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Status and availability of tuberose for commercial cultivation: A study on consumers' choice

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Abstract

The demand for the floricultural products has been steadily increasing both in domestic as well as in export markets. Foothills of Uttarakhand have variable climatic conditions along with efficient transport and communication connectivity. The study was to assess consumers' opinion about status of tuberose cultivation and availability of planting materials and to identify the preference of tuberose cultivation among different levels of consumers. A multi-stage, purposive cum random sampling design was used in the study for selecting respondents. "Understanding the consumer's choice" in respect of cut flowers particularly tuberose at producers, consumers, and a florist's levels. A questionnaire was developed to serve as the instrument for data collection. Responses were recorded in the form of frequencies. Per cent of score was calculated and ranked. The study revealed that tuberose is the most preferred cut flower crop (56.67%) by the producer, consumer and it blooms during March to September when flower requirement is high. Maximum (53.33%) respondents procured planting material of tuberose from progressive farmers of nearby area areas. Most of the consumers had opined to purchase double type tuberose varieties for decoration purpose. In response to availability of planting material with novel traits, maximum (66.67%) responses were given to 'broadening of consumer's choice will be enhanced'. The majority (66.33%) of the consumers responded to procure flower spikes of tuberose from local florist. The majority (36.67 per cent) of the consumers choice towards double type with long rachis length tuberose variety.

Keywords: Tuberose, demand, commercial cultivation, consumers' choice

Introduction

Ornamental plants play a significant role in improving the living condition of various living organisms including human beings which ultimately promote their living in a better way. In fact, flowers are the most exquisite and valuable gift that nature has given to mankind. The demand for the floricultural products has been steadily increasing both in domestic as well as in export markets. In addition to this, floriculture is the emerging Agri-business having a great potential for employment generation and economic progress of the country. Flower production is one of the fastest growing crop trends in agriculture and India's 'flower power' continues to bloom, with the country emerging as the second largest grower of flowers around the world, surpassed only by China (Sundar, 2016, Senthil, 2017) [5, 4]. India is enriched with diverse agro-ecological conditions such as variable land, water, human resources, different skilled manpower, low labour cost etc. Those conditions are quite favorable for growing a variety of flower round the year Moreover, commercial flower cultivation has been providing an entrepreneurial opportunity in the rural areas of the nation which eventually result in enhanced socio-economic status of the rural areas. The floriculture business is a bright spot since it offers excellent self-employment opportunities and competitive pay to floriculturists. Those who cultivate flowers or attractive plants for the garden, the floral industry, or for export are known as floriculturists. In India, floriculture sector is experiencing rapid changes. The total area under floriculture in India is about 303.21 thousand ha and a production of about 2263.20 thousand MT loose flowers and 6846.530 MT cut flowers (NHB, 2018) [3]. The total export of floriculture products from India during India during 2022-23 was about 4762.81 MT, which is equal to a worth value of Rs 170.67 crore (APEDA, 2023). In India, Tamil Nadu holds the first position in the production of floricultural products with a share of 18.45% followed by Karnataka state 12.51%. However, Karnataka (30600 ha) occupies the highest area under floriculture that is followed by West Bengal (24900 ha) (NHB, 2018) [3].

Uttarakhand state also has a variety of climatic conditions owing to valleys, hills, plain fertile regions of *Tarai* & *Bhabhar* along with efficient transport and communication connectivity for a speedy supply of ornamental products, which favors the extent of cultivation and establish the floriculture enterprises in the state. Uttarakhand is also having several tourist places and pilgrims of all religions which helps to enhance the producer, consumer and florist choice and sale of floricultural products.

