

## **HAM14F: mulatto wide chili hybrid for the North-Central Mexico Highlands**

Ulises Santiago López<sup>1§</sup>  
Moisés Ramírez Meraz<sup>2</sup>  
Reinaldo Méndez Aguilar<sup>2</sup>

<sup>1</sup>Experimental Field San Luis-INIFAP. Highway San Luis Potosí-Matehuala km 14.5, Ejido Palma de la Cruz, Soledad de Graciano, San Luis Potosí, Mexico. CP. 78431. (santiago.ulises@inifap.gob.mx).

<sup>2</sup>Experimental Field the Huastecas-INIFAP. Highway Tampico-Mante km 55, Villa Cuauhtémoc, Tamaulipas, Mexico. CP. 89610. (ramirez.moises@inifap.gob.mx; mendez.reinaldo@inifap.gob.mx).

§Corresponding author: santiago.ulises@inifap.gob.mx.

### **Abstract**

The mulatto wide chili is demanded mainly in dry or dehydrated state. In Mexico, as a basic ingredient of traditional dishes, it has great gastronomic, economic and social importance. In 2014, 1 878 ha of this type of chili were harvested nationally with a production of 3 869 t and an average yield of 2.1 t ha<sup>-1</sup>. Obtaining low yields in the producing areas, mainly in the North-Central High Plateau of Mexico, is due to the high use of unimproved or creole seed, which is estimated to be sowed 80% of the area dedicated to this crop. In order to mitigate the aforementioned problems, the hybrid mulatto wide chili HAM14F was developed, which reaches a height of 80 to 95 cm and has good foliage coverage, 60 to 75 cm in diameter. It is considered early cycle because the flowering and maturation of the fruit occurs at 40 and 135 days after transplantation (ddt), respectively. It produces dark green fruits that turn dark brown with a strong brilliance in a mature state. This hybrid has an average open-air yield of 3.8 t ha<sup>-1</sup>, 21.1% higher than that of the AM-VR variety (3 t ha<sup>-1</sup>). For the aforementioned, HAM14F is considered a good alternative for the North-Central Plateau of Mexico.

**Keywords:** *Capsicum annuum* L., vegetable, yield.

Reception date: May 2018

Acceptance date: June 2018

## Introduction

In Mexico, the cultivation of chili (*Capsicum annuum* L.) is the second most important vegetable (Acosta and Chávez, 2003). The greater variability of cultivated and wild forms of chili is widely distributed in our national territory. *C. annuum*, is the species that groups the vast majority of types and varieties grown in Mexico, including: serrano, jalapeño, morron, ancho, mirasol, pasilla and mulato (Pozo, 1981; Laborde and Pozo, 1982). Mulato wide chili is demanded mainly in dry or dehydrated state, since it allows its conservation for long periods, as well as facilitating its storage and transport (Ramiro, 2008). Because it is a basic ingredient of traditional dishes, it has great gastronomic, economic and social importance (Rodríguez *et al.*, 2007).

At the national level, 1 878 ha of mulatto broad chili were harvested with a production of 3 869 tons and an average yield of 2.1 t ha<sup>-1</sup> (SIAP-SIACON, 2014). Obtaining low yields in the producing areas, mainly in the North-Central Mexico Plateau (Durango, Zacatecas, Aguascalientes, San Luis Potosi and Guanajuato) is due to several factors, among which the high use of unimproved seed or creole, which is estimated to be sown in 80% of the area dedicated to this crop (Ramiro, 2008).

Starting from the problematic and with the purpose of contributing in the competitiveness of this vegetable, the objective of the present study was to develop a hybrid of simple cross of mulatto wide chili with good botanical, horticultural and production characteristics for the North-Central Plateau region from Mexico.

