

TECHNICAL ARTICLE

Seasonality of chrysanthemum commercialization in the west region of São Paulo: the case of breeder

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Abstract

The Flowers and Ornamental Plant sector supports an extensive network of entrepreneurs, in all stages related to cultivation, transport and commercialization. In this aspect, there is a great demand for skilled labor, making this sector a source of employment and income generation in the regions covered. However, there is great interference on the commercialization of flowers and ornamental plants by the seasonality of demand, which is often related to festive dates, weather, among other factors. Thus, knowledge about seasonal demands allows the sector to develop a plan, directing efforts to offer products with greater demand in a given period. This study aimed to generate information, through a case study based on the analysis of commercialization data, and verify the seasonal demand on the commercialization of ornamental species in western São Paulo. There was an increase in the demand for chrysanthemum cuttings, both for the domestic and export markets, during the years 2019 and 2020, in addition to fluctuations in the demand for some cultivars of cuttings of chrysanthemum in one year compared to the other. Through the analysis, it is concluded that the seasonality of commercialization of ornamental plants in the West Region of São Paulo really occurs, especially between the 26th and 34th week of the year, with the purpose of serving the domestic market of chrysanthemums. This result allows planning the planting and harvesting time, as well as the definition of the best varieties to be cultivated in these periods.

Keywords: Agricultural sector, exportation, flowers, market.

Resumo

Sazonalidade da comercialização do crisântemo na região oeste de São Paulo: o caso do criador

O setor de Flores e Plantas Ornamentais apoia uma extensa rede de empreendedores, em todas as etapas relacionadas ao cultivo, transporte e comercialização. Neste aspecto, há uma grande demanda por mão-de-obra qualificada, tornando este setor fonte de emprego e geração de renda nas regiões abrangidas. Porém, há grande interferência na comercialização de flores e plantas ornamentais pela sazonalidade da demanda, que muitas vezes está relacionada a datas festivas, clima, entre outros fatores. Assim, o conhecimento sobre as demandas sazonais permite ao setor desenvolver um planejamento, direcionando esforços para oferecer produtos com maior demanda em determinado período. Este estudo teve como objetivo gerar informações, por meio de um estudo de caso baseado na análise de dados de comercialização, e verificar a demanda sazonal na comercialização de espécies ornamentais no oeste paulista. Houve aumento na demanda por mudas de crisântemo, tanto para o mercado interno quanto para exportação, durante os anos de 2019 e 2020, além de oscilações na demanda por algumas cultivares de mudas de crisântemo em um ano em relação ao outro. Através desta análise concluiu-se que a sazonalidade da comercialização de plantas ornamentais na Região Oeste de São Paulo realmente ocorre, principalmente entre a 26ª e a 34ª semana do ano, com a finalidade de atender ao mercado interno de crisântemos. Este resultado permite planejar a época de plantio e colheita, bem como a definição das melhores variedades a serem cultivadas nestes períodos.

Palavras-chave: Exportação, flores, mercado, setor agrícola

Introduction

The Brazilian floriculture has been gaining prominence in recent years, even in the period of the new Coronavirus pandemic, where the sector showed growth in production,

wholesale and retail (IBRAFLO, 2022). Extending the analysis of growth of Brazilian floriculture, it is understood that the flower market started to receive strong growth momentum in the last decade, following an evolution of socioeconomic indicators, improvements in the distribution

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system and expansion of the culture of flowers and plants consumption as elements that characterize quality of life, well-being and rapprochement with nature (Oliveira et al., 2021). Among these socioeconomic indicators is the generation of income and jobs, and the cultivation of flowers and ornamental plants in Brazil was responsible, in 2017, for the generation of 18.7 thousand jobs, adding more than eight thousand producers and moves about 1.6 billion reais (Brainer, 2018). Floriculture is an activity marked by spatial characteristics and seasonal events, being influenced by the variation in consumption at certain times, being greater on commemorative dates and festive periods (Alvarenga et al., 2022).

As the country's largest consumer market, the state of São Paulo also stands out for concentrating the largest area devoted to the cultivation of flowers and ornamental plants and the largest share in sales values (IBGE, 2019). In the Southeast region, the highlight of the sector is the state of São Paulo, which concentrates most of the national wholesale trade of ornamental plants, and the main related negotiations are carried out by Cooperativa Veilling Holambra (Holambra), the Company of Warehouses and General Warehouses of São Paulo (CEAGESP, São Paulo), Permanent Market of Flowers and Ornamental Plants of CEASA Campinas (Campinas) and others (Junqueira and Peetz, 2014). As for the species of cut flowers produced nationally, we can recognize the chrysanthemums as one of the main and most popular along with roses, carnations and gerberas, being part of the basic cast of floriculture (Barbosa, 2003).

