

New Mexican variety of poinsettia called Victoria

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Abstract

The state of Morelos is characterized by the diversity of ornamental species that are grown and marketed both in the national and international market. In Mexico, approximately 20 million plants finished in different container sizes are marketed annually, with a production value of 718 million. Genetic improvement programs for cultivated species run by government agencies are scarce. The largest proportion is carried out by foreign private companies. Poinsettia is subjected to the same model. Faced with this situation, the National Institute of Forestry, Agricultural and Livestock Research launched the Poinsettia Genetic Improvement Program in the Experimental Field of Zacatepec, Morelos. The poinsettia variety called Victoria is a product of this program and was generated through hybridization, selection and grafting technique. Victoria is an intermediate plant with medium branching and width. The outstanding attributes of this variety are the oval shape of the leaf, the size of the leaf and the absence of lobes. The shape of the base of the leaf is rounded. The bracts are elliptical in shape, red in color and of intermediate size. The width of the cyme and the size of the gland are medium. It is considered an intermediate cycle variety. The response of Victoria is statistically comparable to commercial varieties and represents an option for the country's producers in order to diversify the offer in the Christmas season.

Keywords: aesthetic attribute, bract, leaf, plant size.

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The state of Morelos stands out in the country for the diversity of ornamental species that are grown. The national and international market is supplied from here. Ornamental plants are grown in pots, in polyethylene bags, on the ground for cut flowers or foliage. Poinsettia (*Euphorbia pulcherrima* Wild. ex Klotzsch) is one of the most important species due to the volume of plants that are marketed each year, the labor required and its production value. It is a species that is considered a symbol of the Christmas holidays worldwide. This ornamental plant is native to Mexico, and it is possible to find it in the wild, semi-cultivated and cultivated in several states of the country (Canul *et al.*, 2013). Paradoxically, its domestication and genetic improvement process has been done abroad since the last century (Taylor *et al.*, 2011) and so it continues to the present.

In Mexico, approximately 20 million plants are marketed annually in different pot presentations, with a production value of 718 million 372 thousand pesos. The consumption of this ornamental plant grows constantly, so in the period from 2016 to 2019, the production increased 15%. The state with the highest production is Morelos, with six million 424 thousand plants; followed by Michoacán, three million 922 thousand; Mexico City, three million 575 thousand; Puebla, two million 639 thousand; Jalisco, one million 716 thousand; State of Mexico, 820 thousand and Oaxaca, 14 thousand 500 plants (SIAP, 2018). Worldwide, poinsettia production is estimated at 500 million plants, with a constant increase due to its economic and commercial potential in countries in Europe, Asia and North America (Islam and Joyce, 2015).

The national production of poinsettia occupies more than 40 imported commercial varieties, there are no Mexican varieties. This causes dependence on vegetative material (Márquez-Márquez *et al.*, 2017), because the producer grows what the companies offer, without considering consumer tastes and preferences. The incorporation into the market of new imported improved varieties lacks advance evaluations by specialist researchers and subsequently in nursery of leading producers.

This practice causes abnormal plant growth and bract pigmentation outside the commercial period, aspects that translate into economic losses. Vegetative material is purchased from private companies, whose royalties increase production costs (Canul-Ku *et al.*, 2017). Genetic improvement programs for cultivated species implemented by government agencies are scarce. This situation has led private companies, especially foreign companies, to dominate the market of seeds and vegetative material. Poinsettia is one of the crops that has succumbed to this model. Given this panorama and to solve part of the demand for new varieties of Mexican origin, the National Institute of Forestry, Agricultural and Livestock Research (INIFAP, for its acronym in Spanish) has been conducting the Poinsettia Genetic Improvement Program in the Experimental Field of Zacatepec, Morelos, for 10 years (Canul-Ku *et al.*, 2018).

Genetic improvement focuses on characters related to leaf, bract and plant architecture, essential aspects of aesthetics and commercial value (Canul-Ku *et al.*, 2017). The program began with the exploration and national collection of scions and seeds that constituted the largest genetic base (Canul *et al.*, 2013). Materials with better aesthetic attributes demanded by the market were selected and recombined with contrasting genotypes (Canul-Ku *et al.*, 2017). The purpose was to reduce the size of the plant and improve branching (Canul-Ku *et al.*, 2018). In addition, the grafting technique has served to improve the architecture of the plant (García-Pérez *et al.*, 2017).

Origin

The poinsettia variety called Victoria is a product of the Genetic Improvement Program of INIFAP. In 2011, a simple manual cross was made between the parents called SINO2P8 and MORFR following the technique of Canul-Ku *et al.* (2015). In 2012, the F1 progeny resulting from this cross was evaluated. The seeds were sown in 50-cavity polystyrene trays with Sunshine Mix[®] No. 3 commercial substrate. When the plants got four true leaves, they were changed to 8” pots, using as substrate the mixture of ocochal (pine needles), atocle (silty-type soil that accumulates in lakes, meadows and riverbanks) and coconut powder in $\frac{3}{4}$ Pelemix[®] block in a proportion 60:20:20 v/v/v. In the bract pigmentation stage, the most promising individuals were selected based on previously established criteria (Canul-Ku *et al.*, 2018).

