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Title: Exploitation of the genetic variance in maize (Zea mays L.) populations for the mexican tropic

Authors: SIERRA-MACIAS, Mauro, RÍOS-ISIDRO, Clara, GÓMEZ-MONTIEL, Noel Orlando and BARRÓN-FREYRE, Sabel

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MARVID - Mexico
Park Pedregal Business. 3580-Adolfo Ruiz Cortines Boulevard – CP.01900. San Jerónimo Aculco-Álvaro Obregón, Mexico City
Skype: MARVID-México S.C.
Phone: +52 1 55 6159 2296
E-mail: contact@marvid.org
Facebook: MARVID-México S. C.
Twitter:@Marvid_México

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Introducción

The synthetic maize varieties is the best way of joining the good per se grain yield of inbred lines and their general combining ability in generating varieties adapted to the humid tropic in México. This kind of germplasm can be used by farmers for several seasons of sown without affecting the grain yield and is easier and profitable the commercial seed production, (Márquez et al., 1983; Reyes 1985; Andrés et al., 2017).

Objectives

a) To practice mass selection in synthetic maize varieties VS-536, V-537C and SINT4B, for breeding in yield and agronomic traits.

b) To know the yield, agronomic characterístics and the Heterosis with respect to the best parent in varietal crosses

Materials y Methods

Localization. *The mass selection plots of the maize varieties VS-536, V-537C and Sint 4B and the plot for getting the varietal crosses, were carried out in Cotaxtla experimental station in Veracruz, which belongs to INIFAP, México and is located at Medellín de Bravo, Ver., in the 18º 56' North Latitude and 96º 11' West longitude and altitude of 15 masl, annual temperature of 25 ºC and annual precipitation of 1400 mm The evaluation of the maize hybrids were carried out in Cotaxtla Experimental Station and CBTA 84 in Carlos A. Carrillo municipality in Veracruz, and Huimanguillo in Tabasco, The clime condition is Aw1(w), Aw2 y Am, for each location, respectively.*

Variables and data recording

During the development of the crop and at harvest time, there were recorded in the experiment the following agronomic variables: Grain yield, days to tassel and silking, Plant and ear height, qualification of plant and ear aspect and sanity, using a scale from 1 to 5, where, 1 correspond to the best phenotypic expression and 5 for the worst; lodging, ears with bad husk cover, total number of ears, dry matter and ear rot.

Statistical methods

The experimental design used was complete blocks at random with 28 entries and three replications in plots of two rows 5m long and 80 cm wide in a plant density of 62,500 pl ha^{-1}. Individual and combined analysis of variance were made for all variables recorded and were analyzed statistically and for the separation of means, the Significant Minimum Difference test was applied at 0.05 and 0.01 of probability (Reyes, 1990). The percentages of heterosis with respect to the best parent (Reyes, 1985), were calculated as follows:

$$\%\ of\ Heterosis = \frac{F1 - Best\ parent}{Best\ parent}\ x\ 100$$

Advances in selection for VS-536, V-537C and SINT4B

The criteria of mass selection have been short plant and ear height, Good husk cover, lodging tolerance, good plant and ear aspect and sanity, regular ears, white grain and dent texture in VS-536 and V-537C and semident texture in the SINT4B (Sierra et al., 2019);

The new version of VS-536, present good plant and ear aspect and sanity; The relation ear height/plant height of 0.54, it is very important for lodging tolerance, present ears with 14 regular rows, good sanity white color and dent texture

Selection in VS-536

Actually, there has been completed the four cicle of mass selection in the synthetic maize variety VS-536, the most used maize variety in the southeast of México. the position of the ear height has been reduced and present less variability. The plant height is intermediate and the ear, present white grain and dent texture, good plant and ear aspect

