

SP 2000-04
April 2000



Staff Paper

Department of Agricultural, Resource, and Managerial Economics
Cornell University, Ithaca, New York 14853-7801 USA

International Competition in the Greenhouse Production of Floriculture Products – Lessons for New York and India

Sudha Mysore and Wen-fei L. Uva

TABLE OF CONTENTS

	<i>Page</i>
INTRODUCTION	1
METHODS AND ANALYSIS.....	2
DISCUSSION	2
I. Profile of the Greenhouse Industry in the United States and New York State	2
II. Profile of the Greenhouse Industry in India	5
III. Comparisons of the Economics of the Greenhouse Industries in India and New York State	6
A. <i>Costs of Establishing a Greenhouse Operation in India</i>	6
B. <i>Comparisons of Costs of Production and Returns in India and New York State</i>	7
C. <i>Comparisons of Income Distributions in the Greenhouse Industries in India and New York State</i>	9
D. <i>Overall Comparisons and Contrasts between the Greenhouse Industry in New York State and India</i>	10
IV. Strategy Observations in the New York Greenhouse Industry	12
V. Lessons for the Indian Greenhouse Industry	13
CONCLUSION	13
REFERENCES	14

LIST OF TABLES

	<i>Page</i>
1. Top Ten Floriculture Crop Production States in 1997	3
2. Distribution of Floriculture Firms in New York, by Crop Category	4
3. Average Costs of Establishing a Greenhouse Operation Across Groups in the Indian Greenhouse Industry	7
4. Average Investment, Production Costs and Returns Across Different Groups in India	8
5. Average Costs and Returns Across Indian Greenhouse Groups and New York Greenhouse Firms	9
6. Sales Distributions of the Greenhouse Industries in New York and India	10
7. Comparisons of the Greenhouse Industries in New York and India	10

LIST OF FIGURES

	<i>Page</i>
1. Changes of the Crop Mix in the New York Greenhouse Industry	4

International Competition in the Greenhouse Production of Floriculture Products – Lessons for New York and India

Sudha Mysore¹ and Wen-fei L. Uva²

INTRODUCTION

Greenhouse or protected cultivation of floriculture and environmental horticultural crops (including greenhouse, turfgrass and nursery-related crops) is an important sector of U.S. agriculture. Floriculture and environmental horticulture, including greenhouse and open-ground production, is considered the fastest growing segment of agriculture with an annual increase of over \$440 million in growers' cash receipts in the past decade (Uva, 1999a). Cash receipts from floriculture crops (including bedding/garden plants, cut flowers and cut florist greens, foliage plants, and potted flowering plants), the major greenhouse crop category in the U.S., showed a steady compound growth rate of over 4 percent annually during the last decade. Total grower cash receipts have been estimated at \$3.56 billion in 1997. While average annual gross receipts from greenhouse operations show an increasing trend for the nation, changes in receipts in the Northeastern United States³, in general, and New York, in particular, have not been as robust over the last decade. Nonetheless, Traver (1998) observed that, despite some disadvantages relative to other regions in the nation, growers in New York have been able to adopt suitable strategies to remain competitive.

In contrast to the greenhouse industry in New York, the greenhouse industry in India is in an early stage of development. A key segment is the protected cultivation of cut roses for the international market. Favorable climate facilitates year-round production of a variety of horticultural crops like fruits, vegetables and flowers. Long days, abundant sunshine, and mild weather, even during the winter months, enable growers in India to produce cut flowers under relatively simple protected structures. Additionally, India enjoys a strategic location advantage of being close to the important international markets in Europe. However, being capital intensive, dependent on imported technology, and relatively small in volume of business, the Indian cut rose industry faces the problems of a nascent industry. A study of the greenhouse industry in New York would help the Indian growers draw perspectives for future directions for the greenhouse industry in India.

¹ Senior Scientist of Agricultural Economics, Indian Institute of Horticulture Research (IIHR), Bangalore, 560089, India. A Fulbright Visiting Fellow with the Department of Agricultural, Resource, and Managerial Economics, Cornell University, Ithaca, New York from July 1999 to January 2000.

² Senior Extension Associate, Department of Agricultural, Resource, and Managerial Economics, Cornell University, Ithaca, New York.

³ The "Northeast" includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont.

