Revista Mexicana de Ciencias Agrícolas

REMEXCA

DOI: https://doi.org/10.29312/remexca.v16i1.3368

Evaluation of corn yield for the High Valleys of the State of Mexico

Rodrigo Ocampo De Jesús[1]
Erasto Domingo Sotelo-Ruiz[2,§]
Gustavo Salgado-Benítez[1]
Román Flores-López[2]
Abygail Adarely Martínez-Mendoza[3]
Hernán Gil-Gil[1]

1 Facultad de Ciencias Agrícolas-Universidad Autónoma del Estado de México. Carretera Toluca-Ixtlahuaca km 15.5, El Cerrillo, Piedras Blancas, Toluca, Estado de México. CP. 50200. (agroalexbeac@gmail.com; gsalgadob@uaemex.mx).

2 Campo Experimental Metepec-INIFAP. Vialidad Adolfo López Mateos, carretera Toluca-Zitácuaro km 4.5, San José Barbabosa, Zinacantepec, Estado de México. CP. 51350. (flores.roman@inifap.gob.mx).

3 Universidad Tecnológica de Tula. Av. Universidad Tecnológica Núm. 1000, Colonia el 61, El Carmen, Tula de Allende, Estado de Hidalgo. CP. 42830. (statusprodigy@yahoo.com.mx).
Autor para correspondencia: soteloe@colpos.mx.

Abstract

Corn (*Zea mays* L.) is the most consumed and sown grain in Mexico. Annual consumption is 46 million tonnes. For the High Valleys region (>2 800 masl), there are very few hybrids that adapt to these conditions due to the altitude and low temperatures; the few that exist have low yields (<3 t ha^{-1}). Therefore, this work aimed to evaluate the yield and adaptation of five corn hybrids under conditions of the High Valleys of the State of Mexico. A completely randomized experiment with three replications was established; seeded was carried out on March 30, 2020. The corn hybrids that were established were H-40, H-66, H-70, AS 722, Cherokee, and the control, which was the native corn of the area. The yields obtained were: AS 722 with 6 953 kg ha^{-1}, H-40 with 5 188 kg ha^{-1}, and Cherokee with 4 547 kg ha^{-1}; for the remaining two, H-66 had 4 313 kg ha^{-1} and H-70 had 4 265 kg ha^{-1}; the native corn presented a yield of 6 078 kg ha^{-1}, which was higher than that of the H-40, H-66, H-70, and Cherokee hybrids. It can be concluded that the AS 722 hybrid presented the highest yield and the best adaptability to the conditions of altitudes >2 800 masl, with a yield of 6 953 kg ha^{-1}.

Keywords:

High Valleys, hybrid corn, native.

DOI: https://doi.org/10.29312/remexca.v16i1.3368

Introduction

Since ancient times, Mesoamerican man undertook the domestication of corn (*Zea mays* L.) in the Mesoamerican region and was the main cereal used by the Maya in their religious ceremonies, festivities and nutrition (Turrent, 2004). Corn is the only important cereal native to the Western Hemisphere. Native to Mexico, it extends north to Canada and south to Argentina.

In Mexico, no other crop is as important as corn. From the point of view of area and production, it ranks as the main crop, followed by sorghum, wheat, barley, rice, and oats, which are the most grown cereals in Mexico. On average, 22 million tons of corn are produced per year, with an average annual growth rate of 2%. Mexico is the home and place of origin of corn, so the country has a unique and irreplaceable genetic diversity in its local varieties or native breeds (FAO, 2015; FAO, 2018; SIAP, 2023).

According to FAO (2018) statistics, corn was grown in 163 countries; Mexico ranks fourth in terms of production volume, with 22 million tons (SIAP, 2023). The use of corn production worldwide is distributed as follows: 22% is for human food, 63% for animal consumption, and 15% for other (industrial) uses; for its part, in Latin America, 29% is used as human food, 58% for animal consumption, and 13% for other uses FAO (2018).

No other species may be adapted to as many types of environment and have as great a variation in human interest traits as corn. In addition, the number of ways in which corn is used is also unrivaled among domesticated species (Perales, 2009). Corn is the main food of the Mexican population; it has a great diversity of hybrids, varieties, and types that adapt to the different climate, soil, and altitude conditions present in Mexico.

