Combining Ability of Some New Yellow Maize Inbred Lines by Using Line X Tester Analysis

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DOI: 10.21608/JALEXU.2022.99989.1062

Article Information

Received:May 9th 2022

Revised: May 19th 2022

Accepted: May 29th 2022

Published: June 31st 2022

ABSTRACT: Eleven new yellow maize inbred Lines developed at Sids Agricultural Research Station were crossed with two lines as tester i.e. Gz-666 and Gm-6038 during 2019 summer season. The 22 crosses and two yellow check hybrids SC-168 and SC-3444 were evaluated at Sakha, Sids and Ismailia Agricultural Research Stations during 2020 summer Season. General (GCA) and specific (SCA) combining ability variances and effects were estimated for days to 50% silking, plant height, ear height, percentage of resistant plant to late wilt disease and grain yield traits. Results showed significant differences between the three locations for all the traits except for percentage of resistant to late wilt disease. Mean squares due to lines (L), testers (T), Lx T with locations (Loc) and their interaction were *significant* for most the studied traits. The inbred lines L-4, L-14 and L-19 exhibited positive and significant GCA effect for grain yield. The crosses (L-14 x Gm-6038) and (L-19 x Gz-666) significantly out yielded the best check hybrid SC-168 and late wilt resistance 100%. The crosses (L-13 x Gz-666) possessed significantly and desirable SCA effects for grain yield. The magnitude of non-additive gene effects was larger than additive gene effects for plant height and grain yield. While, for days to 50% silking, ear height and resistant to late wilt the magnitude additive gene effects were more important than that of non-additive gene effects..

INTRODUCTION

Maize is one of the most important grain crops in Egypt. The main goal of the national maize breeding program in Egypt is to cover all the area devoted to maize with high yielding maize crosses and diseases resistance. **Sprague and Tatum (1942)** was the first to partition the total combining ability of the lines into general and specific combining ability. Line x tester mating design was developed by **Kempthorne (1957)**, which provides reliable information on the general and combining ability effects of parents and their hybrids combinations in applied breeding programs. However, the effectiveness of this test depends mainly upon the type of tester to be used in the evaluation program to select superior lines with a significant reduction in costs and labor. Ideal testers should allow great expression of genetic variability in their progeny. In hybrid development program, it is common to use inbred lines as testers to obtain high yielding single cross hybrids (**Russell 1961**). **Legesse *et al* (2009),** reported that significant values for GCA and SCA may be interpreted as indicating the performance, respectively, of additive or non-additive (i.e. dominant or epistatic) effects.

Late Wilt disease caused by *Cephalosporium maydis* is one of the most economical diseases of maize in Egypt. The information of type of gene action is very important for the breeder in making decisions for the collection resources and expected response to selection for different traits. **Mosa *et al* (2010)**, **Aly *et al* (2011)**, **Gamea (2015), Abd El-Mottalb (2017) and Abd El-Azeem *et al* (2021)** found that additive gene effects plays a major role in the expression of grain yield and resistance to late wilt disease. Meanwhile, **Mousa and Abd El-Azeem (2009)**, **Ibrabim *et al* (2012)**, **Aly and Khalil (2013)**, **Mosa *et al* (2017) and Abd El-Mottalb (2019)** reported that non-additive gene effects were predominant in inheritance of grain yield and late wilt resistance. The main objectives of this present study were to; estimates the general combining ability effects of lines and testers, specific combining ability effects of crosses for grain yield and the other agronomic traits and define the superior crosses for yielding ability and late wilt resistance.

MATERIALS AND METHODS

Eleven new yellow maize inbred lines were developed by the breeding program at Sids Agric. Res. Station from different populations. These inbred lines were crossed to two inbred lines as a tester i.e., Giza-666 and Gemmeiza-6038 during the 2019 summer season. This inbred lines having a good combiner for yield and some its attributes. In 2020 summer season, the 22 crosses and two yellow check hybrids SC-168 and SC-3444 were evaluated at three location; Sakha, Sids and Ismailia Agricultural Research stations. A randomized complete blocks design with three replications was used. The experimental unit was one row, 6.0 m long and 0.8 m apart. Plating was in hills, spaced 0.25 m. Data were recorded for number of days from planting to 50% silking, plant height (cm) ear height (cm) percentage of resistant plants to late wilt disease, and grain yield in ardab feddan^{-1}, adjusted to 15.5% grain moisture content. Analysis of variances was performed for the combined data across three locations according to **Sendecore and Cochran (1967)**. Line x tester analysis was applied as described by **Kempthorne (1957).**