Special appreciation is expressed to our colleagues Gerald White, Nelson Bills and William Lesser, who provided helpful reviews for this paper, and to the greenhouse operators who provided us with valuable information.

This report attempts to compare the nascent floriculture industry in India with the greenhouse industry in New York State. The objectives of this study are to: 1) compare the industry structure and costs and returns of greenhouse production in the Northeastern U.S. with that of India; 2) draw inferences for the future directions in the Indian greenhouse industry from the experiences of New York growers; and 3) develop an understanding of international floriculture markets among New York growers.

METHODS OF ANALYSIS

The costs and return data referred to in this study are based on information collected from growers and from secondary sources. Personal interviews were conducted with New York State greenhouse growers and agriculture consultants between July and October 1999. All data on Indian greenhouse production are based on information collected from greenhouse rose growers by personal interview, as part of the research work of author Sudha Mysore in India.

DISCUSSION

I. Profile of the Greenhouse Industry in the United States and New York State

Greenhouses in the U.S. are used for growing a variety of crops such as bedding/garden plants, bulbs, corns, rhizomes, cut flowers and cut florist greens, foliage plants, potted vegetables, and nursery crops (Uva, 1999b). Greenhouse production in the United States is concentrated in the West and South⁴. Floriculture is the most important crop category produced in greenhouses. Ten states contributed two-thirds of the domestic production of floriculture crops in 1997 (Table 1). The Southern region contributed 38 percent of this production, followed by the Western region (29 percent), while the Northeastern region was the lowest at 13 percent (Traver, 1998). Favorable climate helps the Southern and Western growers achieve cost effective production, while the proximity to growing markets further helps fast expansion of the industry in these regions. Thus, the Northeastern region is at a disadvantage for floriculture crop production with a relatively harsh climate and a stable population compared with other regions.

⁴ The "South" includes Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, N. Carolina, Oklahoma, S. Carolina, Tennessee, Texas, Virginia and W. Virginia. The "West" includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.

Table 1. Top Ten Floriculture Crop Production States in 1997

State	% of production based on grower receipts
California	21
Florida	18
North Carolina	8
Texas	8
Ohio	5
Oregon	5
Michigan	4
Pennsylvania	4
Oklahoma	2
New York	2
Other States	23

Source: USDA, 1999, Floriculture and Environmental Horticulture.

Although New York's contribution to total U.S. greenhouse production is relatively small, it is important to New York and Northeastern agriculture. According to the New York Agricultural Statistics Service, the greenhouse and nursery crop production industry, including greenhouse and open-ground production, is the second largest sector of agriculture in New York State next to dairy, with a production sales value reaching \$258 million in 1997, including both greenhouse and open-ground production (Uva, 1999a). New York State accounted for nearly 50% of floriculture crop production in the Northeastern U.S., with most of these crops being produced in greenhouses (Traver, 1998). It is considered an industry which makes substantial contributions to job opportunities and income generation in local communities. The industry has an economic impact on the state's economy through the business interactions that it provides between the various sectors. However, similar to other Northeast growers, New York greenhouse growers are operating under a number of competition pressures, along with climate disadvantages, labor scarcity, relatively stagnant regional economic growth, and increasing environmental concerns.

There were a total of 1,510 firms in New York accounting for 28.8 million square feet of covered area under glass or other type of protection in 1997. Ninety percent of grower receipts from greenhouse crops were generated by floriculture crops. Among all states, New York floriculture production (greenhouse and open-ground) ranked sixth in 1998 and seventh in 1997 (Uva, 1999b). The New York floriculture industry has been increasing both in number and sales value. The total number of firms in 1997 increased by 15 percent over 1992, while sales value increased 38 percent (Table 2).