The problem of corn, as it has been raised in Mexico in recent decades, has many facets, such as economic, social, cultural, ethical, political, agricultural, environmental, food, technical, and scientific (Olivé, 2009). Mexico is experiencing a lack of corn grain that forces it to import 15 million tons per year (SIAP, 2023). Likewise, agronomic research seeks to contribute to greater corn production in the country with the generation of improved seeds in national research institutions (Espinosa *et al*., 2009; Trueba, 2012).

In Mexico, no other crop is as important as corn. From the point of view of area and production, it ranks as the main crop, followed by sorghum, wheat, barley, rice, and oats, which are the most grown cereals in Mexico. On average, 19.3 million tons of corn have been produced in the last 11 years, with an average annual growth rate of 2%, which is significantly higher than the 6.1 million tons produced of sorghum and 3.1 million tons of wheat. Mexico has a unique and irreplaceable genetic diversity in its local varieties or native breeds (FAO, 2015; FAO, 2018).

Corn is the most important food in the country. Its per capita consumption is estimated at 300 g day^{-1}, which provides 56% of the calories and 47% of the proteins in the Mexican diet. Of the total corn used in the country, 59.5% is consumed in tortillas. Four point seven percent is processed by the starch industry and 35.8% is destined for other uses (seeds, animal feed and consumption by the farmer) (González, 1995).

In Mexico, corn is not just another agricultural product and its cultivation is carried out in the hope of obtaining greater profits and supplying family consumption (Nadal and Wise, 2005). The use of native seed in Mexico is 75%. The remaining 25% comes from seed of improved varieties. In this context, in the High Valleys of Mexico, only 6% is planted with improved seed (Tadeo *et al*., 2015).

Given the situation of available corn materials, we must have a wide variety of options that adapt and have profitable yields; therefore, having specific hybrids for the High Valleys is a great opportunity for the continuous improvement of corn production in the region. A corn hybrid is the result of genetic improvement by crossing two or more lines with desirable traits. Some characteristics that are sought with this technique are: improvements in yield and grain composition, tolerance to pests and diseases, adaptation to situations of abiotic stress, resistance to lodging and earliness, among others (Delgado, 2017).

DOI: https://doi.org/10.29312/remexca.v16i1.3368

The adaptation of exotic corn genotypes to the Central Mexican Plateau modified the morphology of earliness to flowering, length and branching of the central tassel, ear shape, number of grains per row of ear, and number of rows per ear. The morphological changes in the original populations allow us to recognize the phenotypic variability existing in the evaluated populations, which could be incorporated into corn genetic improvement programs to take advantage of their divergence and generate greater heterosis (Velasco *et al*., 2022).

In the State of Mexico, corn is mostly grown under rainfed conditions and with very varied levels of technology, whose yields are less than 1 t ha^{-1} in some regions and above 8 t ha^{-1} in the most technical production systems. In this state, an average of around 470 000 ha are cultivated historically, of which 20% is cultivated under irrigation, 26% under favorable rainy season, and the remaining 54% is cultivated under limited rainy season (SIAP, 2023).

In general, the yields of corn and crops depend mainly on climate and soil conditions in addition to technological development, the use of inputs, machinery, and specialized technical assistance. Therefore, there is a variation in yields. The State of Mexico has the land, conditions, and technology required to achieve self-sufficiency and food sovereignty in corn. What is needed is to use the information on the lands that have good potential to implement development programs in these areas and thus increase productivity (Sotelo *et al*., 2016).

It is necessary to introduce new corn hybrids that adapt to the conditions of the High Valleys to increase yields because producers in these areas only sow native corn (Sotelo *et al*., 2016). The purpose of this work was to find the hybrid that best adapts and presents the highest yield for the conditions offered by the High Valleys region.

In these areas, the use of improved materials is almost non-existent due to the lack of research work that tries to find corn hybrids that adapt to this area. There is no technological package to improve crop production, there is a lack of confidence on the part of the producer to use hybrids in the area since there is not a well-established material that adapts and has a yield that becomes attractive to producers.

In the market, there are few options for hybrids for High Valleys (<2 700 masl), their use is reflected in the small area sown with the same materials; for that reason, it is still the native seed that predominates in the sowings of these areas. Therefore, the objective proposed in this work was to evaluate the yield and adaptation of five corn hybrids under conditions of the High Valleys of the State of Mexico.