RESULTS AND DISCUSSION

Combined analysis of variance for five studied traits across three locations is presented in Table 1. The result showed significant or highly significant effects between the three locations for all traits except percentage of resistant plants to late wilt disease, indicating that the three locations different from each other in their environmental conditions. These results are in agreement with those obtained by several researchers; **Abd El-Azeem *et al* (2004), Abd El-Moula and Abd El-Azeem (2008), Mousa and Abd El-Azeem (2009), Ibrahim *et al (*2012), Abd El-Mottalb (2014), Abd El-Mottalb (2015), Gamea (2015), Moshera *et al.* (2016), Abd El-Mottalb (2019) and Mousa *et al* (2021)**. Mean squares due to crosses were significant or highly significant effects for all the studies traits. Mean squares due to lines (L), testers (T) and L x T interaction were significant or highly significant effects for all the studied traits except for plant height, percentage of resistant plants to late wilt disease and grain yield for testers and days to 50% silking and percentage of resistant plants to late wilt disease for (L x T). Mean squares due to crosses x location (Loc) and their partition; L x Loc, T x Loc and L x T x Loc interaction were significant or highly significant effects for all the studied traits except for plant height and percentage of resistant plants to late wilt disease for T x Loc and ear height and percentage of resistant plants to late wilt disease for L x T x Loc interaction.

Table 1. Combined analysis of variance for grain yield and other studies traits across the three locations.

SOV	df	Days to 50% silking	Plant height (cm)	Ear height (cm)	Late wilt resistance %	Grain yield ard fed^{-1})
Locations (Loc)	2	306.61**	46234.88**	6252.61*	1064.32	776.05**
Reps/Loc	6	5.389	2439.739	797.294	221.49	27.265
Crosses (C)	21	2.677*	384.454**	643.989**	184.47**	38.843**
Lines (L)	10	4.500**	596.836**	484.352**	373.35**	53.910**
Testers (T)	1	7.293*	114.395	6984.727**	8.08	0.005
Lines x Testers	10	0.393	199.079**	169.552**	13.24	27.660**
C x Loc	42	3.394**	163.581**	145.455**	171.88**	23.035**
L x Loc	20	3.623**	212.377**	157.906**	347.17**	30.528**
T x Loc	2	6.929*	155.910	1149.682**	5.41	35.275**
L x T x Loc	20	2.813*	115.552*	32.582	13.24	14.317**
Pooled error	126	1.521	71.612	55.094	41.35	5.825

*,** significant at 0.05 and 0.01 levels of probability, respectively.

Mean performance of 22 crosses along with two hybrid checks SC-168 and SC-3444 for all the studied traits across three locations are presented in Table 2. Results showed that, means of days to 50% silking of 22 crosses were significantly earlier than both check hybrids SC-168 (67.0 days) and SC- 3444 (67.0 days). These results indicated that these crosses may be used in developing new hybrids toward earliness in maize breeding programs. The best crosses for earliness were L-6 x Gm-6038 followed by L-6 x Gz-666 and L-20 x Gm-6038. For plant height and ear height, the shortest cross was L-11 x Gz-666 while, the tallest cross was L-12 x Gm-6038. For percentage of resistant plants to late wilt disease the crosses, L-5 x Gz-666, L-11 x Gz-666, L-11 x Gm-6038, L-13 x Gz-666, L-14 x Gm-6038, L-18 x Gz-666, L-19 x Gz-666 and L-20 x Gz-666 were 100% resistance to late wilt disease. Regarding grain yield (ard fed^{-1}) the two crosses (L-14 × Gm-6038) and (L-19 × Gz-666) significantly out yielded (31.54 and 31.03 ard fed^{-1}, respectively) than the highest check hybrid SC-168 which yielded 28.78 ard fed^{-1} compared with the rest crosses. While, three crosses; L-4 × Gm-6038, L-5 × Gm-6038, L-13 × Gz-666 did not differ significantly from the best check hybrid SC-168. These new crosses could be desirable and promising crosses for grain yield and they could contribute for the enhancement of maize breeding program in the future. From the previous results, these crosses may be used in developing new hybrids toward high yielding, earlier, shorter plant, low ear placement and resistance to late wilt disease.