The consumer choice about the purchase of flowers depends upon many factors such as availability, variety of products, sale rates, quality of the floral arrangement, place of sale,

etc. The advancement in tuberose must be according to the choice and preference of a variety of consumers as well as floral industry needs. Novel traits are required to determine the present-day consumer's preference of floral products. Such information is of paramount importance to the breeder and the producer for concentrating their efforts in developing/ producing plants with trait of choice and other factors leading to peaks in demand. Most of the consumers buy flowers during the festival (Garbarino, 1963) [2]. Tilburg (1979) [6] studies economics and marketing literature and assumed that consumers were implicitly or explicitly involved in some multistage choice process before the actual purchase takes place. Stages that may be distinguished are determination of the budget share that will be spent on each product class, the choice of a product category within a product class and the choice of a specific brand or variety within a product category. In each of these stages many factors may influence consumer choice behaviorist stated the flower and plant buying households a multistage choice process can be assumed. After that, a mathematical model will be proposed and discussed for each phase in the choice process. Keeping in view the above key facts, the present study was carried out with the following objectives to identify the consumers' opinion about status of tuberose cultivation and availability of planting materials in *Tarai* and *Bhabhar* regions and to identify the preference of tuberose cultivation among different levels of consumers.

Materials and Methods
This investigation consisted of a field survey towards "Understanding the consumer's choice" in respect of cut flowers particularly tuberose at producers, consumers, and a florist's levels. Experimental Site was four districts *viz.* Udham Singh Nagar, Nainital, Bareilly and Pilibhit around Pantnagar. Interview and questionnaire based on post-facto survey for qualitative traits of producers, consumers and florists for their requirement and acceptability of tuberose. The information collected from three consumer groups (Level 1-Producers/Farmers, Level 2-Consumer of society,

Level-3-Florist of the market). Sample size, n=30.
A questionnaire was developed to serve as the instrument for data collection. The questionnaires were composed based on the results of previous studies that implied the potential consumption values, attributes, problems, prospects etc. for the purchases of flowers. A questionnaire related to the choice of consumers were prepared and asked to each level of consumers to find out the outcome of their understanding of consumers choice. The survey work started from October 2021 to December 2022. Responses were recorded in the form of frequencies. Per cent of score was calculated and ranks were marked according to respective frequencies. Data were tabulated and analyzed with the application of Chi Squire Test.

Results and Discussion
In order to understand the consumers' choice, a field survey was done to know the preferences of consumers for status and availability of tuberose for commercial cultivation in *Tarai* and Bhabhar regions. A total of 30 respondents, dealing with tuberose, were selected for survey at 3 different levels: -
Level 1 - Producers
Level 2- Consumers
Level 3- Florists

Level 1 (Producers)
A perusal of data presented in Table1 envisaged that 53.33% of respondents procure their planting material from progressive farmers of that areas followed by self-multiplied (20%), Procure from Private organizations/ Nursery (16.67%) and only 10%. from Government organizations. However, the responses were significant. It is also evident that tuberose is the most preferred floriculture crop by the farmers in the area of study with 33.33% of preference followed by gladiolus and rose having 30% preference level, while only 6.67 per cent (2 frequencies) responded to gerbera. However, the statistical effects on the question were found to be non-significant.

Table 1: Consumers' choice for procurement of planting material and most preferred floriculture crop.

1	From where you procure the planting material of Tuberose?				2	Which floriculture crop is most preferred by the farmers of your area?			
Responses	Frequencies	Percentage	Rank	Chi Square (χ^2)	Responses	Frequencies	Percentage	Rank	Chi Square (χ^2)
Government organisations	3	10%	IV	2.70	Rose	9	30%	II	0.30
Private organisations/ Nursery	5	16.67%	III	0.83	Gerbera	2	6.67%	IV	4.03
Progressive Farmers	16	53.33%	I	9.63	Gladiolus	9	30%	III	0.30
Self-multiplied	6	20%	II	0.30	Tuberose	10	33.33%	I	0.83
Chi Square (χ^2) at 5% level of significance				13.46	Chi Square (χ^2) at 5% level of significance				5.46

The data pertaining to a query "Among cut flowers, which crop do you prefer the most", most of the producers (56.67 per cent) responded to tuberose (17 frequencies). Whereas the other crops *viz.*, gladiolus, rose and gerbera had less than 3 frequencies. The responses were statistically significant (Table 2). When the question "Which variety/ type of tuberose do you grow?" was asked to the respondents of study area, their responses were comparable to each other.

Double type tuberose varieties had maximum (50 per cent) preference while minimum response was with 'semi double type' (10 per cent, 3 frequency) wherein the responses was noted statistically significant (Table 2).
Another question pertaining to "Why is tuberose preferred by consumers among other cut flowers?" was put to the producers, the maximum (36.67 per cent and 11 frequencies) response was recorded for 'it is easy to grow'.

