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**RESEARCH ARTICLE**

**Evaluation a performance of different Genotypes of Corn *Zea mays* L. under Al-Muthanna & Thi-Qar governments conditions**

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**Abstract**

A field experiment was carried out in two locations. The first location was Al- Muthanna government (Al- Rehab region) and the second location was Thi- Gar government (Al-Gharraf district) to evaluation a performance of seven genotypes of maize which were ( Cadez Single cross, 2052 Double cross, 3003 Tri cross, 5015 synthetic, 5016 synthetic, 5017 synthetic and 5018 synthetic) under Al-Muthanna and Thi- Qar conditions. Layout of experiment was random complete block design ( R.C.B.D) with three replications. The results revealed that Al-Muthanna location was superior to Thi- Gar location in which the number of days until 75% flowering, seed number/ row, seed weight and seed yield were (4.96 and 5.38 ton/ha) for two years 2011 and 2012 respectively ,whereas number of ears/plant and number of rows/ ear were superior in thi- Qar location. Plant height and leaf area had non-significant effect by variation of location. With respect of genotypes the results revealed that the Synthetic 5017 gave maximum number of days until 75% flowering , leaf area and seed number/ row, whereas the 5015 Synthetic gave maximum mean for ears/ plant and the Single cross Cadz gave maximum mean of seed yield which reached 5.67 ton/ ha<sup>-1</sup> during 2012.

Synthetic 5018 gave maximum mean of seed yield which reached 5.73 ton/ ha<sup>-1</sup> during 2011. Also, with respect of interaction the combinations (Al-Muthanna × Synthetic 5017), (Thi- Gar × Synthetic 5017), (Thi- Qar × Synthetic 5018), (Al-Muthanna × Single cross Cadz) and (Al-Muthanna × double cross 2025) were superior in (number of days until 75% flowering, Leaf area, number of ears/plant, number of seeds /row and seed weight) respectively. The Single cross Cadz that was cultivated in Al-Muthanna location and 5018 synthetic that was cultivated in Thi- Qar location gave maximum mean of seed yield during 2011 and 2012 respectively.

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**Introduction**

Maize *zea mays* L. crop express one of the third major cereal crops that occupy the third order after wheat and rice crop on the basis of cultivated area and productivity. It has multiple usages so it contributes to human and animal nutrition and industrial side due to high quantity of oil and protein. Maize has high ability to production high yields and can adapts to different climatic conditions (Satoor, 1989). In spite of the increase of cultivated area in Iraq with this crop which is from 61000 ha during 1998 (FAO, 1998) to 91000 ha during 2003, it is below the required level.

The developing of this crop requires make efforts to increase the efficiency of productivity by means of invention the cultivars that characterize with high productivity and quality, so this can be achieved by using modern techniques through soil and crop management and interest of breeding and improvement processes to invention varieties and hybrids due to that hybridization is an effective instrument which is under control of plant breeder for gives probabilities to production wide genetic variance to give the opportunity to selection new and useful genotypes in a big scale and characterize with high productivity comparing with other varieties (Al- Zuhaery, 1980).

Every environmental region has cultivars and hybrids that suitable for that region and which is differs between them in its genetic ability and range of response to different developing cropping systems (Dhaaef et al., 1985).

Although the big development in agriculture sector in world for example crop cultivation especially maize crop dependence on the hybrids that characterize with high ability of productivity, but Iraq now depend on synthetics that have good productivity and broad genetic base that make it tolerance to different conditions comparing with other cultivars. Synthetic varieties consist of 75% of cultivated area in Iraq (Al- Zubai, 2001), So Saad et al., (1998) found that Abo- Ghraib location was significantly superior to Atshanah station in plant height, number of rows/ears, number of seeds/row and weight of 1000 seeds. Dhaaef et al., (1995) found that superiority of Kirkuk location in seed yield significantly comparing with Abo- Ghraib location due to its superiority in some yield components ( number of rows, number of seeds/row and weight of 1000 seeds). Baser and Genctan, (1996) reached to specifying the varieties that suitable for both regions depending on selection of a variety which has high yield in each region. Also significant differences were showed between varieties and locations on seed yield, plant height, number of seeds/row and weight of 1000 seed (Dhaaef et. al., 1999).