Table 2. Mean performances of 22 single crosses and two checks for five traits across three locations.

cross	Days to 50% silking	Plant height (cm)	Ear height (cm)	Late wilt resistance %	Grain yield ard fed^{-1})
L-4 x Gz-666	63.44	235.11	114.78	99.56	27.93
L-4 x Gm-6038	62.89	240.00	129.89	99.56	30.00
L-5 x Gz-666	62.44	227.00	109.89	100.00	26.48
L-5 x Gm-6038	62.67	235.67	128.00	99.56	29.45
L-6 x Gz-666	62.00	236.72	110.33	93.33	26.69
L-6 x Gm-6038	61.44	223.61	115.00	95.56	26.24
L-11 x Gz-666	63.78	214.22	97.89	100.00	24.47
L-11 x Gm-6038	63.33	224.22	115.50	100.00	25.87
L-12 x Gz-666	63.44	236.17	111.39	91.56	25.52
L-12 x Gm-6038	62.89	240.22	131.44	87.11	24.98
L-13 x Gz-666	62.78	232.61	107.50	100.00	30.34
13 x Gm-6038	62.22	229.22	116.39	98.22	24.83
L-14 x Gz-666	62.89	218.28	100.50	99.56	28.76
L-14 x Gm-6038	62.33	224.78	114.00	100.00	31.54
L-18 x Gz-666	63.00	228.72	110.17	100.00	26.36
L-18 x Gm-6038	62.56	228.33	117.22	99.56	26.13
L-19 x Gz-666	62.22	230.17	116.06	100.00	31.03
L-19 x Gm-6038	62.33	227.44	116.33	99.56	28.34
L-20 x Gz-666	62.67	234.44	111.22	100.00	27.24
L-20 x Gm-6038	62.00	232.67	125.50	99.11	26.74
L-25 x Gz-666	62.78	227.22	108.78	87.11	25.52
L-25 x Gm-6038	62.56	231.22	119.89	88.44	26.09
Check SC-168	67.00	236.50	123.50	99.60	28.78
Check SC-3444	67.00	242.83	119.28	100.00	25.79
LSD 0.05	1.14	7.82	6.86	5.94	2.23

General combining ability effect (ĝi) for eleven inbred lines and two testers for five traits across three locations is presented in Table 3. The inbred line tester Gz-666 exhibited significant desirable (ĝi) effects for ear height. While, the parental inbred L-6 exhibited significant and negative favorable (ĝi) effects for days to 50% silking towards earliness. The parental inbred L-11 and L-14 exhibited significant and negative (ĝi) effects desirable for plant height and ear height towards short plant and low ear height. The inbred line L-25 have desirable (ĝi) effects for percentage of resistant plants to late wilt disease. The inbred lines L-4, L-14 and L-19 showed positive and significant effects desirable for grain yield toward high yielding.

Table 3. Estimates of general combining abilities effects for eleven inbred lines and two testers for five traits combined across three locations

Lines / Testers	Days to 50% silking	Plant height (cm)	Ear height (cm)	Late wilt resistance %	Grain yield ard fed^{-1})
Line - 4	0.500	7.644**	7.439**	2.384	1.667**
Line - 5	-0.111	1.422	4.051*	2.606	0.668
Line - 6	-0.944**	0.255	-2.227	-2.727	-0.833
Line - 11	0.889**	-10.689**	-8.199**	2.900*	-2.128**
Line - 12	0.500	8.283**	6.523**	-7.838**	-2.048**
Line - 13	-0.167	1.005	-2.949	1.939	0.288
Line - 14	-0.056	-8.384**	-7.644**	2.606	2.848**
Line - 15	0.111	-1.384	-1.199	2.606	-1.151*
Line - 19	-0.389	-1.106	1.301	2.606	2.386**
Line - 20	-0.333	3.644	3.467*	2.384	-0.307
Line - 25	0.001	-0.689	-0.561	-9.394**	-1.490**
S.E. gi lines	0.291	1.995	1.750	1.516	0.569
LSD 0.05	0.570	3.909	3.429	2.971	1.115
0.01	0.749	5.138	4.507	3.904	1.465
Giza-666	0.192	-0.760	-5.939**	0.202	0.005
Gem-6038	-0.192	0.760	5.939**	-0.202	-0.005
S.E. gi tester	0.124	0.851	0.746	0.646	0.243
LSD 0.05	0.243	1.667	1.462	1.267	0.475
0.01	0.319	2.191	1.922	1.665	0.625