However, 10 per cent (3 frequencies) responded to 'it is hardy crop'. The data presented in Table 3 about a response to "State the scope of tuberose in your district if variety with novel traits available easily?" maximum (66.67 per cent with 20 score) responses were given to 'broadening will be enhanced of consumer's choice' while 3.33 per cent responses were with 'flower industry will boost up'. However, the difference in response was significant (Table 3).

Table 2: Consumers' choice for most preferred cut flower crop and flower type of tuberose.

3	Among cut flower which crop do you prefer most.				4	Which variety(ices) type of tuberose do you grow?			
Responses	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**	**Responses**	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**
Gladiolus	5	16.67%	II	0.83	Single Variety	4	13.33%	III	1.63
Tuberose	17	56.67%	I	14.7	Semi Double	3	10%	IV	2.70
Rose	5	16.67%	III	0.83	Double Variety	15	50%	I	7.50
Gerbera	3	10%	IV	2.7	Mixed Variety	8	26.67%	II	0.03
Chi Square (χ^2) at 5% level of significance				19.06	Chi Square (χ^2) at 5% level of significance				11.86

Table 3: Consumers' choice for tuberose preferred among other cut flower and scope of tuberose variety with novel trait.

5	Why is tuberose preferred among other cut flowers?				6	State the scope of tuberose in your district if varieties with novel traits available easily?			
Responses	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**	**Responses**	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**
Easy to grow	11	36.67%	I	1.63	Production area will increase	5	16.67%	II	0.83
It is perennial in nature	6	20%	III	0.30	Producer will get remunerative price	4	13.33%	III	1.63
It blooms almost round the year	10	33.33%	II	0.83	Flower industry will be boost up	1	3.33	IV	5.63
It is a hardy crop	3	10%	IV	2.70	Consumer choice will be broadened	20	66.67	I	20.83
Chi Square (χ^2) at 5% level of significance				5.46	Chi Square (χ^2) at 5% level of significance				28.92

Level 2 (Consumer level)

The level 2 study was related to consumers who purchase and utilize flowers for personal use and floral arrangements. In response to the question "from where you procure the flowers?" The majority (66.33 percent with 19 score) of the consumers responded to the option 'local florist' whereas minimum (10 per cent) responded to 'procured flowers from nurseries and from home garden'. The responses had statistically significant difference. The study revealed that local florists are the main source of flower availability for consumers. The consumers were asked "In which season the tuberose flower requirement is more?" maximum (33.35 per cent with 10 frequencies) responded to 'off season from July to September' whereas minimum (13.33 per cent) responses were recorded for 'only in marriage season'. However, statistical effect was noted non-significant (Table 4).

Table 4: Consumers' choice for procurement of flowers and seasonal requirement of tuberose.

1	From where you procure the flowers?				2	In which season your requirement of tuberose is the most?			
Responses	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**	**Responses**	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**
Local florist	19	63.33%	I	17.63	Only in Festival season	9	30%	II	0.30
From Nursery	3	10%	III	2.70	Whole the year	7	23.33%	III	0.03
Directly from the farmer	5	16.67%	II	0.83	Only in Marriage season	4	13.33%	IV	1.63
From Home Garden	3	10%	IV	2.70	Off-season (From July to September)	10	33.33%	I	0.83
Chi Square (χ^2) at 5% level of significance				23.86	Chi Square (χ^2) at 5% level of significance				2.79

Responding to the question "What do you expect from the producer with respect to tuberose production?" majority (36.67 per cent) of the consumers inclined towards 'produce more double type with long rachis length' while minimum (13.33 per cent) consumers responded to 'produce more variegated varieties. However, differences were statistically non-significant (Table 5). When they were asked "What is your thinking about use of tuberose flowers?" maximum (80 per cent with 24 frequencies and rank first) responded to 'I use it for decoration purpose' while minimum 3.33 per cent

responded to 'I use it for natural fragrance'. The statistical difference in response was significant (Table 5).

