

Leticia: new Mexican variety of poinsettias for interiors

Faustino García Pérez¹
Sandra Eloísa Rangel Estrada¹
Edwin Javier Barrios Gómez¹
Sergio Gavino Ramírez Rojas¹
Blanca Portas Fernández²
Jaime Canul Ku^{1§}

¹Experimental Field Zacatepec-INIFAP. Highway Zacatepec-Galeana s/n. Colonia Centro, Zacatepec, Morelos, Mexico. CP. 62780. Tel. 01 (800) 088 22 22. (garcia.faustino@inifap.gob.mx; rangel.sandra@inifap.gob.mx; barrios.edwin@inifap.gob.mx; ramirez.sergio@inifap.gob.mx).

²Independent professional. (blancaportas@yahoo.com.mx).

§Corresponding author: canul.jaime@inifap.gob.mx.

Abstract

Poinsettia (*Euphorbia pulcherrima* Willd. ex Klotzsch) is native to Mexico and Mesoamerica. Its cultivation depends on improved varieties from abroad, which causes foreign exchange losses and economic losses. Currently its import is restricted. This represents an opportunity to offer varieties generated in the country. The INIFAP, Experimental Field Zacatepec realizes the genetic improvement of poinsettia. Thus, in 2010 by manual cross between MOR13 x MORPR10 F₁ progeny was obtained, which was evaluated in 2011 and in the immediate cycle the number of plants increased. In 2013, clonal hybrid progeny (barb) with a commercial variety (pattern) were grafted by wedge; in 2014, graft cuttings were obtained, they were grown to a finished plant and selected according to the biotype demanded by the market. In 2015 it was evaluated in a nursery in Tetela del Monte, Cuernavaca, Morelos. In 2016, the varietal description was made with Leticia name. This variety has an intermediate size of great amplitude with intermediate branching, leaves of large oval shape with petioles of medium length, bracts of elliptical shape and red. It is of intermediate response, the pigmentation of bracts appears nine weeks after the beginning of autumn.

Keywords: *Euphorbia pulcherrima* Willd. ex Klotzsch, bract, cross, hybrid, ornamental.

Reception date: February 2019

Acceptance date: March 2019

Euphorbia pulcherrima Willd. ex Klotzsch, poinsettia, is a tropical species native to Mexico. This ornamental plant grown in pots is one of the most important economic agricultural activities within the floriculture sector (Trejo *et al.*, 2012).

Its worldwide production reaches 500 million finished plants and are destined for end-of-year festivities, which is why it is known as a symbol of Christmas. Mexico occupies the fourth place in the international plane, with a commercialization of almost 30 million plants, the presentations vary from square pot of 2.5" (0.170 L) to pot of 50 gallons (189.3 L). More than 8 000 producers with an area of 300 ha participate in its cultivation in the following entities: Morelos (34.5%), Michoacán (21.5%), Mexico City (16.9%), Puebla (11.3%) and Jalisco, State from Mexico, Oaxaca (15.8%).

The Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) estimates that this production chain, including the commercialization and export of cuttings, generates 3 200 direct jobs and around 9 600 indirect jobs (SAGARPA, 2013).

At present, the national production is sustained with more than 100 varieties whose generation was made abroad. The foregoing, generates technological dependence and foreign exchange leakage for the payment of four cents per imported cutting, also due to the environment and management in which they occur may present some pigmentation deficiencies outside the commercial period that results in economic losses (Canul *et al.*, 2018). In addition, there are current restrictions to import vegetative material from new varieties of poinsettia. Under these circumstances, it is necessary to develop new varieties that, adapted to the climatic conditions of Mexico, can diversify the supply and compete with the imported ones.

The genetic improvement program of poinsettia of the National Institute of Forestry, Agriculture and Livestock Research (INIFAP) began in 2010 (Canul *et al.*, 2011) with the collection of materials. Morphological characterization, selection of accessions with commercial and aesthetic attributes, and crossing between selected materials were continued (Canul *et al.*, 2017a). As a result, a large group of materials with different degrees of genetic progress has been generated (Canul *et al.*, 2017b, c).