### Hybrid registration HAM14F

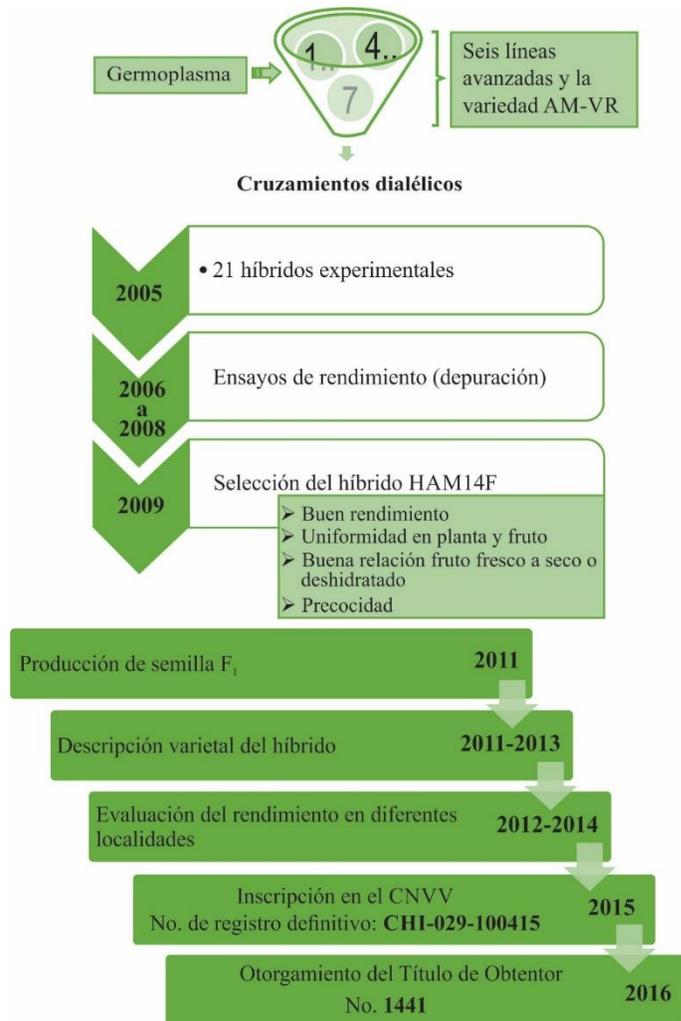
It is owned by the National Institute for Forestry, Agriculture and Livestock Research (INIFAP) and is registered in the National Catalog of Plant Varieties (CNVV) of the National Seed Inspection and Certification Service (SNICS) with the definitive registration number CHI-029 -100415 and Breeder's Title num. 1441.

### Origin and development of the hybrid

The hybrid mulatto wide chili "HAM14F" was developed in the San Luis-INIFAP Experimental Field by the simple cross between the AM-VR variety used as a female parent, and the AM-97-45-21 line, as a male parent; both parents are property of INIFAP. The genealogy is AM-VR()7 and AM-97-45-21()7 of the variety and line, respectively, and the obtaining of the two progenitors as pure lines was by successive self-fertilization; for the formation and selection of the hybrid, the use of diallelic crosses of seven progenitors (six lines and one variety) was used, using Griffing's design 2 (Martínez, 1983), until obtaining the hybrid of simple cross HAM14F (Figure 1).

### Variety description

It was carried out through the use of qualitative and quantitative descriptors for chili (IPGRI-AVRDC-CATIE, 1995, SAGARPA-SNICS, 2014).



**Figure 1. Process for obtaining the hybrid HAM14F.**

### Botanical and horticultural characteristics

The HAM14F hybrid reaches a height of 80 to 95 cm and has good foliage coverage, 60 to 75 cm in diameter. The position of the plant is semi-erect with habit of dichotomous growth, the main stems have an average length of 20.25 cm and internodes of 7.8 cm. It has dark green leaves, large and wide with a value of 9.49 and 4.42 cm, respectively. HAM14F is considered to be an early cycle since flowering and maturation of the fruit occur at 40 and 135 days after transplantation (ddt), respectively; while the variety AM-VR is intermediate cycle with 48 and 140 ddt. The HAM14F hybrid produces dark green fruits that turn a dark brown color with a strong brightness in the mature state (Figure 2), while the AM-VR variety has a dark brown color and medium brightness. The hybrid has a length and diameter of fruit of 14.90 and 7.38 cm, respectively, and the pericarp of greater thickness (4.53 mm) in comparison with the variety AM-VR (3.3 mm) (Table 1). This last character is an indicator of dry matter, which with greater thickness produces a better quality at the time of drying (Berríos *et al.*, 2007).



**Figura 2. Mulatto wide chili hybrid HAM14F. a) plant with fruits in mature state; b) dehydrated fruits.**

**Table 1. Botanical and horticultural characteristics of the HAM14F hybrid compared to the AM-VR variety.**

Characteristics	HAM14F	AM-VR
Botanicals		
Height of plant (cm)	80-95	75-100
Foliage coverage (cm)	60-75	75-85
Position of the plant	Semi-erect	Semi-erect
Habit of growth	Dichotomous	Dichotomous
Type of root	Branched pivoting	Branched pivoting
Leaf color	Dark green	Intermediate green
Leaf limb length (cm)	Large: 9.49	Medium: 6.6
Leaf limb width (cm)	Width: 4.42	Medium: 3.36
Petiole length (cm)	Length: 4.5	Intermediate: 1.04
Stem length (cm)	Length: 20.25	Intermediate: 3.5
Days to the beginning of flowering (ddt)	Early: 40	Intermediate: 48
Days to ripening of the fruit (ddt)	Early: 135	Intermediate: 14
Horticultural		
Fruit color in green	Dark green	Dark green
Ripe fruit color	Strong dark coffee	Medium dark coffee
Brilliance of fruit	Strong	Half
Fruit length (cm)	14.9	13.1
Diameter of fruit (cm)	7.38	7.4
Thickness of the pericarp (mm)	4.53	3.3
Position of the placenta of the fruit	Compact	Distributed
Depth of the peduncular cavity of the fruit	Half	Deep

ddt= days after the transplant.

