Evaluation of Some New White Maize Top Crosses for Yield and Some Other Traits

Abo Yousef, H.A., H.A.A. Gamea and Moshera S.E. Sadek
Maize Department, Field Corps Res. Inst., Agricultural Research Center, Giza, Egypt

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ABSTRACT

A line x tester analysis involving 30 test- crosses generated by crossing 15 elite white maize inbred lines with two testers during 2015 summer season at Gemmeiza Station. These top crosses and two commercial checks single crosses ;SC 10 and SC128 were evaluate din replicated field trials at Gemmeiza and Mallawy Agricultural Research Stations, Agriculture Research Center (ARC), Egypt during 2016 summer season. Mean performance, General (GCA) and Specific (SCA) combining abilities of all inbred lines and testers lines and their interaction were estimated for, days to 50% silking, plant and ear heights, and grain yield characters. The obtained results showed that, highly significant differences among lines, testers and lines x testers for all studied traits. Significant and highly significant differences were detected between locations for all studied traits except grain yield. Crosses x location interaction was significant for days to 50% silking, plant height and ear height and highly significant for grain yield. Tester inbred line Gm18 was found to be the best general combiner for high yielding ability and the tester line, Gm 2was the best general combiner for earliness, shortness and low ear placement. However, the tested inbred lines Gm 2019, Gm 2020gave the highest and significantly positive general combining ability effects for grain yield. The most potent general combiner for days to 50% silking, plant height and ear height was Gm 3010 inbred line. The top crosses; GM 3002 x Gm 18 (35.06 ard.) and Gm 3020 x Gm 18 (34.65 ard) gave the highest values of grain yield per fed and were significantly superior to check hybrid SC 10. However, top crosses; Gm 3018 x Gm 2 (32.44 ard), Gm 3019 x Gm 18 (31.97 ard) and Gm 3021 x Gm 18 (31.72 ard) were not significantly different from the check hybrids SC 10 and SC 128 Therefore, these crosses must be evaluated in advanced trials for testing their stability and yield potentiality through the national maize breeding program for releasing as new white single crosses.

Key words: Maize, GCA, SCA, Top-crosses, and Line x tester analysis.

INTRODUCTION

In hybrid breeding programs, the choice of the correct parents is the secret of the success. One of the most important criteria in breeding programs for identifying hybrids with high yield is knowledge regarding parent's genetic structure and information regarding their combining ability (Ceyhan 2003).

Combining ability studies provide information on the genetic mechanisms controlling the inheritance of quantitative traits and enable the breeders to select suitable parents for commercial purposes. Combining ability estimates are important genetic attributes for maize breeders in anticipating improvement in productivity via hybridization and selection (Ali *et al*. 2012).Line × tester mating design was developed by Kempthorne (1957), which provides reliable information on the general and specific combining ability effects of parents and their hybrid combinations in applied breeding programs. The design has been widely used in maize breeding by several workers and continues to be applied in quantitative genetic studies in maize due to its significance (Sharma *et al.*, 2004). Matzinger *et al.*, (1953), Russell *et al.*, (1973), El-Hosary (1985), Salama *et al*., (1995), Sultan (1998), Sadek *et al*., (2001), Sadek *et al*., (2002) and El-Shenawy *et al*., (2003) reported that the variance component due to SCA for some agronomic characters *i.e*. plant height and ear height were relatively larger than that due to GCA. This result indicates that the non-additive effects were important in the inheritance of previous traits.

Aly (2013) showed that GCA effects of grain yield (GY) were related to GCA effects of the yield component traits (YCTs) in an inbred line. Significant positive GCA effects for grain yield (GY) were highly correlated with that had significant positive GCA effects, indicating that line with high GCA effects for grain yield (GY), generally had high GCA effects for the yield component traits (YCTs). Thus, selecting inbred lines with positive GCA effects in either all or most of the yield component traits (YCTs) will have greater chance to produce crosses with higher grain yield. However, Abrha *et al*., (2013) reported that generally, mean squares due to GCA of lines, testers and SCA of line x tester interactions were significant for grain yield and most yield related traits indicating the importance of both additive and non-additive gene actions in controlling these traits.

The objectives of this study were (1) Estimating general and specific combining ability variances and effects of fifteen inbred lines of white maize in top crosses with two testers under two locations and (2)

Identifying the desirable superior inbred line(s) and the resulting single crosses for yielding potentiality and other related traits for further use in the breeding program.