In response to the constant demand for new varieties and presentations of poinsettia in Mexico, which satisfy the tastes and needs of consumers, INIFAP has registered four varieties of poinsettia. These varieties have been generated with different techniques that include hybridization and selection. Subsequently, grafting has been used as a method to transmit some important horticultural characteristics according to the established plant ideotype. In the case of the new Leticia poinsettia variety, the grafting technique was used to support the genetic improvement of this ornamental in relation to characteristics related to the compaction of the plant and the formation of archetypes (García *et al.*, 2017a).

Product of the constant and dynamic work of the team of researchers in ornamental plants of the INIFAP-Campo Experimental Zacatepec and the genetic improvement program of poinsettia, is the new variety Leticia whose attributes outline it to decorate interior spaces in Mexico.

Origin

In 2010, the manual crossbreeding between the MOR13 x MORPR10 progenitors was made. The resulting progeny (F₁) was evaluated in 2011 and the best individuals were selected following the guidelines of the poinsettia biotype established by Canul *et al.* (2010). In 2012, the number of individuals was increased by vegetative propagation. In 2013 grafts were made by wedge technique, hybrid clonal progeny was used as a barb and a commercial variety was the pattern. In 2014, graft cuttings were obtained, which were cultivated in the Zacatepec Experimental Field until reaching a finished plant based on the technological package for the production of poinsettia (Garcia *et al.*, 2017b), in this stage a selection of according to the determined biotype.

These plants were evaluated in 2015 in Tetela del Monte, Cuernavaca, Morelos (18° 58' North and 99° 15' West and 2 000 m altitude), the management was carried out according to the knowledge and experience of the cooperating producer, second generation nursery.

The cuttings obtained from the graft are those that gave rise to the Leticia variety (Table 1), which was described varietally following the criteria of the International Union for the Protection of New Varieties of Plants (UPOV, 2008) in 2016.

Table 1. Process of obtaining the variety of poinsettia for Leticia interior.

Year	Generation	Procedure
1 (2010)	MOR13 x MORPR10	Hybridization
2 (2011)	F ₁ seed	Evaluation and selection
3 (2012)	F ₁ clonal	Plant increment
4 (2013)	F ₁ /Commercial variety	Graft
5 (2014)	Clonal graft	Selection
6 (2015)	Clonal graft	Evaluation
7 (2016)	Leticia	Variety description

In its obtaining process, the vegetative propagation of the poinsettia was used, a condition that allowed to maintain the phenotypic and genetic identity of the plant; that is, it is guaranteed that the characters expressed in the hybrid progeny will be stably inherited and maintained genetically in the cuttings used for the establishment of new cultivation cycles (Islam *et al.*, 2013).

Features

Leticia is essentially an ornamental plant whose medium-sized attributes of great amplitude and medium branching is ideal for decorating interior spaces. The intensity of the green color of the stem is also medium. It has large oval-shaped leaves with petioles of medium length, a green beam with a strong intensity, the shape of the base is rounded, with the main nerve of the beam of two colors, green and red, the lobes are shallow.

The bracts are elliptical and red in color [code 45B in color charts of the Royal Horticultural Society (RHS), 2006], do not show bending along the main nerve or twist, weak roughness between the nerves.

The top is broad with medium glands of the cyatium, yellow without deformation (UPOV, 2008). Leticia is considered a variety of cycle or intermediate response; that is to say, the pigmentation of bracts appears nine weeks after the beginning of autumn (Figure 1).