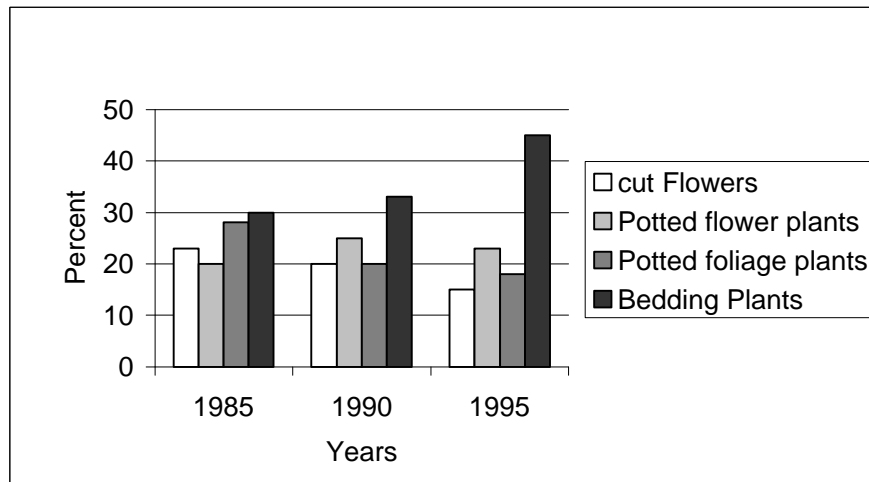
Table 2. Distribution of Floriculture Firms in New York, By Crop Category

Crop category	Number of firms			Sales value		
	1992	1997	Change	1992	1997	Change
	#		%	\$1,000		%
Bedding garden plants	1,016	1,217	+19.7	57,958	107,500	+85.5
Potted flowering plants	406	380	-6.4	52,420	53,006	+1.1
Foliage plants	142	138	-2.8	4,437	6,976	+57.2
Cut flowers and greens	105	79	-24.8	13,989	10,280	-26.5
Total	1,164	1,346	+15.6	128,803	177,763	+38.0

Source: USDA, 1997 Census of Agriculture.

One notable feature of the New York greenhouse industry is the changing profile of crop combinations over the years. Bedding/garden plants have gained significant shares over foliage and potted flowering plants and cut flowers. Figure 1 shows that cut flowers (including cut roses), which accounted for 22 percent of the total production area for floriculture crops in 1985, have declined to 11 percent in 1995 (Taver, 1998). The substantial increase in proportion of production area for bedding/garden plants over the last decade indicates changing consumer demand as well as the shifting marketing strategy followed by New York growers.

Figure 1. Changes of the Crop Mix in the New York Greenhouse Industry



II. Profile of the Greenhouse Industry in India

In contrast with the greenhouse industry in the U.S., development of the greenhouse industry⁵ in India is of recent origin. The industry was introduced as a potential export-oriented venture, mainly due to the liberalization policies of the Union Government during 1990 and 1991. The new policy regime became popular as the New Economic Policy (NEP) aimed at reducing import restrictions on capital goods including infrastructure and buildings such as greenhouse structures. The government also favored liberalizing imports of exotic planting materials and offering special incentives to encourage export oriented production of commercial horticultural crops. These policies paved the way for the recent rapid growth of the greenhouse industry in India.

In view of the growing international demand for floriculture products, especially cut flowers which have been registering an annual growth of over 11 percent (Anonymous, 1997), floriculture was given a priority status for export market development in India. Cut roses accounted for 19 percent of the international cut flower trade; therefore, special attention was paid to developing cut rose production as the major crop for export in India. However, in order to meet international standards for cut flowers, special production structures (greenhouses) were required for development of the floriculture industry in India.

As a result, the greenhouse industry, popularly referred to as “hi-tech floriculture,” was promoted as a specialized industry in India. The number of investment projects increased from as low as two in 1991 to over 177 within the short span of four years, registering an annual growth rate of over 75 percent and an estimated total capital outlay of around U.S. \$230 million. The annual cash receipts from 70 greenhouse firms in operation are estimated at U.S. \$18 million, and are expected to increase rapidly with more potential investment projects underway.

Since protected cultivation is not a common practice in India, the greenhouse designs and structures have been imported from countries like Holland, Israel, France, and the United States. Due to the mild climate, Indian growers need only simple poly-covered structures to facilitate protected cultivation of cut flowers. Growers had the choice of either importing state-of-the-art technology from abroad or fabricating the design indigenously. Rose varieties were all imported from abroad. The primary goal was to achieve cost effective production and be competitive in global trade.

Hi-tech greenhouse rose production in India, like other countries, is highly capital intensive, with wide variations in both capital costs and returns. Most cut rose production firms in India had marketing contracts with their foreign collaborators in the initial years. However, after the marketing arrangements ended, Indian firms often faced risks of low market prices due to unstable crop quality and other production, marketing, and management problems.