AGRICULTURA

SECRETARÍA DE AGRICULTURA Y DESARROLLO RURAL

5.46 t ha^{-1}

6.84* t ha^{-1}

Heterosis

15.80 %

5.91 t ha^{-1}

2023 año de Francisco VILLA

Table 1. Combined analysis of variance for grain yield of varietal maize hybrids across the 10 environments in Veracruz and Tabasco states. 2016 a 2023

Source of Variation	***DF***	***SS***	***MS***
Genotypes (G)	*27*	*92.07*	*3.41***
Environments (E)	*9*	*394.78*	*68.84***
Interaction GxE	*243*	*306.14*	*1.26***
Error	*455*		*0.7151*
CV (%)			*13.44%*

Grain yield of varietal maize hybrids across 10 environments in Veracruz and Tabasco states 2016-2023

Trat	Genealogy	Yield t ha^{-1}	Relative %	% Heterosis
1	SINT2BxVS-536	6.96*	103	17.70
14	SINT4BxVS-536 (HV570)	6.84*	102	15.80
28	H-520	6.73*	100	
17	SINT4BxSINT2B	6.55*	97	10.78
16	SINT-5B x VS-536	6.48**	96	5.93
9	SINT-5B x V-537C	6.42*	95	4.91
13	SINT-1BQ xVS-536	6.41**	95	5.25
10	H-518	6.39**	95	
19	SINT-2BxVS-537C	6.34	94	7.32
4	V-537CxVS-536	6.34	94	11.21
20	VS536xV537C	6.33	94	11.07
21	SINT-1BQ	6.09	90	
22	SINT-2B	5.91	88	
24	SINT-4B	5.91	88	
23	SINT-3B	5.88	87	
27	V-537 C	5.70	85	
26	VS-536	5.46	81	
	MEAN	6.26		
	CV (%)	13.44		
	SME	0.7151		
	MSD 0.05	0.4279		

Agronomic traits

Entry	Genealogy	Days to tassel	Plant height	Ear height	Plant Aspect	Ear aspect	Plant sanity	Ear sanity	% bad husk cover	% ear rot	Rel ear height /plant height
4	V-537C X VS-536	51	227	122	2.2	2.8	2.3	2.3	2.98	6.39	0.54
10	H-518	52	222	112	1.5	2.0	1.5	2.0	4.11	4.36	0.5
14	SINT4BxVS-536 (HV570)	51	228	123	2.3	2.2	2.2	2.3	5	1.74	0.54
24	SINT-4B	52	225	118	2.3	2.5	2.3	2.3	2.38	5.14	0.53
26	VS-536	52	232	132	2.5	2.7	1.7	2.7	4.78	3.98	0.57
27	V-537 C	52	225	115	2.3	2.8	2.5	2.5	5.87	6.98	0.51
28	H-520	51	228	122	2.2	2.3	2	2.2	4.11	4.04	0.53
	Mean	51.7	230.1	122	2.28	2.45	2.3	2.32	4.33	4.04	0.53
	SME	0.97	687.3	589.1	0.27	0.30	0.3	0.25	42.5	11.8	50.3
	CV (%)	1.91	11.39	19.89	22.79	22.4	24.0	21.15	150.5	85.0	13.4

Conclusions

The best Varietal hybrids at 0.05 of probability were: SINT-2BxVS-536, SINT-4BxVS-536, SINT-4BxSINT-2B, with grain yield of 6.55 to 6.96 t ha^{-1}, stadístically similar to the comercial hybrids H-520, used as check.

The heterosis with respect to the best parent in the best varietal crosses were: SINT-2BxVS-536 (17.70%), SINT-4BxVS-536 (15.80%), SINT-4BxSINT-2B (10.78%), V-537CxVS-536 (11.21%).

These varietal crosses registered an average of 6.38 t ha^{-1}, 9% more than their parents.

Beacuse of the yield and agronomic traits it was suggested that the varietal cross SINT-4BxVS-536, for oficial register by the SNICS, as HV-570, New maize hybrid for the humid tropic in Mexico.

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