Ali et al., (2002) showed that the studied genotypes gave maximum yield in Ali al- Gharby location comparing with Al- Qurna location. Al- Obaydi (2003) showed that Abo- Alkhaseeb location was superior to Al- Hartha location in seed yield traits in Al- Basrah recorded maximum mean (167.32 gm/plant), whereas Abo- Alkhaseeb location showed significant superiority in plant height, weight of 500 seeds, number of ears/plant and yield comparing with in Al- Hartha location. Bektash and Aswady (2005) and Mustafa (2008) and yusef et. al., (2008) found difference between genotypes to studies trails. Dawood et. al., (2009) showed significant difference between Corn genotypes to yield and its components. Ghoukan (2010) Observed significant difference to grain yield for 14 genotypes cultivated in five location (Iran) through 2007 and 2008. Gamal and Saadallah (2011) found difference between genotypes to studies trails.

Boakyewaa (2012) reached that significant differences were appeared in 12 genotypes that cultivated in three location in Ghana, in addition the significant effect of interaction between genotypes and locations in seed yields therefore this experiment was carried out in order to evaluation seven genotypes which cultivate for the first in southern region and determination which are suitable based on yield and quality.

## Materials and methods

The experiment was carried out during fall for two years 2011 and 2012 in two location first location in Al-Muthaunna government (AL- Salhoobia region) East of city centre about 35 km ,Second location in Thi- Qar Government (AL- Gharraf) which is Located North of city center about 25 km in two typed of soil that its characteristics showed in table (1) to evaluation of performance seven different genotype of maize (Single cross Cadz, Double cross 2052, Tri-cross 3003, Synthetic 5015, Synthetic 5016, Synthetic 5017 and Synthetic 5018) under AL-Muthanna and Thi- Qar government condition, seeds crop were brought from public body of Agricultural researches Abo- Ghraib ,layout of experiment was Random complete block design with three replications. The seeds cultivated at mid July 2011 and 2012 on furrows with distance 0.75 m. between them and 0.25 between dig and other.

The seeds 2-3 were sowed in the soil then plats thinned to one seedling with 5 Leaves age .experimental plot consisted of 4 furrows with distance 6m ,after that service practices post-cultivation were done which are Irrigation weeds control in case need. Phosphate Fertilizer was applied post-cultivation as(tri super phosphate 42% with quantity 80 kg/ ha all at once while N Fertilizer was applied as (Urea 46% N) with quantity 200 kg/ ha at two shares, first was at cultivation and the next was after one month of plant age (Dhaaef, 1985).

When plants reached to 75% flowering stage period of male flowering (number of days from cultivation until 75% male flowering), plant height (cm) leaf area (cm<sup>2</sup>) (square of tall leaf under ear x 0.75) according to (montgamery,1911 ) traits were calculated . Yield components (number of ears /plant ,number of rows/ear, number of seeds /row ,seed weight (gm) and seed yield ton/ ha were calculated at maturity. Data analyzed statically using collective analysis between both location and the comparison between means were done using revised significant least differences L. S. D. at alpha 0.05 according to (AL-rawy and Khalufallah, 1980).

**Table (1) physical and chemical characteristics for experiment locations in fall season 2011 and 2012.**

Year	Location	E.C (d.s/m)	PH	N mg/kg	P mg/kg	Clay gm/kg	Sand gm/kg	Silt gm/kg	Texture
2011	Al-Muthanna	3.70	8.20	13.20	19.15	212	644	144	sandy clay
	Thi- Qar	5.34	7.30	16.20	24.5	450	150	400	Clay silt
2012	Al-Muthanna	3.21	8.11	13.89	20.78	214	643	143	sandy clay
	Thi- Qar	4.45	7.56	15.89	22.89	452	148	400	Clay silt

## Results and discussion

### Effect of Location

Data of statistical analysis show that Al-Muthanna location was significantly superior to Thi- Qar location in number of days until 75% flowering about 65.66 and 61.42 days in 2011 and 67.17 and 61.42 days in 2012 for two location respectively, may be due to low level of salinity in addition to soil texture to Al- Muthanna location comparing with Thi- Qar location (Table1) of which allow better growth for cultivated plants in Al- Muthanna location from germination until flowering, this result agree with baser and Genctan (1996) and Al-Freeh (2003), whereas superiority of Thi- Qar location comparing with Al- Muthanna location was showed on number of ears /plant in which reach about 1.49 and 1.43 ear /plant for both years 2011 and 2012 respectively, whereas the number of ears /plant about 1.25 and 1.23 for both years 2011 and 2012 respectively in Al- Muthanna location (Table 2) may be due to superiority of Thi- Qar location in leaf area/ plant (table 2) of which prepared better vegetative growth caused increase in number of ears/plant, so this result agreement with Dhaaef (1995).