MATERIALS AND METHODS

Through the two seasons of 2015 and 2016 this investigation has been done to evaluate some white maize inbred lines for combining ability based on top-crosses. The used materials (Table 1) were fifteen white inbred lines of maize that were developed at Gemmeiza Agriculture Research Station, Agriculture Research Center (ARC), Egypt. These inbred lines were derived from two different populations *i.e*. Tuxpino and Gemmeiza White Population. In the first season *i.e*.; 2015, all the inbred lines were used as females and top-crossed to each of the two testers, *viz* Gm 2 and Gm 18 at Gemmeiza Station for Agricultural Research. In the second growing season 2016, all the 30 resultant top crosses along with two commercial check hybrids *i.e*.; SC 10 and SC 128 were evaluated at Gemmeiza and Mallawy Agriculture Research Stations in a randomized complete block design with four replications in each location. Plot size was one row, six m. long and 8.0 m. apart. Hill spacing was 0.25 m. within the row. Two kernels were planted per hill and thinned later to one plant per hill to provide a population of 21,000 plants/fad (faddan = 4200 m^2). Recommended practices for maize production were applied.

The recorded data were; days from planting to 50% silking, plant height (cm), ear height (cm) and grain yield (ard/fed). The analysis of variance for each location and it's combined over locations based on the homogeneity test (Steel and Torrie 1980) were computed.

The procedures of Kempthorne (1957) and Singh and Chaudhary (1985) were performed to obtain valuable information about the combining ability of lines and testers as well as their top crosses.

RESULTS AND DISCUSSION

I. Analysis of variance

The analyses of variance for each separate location and their combined over locations are presented in Table (2). Significant and highly significant differences were detected among locations for all studied traits, except for grain yield trait, indicating that, the two locations were not different in the environmental conditions. Highly significant differences were detected among crosses, lines, testers and the interaction between lines x tester for all studied traits combined over the two locations. Highly significant differences in all studied traits indicate the presence of genetic variation among the studied material for these traits. Mean squares due to crosses x location interaction were significant for days to 50% silking, plant height, ear height and for grain yield. Line x location interaction was highly significant only for grain yield. Tester x location interaction was highly significant for days to 50% silking and grain yield. However mean squares due to lines x tester x location interaction were significant or highly significant for all studied traits except for ear height.

Similar results were obtained by Solimain *et al*., (2005), Amer *et al*., (2003), Soliman and Osman (2006), Abd EL Moula *et al*., (2010), Sadek *et al.*, (2011), Meseka and Ishaaq (2012), Aly (2013), Gamea *et al*., (2015), Barh *et al*. (2015).

II. Top crosses performance

Mean performance for the studied traits of the thirty top crosses at each location and its combined data are presented in Table (3). For days to 50% silking, the earliest top crosses were namely; Gm3010 x Gm 2, Gm 3012 x Gm 2 and Gm 3013x Gm 2 since these were significantly earlier than the earliest check hybrid SC128. The second group of hybrids were Gm 3006 x Gm 2 and Gm 3015 x Gm 2 which were insignificant different from the check variety SC 128. However, the latest crosses were Gm 3014 x Gm 2 (66 days) followed by Gm 3002 x Gm 2, Gm 3018 x Gm 18, Gm 3020 x Gm 2 and Gm 3012 x Gm 2 (65 days).

For plant height the crosses *i.e*. Gm 3002 x Gm 2 (200 cm), Gm 3010 x Gm2 (215 cm), Gm 3014 x Gm18 (216 cm), Gm 3005 x Gm 2 (218 cm), Gm 3007 x Gm 2 (220 cm) and Gm 3006 x Gm 2 (222 cm) were significantly the shortest crosses relative to the shortest commercial check single cross 128. All the other top crosses except, for single crosses Gm 3020 x Gm 18 and Gm 3002 x Gm 18 were significantly short relative to the check single cross 10.

Concerning ear height, the best crosses with lowest ear placement were, Gm 3002 x Gm 2 and Gm 3010 x Gm 2 since it gave the desirable mean values (101 cm and 115 cm respectively). In the meantime these values were superior relative to the best check SC 128.

Table 1: Names and origin of used inbred lines and testers.