*,** significant at 0.05 and 0.01 levels of probability, respectively.

Specific combining ability (SCA) effects of 22 crosses for all the studied traits across three locations are shown in Table 4. Results showed that, the cross (L-6×Gm-6038) gave negative desirable and significant SCA effects for plant height towards shorter plants. The cross (L-19×Gm-6038) exhibited negative desirable and significant SCA effects for ear height towards lower ear placement. On the other hand, for yield the cross (L-13×Gz-666) had positive desirable and significant SCA effects towards high yielding ability.

Genetic parameters for five traits a cross three locations is illustrated in Table 5. The magnitude of K^2 GCA was larger than that obtained for K^2 SCA for days to 50% silking, ear height and resistance to late wilt, indicating that the additive type gene actions played an important role in the inheritance of these traits. On the other hand, the non-additive gene effects played the major role in the inheritance of plant height and grain yield. These results are in agreement with those obtained by **Aly *et al* (2011), Ibrahim *et al* 2012, Aly (2014) and Gamea (2015).**

Table 4. Estimates of specific combining abilities effects for 22 single crosses for five traits combined across three locations.

Crosses	Days to 50% silking	Plant height (cm)	Ear height (cm)	Late wilt resistance %	Grain yield ard fed^{-1})
L-4 x Gz-666	0.086	-1.684	-1.616	-0.202	-1.040
L-4 x Gm-6038	-0.086	1.684	1.616	0.202	1.040
L-5 x Gz-666	-0.303	-3.573	-3.116	0.020	-1.494
L-5 x Gm-6038	0.303	3.573	3.116	-0.020	1.494
L-6 x Gz-666	0.086	7.316**	3.606	-1.313	0.222
L-6 x Gm-6038	-0.086	-7.316**	-3.606	1.313	-0.222
L-11 x Gz-666	0.030	-4.240	-2.866	-0.202	-0.703
L-11 x Gm-6038	-0.030	4.240	2.866	0.202	0.703
L-12 x Gz-666	0.086	-1.268	-4.088	2.020	0.263
L-12 x Gm-6038	-0.086	1.268	4.088	-2.020	-0.263
L-13 x Gz-666	0.086	2.455	1.495	0.687	2.747**
13 x Gm-6038	-0.086	-2.455	-1.495	-0.687	-2.747**
L-14 x Gz-666	0.086	-2.490	-0.811	-0.424	-1.395
L-14 x Gm-6038	-0.086	2.490	0.811	0.424	1.395
L-18 x Gz-666	0.030	0.955	2.412	0.020	0.107
L-18 x Gm-6038	-0.030	-0.955	-2.412	-0.020	-0.107
L-19 x Gz-666	-0.247	2.121	5.801*	0.020	1.340
L-19 x Gm-6038	0.247	-2.121	-5.801*	-0.020	-1.340
L-20 x Gz-666	0.141	1.649	-1.199	0.242	0.242
L-20 x Gm-6038	-0.141	-1.649	1.199	-0.242	-0.242
L-25 x Gz-666	-0.081	-1.240	0.384	-0.869	-0.289
L-25 x Gm-6038	0.081	1.240	-0.384	0.869	0.289
S.E. sij	0.411	2.821	2.474	2.143	0.804
LSD 0.05	0.806	5.529	4.849	4.201	1.577
0.01	1.059	7.266	6.374	5.522	2.072

*,** significant at 0.05 and 0.01 levels of probability, respectively.