The chrysanthemum (*Chrysanthemum morifolium* Ramat.), may be annual or perennial herbaceous plants, originate from East Asia and are of great ornamental, medicinal, environmental and industrial value (Hadizadeh et al., 2022), and it is a highly favored ornamental plant, ranking second globally in the cut flower trade after the rose (Mekapogu, et al., 2022). This specie is among the most valuable floricultural crops in the world and is extremely popular for its wide variety of flower cores and structures. Is the second most produced ornamental flower in greenhouses, with continuous growth in the commercialization in the internal market, due to characteristics of diversity of colors, format and size, besides a good post-harvest durability and a fast-growing cycle (Mainardi et al., 2004). Chrysanthemum is a leading flower with value worldwide. Developing new chrysanthemum cultivars with novel characteristics such as new flower colors and shapes, plant architectures, flowering times, postharvest quality, and biotic and abiotic stress tolerance in a time- and cost-efficient manner is the ultimate goal for breeders (Su et al., 2019).

The seasonal demand for flowers and for ornamental plants is very evident in the Brazilian market, where the production is concentrated in periods of higher demand, as commemorative dates; Mother's Day, Saint Valentine's Day, New Year's Day and Christmas (Almeida and Aki, 1995). Seasonality has a strong impact on sales in the floriculture sector and, therefore, has been studied and used for decision-making by producers, allowing a

planting and harvesting schedule for each product and time of year (Grisotto and Filho-José., 2018; Anacleto et al., 2022; Drechsler and Holzapfel, 2022).

Observing all this scenario and analyzing the great importance of the production chain of flowers and ornamental species for the Brazilian economy, also taking into account the differences in marketing for both the domestic and foreign markets, the present work aimed to analyze the seasonality of production and marketing throughout the years 2019 and 2020 of the chrysanthemum varieties most in demand at each time of the respective years.

Material and Methods

The work was conducted as a case study, in which data regarding the commercialization of ornamental plants was sought and analyzed, which were collected from the company Athena Brazil, located near the municipality of São José do Rio Preto, state of São Paulo, 20°52'30.7 "S 49°16'46.2 "W.

The data collected were obtained based on the exports of chrysanthemum cuttings from the years 2019 and 2020, produced by the company Athena Brazil. These were destined for export to countries such as Belgium and France, in addition to the domestic market. The company produces approximately 120 chrysanthemum varieties per year, all with variations in the color and shade of their flowers.

The survey of data about the marketing of chrysanthemum varieties was carried out with the company. The values regarding the units of each commercialized variety were compiled, enabling the verification as to their participation during the commercialization for the domestic, French and Belgian markets, in the years 2019 and 2020.

For these periods, commercialization peaks were established through graphic expression, where graphs and tables were created using the Excel computer program, displaying the varieties and numbers referring to the periods with the highest commercialized volume of chrysanthemums.

Results and Discussion

The company Athena Brazil is the only one in the city that works with flower exports and, according to data from 2020 from the Ministry of Foreign Trade, the category of "live plants," which includes flower cuttings, ranks second among the most exported products by the city of São José do Rio Preto, SP.

It was found that, (Table 1), for the domestic market, there was a preference for the Papiro White chrysanthemum variety, in the two years covered by the study, representing about 21% and 31% of the plants sold in 2019 and 2020, respectively. This variety has as main characteristics, white color of its flowers in addition to a smooth and striking aroma and has rapid development.

Table 1. Units of commercialized Chrysanthemum varieties, 2021.