## Performance evaluation under open sky conditions

In the period 2012-2014 in different locations of the state of San Luis Potosí, the HAM14F hybrid and the control variety were established under open sky conditions to evaluate the yield of dry or dehydrated fruit. The management of the evaluation plots was according to the production systems of each locality. This hybrid obtained an average yield of 3.8 t ha<sup>-1</sup>, which was higher by 21.1% compared to the variety AM-VR (3 t ha<sup>-1</sup>). The best expression of the hybrid was obtained in the town of Soledad of Graciano Sanchez, with a yield of 7.4 t ha<sup>-1</sup>, superior production in 1.3 t ha<sup>-1</sup> of dry or dehydrated product compared to the variety AM-VR which obtained a yield of 6.1 t ha<sup>-1</sup> (Table 2), both results were obtained in plots evaluated under the same conditions. The high yields obtained in the town of Soledad of Graciano Sánchez are attributed, in addition to the potential of the hybrid, to the technological components used during the development of the crop (fertigation, plastic mulching, integrated pest and disease management) unlike the rest of the localities where the plots were traditionally managed. For this reason, the HAM14F hybrid represents a good alternative to be cultivated in the North-Central Mexico Plateau region.

**Table 2. Yields of dry or dehydrated fruit of the HAM14F hybrid compared to the AM-VR variety.**

Year	Locality	Yield (t ha <sup>-1</sup> )	
		HAM14F	AM-VR
2012	V. Reyes, S. L. P.	2	ϕ
2012	V. Arista, S. L. P.	3.8	ϕ
2013	V. Arista, S. L. P.	3.1	1.8
2013	Moctezuma, S. L. P.	2.2	1.6
2013	V. Ramos, S. L. P.	3.1	1.7
2013	Soledad of G. S., S. L. P.	7.4	6.1
2014	V. Ramos, S. L. P.	3.1	2.3
2014	*V. Ramos, S. L. P.	4.3	3.7
2014	Soledad of G. S., S. L. P.	5	4
Average		3.8	3

V. Reyes, SLP= Villa de Reyes, San Luis Potosi; V. Arista= Villa of Arista; V. Ramos= Villa of Ramos; Soledad of G.S.= Soledad of Graciano Sánchez; \*= locality two in V. Ramos; ϕ = no data.

## Conclusions

The hybrid HAM14F is a good alternative to be cultivated in the North-Central High Plateau of Mexico, because it has desirable botanical, horticultural and production characteristics.

## Acknowledgments

The authors thank INIFAP and Produce Foundation San Luis Potosi, AC. for the financing of several projects that resulted in the hybrid mulato wide chili hybrid HAM14F.

## Cited literature

- Acosta, R. G. F. y Chávez, S. N. 2003. Arreglo topológico y su efecto en rendimiento y calidad de la semilla de chile jalapeño. *Agric. Téc. Méx.* 29(1):49-60.
- Berríos, U. M. E.; Arredondo, B. C. y Tjalling, H. H. 2007. Guía de manejo de nutrición vegetal de especialidad. SQM, SA. 103 p.
- Laborde, J. A. y Pozo, O. 1982. Presente y pasado del chile en México. SARH-INIA. Publicación especial núm. 85. México. 80 p.
- IPGRI, AVRDC, CATIE. 1995. Descriptors for *Capsicum* (*Capsicum* spp.). International Plant Genetic Resources Institute, Rome, Italy the Asian Vegetable Research and Development Center, Taipei, Taiwan, and the Centro Agronómico Tropical de Investigación y Enseñanza, Turrialba, Costa Rica. 51 p.
- Martínez, G. A. 1983. Diseños y análisis de cruza dialélicas. Centro de Estadística y Cálculo. Colegio de Postgraduados, Chapingo, México. 252 p.
- Pozo, C. O. 1981. Descripción de tipos y cultivares de chile (*Capsicum* spp.) en México. Folleto técnico núm. 77. INIA. SARH. México. 40 p.
- Ramiro, C. A. 2008. AM-VR, Nueva variedad de chile ancho mulato para el Altiplano de México. INIFAP-CIRNE-Campo Experimental San Luis. Folleto técnico núm. 34. San Luis Potosí, SLP. México, D. F. 10 p.
- Rodríguez, J.; Peña, O. B. V.; Gil, M. A.; Martínez, C. B.; Manzano, F. y Salazar, L. L. 2007. Rescate *in situ* del chile “poblano” en Puebla, México. *Rev. Fitotec. Mex.* 30(1):25-32.
- SAGARPA-SNICS. 2014. Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación-Servicio Nacional de Inspección y Certificación de Semillas. Guía técnica para la descripción varietal de chile (*Capsicum annuum* L.). 25 p.
- SIAP-SIACON. 2014. Servicio de Información Agroalimentaria y Pesquera-Sistema de Información Agroalimentaria de Consulta. Contenido de la base de datos. <http://www.siap.gob.mx/cierre-de-la-produccion-agricola-por-cultivo/>.