⁵ More popularly known as the Hi-tech floriculture or poly house cultivation of cut roses.

III. Comparisons of the Economics of the Greenhouse Industries in India and New York State

Although the greenhouse industries in New York and India seem very different, the comparisons and contrasts can lead to some meaningful inferences for future directions of the greenhouse industry in India and can improve New York growers' understanding of the international floriculture market. The New York greenhouse industry is based on diversified products, whereas in India it is based on a single crop - cut roses. The industry's focus in New York is on the domestic market, while the Indian industry depends on the export market. The types of greenhouse structures used are similar in both industries. The main difference is in the heating system required for New York greenhouse operations, which is not required in India. Source of greenhouse structures is mainly domestic for the U.S. greenhouse industry, while the Indian industry mainly depends on foreign sources.

A. Costs of Establishing a Greenhouse Operation in India

The cost of constructing a greenhouse structure differs with respect to the type of technology being adopted. In India, three types of greenhouse production technologies could be identified. The first group represents the low-cost polyhouse technology. This group had taken foreign greenhouse designs and fabricated the structures indigenously in India with little or no environmental control systems. The second group imported polyhouse structures with special environmental control systems like the fan-and-pad system to control temperatures and maintain required humidity levels in the greenhouses to improve quality control. The third group is the most technologically oriented. They also imported polyhouse structures and the fan-and-pad environmental control systems with additional structure features to allow the use of artificial growing media for cultivation, such as rockwool blocks. The first two groups were growing roses in normal soil.

In India, nearly 72 percent of the growers adopted the low-cost indigenous technology, while 21 percent adopted the second type of greenhouse, and only 7 percent adopted the high-cost imported polyhouse with artificial medium of cultivation. The total investment costs varied significantly among the three groups. The cost of constructing the greenhouse is the main source of variation in total investment costs among groups. Other costs, such as costs of planting materials and other greenhouse accessories, do not show significant variation among the three groups. Table 3 presents total investment costs in U.S. dollars for the three types of greenhouse operations.

Table 3. Average Costs of Establishing a Greenhouse Operation across Groups^a in the Indian Greenhouse Industry

	Group 1	Group 2	Group 3	Overall
	U.S. \$1,000/ha ^b			
Polyhouse Structure (Including Environmental Control Systems)	132	192	575	181
Other Structure and Equipment (Irrigation, Cold Storage etc.)	68	70	73	83
Costs of Plant Materials	114	129	140	123
Costs of Technology Transfer	180	145	51	18
Others	159	224	288	197
Total Investment Cost	494	645	1,139	587

^a Group1: Indigenously fabricated polyhouses;

Group2: Imported polyhouses with fan-and-pad environmental control systems;

Group 3: Imported polyhouses with fan-and-pad environmental control systems and artificial growing media (rockwool blocks) for cultivation.

^b 1 hectare equals 2.47 acres.

Source: This information was collected from rose growers in India as part of the first author's research work.

B. Comparisons of Costs of Production and Returns in India and New York State

Costs and returns in the Indian greenhouse industry:

The investment costs, production costs and returns for the three types of greenhouse operations in India (based on the types of greenhouse structures used) were estimated in U.S. dollar terms and presented in Table 4. Total project investment costs range between around \$500,000/ha to \$1,152,000/ha depending on the sophistication of the technology used. The percentage of investment on the greenhouse structures was the lowest for Group 1, which used indigenously fabricated polyhouses and had no sophisticated environmental control and production systems compared with the categories with imported technology.

These greenhouse operations spent an average of \$170,000 annually producing and marketing roses as cut flowers. Annual gross receipts ranged from \$174,000 to \$432,000, with the highest being received by Group 3 who used imported technology and rockwool blocks for cultivation. Gross margin and net margin were the highest for Group 3. The fact that the variation in returns between the three groups is significant indicates the instability in profitability of the Indian greenhouse industry. With low return on investments, the hi-tech cut rose cultivation in India is still a low-profit, high-cost, and high-risk venture.