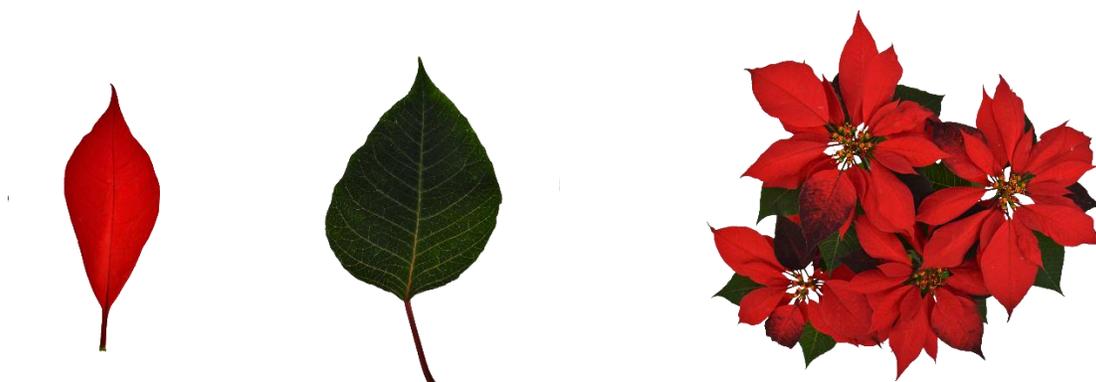


Figure 1. Bract and leaf, and top view of Leticia.

In 2016, 10 plants (replications) were established in a 6” pot (1.61 L and 11 cm high) in Tetela del Monte, Cuernavaca, Morelos, from the new Leticia variety and as witnesses the Prestige[®], Sonora Red[®] and Freedom[®] varieties under a completely randomized experimental design. In accordance with the provisions of UPOV (2008) pruning was done and no growth regulators were applied. Vegetative and bract characters were measured. An analysis of variance and mean comparison test was applied using Tukey ($p \leq 0.05$) (Table 2) with the statistical analysis program SAS version 8.1 (SAS, 2000).

Table 2. Comparison of vegetative characters evaluated between Leticia and three commercial witnesses of poinsettia.

Character	Leticia	Prestige [®]	Sonora Red [®]	Freedom [®]	DMSH	CV(%)
Plant height [AP] (cm)	28.11 a	23.99 b	18.9 c	17.97 c	2.86	10.7
Stem diameter [DM] (mm)	2.86 a	1.42 b	1.75 b	1.35 b	0.47	21.35
Leaf length [LH] (cm)	8.96 a	10.03 a	7.8 a	8.68 a	2.27	21.31
Leaf width [AH] (cm)	6.41 a	5.74 ab	4.96 b	5.88 ab	1.23	17.91
Leaf petiole length [LPH] (cm)	3.42 b	4.75 a	3.31 b	3.17 b	0.75	17.2
Number of branches [NR]	5.2 c	7.9 a	6.3 bc	6.70 ab	1.42	18.18
Number of nodes [NN]	16 c	21.3 a	21 ab	17.8 bc	3.35	14.65
Bract width [AB] (cm)	4.21 c	5.9 b	5.72 b	6.99 a	1.01	14.81
Bract length [LB] (cm)	8.86 b	10.21 ab	10.35 a	10.94 a	1.42	11.75
Bract canopy width [ADB] (cm)	21.69 a	23.02 a	21.78 a	24.12 a	3.14	11.52
Bract petiole length [LPB] (cm)	1.31 bc	1.28 c	1.71 ab	1.81 a	0.41	22.47

DMSH= minimal significant difference honest; CV= coefficient of variation. Values with different letters within rows indicate significant differences (Tukey, 0.05).

There were highly significant differences ($p \leq 0.01$) in the characters: AP, DM, LPH, NR, NE, AB, LB, and LPB, in AH it was significant at 0.05 probability, and in LH and ADB there was no significant statistical effect.

The lowest coefficient of variation was for AP with 10.7% and the highest in LPB with 22.47% (Table 2), these are similar to those reported in works with this same species by Canul *et al.* (2017b, c) and García *et al.* (2017a).

In AP, DT and AH, Leticia stands out. The AP (28.11 cm) meets the pot-plant ratio (1:2). DT (2.86 mm) is a substantial character to support and balance the height of the plant. AH (6.41 cm) is important from the point of view of ornamental decoration. LH (10.03) in Leticia was statistically equal to the three commercial varieties Prestige[®], Sonora Red[®] and Freedom[®]. LPH (4.75 cm) was longer in Prestige[®], but followed by Leticia (3.42). These characters are important, because together they are the expression of a finished plant of poinsettia with an aesthetic architecture attractive to the consumer.

The results of these evaluations based the application for breeder's title before the National Seed Inspection and Certification Service (SNICS-SAGARPA) in May 2017 and finally in July 2018 it was granted registration number 1886 for having met the requirements established for such a distinction.