No	Inbred lines and testers	Origin
1 –8	Gm 3002, Gm 3005, Gm 3006, Gm 3007, Gm 3009, Gm 3010, Gm 3012 and Gm 3013	Tuxpino
9-15	Gm 3014, Gm 3015, Gm 3017, Gm 3018, Gm 3019, Gm 3020 and Gm 3021,	Gm. W. Popuation.
16-17	Gm 2, Gm 18	Population Gm 7421

However, 23 top crosses with values of ear height ranged from 117 cm to 136 cm were significantly lower ear placement than the check hybrid Sc 10. The other crosses *i.e*. Gm 3017x Gm 18, Gm 3018 x Gm 18, Gm 3017 x Gm 2, Gm 3002 x Gm 18 and Gm 3020 x Gm 18 showed values of ear height ranged from 137 cm to 145 cm. with no significant differences with the check hybrid Sc 10.

Regarding grain yield, the single crosses Gm 3002 x Gm 18(35.06 ard.) and Gm 3020 x Gm18 (34.65ard) gave the highest values of grain yield per fed.,which were significantly superior to check hybrid Sc 10 (31.04 ard). While top crosses; Gm 3018 x Gm 2 (32.44 ard), Gm 3019 x Gm 18 (31.97 ard) and Gm 3021 x Gm 18 (31.72 ard) were not significantly different from the check hybrids Sc 10 and Sc 128. Insignificant differences among locations due to probably necessity the evaluation of these crosses in advanced trials for testing their stability and yield potentiality as a step before the release of these crosses as new commercial hybrids.

III. Combining ability effects

Data in Table(4) showed the general combining ability effects of inbred lines and testers in two locations and combined over locations during 2016 season. From combined data, tester line namely Gm 2 had better GCA effects for earliness, shortness and low ear placement. However, the other tester line Gm 18 was the best for grain yield.

As for, parental inbred lines, results in Table (4) revealed that desirable significant and/or highly significant and negative effects ($\hat{g}_i$), had recorded for inbred lines; Gm 3006, Gm 3010, Gm 3012, Gm 3013 and Gm 3015 for days to 50% silking (towards earliness), while, both inbred lines; Gm 3010 and Gm 3014for plant height (towards shortness). In addition the inbred lines Gm 3002 and Gm 3010 showed negative effect for ear height (towards low ear placement).

The results showed that, the most potent general combiners which induced significant and/or highly significant and negative ($\hat{g}_i$) effects for days to 50% silking, plant height and ear height characters was Gm 3010 inbred line. On the other side, the inbred lines; Gm 3019 and Gm 3020 gave the highest positive general combining ability effects for grain yield.

Specific combining ability effects of the 30 tested top crosses in two locations and combined over locations through 2016 season were presented in Table (5). Data showed that, many top crosses exhibited desirable, negative, significant and highly significant specific combining ability for the three vegetative growth traits. For days to 50% silking, the highest desirable and negative SCA effects were obtained from the top crosses; Gm 3010 x Gm 2, Gm 3012 x Gm 2, Gm 3013 x Gm 2, Gm 3014x Gm 18, Gm3015 x Gm 2 and Gm 3020 x Gm 18. For plant height and ear height the crosses; Gm 3002 x Gm 2 and Gm 3014 x Gm 18 had the highest desirable and negative SCA effects.

However, the highest desirable and positive SCA effects were obtained from top crosses; Gm 3002 x Gm 18, Gm 3005 x Gm 2, Gm 3015 x Gm 2 and Gm 3018 x Gm 2 for grain yield. Similar results were reported by Abd EL-Azeem *et al.*, (2004), Soliman and Osman (2006), El- Sherbieny *et al*., (2006) Abdelghany *et al*., (2008), Abd el Moula *et al*., (2010), Sadek *et al*., (2011), Aly (2013), Rahman *et al*., (2013), Barh *et al*., (2015) and Apraku *et al.*, (2016).

IV. Proportional contribution of all genotypes to total variance.

The contribution of lines, testers and interactions to total variance are presented in Table (6). Fifteen inbred line and two testers and their interaction relative to the total variance for all studied traits over locations and combined over locations during 2016 season were calculated according to the procedure of Singh and Chaudhary (1985). The combined proportional contributions of inbred lines for all of the studied traits were higher than those of testers but lower than interaction of Line x tester except for days to 50% silking. The great contribution of lines in the total variation for days to 50%silking is an indication for higher estimates of variance due to general combining ability. On the contrary, a higher part of variance due to specific combining ability was detected for the other studied traits. Similar results were found by other researchers; Abdelghany *et al.*, (2008), Uddin *et al.*, (2008) and Hefny (2010).