Brazil					
2019			2020		
Cultivar	Units (mil)	%	Cultivar	Units (mil)	%
Papiro White	1.009	21	Papiro White	1.160	31
White Star	675	14	White Star	348	9
Papiro Yellow Improved	447	9	Papiro Yellow Improved	337	9
Dark Gold Star	436	9	Jasoda White	215	6
Demais	2229	46	Demais	1.700	45
Total	4.795	100	Total	3.762	100
France					
2019			2020		
Cultivar	Units (mil)	%	Cultivar	Units (mil)	%
Yahou Golden	489	15	Yahou Golden	492	13
Yahou Coco	355	11	Yahou Coco	385	10
Yahou Abricot	296	9	Yahou Abricot	328	8
Yahou Rose	211	6	Yahou Rose	229	6
Yahou Fraise	189	6	Yahou Fraise	214	5
Yahou Prune	169	5	Malibu Blanc	204	5
Malibu Blanc	139	4	Yahou Prune	177	5
Demais	1.444	44	Demais	1.893	48
Total	3.293	100	Total	3.922	100
Belgium					
2019			2020		
Cultivar	Units (mil)	%	Cultivar	Units (mil)	%
Jasoda Dark Yellow	1.770	10	Jasoda White	1.255	8
Jasoda White	1.587	9	Jasoda Dark Yellow	1209	8
Jasoda Mauve	1.217	7	Jasoda Dark Pink	662	4
Jasoda Dark Pink	820	5	Jasoda Purple	593	4
Jasoda Red	606	3	Jasoda Dark Orange	471	3
Jasoda Dark Orange	552	3	Jasoda Red	429	3
Mefisto Purple	459	3	Mefisto Purple	415	3
S. Sister Yellow	382	2	Mefisto Pink	263	2
S. Sister White	300	2	Jasoda Dk Yellow Bk	230	2
Mouria Yellow	295	2	Mouria Yellow	225	1
Mirage Yellow	270	1	Staviski Yellow	194	1
Mefisto Pink	262	1	Padre Yellow	188	1
S. Sister Orange	260	1	S. Sister Yellow	186	1
S. Sister Dk Pink	250	1	Arluno Yellow	156	1
Miral White	237	1	Mefisto Yellow	154	1
S. Sister Red	233	1	Pianello White	152	1
Staviski Yellow	221	1	Padre White	150	1
Primo Pistache	200	1	Staviski White	148	1
S. Sister Pink	171	1	Matari White	147	1
Pianello White	159	1	S. Sister White	144	1
Amarena Pink	159	1	S. Sister Pink	131	1
Staviski White	156	1	Padre Lilac	129	1
Demais	7.514	42	Demais	7.519	50
Total	18.078	100	Total	15.149	100

Source: Elaborated by the author, 2021.

A comparison analysis of the preference for cut chrysanthemums among distributors and sellers of national and foreign flowers, carried out in Korea, Japan, Australia and Vietnam, pointed out that the preferred varieties of consumers were the white and yellow ones, corroborating the results found in the present study (Kim and Lim, 2021).

Also, it stands out for the national market, among the chrysanthemum varieties that were most in demand in the two years, the White Star variety stands out, which represented about 14% and 9% of the plants sold in 2019 and 2020, respectively. This variety has as one of its main characteristics; showy flowers with a striking aroma and white color.

It can be seen that, for the French market, (table 1), there was a preference for the Yahu Golden chrysanthemum variety in those years, where it represented approximately 15% and 13% of the plants sold, respectively. This variety has as its main characteristics, the yellowish color (golden color) of its flowers in addition to a pleasant and striking aroma, and they are larger in size when compared to the varieties marketed for the domestic market and for Belgium. Also noteworthy among the chrysanthemum varieties demanded by the French market is the variety, Yahu Coco, which in the two years covered by the aforementioned study, represents about 11% and 10% of the plants sold in 2019 and 2020, respectively. The aforementioned variety has within its main characteristics, the easy cultivation, high adaptability, easy establishment of uniformity pattern, flowers with white and showy color, besides a smooth and pleasant aroma.

It can also be noted that, for the Belgian market (Table 1), there was a preference for the following chrysanthemum varieties; Jasoda Dark Yellow and Jasoda White, for both years, where in 2019 the Jasoda Dark Yellow variety corresponded to about 10% of the commercialized plants, and has the following characteristics; flowers with a dark yellow color, showy and with a pleasant aroma. Also noteworthy among the varieties of chrysanthemum commercialized for the Belgian market in 2019, is the variety Jasoda White, which comprised about 9% of the commercialized plants and has as its main characteristics flowers with white color, mild aroma and plant with a large amount of leaf area.

According to CEPEA (2017), Belgium and France are, respectively, the sixth and ninth largest importers in this

sector, and France is in ninth place, between the years 1997 to 2021.

During the long history of chrysanthemum breeding, a wide range of petal colors, including purplish-red, red, orange, dark red, and green, has been developed. Flower color is an important trait that determines the commercial value of chrysanthemum cultivars. Hence, improvement of flower coloration has always been a crucial goal for breeders (Ohmiya, 2019).