Materials and methods

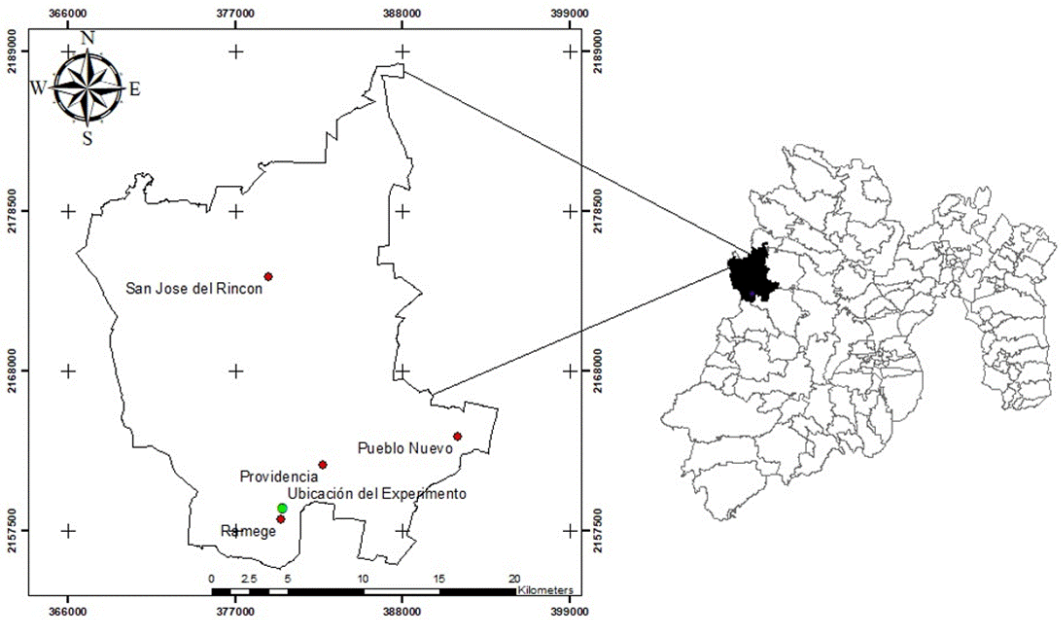
Location of the study area

The municipality of San José del Rincón is located in the western part of the State of Mexico and ranges from 99° 52' 01" to 100° 16' 26" west longitude and from 19° 28' 58" to 19° 47' 07" north latitude. The average altitude is 2 740 masl (INEGI, 2019; INEGI, 2022). The predominant climate is temperate subhumid with rainfall in summer C (w2) (w). The annual temperature varies between 12 °C and 18 °C. Nonetheless, there are minimum temperatures of -2 °C and maximum temperatures of 28 °C. Rains are abundant from July to September, winds and dust devils occur in February and March, whereas in December, January, February and March, there are frosts.

The dominant soil where the experiment was established is Andosol, with an altitude of 2 865 masl and coordinates of -100° 08' 34" west longitude and 19° 31' 20" north latitude (Figure 1); the locality is Rameje, San José del Rincón, State of Mexico (INEGI, 2019; Sotelo *et al*., 2020; INEGI, 2022).

Revista Mexicana de Ciencias Agrícolas
REMEXCA
DOI: https://doi.org/10.29312/remexca.v16i1.3368

Figure 1. Location of the experiment in Rameje, San José del Rincón, State of Mexico.



Methodology

The experiment was established in the locality of Rameje, with an altitude of 2 865 masl at the site or place of the experiment, in San José del Rincón, State of Mexico. The corn hybrids that were selected for the experiment were: H-40, H-66, H-70, AS 722, Cherokee and the producer's native corn, which was the control of the area. The experiment was sown on March 30, 2020, with a seeder and all the established materials were harvested on October 29, 2020.

Land preparation included fallow and harrowing; sowing was done with a seeder, which was calibrated for a density of 60 000 plants ha^{-1}. The fertilization dose applied to the experiment was 90-70-90 (N-P-K), 70% of the nitrogen and potassium were applied at sowing and all the phosphorus and the remaining 30% of N and K were applied at the second weeding; the sources used were urea, diammonium phosphate (18-46-00), and potassium chloride.

The work carried out on the crop was the application of a pre-emergent herbicide. In addition, at the sowing, first and second weeding, after the second weeding, a second application of herbicide was carried out with Maister. The experimental design was completely randomized, where the hybrids are the treatments with three replications; the sampling was done by hand and it consisted of three samples for each replication of each hybrid.