Table 4. Average Investment, Production Costs and Returns across Different Groups in India

Items	Farm Groups			Overall
	Group 1	Group 2	Group 3	
	(US \$1,000/ ha)			
Total investment of establishing the greenhouse production ^a	499	653	1,152	592
<i>Investment into polyhouse</i>	<i>134</i>	<i>193</i>	<i>582</i>	<i>183</i>
Production Costs				
(I) Total annual variable expenses	104	116	162	115
(II) Annual fixed expenses	52	68	101	55
(III) Total annual expenses (I+II)	156	184	263	170
Returns				
(IV) Annual gross receipts	174	217	432	227
<i>Yield (1,000 stems/ha)</i>	<i>1,200</i>	<i>1,400</i>	<i>1,833</i>	<i>1,566</i>
(V) Gross margin (IV- I)	70	101	270	112
(VI) Net margin (IV –III)	18	33	169	57
Gross margin as a % of sales	40	46	62	49
Net margin as a % of sales	10	15	39	21
D-E Ratio	0.96	1.38	1.43	1.14
Return on investment	0.03	0.05	0.15	0.09
% of exports	44%	55%	86%	62%

^a The discrepancies of these values with Table 3 are the result of rounding.

Costs/returns comparisons between the greenhouse industries in India and New York State:

Table 5 presents average annual production costs and returns in various types of Indian greenhouse operations compared with costs and returns of greenhouse operations producing cut flowers and other floriculture crops in New York State. The annual per-square-foot costs and returns were calculated for the comparison. Production costs were relatively low in almost all categories for operations in India compared with floriculture production firms in New York State. However, the average net margin was also lower for the Indian greenhouse industry compared with the New York industry.

Table 5. Average Costs and Returns across Indian Greenhouse Groups and New York Greenhouse Firms

Items	Indian Hi-tech Rose Production				NY Floriculture Production	
	Group 1	Group 2	Group 3	Overall	Cut Roses	Diversified floriculture crops
	(US\$/sq.ft.)					
Production expenses	0.21	0.29	0.39	0.25	3.60	6.97
Administration	0.48	0.52	0.75	0.51	1.35	3.95
Marketing	0.48	0.53	0.72	0.54	2.01	0.45
Total expenses	1.43	1.68	2.41	1.55	10.06	11.37
Return	1.94	2.31	3.97	2.3	8.42	12.63
Net margin	0.51	0.63	1.56	0.75	(-)1.60	1.26

Source: This information was collected from interviewing rose growers in India and greenhouse growers in New York State.

The net margin was negative for cut rose production for the observations in New York and was higher for the diversified floriculture production farms. The net margins of Indian rose farms showed wide variations across operations, ranging from about \$0.50/sq.ft. to over \$1.50/sq.ft. It again indicates the high instability in the profitability of the greenhouse industry in India. However, the relatively low production costs could also infer that the cut rose production in India could be competitive in international markets. On the other hand, the diversified floriculture greenhouse production in New York had higher profit margins, justifying the strategy adopted by New York growers in changing from cut flower cultivation (especially roses) to other floriculture crops.

C. Comparison of Income Distributions in the Greenhouse Industries in India and New York State

One noticeable characteristic of greenhouse industries both in New York and India is that a large proportion of firms have low cash receipts (Table 6). In New York, it has been reported that about 70 percent of greenhouse firms realized gross receipts of less than \$100,000 annually. Eleven percent of greenhouse firms had annual gross receipts up to \$200,000, while only 9 percent of the firms had over \$500,000 of annual gross sales (Uva, 1999b). This posts a disadvantage for New York growers to compete effectively in the commodity market where profitability often depends on low cost, high efficiency, specialized production, and economies of scale. In India, nearly 75 percent of all farms realized annual gross receipts of less than \$100,000. Only a small percentage of farms realized receipts in the range of over \$200,000. This generally means weak market power when negotiating in the international market. The instability in prices received and profit potential is another problem facing Indian growers. Facing potentially low profit margins, and lacking resources to enter the export market, many small firms in India tried to explore the domestic market.

Table 6. Sales Distributions of the Greenhouse Industries in New York and India

Annual Cash Receipts	NY Greenhouse Industry ^a		Indian Greenhouse Industry ^b	
	Average sales (\$)	% farms	Average sales (\$)	% farms
Up to \$ 100,000	24,327	70	34,000	75
\$100,000 to \$199,000	136,300	11	144,000	15
\$200,000 to \$499,000	304,373	10	316,000	10
\$500,000 and more	2,966,744	9	----	---

^a Uva, 1999.