Table 6: Proportional contribution (%) of the studied 15 inbred lines and two testers and their interactions to total variance for all studied characters in two locations and combined over locations during 2016 season.

Character	Days to 50% silking			Plant height (cm)			Ear height (cm)			Grain yield (ard/fed)		
Locations	Gm	Mal	Com	Gm	Mal	Com	Gm	Mal	Com	Gm	Mal	Com
Lines (L)	57.74	60.37	61.00	40.75	21.66	28.69	61.31	24.12	36.18	27.40	54.57	24.03
Testers (T)	16.23	3.92	9.67	16.01	16.20	18.37	12.03	18.99	19.40	13.90	1.01	9.44
L x T	26.03	35.71	29.33	43.41	62.13	52.94	26.66	56.88	44.42	58.71	44.42	66.53

Gm and Mal (Gemmeiza and Mallawy locations).

Generally, the results of the current study identified inbred lines with good GCA as; Gm 3010 for earliness, shortness and low ear placement. However, the inbred lines Gm 2019 and Gm 2020 were the best for grain yield. Furthermore, promising crosses combination were; Gm 3002 x Gm 18, Gm 3020 x Gm 18, Gm 3018 x Gm 2, Gm 3019 x gm 18 and Gm 3021 x Gm 18. Those hybrids might be used for future breeding work as well as for direct release after confirming the stability of their performances across environments.

REFERENCES

Abd EL-Azeem, M.E, A.A. Mahmoud and A. A.M. Atia (**2004**). Combining ability analysis of yellow maize inbred lines. Egypt. J. Plant Breed. (**8**): 239-254.

Abd El-Ghany H.M.; M.M. Osman and M.E. Sadek (**2008**). Evaluation of some white maize inbred lines for combining ability based on top-crosses. J. Agric. Sci. Mansoura Univ., **33 (3):** 1747-1760

Abd El Moula, M.A, Abdallah, T.A.EL- Sayed and Moshera, S. E. Sadek (**2010**). Utilization of narrow base testers to estimate combining ability of maize inbred lines. Egypt. J. Agric. Res., **88 (1)**, 47-62.

Abrha S. W, H. Z. Zeleke and D. W. Gissa (**2013**). Line x tester analysis of maize inbred lines for grain yield and yield related traits. Asian Journal of Plant Science and Research **(5)**: 12-19.

Ali F. I., A. Shah, H. u. Rahman, M. Noor, Durrishahwar, M. Y. Khan, I. Ullah and J. Yan (**2012**). Heterosis for yield and agronomic attributes in diverse maize germplasm. Australian Journal of crop science **6 (3)** 455-462.

ALY R. S. H. (**2013**). Relationship between combining ability of grain yield and yield components for some newly yellow maize inbred lines *via* line x tester analysis. Alex. J. Agric. Res. **58, (2)**115-124.

Apraku B. B, M. A. B. Fakorede, M. Gedil, B. Annor, A. O. Talabi, I. C. Akaogu, M. Oyekunle, R. O. Akinwale, and T. Y. Fasanmade (**2016**). Heterotic patterns of IITA and CIMMYT early-maturing yellow maize inbreds under contrasting environments. Agron. J. **108**: 1321–1336

Amer, E.A., A.A. El-Shenawy and A.A. Motawei (**2003**). Combining ability of new maize inbred lines *via* line x tester analysis. Egypt J. Plant Breed., **7, (1)**: 229-239.

Barh, A., N.K. Singh, S.S. Verma, J.P. jaiswal and P.S. Shukla (**2015**). Combining ability analysis and nature of gene action for grain yield in maize hybrids. IJOEAR, **1(8)** 1-5

Ceyhan, E. (**2003**). Determination of some agricultural characters and their heredity through line x tester method in Pea parents and crosses. Selcuk Univ., Graduate School Nat. Applied Sci., Pp.130.

El-Hosary, A.A. (**1985**). Study of combining ability in some top crosses in maize. Egypt J. Agron., **(10)**: 39-47.