The experiment was analyzed with the Statistical Analysis System (SAS), where a comparison of means of yields between hybrids was carried out (Martínez, 1996; SAS, 2018). The treatments established were native corn with 33 rows, AS 722 with 18 rows, H-70 with 21 rows, Cherokee with 27 rows, H-40 with 18 rows, and H-66 with 24 rows; the rows per replication were 11 rows per replication for native corn, six rows per replication for AS 722, seven rows per replication for H-70, nine rows per replication for Cherokee, six rows per replication for H-40, and eight rows per replication for H-66.

The length of the furrows was 70 m, with an orientation from east to west. The experiment was established in the locality of Rameje, San José del Rincón, State of Mexico; the harvest was carried out by hand, where three samples were taken for each replication to obtain an average yield per replication (Table 1).

DOI: https://doi.org/10.29312/remexca.v16i1.3368

Table 1. Corn hybrids of the experiment in Rameje, San José del Rincón, State of Mexico.

Hybrid	Total rows	Rows per replication
Native	33	11
AS 722	18	6
H-70	21	7
Cherokee	27	9
H-40	18	6
H-66	24	8

Results and discussion

Table 2 shows the yield data obtained from the experiment of five corn hybrids and the control, which is the native corn that the producers sow in the area.

Table 2. Yield data of corn hybrids in Rameje, San José del Rincón, State of Mexico.

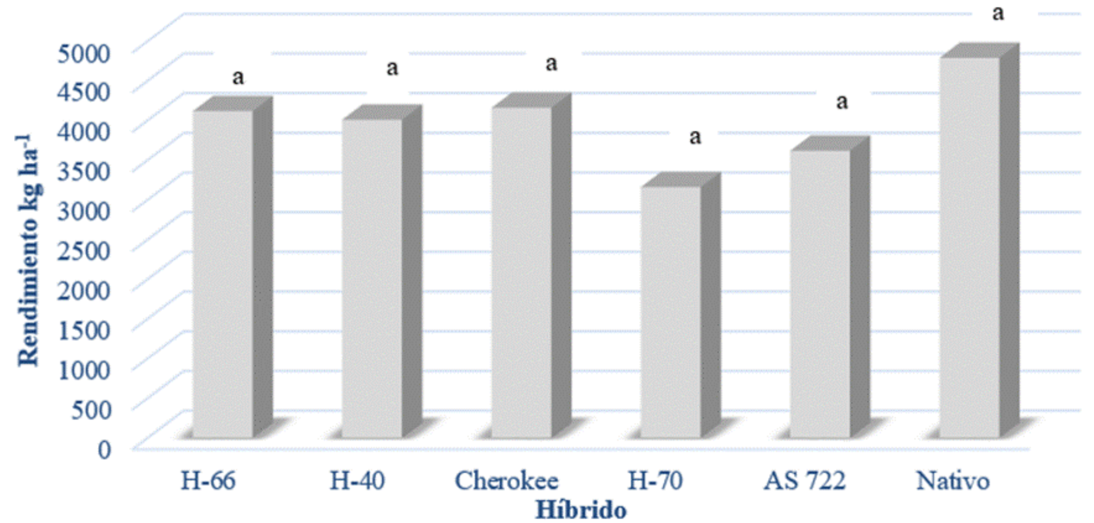
Hybrid	Replication	No. of plants	No. of ears	Sample weight (kg)	Grain weight (kg)	Yield (kg ha^{-1})
H-66	1	19	17	1.86	1.22	3 812.5
H-66	2	18	12	1.69	1.38	4 312.5
H-66	3	22	22	2.08	1.35	4 218.8
H-40	1	27	20	1.59	0.93	2 906.3
H-40	2	34	22	1.53	1.255	3 921.9
H-40	3	26	18	1.99	1.66	5 187.5
Cherokee	1	33	30	2.07	1.4	4 375
Cherokee	2	22	28	1.85	1.135	3 546.9
Cherokee	3	34	34	2.38	1.455	4 546.9
H-70	1	20	17	1.565	1.365	4 265.6
H-70	2	25	20	1.57	0.935	2 921.9
H-70	3	28	17	1.275	0.73	2 281.3
AS 722	1	39	39	3.94	2.225	6 953.1
AS 722	2	39	30	1.27	0.52	1 625
AS 722	3	47	27	0.9	0.725	2 265.6
Native	1	19	15	1.56	1.085	3 390.6
Native	2	23	19	2.41	1.565	4 890.6
Native	3	18	17	2.825	1.945	6 078.1