A question was put to the consumers, "Which flower do you prefer the most?" to which majority (56.67 per cent having 17 score) of consumers responded to 'tuberose'. The study revealed that tuberose is a preferred cut flower among consumers. The chi square value was statistically significant (Table 6). When the question, "Are you satisfied with present status of tuberose in your district?" was asked, maximum (53.33 per cent) responded to 'not satisfied'. None of the consumers (0%) responded to 'fully satisfied'. The study revealed from the study that consumers had the opinion to increase the area and production of tuberose. However, the statistical differences were noted significant (Table 6).

Table 5: Consumers' choice for expectation from the producer with respect to tuberose production and thinking about use of tuberose flowers.

3	What do you expect from the producer with respect to tuberose production?				4	What is your thinking about use of tuberose flowers?			
Responses	Frequencies	Percentage	Rank	Chi Square (χ^2)	Responses	Frequencies	Percentage	Rank	Chi Square (χ^2)
Produce more colourful variety	9	30%	II	0.30	I use it as pot plant	1	3.33%	III	5.63
Produce more variegated variety	4	13.33%	IV	1.63	I use it for decoration purpose	24	80%	I	36.30
Produce more fragrant variety	6	20%	III	0.30	I use it for natural fragrance	1	3.33%	IV	5.63
Produce more double type-with long Rachis length	11	36.67%	I	1.63	I use it for worshipping	4	13.33%	II	1.63
Chi Square (χ^2) at 5% level of significance				3.86	Chi Square (χ^2) at 5% level of significance				49.19

Table 6: Consumers' choice for most preferred flower and satisfaction for present status of tuberose in district.

5	Which flower do you prefer the most?				6	Are You satisfied with present status of tuberose in your district?			
Responses	Frequencies	Percentage	Rank	Chi Square (χ^2)	Responses	Frequencies	Percentage	Rank	Chi Square (χ^2)
Rose	7	23.33%	II	0.03	Not Satisfied	16	53.33%	I	9.63
Gladiolus	5	16.67%	III	0.83	Partially Satisfied	10	33.33	II	0.83
Tuberose	17	56.67%	I	12.03	Fully Satisfied	0	0.0%	IV	7.50
Gerbera	1	3.33%	IV	5.63	Can't Say	4	13.33	III	1.63
Chi Square (χ^2) at 5% level of significance				18.52	Chi Square (χ^2) at 5% level of significance				19.59

Level 3 (Florist level)

At florist level under the group of questioners regarding 'status and availability' of tuberose, six Florists are also considered a consumer of tuberose spikes and serve it as a seller to other consumers. A perusal of data pertaining to the question "From where flowers are supplied in the flower market? presented in Table 7, revealed that a maximum of 53.33 per cent (16 score) florist responded to 'direct from producer's field of peri urban areas', while minimum (6.67 per cent) florists responded to 'florist grow it on their own farm'. Responding to the query, "What is the seasonal variability in flower market?", majority (50 per cent& 15 frequencies) of the florist responded to 'maximum flowers are available in winter season' while minimum 6.67 per cent answered with 'maximum flowers are available in rainy season'. However, differences were statistically significant.

A question seeking information on "Which flower is most preferred by the consumers in general?" in flower market, the data showed non-significant statistical difference. The highest 36.67 per cent florist suggested 'tuberose' while lowest turn-out with 'gerbera' 6.67 per cent (Table 8). The data pertaining to the question "Which flower is most preferred by the consumers in off season i.e., March to September" depicted the significant differences. maximum 80 percent (24 score) respondent recorded 'tuberose' while zero frequencies as minimum responses were recorded with 'gerbera'.

Table 7: Consumers' choice for supply of flowers in market and seasonal variability in flower market.

1	From where flowers are supplied in the flower market?				2	What is the seasonal variability in flower market?			
Responses	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**	**Responses**	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**
Direct from producer field of peri urban areas	16	53.33%	I	9.63	Maximum flower available in winter season	15	50%	I	7.50
Producers of the other district	5	16.67%	III	0.83	Maximum flowers are available in rainy season	2	6.67%	IV	4.03
From Azadpur Mandi Delhi.	7	23.33%	II	0.03	Maximum flowers are available in summer season	8	26.67%	II	0.03
Florists grow at their own farm	2	6.67%	IV	4.03	No set pattern of flower availability	5	16.67%	III	0.83
Chi Square (χ^2) at 5% level of significance				14.52	Chi Square (χ^2) at 5% level of significance				12.39