The population increase was carried out in 2013 through vegetative propagation via cuttings, in order to maintain the varietal genetic identity (clones). From 2014 to 2017, four recurrent selection cycles were carried out with a cooperating producer in Tetela del Monte, municipality of Cuernavaca, Morelos at the coordinates 18°58’ north latitude, 99°15’ west longitude and 2 000 m altitude. This site was selected for being one of the areas with the highest poinsettia production, thanks to the climate, water quality and experience of producers in the management of the crop for more than 50 years.

In each cycle, the phenotype of the plants was analyzed and those with the best aesthetic attributes in leaf, bract, architecture and compact size were selected. In 2018, using the wedge technique, they were grafted onto a commercial variety that served as a rootstock. The purpose of the graft was to transmit some important horticultural characteristics according to the established plant ideotype, specifically in its compaction and the formation of the archetype (García *et al.*, 2019). The cuttings from the grafted plants were planted in 3” pots and when they formed roots, they were changed to larger pots and grown with the technology of the cooperating producer. These plants in the phenological stage of bract pigmentation and with the third cyathium open served for the varietal description applying the Guidelines for the execution of the examination of the distinction, homogeneity and stability of the International Union for the Protection of New Varieties of Plants (UPOV, 2008).

Characteristics

The Victoria poinsettia variety is of intermediate size with medium branching and width. The distinctive characteristics of the variety are the oval shape of the large leaf and absence of lobes. The shape of the base of the leaf is rounded. The color of the midrib of the adaxial side of the leaf blade is green and has no curvature. The intensity of the green color in the middle third of the stem is strong. The bract is elliptical in shape, red in color, of intermediate size and does not present torsion, but roughness between the veins. The width of the cyme and the size of the gland are medium. The glands of the cyathium are non-deformed and yellow in color. The leaf and bract are of a single color (UPOV, 2008) (Figure 1). It is considered an intermediate cycle variety according to the response with the change of season that occurs approximately on September 21.



Figure 1. Variety of poinsettia ‘Victoria’ in stage of bract pigmentation and final presentation for sale to the market.

The phenotypic evaluation of the generated material was carried out by comparing it with two commercial varieties as a control: Carrousel[®] and Luv Pink[®]. In six continuous distribution characteristics, Victoria was statistically similar to the commercial ones. In bract width, it showed no statistical differences with Carrousel[®], but surpassed Luv Pink[®]. Plant height is one of the most important characters in poinsettia, the market demands low-size plants and Victoria met this standard since it was lower than Luv Pink[®] and similar to Carrousel[®]. In the criterion leaf width, Victoria was statistically equal to Luv Pink[®], but lower than Carrousel[®]. Another aspect that gives aesthetic value to poinsettia is the width of the bract canopy, Victoria surpassed the two commercial varieties (Table 1). The response of Victoria indicates that it meets the basic characteristics demanded by the market and is a candidate to diversify the offer of Mexican plants in the Christmas season.

Table 1. Comparison of means of evaluated characters of the Victoria variety and two poinsettia commercial controls.

Character	Victoria	Carrousel [®]	Luv Pink [®]	HMSD	CV (%)
Plant height (cm)	19.86 b	22.84 b	28.67 a	3.07	11.64
Stem diameter (mm)	10.23 a	10.89 a	11.87 a	2.02	16.6
Number of internodes	14.8 b	16.4 ab	17.1 a	2.28	12.81
Leaf length (cm)	7.45 a	7.97 a	7.59 a	1.01	11.91
Leaf width (cm)	4.32 b	5.24 a	4.47 b	0.66	12.89
Leaf petiole length (cm)	2.14 a	1.85 a	2.15 a	0.54	23.88
Bract width (cm)	4.68 ab	4.76 a	3.8 b	0.9	18.41

Bract length (cm)	8.06 a	7.47 a	7.25 a	1.42	16.94
Bract petiole length (cm)	1.51 a	1.58 a	1.5 a	0.42	24.85
Bract canopy width (cm)	19.77 a	16.58 b	17.11 b	2.28	11.54
Cyathium diameter (cm)	1.91 a	1.63 a	1.52 a	0.53	28.42

HMSD= honest minimum significant difference; CV= coefficient of variation, ¹Values with different letters within rows indicate significant differences (Tukey, $p \leq 0.05$).

The Victoria variety was generated for cultivation in the different poinsettia-producing areas in Mexico, so it does not have problems of adaptation or pigmentation of bracts and therefore there will be no economic losses. The management of the variety with the technology of cooperating producers has given excellent results, with good commercial quality of plant, free of pests and diseases through preventive applications of agrochemicals.

The National Seed Inspection and Certification Service (SNICS-SADER) granted the breeder's title of the Victoria variety with registration number 2597. In the INIFAP Experimental Field of Zacatepec, Morelos, it is available as a mother plant since its propagation is through cuttings and its use for commercial exploitation is possible through the signing of a specific concertation agreement.

Conclusions

The Victoria poinsettia variety has medium size, branching and width. It is distinguished by the oval shape of the leaf of large size and without lobes. The shape of the base of the leaf is rounded. The bract is elliptical in shape and of intermediate size. The width of the cyme and the size of the gland are medium. It is considered an intermediate cycle variety. Its phenotypic response is similar to that of commercial varieties currently grown. It represents a viable commercial alternative for poinsettia producers and propagators in Mexico.

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