Based on the data in Table 2, it was observed that the best yields occurred with the AS 722 hybrid, with 6 953 kg ha^{-1} for replication 1, followed by native corn with 6 078 kg ha^{-1} for replication 3, then H-40 with 5 188 kg ha^{-1} for replication 3, and Cherokee with a yield of 4 547 kg ha^{-1} for replication 3. The AS 722, H-40, and Cherokee hybrids are the ones that showed the highest yields and good development in a replication of each established hybrid.

On the contrary, it was analyzed that the lowest yields range from 1 625 kg ha^{-1} for replication 3 and 2 266 kg ha^{-1} for replication 2 of AS 722, 2 281 kg ha^{-1} for replication 3 of H-70 and 2 906 kg ha^{-1} for replication 1 of H-40. The results of the statistical analysis in SAS (SAS, 2018) of the comparison of means of the yields of the experiment do not show significant differences for the hybrids because the yields have similar values and there are no notable differences in yield. Considering the three replications for each hybrid, it was observed that the highest yields occurred in the native corn, Cherokee and H-66 (Figure 2).

DOI: https://doi.org/10.29312/remexca.v16i1.3368

Figure 2. Comparison of yields per replication for each corn hybrid (SAS, 2018) in Rameje, San José del Rincón, State of Mexico.



With respect to the established hybrids, it can be said that they do have very good development and adaptation to the area although the height above sea level is 2 865 m; AS 722 presented 6 953 kg ha^{-1} in one treatment and was the highest. Studies similar to this work are those by López *et al*. (2020); López *et al*. (2021); in their findings, they found that V-520C corn adapted to High Valleys and presented yields of 3.5 t ha^{-1}, which are acceptable for these conditions.

Reynoso *et al*. (2014) evaluated 17 corn hybrids for High Valleys, where they found grain yields of 8.19, 8.1, 7.35 and 7.95 t ha^{-1} for the H-55 hybrid in four localities. Velasco *et al*. (2022) evaluated ten corn hybrids for High Valleys; they found that the outstanding hybrids were Atziri Puma, with grain yield of 8 044 kg ha^{-1}, followed by Tsíri Puma with 7 783 kg ha^{-1}.

The average yield obtained for High Valleys under rainfed conditions is 3.5 t ha^{-1} of corn grain; however, it can be increased to 6 t ha^{-1} if improved seeds are sown and appropriate production technologies are applied. For their part, Tadeo *et al*. (2016) obtained yields of 8 116 kg ha^{-1} for the Tsiri Puma hybrid for the Valley of Mexico, Toluca-Atlacomulco Valley, Puebla Valley, San Martín Texmelucan, Huamantla and Apizaco in Tlaxcala.

Regarding the work of adaptation to these conditions, Velasco *et al*. (2019) mention that hybrids and varieties of corn (*Zea mays* L.) introduced to High Valleys, from other latitudes, are a favorable and useful source in genetic improvement, but before being used, they must adapt to the climatic conditions of the environments of interest; in addition, they mention that the tropical and subtropical corn hybrids adapted to the High Valleys showed outstanding yield traits, so they could be used in the genetic improvement of corn.

A work similar to this research is that by Tadeo *et al*. (2020), who evaluated six corn hybrids: H-51 AE, H-53 AE, H-47 AE, H-49 AE, Tsíri PUMA, and H-48 and three sowing densities: 50 000, 65 000, and 80 000 plants ha^{-1} For the conditions of the Valle de México Experimental Field (CEVAMEX, for its acronym in Spanish), the Tsíri PUMA hybrid presented the highest grain yield with 5 856 kg ha^{-1}.

Authors such as Virgen *et al*. (2013) evaluated the yield and productivity of the H-40, H-66, and H-70 hybrids for the High Valleys of the State of Mexico; they generated information on localities, potential yield, population density, and sowing dates for the production of parents, lines, and single

DOI: https://doi.org/10.29312/remexca.v16i1.3368

crosses of these materials for sowing under these conditions. Eight point sixty eight tonnes were produced and sold per year, which represented 60% of the seed demand by corn producers for this type of environment.