Analyzing the data referring to the Belgian market linked to the preference and demand of varieties marketed during the year 2020 (Table 1), the following varieties stand out: Jasoda White and Jasoda Dark Yellow, where the variety Jasoda White comprised about 8% of the varieties commercialized during the year, while the Jasoda Dark Yellow variety also presented the same amount of 8%, however it is evident the increase of new varieties in the commercialization when compared to the year 2019, where we have the following varieties being incremented in the commercialization in the year of 2020, the variety Jasoda Purple, corresponding to 4% of sales in the sector, has features such as: purple flowers, mild aroma and a larger leaf area. The Padre Lilac variety, corresponding to 1% of sales, has the following characteristics: light purple flowers, flowers with a rounded shape and a mild aroma. This factor of increasing new varieties in the market can be caused by the emergence of new varieties resulting from genetic improvement, with new characteristics, such as: flower color, flower shape, aroma, adaptability, in addition to resistance to biotic factors.

An interesting factor to analyze is that of the chrysanthemum cultivars produced by the company and most commercialized in the domestic market as well as in exports, they are white or yellow in color. In addition to the aesthetic factor, the colors of the flowers influence other aspects. White, for example, conveys tranquility, a feeling of purity and lightness and can even refer to a certain status. On the other hand, yellow can be interpreted as a jovial color, referring to optimism and recreation (Heller, 2022).

Analyzing the units of chrysanthemum cuttings marketed per week during the years 2019 and 2020 in Brazil, (Figure 1), it was found that the highest peaks are between weeks 26 and 34, which correspond to the period from June to September.

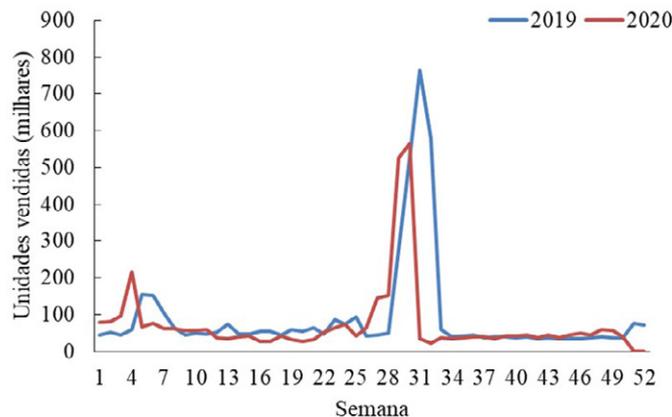


Figure 1. Units of chrysanthemum cuttings sold to the domestic market.

This concentration can be caused by factors such as commemorative dates, such as the All Souls’ Day and Valentine’s Day holidays, periods in which a large part of the demand for commercialized chrysanthemum seedlings is found. Valentine’s Day takes place on June 12 in Brazil, the 24th week of the year, and sales on this date were higher than in September. Farmers probably choose to cultivate chrysanthemums until September because this species needs a short photoperiod to flower, a period that coincides with winter in the southern hemisphere. This may explain that, with a greater supply of production, the price of the product becomes cheaper for the consumer, therefore increasing the demand for chrysanthemum consumption until the month of September.

On the other hand, Junqueira and Peetz (2014) point out that the Brazilian flower trade is heating up because

of the improvement of the Brazilian population in social occupation issues, such as the habit of growing flowers and ornamental species; the increase in the distribution of flowers throughout the country and the reduction of final prices; growth and improvements in the wholesale sector and increased supply of these goods.

Analyzing the units of chrysanthemum cuttings marketed per week during the years 2019, 2020 for France (Figure 2 and 3), it was found that the highest peaks are between weeks 13 and 26, which corresponds to the period of the months of April to June.

Analyzing the units of chrysanthemum cuttings sold per week during the years 2019, 2020 for Belgium (Figure 3), it was found that the highest peaks are between weeks 5 and 29, which corresponds to the period of months April, May, and June.