About yield and its components, the results showed that Thi- Qar location was significantly superior to Al-Muthanna location in number of rows/ears about 14.93 and 15.25 row/ear, whereas al- Muthanna location gave minimum values about 12.95 and 13.96 row/ear for both years 2011 and 2012 respectively. This is may be due to that plants of Thi- Qar location characterized with better leaf area and low plant height which is mean increase in photosynthesis of materials and decrease in its consumption to build the structure of plant and use it towards reproductive stage which was the reason to increase number of rows/ ears, whereas al- Muthanna location was significantly superior to Thi- Qar location for both seed number/ row and seed weight which gave higher means reached to 30.93 and 30.97 seed/row, whereas reached for seed weight 0.191 and 0.203 gm for both years 2011 and 2012 respectively.

The superiority of Al-Muthanna location may be due to that al-Muthanna plants characterized in decreasing number of rows/ear, therefore it caused increase in number of seeds/ and seed weight as result of low competitions of produced materials from photosynthesis within ear, this result was agreement with Saadallah et.al, (1998) and Dhaaef et.al, (1999) who are indicated that difference of yield components as differences of location.

As for yield the results revealed superiority of Al-Muthanna location to Thi- Qar location significantly for both years and gave maximum means reached 4.96 and 3.87 ton/ ha-1 in 2011 and 5.38 and 4.32 ton/ ha-1 in 2012 for Al-Muthanna and Thi- Qar location respectively. It may be due to superiority of Al-Muthanna location in yield components for both number of seed/row and seeds weight which were ensured increase exceeded the decrease of number of rows/ear (table 2), this result was agreement with Boakyewaa (2012) who is indicated that seeds yield was different in the studied location.

**Table (2) Effect of location on some growth and yield traits and its components.**

Year	Trait	%75 Flowering	Plant Height (cm)	Leaf area (cm <sup>2</sup> )	No. Ears/ plant	No. rows/ ear	No. seeds/ row	Seed weight (gm)	Seed yield (ton/ ha)
	Location								
2011	Al- Muthanna	65.66	156.98	436.67	1.25	12.95	30.93	0.191	4.96
	Thi- Qar	61.42	152.85	442.03	1.49	14.93	22.41	0.119	3.87
L.S.D		0.93	N.S.	N.S.	0.19	0.68	1.16	0.053	0.82
2012	Al- Muthanna	67.17	157.69	438.89	1.23	13.96	30.97	0.203	5.38
	Thi- Qar	61.42	153.48	445.15	1.43	15.25	25.70	0.152	4.32
L.S.D		0.99	N.S.	N.S.	0.17	0.72	1.03	0.061	0.89

### Effect of genotype

The result of statistical analysis referred to differences of genotypes within them significantly in number of days until 75 % flowering, leaf area and number of ears/plant for both years in which the 5016 synthetic gave maximum height of plant in 2011 reach to 65.83 cm, whereas Synthetic 5017 gave maximum height of plant in 2012 reach to 66.94 cm.

As respect with leaf area Synthetic 5017 gave maximum mean reach to 563.00 and 569.61 cm<sup>2</sup>, While Synthetic 5015 gave minimum leaf area about 397.04 and 398.54 cm<sup>2</sup> for both years 2011 and 2012 respectively. Also about of number of ears /plant the Synthetic 5015 recorded maximum mean 1.60 and 1.49 ear/ plant, whereas the synthetic 5016 recorded minimum mean 1.20 and 1.22 ear/plant for both years 2011 and 2012 respectively (table 4) it may be that due to the differences in genotypes, so this result was agreement with Bektash and Aswady (2005) and Mustafa (2008) and Yusef et. al., (2008) who were referred that the genotypes were different in studied traits .

About yield components number of seed/ ear was affected significantly with differences of genotype which single cross Cadz and Synthetic 5016 gave maximum mean 27.99 and 27.99 seed/ row during 2011 while synthetic 5017 gave maximum mean 30.26 seed/ row during 2012 may be the reason for that due to the genotype and its interaction with climatic conditions for both years 2011 and 2012 respectively, this result was agreement with Dawood and Ali (2009) who is showed that difference of yield components as a result to difference of genotypes. Single cross Cadz product high seed weight reach to 0.199 gm in year 2012.