Conclusions

The five corn hybrids: H-40, H-66, H-70, AS 722, and Cherokee showed good adaptability and acceptable yields. The highest yields were obtained for AS 722 with 6 953 kg ha^{-1} for replication 1, followed by H-40 with 5 188 kg ha^{-1} for replication 3, and Cherokee with 4 547 kg ha^{-1} for replication 3.

It can be concluded that the AS 722 hybrid presented the highest yield, with 875 kg ha^{-1} more than the native corn planted by the producers in the area; besides, it was observed that the highest average yields occurred with the native corn, Cherokee, and H-66.

Bibliography

1 Delgado, R. J. 2017. La selección del híbrido de maíz. Serie Cereales núm. 35. Artículos técnicos de INTAGRI. México. 3 p.

2 Espinosa, C. A.; Turrent, F. A.; Gómez, N.; Sierra, M.; Caballero, F.; Palafox, A. y Rodríguez, A. 2009. El potencial de las variedades nativas y mejoradas de maíz. Ciencias. 92-93:118-125.

3 FAO. 2015. Food and Agricultural Organization of the United Nations. Anuario FAO de la producción. Roma, Italia. https://openknowledge.fao.org/items/1a89aa6a-9fee-4868-8878-11de6ff84f8a

4 FAO. 2018. Organización de las Naciones Unidas para la Alimentación y la Agricultura. México Rural del Siglo XXI. Ciudad de México, México. 25 p.

5 González, A. U. 1995. El maíz y su conservación. Editorial Trillas. México, DF. 399 p.

6 INEGI. 2019. Instituto Nacional de Estadística, Geografía e Informática. Estadísticas básicas del Estado de México. Síntesis geográfica del Estado de México. (http://www.inegi.gob.mx).

7 INEGI. 2022. Instituto Nacional de Estadística, Geografía e Informática. Estadísticas básicas del Estado de México. Síntesis geográfica del Estado de México. (http://www.inegi.gob.mx).

8 López, M. F.; García, Z. J. J.; Corona, T. T.; Cruz, I. S.; López, R. G.: Reyes, L. D.; Vásquez, C. Ma. G. y Molina, G. J. D. 2020. Comparación del rendimiento y cambios morfológicos en maíz Tuxpeño V-520C adaptado a Valles Altos de México. Revista Fitotecnia Mexicana. 43(2):133-141.

9 López, M. F.; Vázquez, C. Ma. G.; García, Z. J. J.; Reyes, L. D.; Bonilla, B. O.; Esquivel, E. G., García, L.; Hernández, S. G.; Pérez, J. G.; Herrera, P. L. y Molina, G. J. D. 2021. Rendimiento y calidad del maíz Tuxpeño V-520C adaptado con selección a Valles Altos de México. Revista Fitotecnia Mexicana. 44(2):231-239.

10 Martínez, G. A. 1996. Diseños experimentales. Métodos y elementos de teoría. Ed. Trillas. México, DF. 756 p.

11 Nadal, A. y Wise, T. A. 2005. Los costos ambientales de la liberalización Agrícola: el comercio del maíz entre México y EU, en el marco del NAFTA. 44 p. http://ase.tufts.edu/gdae/Pubs/rp/wg/NadalyWise.pdf.

12 Olivé, L. 2009. El maíz en México problemas éticos-políticos. Ciencias. 92-93:147-156.

13 Perales R. H. R. 2009. Maíz riqueza de México. Ciencias. 92-93:46-55.

14 Reynoso, Q. C. A.; González, H. A.; Pérez, L. D. J.; Franco, M. O.; Torres, F. J. L.; Velázquez, C. G. A.; Breton, L. C.; Balbuena, M. A. y Mercado, V. O. 2014. Análisis de 17 híbridos de maíz sembrados en 17 ambientes de los Valles Altos del centro de México. Revista Mexicana de Ciencias Agrícolas. 5(5):871-882.

DOI: https://doi.org/10.29312/remexca.v16i1.3368

15 SAS. 2018. Statistical Analysis System. User's Guide of SAS. Proprietary Software Depot 9.3. SAS Institute Inc. Cary. NC. USA. 550 p.

16 SIAP. 2023. Servicio de Información Agroalimentaria y Pesquera. Cierre de la producción agrícola, por municipios para el Estado de México. http://www.siap.gob.mx/cierre-de-la-produccion-agricola-por-estado/.