Conclusions

The new Mexican variety of indoor poinsettia, Leticia, has an intermediate shape of great amplitude with intermediate branching, large oval-shaped leaves with petioles of medium length, bracts of elliptical shape and red. It is of intermediate response; the pigmentation of bracts appears nine weeks after the beginning of autumn. Leticia represents an alternative to diversify production and could compete with foreign varieties in satisfying the tastes and preferences of consumers of this ornamental plant.

Acknowledgments

To the National Institute of Forestry, Agriculture and Livestock Research (INIFAP) for the financial support of fiscal resources that allowed the generation of the Leticia poinsettia variety.

Cited literature

- Canul, K. J.; García, P. F.; Barrios, G. E. J.; Rangel, E. S. E. y Ramírez, R. S. 2018. Rubí, nueva variedad mexicana de nochebuena roja para interior. *Rev. Fitotec. Mex.* 41(1):91-92.
- Canul, K. J.; García, P. F.; Barrios, G. E. J.; Rangel, E. S. E.; Ramírez, R. S. y Osuna, C. F. de J. 2017b. Variación generada mediante recombinación genética en *Euphorbia pulcherrima* Willd. ex Klotzsch. *Agroproductividad.* 10:13-17.
- Canul, K. J.; García, P. F.; Barrios, G. E. J.; Rangel, E. S. E.; Ramírez, R. S. y Osuna, C. F. de J. 2017c. Valoración agronómica de genotipos experimentales de nochebuena (*Euphorbia pulcherrima* Willd. ex Klotzsch). *Agroproductividad.* 10:8-12.

- Canul, K. J.; García, P. F.; Barrios, G. E.; Rangel, E. S.; Ramírez, R. S.; Osuna, C. F. 2017a. Alondra, nuevo híbrido de nochebuena para interiores. *Rev. Mex. Cienc. Agríc.* 8:1203-1208.
- Canul, K. J.; García, P. F.; Osuna, C. F. y Ramírez, R. S. 2010. Estrategias para el mejoramiento genético de nochebuena (*Euphorbia pulcherrima* Willd. ex Klotzsch). *Investigación Agropecuaria.* 7(1):44-54.
- García, P. F.; Osuna, C. F. J.; Ramírez, R. S. G. y Canul, K. J. 2017b. Producción de nochebuena, *Euphorbia pulcherrima* Willd ex. Klotzsch. *In: agenda técnica agrícola Morelos.* Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuaria (INIFAP). 131-141 p.
- García, P. F.; Rangel, E. S.; Canul, K. J.; Osuna, C. F. de J.; Ramírez, R. S. y Portas, F. B. 2017a. Técnicas de injertos entre genotipos de *Euphorbia pulcherrima* Willd. ex Klotzsch. *Agroproductividad.* 10:18-23.
- Islam, M. A.; Lütken, H.; Haugslie, S.; Blystad, D.; Torre, S.; Rolcik, J.; Rasmussen, S. K.; Olsen, J. E. and Clarke, J. L. 2013. Overexpression of the AtSHI gene in poinsettia, *Euphorbia pulcherrima*, results in compact plants. *Plos ONE* 8(1):e53377. doi:10.1371/journal.pone.0053377.
- Royal Horticultural Society. 2006. R. H. S. Colour Chart. The Royal Horticultural Society, London, England.
- SAGARPA. 2013. Comercializarán productores de Nochebuena 20.5 millones de plantas, con un valor de 720 MDP. <http://www.sagarpa.gob.mx/Delegaciones/jalisco/boletines/Paginas/2013B765.aspx>.
- SAS. 2000. SAS[®] Procedure guide, Version 8. SAS Institute Inc. Cary, NC, USA. 1643 p.
- Trejo, L.; Feria, A. T.; Olsen, K. M.; Eguiarte, L. E.; Arroyo, B.; Gruhn, J. A. and Olson, M. E. 2012. Poinsettia's wild ancestor in the Mexican dry tropics: historical, genetic, and environmental evidence. *Am. J. Bot.* 99:1146-1157.
- UPOV. 2008. Flor de Pascua, *Euphorbia pulcherrima* Willd. ex Klotzsch. Directrices para la ejecución del examen de la distinción, homogeneidad y estabilidad. Ginebra, Suiza. 36 p.