El-Shenawy, A.A., E.A Amer and H.E Mosa (**2003**). Estimation of combining ability of newly development inbred lines of maize by (line x tester) analysis. J Agric. Res. Tanta Univ., (**29**): 50-63.

El-Sherbieny, H.y, Sh, T.A.e. Abdallah and A.M.M. Abdel-Aal (**2006**). Comparative performance and combining ability of new yellow maize inbred lines in top crosses with three inbred testers. First Field Crops Conference 22-24 August Proceedings Pp. 266-272.

Gamea H. A. A (**2015**). Estimate of combining ability of new yellow maize inbred lines using top crosses. Egypt J. Agric. Res. **93(2)**: 287-298.

Hefny, M (**2010**). Genetic control of flowering traits, yield and its components in maize (*Zea mays* L.) at different sowing dates. Asian Journal of crop science. (**2**): 236-249.

Kempthorne, O. (**1957**). An Introduction to Genetic Statistics. John Wiley and Sons Inc., New York, USA.

Matzinger, D.F. **1953**. Comparison of three types of testers for the evaluation of inbred lines of corn. Agron. J. (**45**):493–495.

Meseka, S. and J. Ishaaq (**2012**). Combining ability analysis among Sudanese and IITA maize germplasm at Gezira Research Station. J. Appl. Biosci., **75**: 4198-4207.

Rahman, H, A. Ali, Z. Shah, M. iqbal, M. Noor and Amanullah (**2013**). Line x Tester analysis for grain yield and yield related traits in maize variety sarhad-white. Pak. J. Bot., **45**: 383-387

Russell, W.A., S.A. Eberhart and Urbano A. Vega (**1973**). Recurrent Selection for Specific Combining Ability for Yield in Two Maize Populations. Crop Sci. (**13**):257-261.

Sadek, S.E., M.S.M. Soliman, A.A. Barakat (**2001**). Evaluation of new developed maize lines using commercial inbred testers in the early self generations. Egypt J. Appl. Sci., (**16**): 406-425.

Sadek, S.E., M.S.M. Soliman, A.A. Barakat and K.I. Khalifa (**2002**). Top-crosses analysis for selecting maize lines in the early self generations. Minufiya J. Agric. Res., (**27**): 197-213.

Sadek, M.E.S., A. M. M. Abd El-Aal and M.M.A.Osman (**2011**). Combining ability for yield and some agronomic traits in diallel crosses of ten new yellow maize inbred lines. Bull. Fac. Agric., Cairo Univ., **62**: 387- 394

Salama, F.A., Sh.F. Aboel-Saad, and M.M. Raghab (**1995**). Evaluation of maize top-crosses for grain yield and other agronomic traits under different environmental conditions. J. Agric. Sci. Mansoura Univ., **20, (1)**: 127-140.

Sharma S, M.S. Narwal, R. Kumar and S. Dass (**2004**). Line x tester analysis in maize (*Zea mays L*.). Forage Res. **30**: 28-30

Singh, R.K. and B.D Chaudhary (**1985**). Biometrical Methods in Quantitative Genetic Analysis. Kalyani publishers, New delhi, India.

Soliman M.S.M, Fatma A.E. Nofal and M.E M Abd EL-Azeem (**2005**). Combining ability for yield and other attributes in diallel crosses of some yellow maize inbred lines. Minufiya J. of Agric. Res., (**30**): 1767-1781.

Soliman M.S.M. and M.M.A. Osman (**2006**). Type of gene action for grain yield using testcross analyses in new developed maize inbred lines. J. Agric. Sci. Mansoura Univ., **31**, 2615-2630.

Steel, R.G. and J. H. Torrie (**1980**). Principles and procedures of statistic. MC. Graw Hill Book Inc., New York. USA.

Sultan, M.A. (**1998**). Estimates of combining ability of yellow maize inbred lines in top crosses. J. Agric. Sci. Mansoura Univ., **23(12)**: 5837-5851.

Uddin, M. S, M. Amiruzzaman, S. A. Bagum, M. A. Hakim and M. R. Ali (**2008**). combining ability and heterosis in maize (*Zea mays*, L.). Bangladesh J. Genet. Pl. Breed., **21(1)**: 21-28.