17 Sotelo, R. E. D.; Cruz, B. G.; González, H. A. y Moreno, S. F. 2016. Determinación de la aptitud del terreno para maíz mediante análisis espacial multicriterio en el Estado de México. Revista Mexicana de Ciencias Agrícolas. 7(2):401-412.

18 Sotelo, R. E. D.; Cruz, B. G.; González, H. A. y Flores, L. R. 2020. Actualización de la cartografía Edafológica del Estado de México: una herramienta para la planeación. Revista Mexicana de Ciencias Agrícolas. 11(8):1775-1788.

19 Tadeo, R. M.; Espinosa, C. A.; Canales, I. R. I.; López, L. C.; Zamudio, G. B.; Turrent, F. A.; Gómez, M. N.; Sierra, M. M.; Martínez, G. A.; Valdivia, B. and Andrés, M. P. 2020. Grain yield and population densities of new corn hybrids released by the INIFAP and UNAM for the High Valleys of Mexico. Terra Latinoamericana. 38(3):507-515.

20 Tadeo, R. M.; Espinosa, C. A.; García, Z. J. J.; Lobato, O. R.; Gómez, M. N. O.; Sierra, M. M.; Valdivia, B. R.; Zamudio, G. B.; Martínez, Y. B.; López, L. C.; Mora, G. K. Y.; Canales, I. E. I.; Cárdenas, M. A. L.; Zaragoza, E. J. y Alcántar, L. H. J. 2016. Tsíri puma, híbrido de maíz para Valles Altos con esquema de Androesterilidad para producción de semillas. Revista Fitotecnia Mexicana. 39(3):331-333.

21 Tadeo, R. M.; Zamudio, G. B.; Espinosa, C. A.; Turrent, F. A.; Cárdenas, M. A. L.; López, L. C.; Arteaga, E. I. y Valdivia, B. R. 2015. Rendimiento de maíces nativos e híbridos en diferente fecha de siembra y sus unidades calor. Revista Mexicana de Ciencias Agrícolas. 6(1):33-43.

22 Trueba, C. A. 2012. Semillas mexicanas mejoradas de maíz: su potencial productivo. Colegio de Posgraduados. Montecillo, Texcoco, Estado de México.

23 Turrent, F. A. 2004. Contexto y antecedentes del maíz silvestre y cultivado en México. En maize and biodiversity: the effects of transgenic maize in Mexico. Commission for Environmental Cooperation of North America (CECNA). Report of the Secretariat according to Article 13 of the NAAEC.

24 Velasco, G. J.; García, Z. J.; Sahagún, C. J.; Lobato, O. R.; Sánchez, A. C. y Marín, M. I. M. 2019. Rendimiento, componentes de rendimiento y heterosis de germoplasma de maíz adaptado a Valles Altos. Revista Fitotecnia Mexicana. 42(4):367-374.

25 Velasco, M. S.; Tadeo, R. M.; Espinosa, C. A.; Zaragoza, E. J.; Canales, I. E. y Coutiño, E. B. 2022. Rendimiento de grano, forraje y calidad forrajera de nuevos híbridos de maíz de Valles Altos. Revista Mexicana de Ciencias Agrícolas. 13(1):77-87.

26 Virgen, V. J.; Zepeda, B. R.; Ávila, P. M. A.; Espinosa, C. A.; Arellano, V. J. L. y Gámez, V. A. J. 2016. Producción y calidad de semilla de maíz en valles altos de México. Agronomía Mesoamericana. 27(1):191-206.

Evaluation of corn yield for the High Valleys of the State of Mexico

Journal Information
Journal ID (publisher-id): remexca
Title: Revista mexicana de ciencias agrícolas
Abbreviated Title: Rev. Mex. Cienc. Agríc
ISSN (print): 2007-0934
Publisher: Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias

Article/Issue Information
Date received: 01 November 2024
Date accepted: 01 February 2025
Publication date: 06 March 2025
Publication date: Jan-Feb 2025
Volume: 16
Issue: 1
Electronic Location Identifier: e3368
DOI: 10.29312/remexca.v16i1.3368

Categories

Subject: Articles

Keywords:

Keywords:

High Valleys
hybrid corn
native

Counts

Figures: 2
Tables: 2
Equations: 0
References: 26
Pages: 0