Table 8: Consumers' choice for flower most preferred by the consumers' and preference in off season

3	Which flower is most preferred by the consumers in general.				4	Which flower is most preferred by the consumers in off season i.e., March to September.			
Responses	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2) at 5%**	**Responses**	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2) at 5%**
Cut Rose	7	23.33%	III	0.03	Cut Rose	4	13.33%	II	1.63
Gerbera	2	6.67%	IV	4.03	Tuberose	24	80%	I	36.30
Gladiolus	10	33.33%	II	0.83	Lotus	2	6.67%	III	4.03
Tuberose	11	36.67%	I	1.63	Gerbera	0	0.0%	IV	7.50
Chi Square (χ^2) at 5% level of significance				6.52	Chi Square (χ^2) at 5% level of significance				49.46

In response to the question "reason for liking of tuberose among most of the consumers". Maximum 46.67 per cent florist turnout with 'due to self-life of tuberose' while minimum turnout (16.67 per cent) equally with 'long flower spike with compact florets' and 'it is cheaper than other'. However, the statistical effect was noted as non- significant (Table 9).

Table 9: Consumers 'choice for their liking for tuberose flower and best season for selling of florist product.

5	What do you feel about liking of tuberose among most of the consumer.				6	Which season is best for selling of florist product?			
Responses	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**	**Responses**	**Frequencies**	**Percentage**	**Rank**	**Chi Square (χ^2)**
Due to long self-life	14	46.67%	I	5.63	Throughout year	14	46.67%	I	5.63
Its pleasant fragrance	6	20%	II	0.30	Marriage season	4	13.33%	III	1.63
Long flower spike with compact florets	5	16.67%	III	0.83	only on festivals and new year.	9	30%	II	0.30
It is cheaper than other	5	16.67%	IV	0.83	Summer and rainy due to high rates	3	10%	IV	2.70
Chi Square (χ^2) at 5% level of significance				7.59	Chi Square (χ^2) at 5% level of significance				10.26

The response to the query "Which season is best for selling of florist products at florists' shop?" ranged from 46.67 per cent for 'throughout the Years' to 10 per cent for 'summer and rainy season due to high rates' (Table 9). However, the differences were significant.

Conclusion
It is concluded from the study that 53.33% of respondents procured planting material of tuberose from progressive farmers of that areas. It is also evident that tuberose is the most preferred cut flower crop (56.67 per cent response) by the producer, consumer and florists as it is easy to grow, and it blooms during March to September where flower requirement is high. Most of the consumers had opined to purchase double type tuberose varieties for decoration purpose. In response to availability of planting material with novel traits, maximum (66.67 per cent with 20 score) responses were given to 'broadening of consumer's choice will be enhanced'. The majority (66.33 percent) of the consumers responded to procure flower spikes of tuberose from local florist. Majority (36.67 per cent) of the consumers inclined to produce more double type with long rachis length tuberose variety. A question was put to the consumers, "Which flower do you prefer the most?" to which majority (56.67 per cent having 17 score) of consumers responded to 'tuberose'. Florists are also considered a consumer of tuberose spikes and serve it as a seller to other consumers. They supplied it maximum of

53.33 per cent (16 score) direct from producer's field of peri urban areas in the flower market. It is evident by the study that tuberose is the first choice among consumers. It is well-suited off-season crop of *Tarai* and *Bhabhar* region, mainly utilized for value added decorative products. Local florists are the main source of flower availability.

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References

1. APEDA. Flowers and seed export database-2023. APEDA, New Delhi; c2023.
2. Garbarino AJ. Bulletin "Consumers' preferences for floral products in the Memphis market." University of Tennessee Agricultural Experiment Station; c1963.
3. NHB. Indian horticulture database-2018. NHB, Gurgaon; c2018.
4. Senthil KR. Cultivation and marketing of flowers in India—An empirical study. Int J Res Soc Sci. 2017;7:244-271.
5. Sundar I. Agribusiness scope, opportunities, and challenges in India. EPRA Int J Econ Bus Rev. 2016;4:171-178.
6. Tilburg AV. Framework for the analysis of consumer choice behavior regarding cut flowers and pot plants. Acta Horticulturae. 1979;97:193-208.