Netherlands (10.2 million USD), UK (8.3 million USD), Germany (5.7 million USD), and UAE (4.5 million USD) ([agriexchange.apeda.gov.in/indexp/reportlist.aspx](http://agriexchange.apeda.gov.in/indexp/reportlist.aspx)). The major reasons behind such lackluster performance are (i) Absence of proper and adequate infrastructure, (ii) Lack of proper technical knowledge (iii) Lack of sale and export promotion activities. Indian floriculture is mostly in small scale and unorganized in nature. Looking at the potential of this region and realizing the existing constraints, the University of North Bengal has set up a Center of Floriculture and Agri-Business Management (COFAM) with initial support from the Department of Food Processing and Horticulture (FPI and H), Government of West Bengal. As far as floriculture in the northern West Bengal is concerned, never after the independence, was such an innovative project ever dreamt to push the Himalayan obstacle that stood in the path of the transformation of a hobby/gardening practice/nursery business to a scale of an industry-Floriculture Industry, often termed as 'Sunrise Industry'.

This center has been serving as an instrument for sustainable rural development through the application of scientific and technological knowledge in the horticulture sector and integrated farm management. The mandate of this Center is the transfer of technologies through on-farm demonstration and training. Thus, the primary activity of COFAM is to cater services in the form of rendering practical courses to different target groups and entrepreneurs related and interlinked with the overall process of development of horticulture industry. Mass production of quality planting materials through conventional and micro-propagation technology is another important area where COFAM has carved a niche. Hands-on training courses have been developed to empower the small farmers/growers of this region and to establish a producer-consumer direct pathway applying proper information communication system as needed to address the competitive economy. COFAM is destined to undertake projects/programs to study, develop, standardize, implement, commercialize and popularize innovative and sustainable rural technologies with special emphasis on making traditional, rural enterprises more profitable and bring new income generating opportunities through induction of novel enterprises in rural areas. Many of the COFAM activities were covered in different print and audio-visual media.

For a high-tech industry, where floriculture stands in this millennium, working within global markets, it has been often argued that innovation is the most important source of competitiveness. Simultaneously, it is widely known that particular industries tend to cluster in certain areas and that the clustering of knowledge is an important reason for this phenomenon. In the present context of Floriculture industry in north Bengal (which till-date has just sprouted after the seed-dormancy), the hills of the sub-Himalayan West Bengal is such an area of concentration. The COFAM has been successful in breaking this dormancy. This is the principal impact COFAM has produced with the showcasing of the infrastructure, more precisely the environment-controlled hi-tech greenhouse and a tissue-culture infrastructure, which brought confidence to the bio-entrepreneurs and stood as a source of inspiration and faith that in a demanding situation, COFAM can rise to meet the expectations of quality plantlets to fuel the industry. Industrial dynamics of the biotechnology sector, especially floriculture-sector, strongly favor only a few globally important clusters characterized by well-established relations between small R and D companies, venture capitalists, big multinational corporations, and service providers. It would seem to be at least difficult and perhaps entirely impossible, to develop an industry when some or most of these factors are missing. Our argument, at the time when the project was conceived, was that it is possible, at least to some extent, to compensate for vital resources that may be missing in small economies and clusters. However, there seem to be several basic conditions for success. First, there has to be a substantial local knowledge (in this case the University of North Bengal). Second, a network of capable local actors (in this case the nurserymen of the hills and the sub-Himalayan plain land, and flower traders) must develop and strategically direct a local innovation system. We have identified the factors for successful floriculture clusters well before the project was launched. The factors were: (1) a strong science base (In recent NAAC evaluations, NBU's science base was fairly-high rated); (2) an entrepreneurial culture (Although many new trading companies have been created, there is no strong entrepreneurial culture); (3) business support services and large companies in related industries. (Many specialized services are in Kolkata and only a few metropolises. There are some good local services but the number is still quite small); (4) a skilled workforce (the region's traditional strengths in floriculture provide some experienced people, though not enough. There is also a lack of local business expertise); (5) the presence of investors (missings are MNCs and international venture capital (VC). Recently, VC money has been less available and there have been substantial problems in attracting financing); (6) infrastructure (Generally, the infrastructure for both research and business is poor. The state and central has only recently realized the importance of new infrastructure. This has been crucial since university funding has been tight); (7) effective networks (virtually absent at that time) (8) a supportive policy environment.

### Output of COFAM

1. COFAM through sustained effort from 2006 - 2012, has been successful towards introduction and popularization of greenhouse technology (among growers and entrepreneurs through workshops and training) as the basis for modern commercial floriculture production with the demonstration in a state-of-art infrastructure.
2. COFAM has done well in outlining a set of technical guidelines and standards relating to the establishment of a sustainable small scale greenhouse horti-floriculture, more specifically, the following aspects: (a) low-cost simple Greenhouse structures, to be assembled by local craftsmen; (b) ornamental crop species and varieties for diversification and year-round production; (c) adaptation of technological packages according to region and climate and with regard to structure components, covering materials, climate control, in-situ or on substrate cultivation, irrigation and fertilization management.
3. COFAM has been instrumental and supportive in launching several enterprises. The significant success of COFAM resulted from providing technical consultancy to an Entrepreneur for the first commercial cultivation of Orchids, at industrial scale, under greenhouse set-up in the Darjeeling Hills. The first commercial project [industrial scale of plantation (> 1,00,000 plantlets) under greenhouse condition] of orchid cultivation, particularly Cymbidium, at Ratomati, PehlaGaon, Mirik, Darjeeling, is considered the outstanding achievement of entrepreneurship development.
4. Promoting up-gradation of the technological skills of the farmers with regard to new technologies related to intense flower production under protected cultivation for the production and packaging of high-quality flowers including preparation of technical brochures, in local languages, on specific crop management and post-harvest handling techniques.
5. Successful Tissue culture of orchids in the laboratory and trials with tissue culture plantlets in a mist chamber for growth regulations and hardening were done to transfer the technology from lab to land.

### Other Initiatives and Conclusion

Hopefully, Comprehensive Area Development Corporation (CADC) and certain other North Bengal based organizations have taken up the challenge of promoting floriculture among the common growers of this region. They are experimenting on contract farming for cut flowers under single umbrella system. They are motivating the farmers, providing them quality planting materials, imparting training to them regarding production and protection of the crops and establishing market linkage to assure a good return. As a result of these efforts, flower growing is gaining popularity slowly among the common growers. Cultivation of gerbera, carnation, Lilium, marigold, and tuberose has been started in various areas of Darjeeling and Jalpaiguri district [8]. However, much more is to be done in this direction for commercial exploitation of the geographical advantage of the region. Facilities like easy access to information about the flowers, local availability of planting materials and practically sound resource persons; centralized storage facility and organized market system are to be created immediately to make floriculture a successful and organized sector in this region.

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**Volume 5 Issue 2 February 2019**

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