Table 5. Genetic parameters for five traits of maize across three locations

Genetic parameter	Days to 50% silking	Plant height (cm)	Ear height (cm)	Late wilt resistance %	Grain yield ard fed^{-1})
K^2 GCA	0.011	2.931	52.662	0.247	-0.102
K^2SCA	0.001	9.281	15.219	0.0001	0.001

CONCLUSION:

Most of the studied traits were significant or highly significant, indicating that presence of genetic variability which can be exploited in crop improvement programs. The inbred line L-25 has desirable (ĝi) effects for percentage of resistant plants to late wilt disease. While, inbred lines L-4, L-14 and L-19 showed positive and significant effects desirable for grain yield toward high yielding. The cross (L-13×Gz-666) had positive desirable and significant SCA effects towards high yielding ability. The additive type gene actions (GCA) played an important role in the inheritance of days to 50% silking, ear height and resistance to late wilt. While, the non-additive gene effects (SCA) played the major role in the inheritance of plant height and grain yield.

REFERENCES

Abd El-Azeem, M. E. M., R. S. H. Aly, W. M. El Sayed and Noura A. Hassan (2021). Combining ability and gene action using 10 x 10 diallel crosses of ten maize inbred lines (*Zea mays* L.). J. of Plant Production, Mansoura Univ., 12 (11): 1205-1211.

Abd EL-Azeem, M.E.M., 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-Mottalb, A.A. (2017). Combining ability effects of some new yellow maize inbred lines. Menoufia J. Plant Prod. 2: 349 – 358.

Abd El-Mottalb, A.A. (2014). Evaluation of some yellow inbred lines for combining ability by using topcrosses. Egypt. J. of Appl. Sci., 29 (3) 79-89.

Abd El-Mottalb, A.A. (2015). Estimates of combining ability for some new white maize inbred lines by line x tester analysis. Egypt. J. plant Breed. 19 (7) : 1981 – 1992.

Abd El-Mottalb, A.A. (2019). Evaluation of some new white Maize inbred lines using line x tester analysis. Egypt. J. of Appl. Sci., 34(3) 70-81.

Abd El-Moula, M. A. and M. E. M. Abd El-Azeem (2008). Selection among S_3 yellow maize lines using combining ability. Assiut J. of Agri. Sci., 39(4)1-17.

Aly, R.S.H. (2014). Combining ability and type of gene action via line x tester analysis for new nine white maize inbred lines under three locations. Egypt. J. Pl. Breed. 18 (1): 29-43.

Aly, R.S.H. and A.G. Khalil (2013). Combining ability for sixteen promising white maize inbred lines for grain yield and yield component traits. Egypt. J. Plant Breed. 17(3): 143-160.

Aly, R.S.H., E.M.R. Metwali and S.Th.M. Mousa (2011). Combining ability of maize (Zea mays L.) inbred lines for grain yield and some agronomic traits using topcross mating design. Global J. of Molecular Sciences, 6(1): 01-08.

B.W. Legesse, K.V. Pixley and A.M. Botha (2009). Combining ability and heterotic grouping of highland transition maize inbred lines. Maydica. 54: 1–9.

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.

Ibrahim, M.H.A.; M.A. El-Ghonemy and A.A. Abd El-Mottalb (2012). Evaluation of fifteen yellow maize inbred lines for combining ability by their top crosses. Egypt. J. Plant Breed. 16 (2) 225-236.

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

Mosa, H.E., A.A. Motawie and A.M.M. Abd El-Aal (2010). Nitrogen fertilization influence on combining ability for grain yield and resistance to late wilt disease in maize. J. Agric. Res. Kafr Elsheikh Univ., 36: 278-291.

Mosa, H.E., S.M. Abo El-Hars and M.A.A. Hassan (2017). Evaluation and classification of maize inbred lines by line x tester analysis for grain yield, late wilt and downy mildew resistance. J. Plant Production, Mansoura univ. 8: 97-102.

Moshera, S.E. Sadek; A.A. Abd EL-Mottalb and H.A.A. Gamea (2016). Estimation of combining ability for some promising white inbred lines through line x tester mating design under different locations. Egypt J. Pl. Breed. 20 (4) : 175 – 191.