^b Unpublished data collected by Sudha Mysore, 1999.

D. Overall Comparisons and Contrasts between the Greenhouse Industry in New York and India.

Based on the previous analysis, Table 7 presents overall comparisons and contrasts between the greenhouse industries in New York and India, including factors such as contribution to total market production, operation profiles, competitive advantages, and risks associated with production, marketing, etc.

Table 7. Comparisons of the Greenhouse Industries in New York and India

Comparison	New York	India
(i) Type of Industry	Diversified	Single crop (cut roses)
(ii) Marketing focus of the Industry	Domestic market Wholesales and retails	Export market Wholesales
(iii) Type of greenhouse structures	Poly and Glass Houses	Polyhouses
(iv) Source of technology	Domestic	Foreign
(v) Contribution to the total production	Small (13 percent of the U.S. floriculture production)	Small (meager percentage in the international market)
(vi) Concentration of business	Large number of small growers Few large firms produce majority of output	Large number of small growers Few large farms produce majority of output High margins for few farms
(vii) Cost-based competitiveness	At a disadvantage	At an advantage
(viii) Price-based competitiveness	Difficult	Difficult
(ix) Quality-based competitiveness	Advantage	Only a small segment
(x) Market Seasonality (timing of sale)	High	Low
(i) Production Risks	High	High

Contribution to total production:

Being small in terms of their contribution to total sales, both New York and India greenhouse industries do not possess price-based advantages. They are mainly price-takers. A comparison of floriculture crop receipts for New York growers with the national average over the last ten years indicated that New York growers have not been able to increase their annual crop receipts at the rate of the national growth trend (Traver, 1998). The national average was higher and showed an increasing trend, while the New York average was steady but lower than the national average. This suggests that NY greenhouse growers are at a competitive disadvantage when compared with national trends. However, it would be interesting to study the specific strategies utilized by New York greenhouse growers to maintain their gross receipts at a steady level in this extremely competitive market.

The Indian greenhouse industry contributes less than 1% to the total global cut flower trade. Being a nascent industry, Indian growers have yet to achieve the necessary volume and quality demanded by the international trade. Therefore, they are at a competitive disadvantage in the global market and often receive low prices due to weak marketing power and low product quality.

Risks involved in producing and marketing products:

The New York and Indian greenhouse industries both face production and market seasonality (timing of sale) risks. Production-based risks in New York arise mainly from the acute labor scarcity during the peak production periods. In order to minimize this risk, some New York growers have invested in mechanization to replace labor. In contrast, the Indian rose industry faces production risks in terms of adaptability of the new, imported technology to the domestic environment and learning the appropriate techniques to produce high-quality crops. Lack of specific modern cut rose varieties, low yields, and inadequate post harvest practices are common production disadvantages under Indian conditions.

The risk due to seasonality (timing of sale) is higher in NY due to the strong seasonal market demand and a short growing season. Sales of many crops link closely with specific holidays or seasons. Demand for the specific crop disappears after the holiday or season is over. Moreover, in the winter season, New York growers endure even higher risks due to the possibilities of heating system malfunction and heavy snow loads which can collapse a greenhouse structure. In these cases, the loss in value is enormous. In the Indian industry, the highest marketing risk is product perishability. If the cut roses are not exported promptly after harvest, the value of the product in the domestic market is very low, and the decrease in gross receipts can be very high.

Hence, from the above discussion, it could be inferred that despite the variations, the greenhouse industries in New York and India are comparable with regards to relatively low marketing power and business profiles. Experience from the development of the New York greenhouse industry over the last three decades is valuable for the development of the Indian industry. Study strategies adopted by New York growers can provide ample scope for the Indian industry to draw perspectives for future directions.

IV. Strategy Observations in the New York Greenhouse Industry

The following strategies were observed to be adopted by greenhouse growers in New York to overcome some of their production and marketing challenges.

A. Focus on expansion in the local markets

The majority of New York greenhouse growers have focused their marketing efforts in local and regional markets. They grow a diversified product mix, including different varieties and types of bedding and potted flowering crops throughout the year to meet changing seasonal and consumer demands. Discussions with growers, extension educators and agricultural consultants indicate that the marketing focus of New York greenhouse growers has been towards crop diversification and retail sales in recent decades.