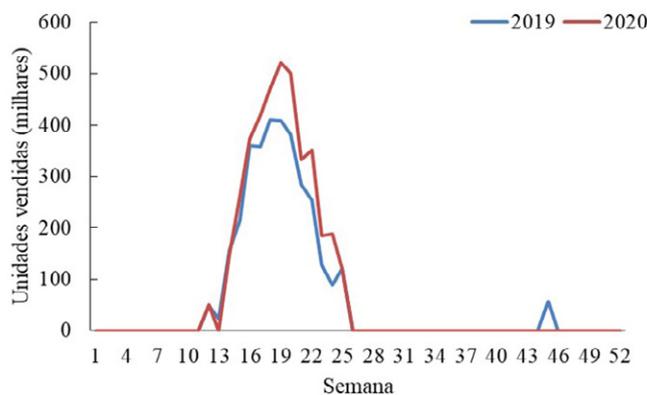


Figure 2. Units of chrysanthemum cuttings exported to France

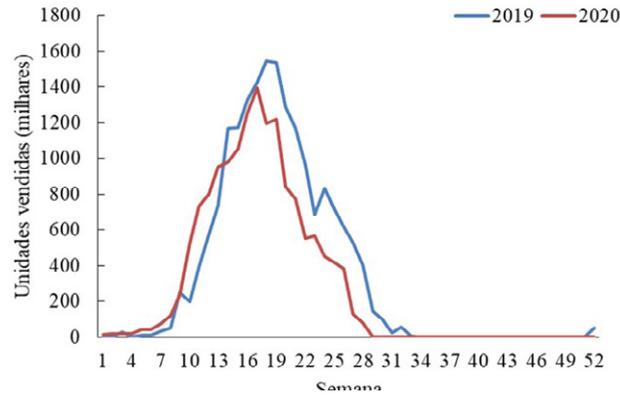


Figura 3. Units of chrysanthemum cuttings exported to Belgium

Regarding the domestic market, Carvalho et al. (2009) state that this is characterized by low per capita consumption, small number of frequent buyers, purchases centered on traditional products and demand concentrated on special and commemorative dates. Thus, the average amount spent by Brazilian consumers is approximately seven dollars per inhabitant/year, whereas in European countries such as Switzerland this amount reaches US\$ 145 per inhabitant/year (SEBRAE, 2015).

In addition to analyzing the consumption of flowers and ornamental plants on commemorative dates, it can be said that the demand for these items also varies according to income, economic situation, social class and gender factors. Thus, the variation of these criteria over the years has a direct influence on the demand for these products (Neves and Pinto, 2015).

In order to mitigate the effects of seasonality in Brazilian floriculture, the Brazilian Institute of Floriculture (IBRAFLOR), encourages consumers to buy flowers outside the main commemorative dates, encouraging consumption in spring, on Secretary's Day, Father's Day and Grandparents' Day, for example. Furthermore, the development of varieties with new traits offers marketing opportunities for retailers, and careful selection can both increase productivity and improve product quality. Furthermore, the development of varieties with new traits offers marketing opportunities for retailers and careful selection can both increase productivity and improve product quality (Kumari et al., 2019).

Brazil, although not considered a major exporter of flowers and ornamental plants, has been showing growth with this agribusiness in recent decades (REIS and MARAFON, 2020). Foreign trade expectations are positive, as the data show the growth in the number of exports each year, mainly to European countries with good consumption per inhabitant/year, for the national trade of flowers and ornamental species, the seasonality of commercialization in Brazil between the main festive and commemorative dates and the low average of consumption per inhabitant during the year, which traditionally happens since always.

It is noticed that the consumption of chrysanthemums

is different between the countries studied. Demand for chrysanthemum seedlings in Brazil peaks between weeks 26 and 34, corresponding to the period from June to September. This can be attributed to commemorative dates such as All Souls' Day and Valentine's Day. In France, the greatest demand for chrysanthemum seedlings occurs between weeks 13 and 26, which corresponds to the months of April to June. The peak demand for chrysanthemum seedlings in Belgium occurs between weeks 5 and 29, which corresponds to the months of April, May and June.

It is therefore verified that the greatest demand for chrysanthemums, for European countries, occurs two months before the peak of Brazilian consumption, and this, in turn, extends two months after the end of the peak of sales for France and Belgium. Therefore, the producer needs strategic planning to serve the consumer market with a greater volume of plants between the months of April to September.

Conclusions

In addition, it is agreed that, in the national market, the White Star variety was one of the most common in the two years, representing approximately 14% and 9% of the plants sold in 2019 and 2020, respectively. This preference is due to the attractive characteristics of these flowers, such as their white color and striking aroma. For the French market, the Yahu Golden variety. In the Belgian market, the Jasoda Dark Yellow and Jasoda White varieties were preferred in both years, with no seasonality in their consumption. In summary, this study provides valuable information about the chrysanthemum market, with emphasis on regional regions, seasonality and opportunities for genetic improvement. These insights are essential to guide strategies

Author Contributions

LMNF and EPV: Experimental design and execution in the field and laboratory, data tabulation, graph and table creation, statistics, and writing; **FEAB and PSJC:** Data tabulation, graph

and table creation, statistics, and writing; **MBM**: Contributed to laboratory experiments, statistics, and writing; **IFV**: Laboratory experiments, statistics, and writing.

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