Mousa, S.Th.M. and M.E.M. Abd El-Azeem (2009). Combining ability of new yellow maize inbred lines using line x tester analysis. Annals Agric. Sci. Mashtohor. Vol. 47(1) : 35 - 42.

Mousa, S.Th.M., H.A.A. Mohamed, R.S.H. Aly and H.A. Darwish (2021). Combining ability of white maize inbred lines via line x tester analysis. J. of Plant Production, Mansoura Univ., 12 (2): 109-113.

Russell, W.A.A. (1961). Comparison of five types of testers in evaluating the relationships of stalk rot resistance in corn inbred lines and stalk strength of the lines in hybrid combination. Crop sci. 1:393-397.

Sendecore, G.W. and W.G. Cochran (1967). Statistical methods. 6th Edition, Iowa State Univ., Press. Ames, Iowa, USA.

Sprague, G.F. and L.A. Tatum (1942). General vs specific combining ability in single crosses of corn. J. American Soc. Agron., 34, 923-932.

الملخص العربي

القدرة علي التآلف لبعض سلالات الذرة الشامية الصفراء الجديدة باستخدام تحليل السلالة فى الكشاف

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فى هذه الدراسة تم استخدام 11 سلالة من سلالات الذرة الصفراء الحبوب الجديدة مرباة تربية داخلية بمحطة البحوث الزراعية بسدس ثم انتخابها من مصادر وراثية مختلفة حيث تم تهجينها قمياً مع سلالتين كشافتين هما (جيزة 666 وجميزة 6038) خلال الموسم الزراعى 2019. في الموسم الزراعى 2020 تم تقييم الـ 22 هجين قمي بالإضافة الي هجينى المقارنة الصفراء هما (هجين فردي 168 وهجين فردي 3444) في تجارب حقلية فى ثلاثة محطات بحثية وهى سخا وسدس والاسماعيلية. تم تقدير القدرة علي التآلف ودراسة التفاعل البيئي لصفات التزهير وارتفاع النبات وإرتفاع الكوز والنسبة المئوية للنباتات المقاومة لمرض الذبول المتأخر ومحصول الحبوب (اردب فدان$^{-1}$). وكانت أهم النتائج المتحصل عليها كما يلى:

أوضحت النتائج ان التحليل المشترك عبر المواقع ان هناك فروق عالية المعنوية بين المواقع لجميع الصفات تحت الدراسة مما يدل علي ان مواقع التقييم المحصولية مختلفة في الظروف البيئية عن بعضها البعض. وجدت إختلافات معنوية بين السلات والكشاف والتفاعل بين السلالات والكشاف والتفاعل فيما بينهم وبين المواقع لمعظم الصفات تحت الدراسة. أشارت النتائج إلى أن السلالات 4 ، 14 و 19 كانت تمتلك قدرة عامة على التآلف موجبة ومعنوية لصفة محصول الحبوب. أظهر الهجينين (سلالة -14 x جميزة-6038) و (سلالة – 19 x جيزة-666) تفوقاً معنوياً لصفة محصول الحبوب مقارنة بأفضل هجن المقارنة محصولاً وهو هجين فردى 168 إلى جانب مقاومتهما لمرض الذبول المتأخر بنسبة 100% ، فى حين أمتلك الهجين (سلالة-13 x جيزة-666) قدرة خاصة على التآلف موجبة ومرغوبة لصفة محصول الحبوب.

اشارت النتائج إلى أن تأثيرات الفعل الجينى غير المضيف كان أكبر وأكثر أهمية من الفعل الجينى المضيف لصفات إرتفاع النبات ومحصول الحبوب بينما كانت تأثيرات الفعل الجينى المضيف أكثر اهمية من الفعل الجينى غير المضيف فى صفات عدد الأيام حتى ظهور 50% من الحراير ، إرتفاع الكوز والنسبة المئوية لمقاومة مرض الذبول المتأخر.

وتوصي هذه الدراسه باعادة تقييم هذه الهجن علي نطاف أوسع تمهيداً لإطلاقها للإنتاج التجاري لزيادة انتاجية الذرة الصفراء في مصر والإستفادة منها مستقبلاً فى برامج التربية للذرة الشامية بعد التأكد من إجتيازها المراحل المتقدمة فى برامج التقييم فى الذرة الشامية.