B. Diversify to new products and new crop varieties

The most important strategy being followed by greenhouse growers in New York State is increasing the varieties of products cultivated. They are constantly searching for new floriculture crops and trying new varieties. Within the broad classification of floriculture crops, the varieties of new crops grown are on the increase. Many growers have also adopted new methods of product presentation, such as arranging multiple plants in baskets similar to flower arrangements. This value-added strategy expands the consumer base and hence increases sales.

C. Sources for support and assistance

A number of private and government agencies provide a support system for the New York greenhouse industry. A network of agribusiness consultants and land grant university educators provides specialized services and educational opportunities for the industry. Consultants from farm credit are available to visit farms on a regular basis, assist growers in maintaining financial records, provide tax assistance, analyze the accounts for individual farms, and help them evaluate their business. Based on these supports, growers will be able to set their priorities and plan in advance for the future.

V. Lessons for the Indian Greenhouse Industry:

The following are some lessons that the Indian greenhouse industry can learn from studying the greenhouse industries in New York for future development.

- A. A large number of Indian growers receive relatively low annual cash receipts of less than \$100,000. Because costs of export marketing are high, some Indian growers have tried to expand into the local markets. However, the economics of the domestic market have not been able to offer high prices for the product. Since the main objective of the Indian rose production is to export, growers should focus their efforts on developing and expanding into profitable international markets.
- B. Another lesson for Indian growers is to diversify production, and not to depend on cut rose production alone. The Indian growers should explore other high-value product alternatives, such as propagating materials of specialty crops for exporting purposes. This could be achieved through licensing and contractual agreements with foreign collaborators. Having appropriate intellectual property regimes in place will be necessary to help Indian growers in such ventures. Since India does not have appropriate intellectual property protection mechanisms for plant materials, foreign breeders are often reluctant to sell new varieties to Indian growers for fear of illegal proliferation through asexual propagation.
- C. Developing vertical integration and joint ventures is yet another strategy that could be adopted by Indian growers, as they need to increase their volume of sales to receive the benefits of economies of scale. Although Indian rose production is comparable and competitive in terms of costs and returns, increasing export volume will help to achieve higher profitability.
- D. Finally, establishing a network of support systems from the government, universities and the private sector, as in the United States, will be of immense value for growers and the industry as a whole for forward planning and periodic evaluation of business goals. The greenhouse industry in India has great potential for growth, but realizing this potential will require joint effort from the public as well as the private sectors in India.

CONCLUSION

Many changes in the world affect the business climate in which growers compete. The globalization in the floriculture market has had an important impact on the greenhouse industries in the world. To gain any competitive advantage, companies need to be aware of these changes and be willing to change accordingly. Since the Northeastern United States is at a competitive disadvantage to national and international markets, floriculture producers in New York and the Northeastern United States have adopted various marketing strategies to stay competitive. Although most New York growers are currently focusing on the domestic regional market, the marketing pressure from international competitors should not be

ignored. An understanding of the development of international floriculture markets can help the New York floriculture industry improve its competitiveness and identify market opportunities in the domestic markets as well as foreign markets. Learning from the evolution of a mature floriculture industry, such as the industry in New York, will help the emerging greenhouse industry in India develop alternative strategies to improve the industry's sustainability into the future.

REFERENCES

- Anonymous. 1997. *Viability of the Indian Cut flower Export Industry*, By TATA Consultancy Services, report prepared for APEDA, India.
- Traver, Terry. 1998. *The Greenhouse Industry – Northeast Business Trends*. Special Report. First Pioneer Farm Credit, ACA. Flemington, NJ.
- Uva, Wen-fei L. 1999a. "Chapter 10: Ornamentals." *New York Economic Handbook, 2000*, EB 99-20, Department of Agricultural, Resource, and Managerial Economics, Cornell University, Ithaca, NY, 14853, USA. pp. 10-1 to –10-10.
- Uva, Wen-fei L. 1999b. *An Analysis of the Economic Dimensions of the New York State Greenhouse Industry*. RB 99-08, Department of Agricultural, Resource, and Managerial Economics, Cornell University, Ithaca, NY, 14853, USA.
- USDA. 1999. *Floriculture and Environmental Horticulture – Situation and Outlook Yearbook*. Economic Research Service, United States Department of Agriculture, Washington, DC. October 1999.