الملخص العربى

تقييم بعض الهجن القمية الجديدة للذرة الشامية البيضاء للمحصول وبعض الصفات الأخرى

هشام عبد الحميد أبو يوسف، مشيرة صادق الشحات صادق، حمدي السيد أحمد جامع

قسم بحوث الذرة الشامية – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – الجيزة – مصر

تم تهجين خمسة عشر سلالة نقية من الذرة الشامية البيضاء– تم إستنباطها بمحطة بحوث الجميزة– هى جميزة 3002، جميزة 3005، جميزة 3006، جميزة 3007، جميزة 3009، جميزة 3010، جميزة 3012، جميزة، جميزة 3014، جميزة 3015، جميزة3017، جميزة3018، جميزة 3018، جميزة3019، جميزة3020 وجميزة3021 مع كشافين من السلالات النقية البيضاء هى جميزة 2، وجميزة 18. أجريت التهجينات القمية بين هذه المواد الوراثية خلال الموسم الصيفى لعام 2015 بمحطة البحوث الزراعية بالجميزة. تم تقييم الهجن القمية الناتجة(30هجين فردى) فى تجارب حقلية مع مقارنتها مع إثنين من الهجن الفردية التجارية هى: هجين فردى 10، هجين فردى 128 فى موقعين زراعيين هما محطة بحوث الجميزة ومحطة بحوث ملوي، بمركز البحوث الزراعية خلال الموسم الصيفى لعام 2016. تم تقيم سلوك السلالات والهجن القمية تحت ظروف الموقعين الزراعيين وكذلك التحليل المشترك لهما لقدرتها العامة والخاصة على التآلف بالإضافة إلى تقدير المساهمات النسبية لجميع السلالات والكشافات وكذلك التفاعل بينهما لبعض صفات النمو الخضرى والمحصول خلال مراحل نمو النبات وتشمل عدد الأيام من الزراعة حتى ظهور 50% من الحراير، إرتفاع النبات والكوز ومحصول الحبوب. وقد أظهرت النتائج وجود إختلافات عالية المعنوية بين جميع السلالات المختبرة، الكشافات والسلالات x الكشافات للصفات تحت الدراسة. كذلك وجدت اختلافات معنوية وعالية المعنوية بين الموقعين الزراعيين، لكل الصفات المدروسة فيما عدا صفة محصول الحبوب وقد كان التفاعل بين الهجن والمواقع معنويا للصفات تحت الدراسة (التزهير حتي ظهور 50% من الحراير، ارتفاع النبات وإرتفاع الكوز) وعالي المعنوية لصفة محصول الحبوب. أظهرت السلالة الكشاف جميزة 18 تفوقا في القدرة العامة علي التآلف بالنسبة لصفة المحصول. بينما كانت السلالة الكشاف جميزة 2 الأكثر تفوقا في القدرة العامة على التآلف نحو التبكير وقصر النباتات وموقع الكوز المنخفض. أما بالنسبة للسلالات المختبرة كانت أفضل السلالات هي جميزة 2019 وجميزة 2020حيث أعطت

أعلي تأثيرات معنوية وموجبة للقدرة العامة علي التألف بالنسبة لصفة محصول الحبوب. والسلالة جميزة 3010 الأكثر فاعلية في تأثيرات القدرة العامة على التآلف لصفات التزهير وإرتفاع النبات وإرتفاع الكوز. الهجن القمية: جميزة 3002 x جميزة 18 (إنتاجيتها 35.06 أردب للفدان (و جميزة x 3020 جميزة 18 (إنتاجيتها 34.65 أردب للفدان) أعطت أعلي إنتاجية لمحصول الحبوب حيث تفوقت معنويا في إنتاجيتها علي هجين المقارنة هجين فردي 10 بينما كانت الهجن القمية: جميزة3018 x جميزة 2 (إنتاجيتها 32,44 أردب)، جميزة 3019 x جميزة 18 (إنتاجيتها 31.97 أردب) وجميزة 3021 x جميزة 18 (إنتاجيتها 31,72 أردب)لا تختلف معنويا عن هجن المقارنة (هجين فردي 10 وهجين فردي 128) ومن ثم هذه الهجن تحتاج لمزيد من تجارب التقييم في البرنامج القومي لبحوث الذرة الشامية لاختبار الثبات الوراثي وإنتاجية المحصول كتمهيد لإطلاقها كهجن فردية بيضاء جديدة.