Data of seed yield recorded significant variance in studied genotypes with differences of its performance from year to another, in which synthetic 5018 and Single cross Cadz gave maximum seed yield about 5.73 and 5.13 ton/ ha in 2011 while Single cross Cadz and synthetic 5017 gave maximum mean 5.67 and 5.10 ton/ ha during 2012 due to the superiority of genotypes that mentioned above in seed yield as a result of superiority basically in one or more of yield components, this result was agreement with Ghoukan, (2010) who referred to difference of studied genotypes in seed yield.

**Table (3) Effect of genotype on some growth and yield traits and its components.**

Year	Trait	%75 flowering	Plant Height (cm)	Leaf area (cm <sup>2</sup> )	No. Ears/ plant	No. rows/ ear	No. seeds/ row	Seed Weight (gm)	Seed yield (ton/ha)
	Genotype								
2011	Single cross Cadz	64.16	157.55	435.45	1.26	14.07	27.99	0.183	5.13
	Double cross 2052	62.50	151.38	460.41	1.37	12.99	27.21	0.162	4.28
	Tri-cross 3003	62.66	152.77	402.50	1.48	14.05	23.60	0.155	4.01
	Synthetic 5015	62.83	148.05	397.04	1.60	14.66	25.27	0.142	4.28
	Synthetic 5016	65.83	152.21	398.45	1.20	13.99	27.99	0.137	3.45
	Synthetic 5017	64.16	168.44	563.00	1.21	14.44	27.77	0.158	3.99
	Synthetic 5018	62.66	153.99	418.62	1.49	13.55	26.83	0.150	5.73
	L.S.D	2.16	N.S.	83.69	0.23	N.S.	3.56	N.S.	1.02
2012	Single cross Cadz	64.11	156.66	439.39	1.27	14.85	28.80	0.199	5.67
	Double cross 2052	63.29	152.68	461.08	1.32	13.39	28.84	0.172	4.52
	Tri-cross 3003	64.15	154.13	404.79	1.31	14.50	24.42	0.157	3.83
	Synthetic 5015	63.38	148.79	398.54	1.49	15.03	26.97	0.178	5.26
	Synthetic 5016	66.17	154.06	401.83	1.22	15.01	30.09	0.182	4.63
	Synthetic 5017	66.94	167.13	569.61	1.22	15.00	30.26	0.189	5.10
	Synthetic 5018	64.24	155.65	418.91	1.48	14.45	28.95	0.166	4.91
	L.S.D	2.56	N.S.	79.24	0.20	N.S.	3.23	0.021	1.17

### Effect of Interaction (Location × Genotype)

Results of statistical analysis showed the significant effect of interaction in all studied growth traits, so the combination (Al- Muthanna × Synthetic 5017) gave maximum means of number of days until 75% flowering about 68.33 and 71.00 days for both years 2011 and 2012 respectively. Also the combination (Thi- Qar × Synthetic 5017) gave maximum means of plant height about 185.77 and 183.92 cm, whereas (Thi- Qar × Double cross 2052) combination gave minimum means about 137.21 and 139.01 cm. Also the combination (Thi- Qar × Synthetic 5017) gave maximum means of leaf area about 621.66 and 621.78 cm<sup>2</sup> for both years 2011 and 2012 respectively .

Number of ear/ plant recorded maximum mean with combination (Thi- Qar × Synthetic 5018) about 1.77 and 1.78 ear/plant for both years 2011 and 2012 respectively.

As respect with yield components the combination (Al- Muthanna × Single cross Cadz) recorded maximum means of seeds/ row about 35.33 in 2011 and (Al- Muthanna × Synthetic 5016) 33.29 seed/ row in 2012, While the results differ as respect with minimum means therefore the combination (Thi- Qar × Synthetic 5015) gave maximum mean about 18.55 seed /row in 2011, Whereas (Thi- Qar × Tri cross 3003) combination gave minimum mean 22.37 in 2012, Also about seed weight the combination (Al- Muthanna × Double cross 2025) gave maximum means about 0.230 and 0.243 gm, whereas (Thi- Qar × Double cross 2025) gave minimum means 0.093 and 0.101 gm for both years 2011 and 2012 respectively (Table 5, 6).

As respect with seed yield the results were various between locations of experiment, in which Single cross Cadz was superior to all others and recorded maximum means about 7.14 and 7.36 ton/ha-1 in Al-Muthanna location for both years 2011 and 2012 respectively, whereas Synthetic 5018 was superior and recorded maximum means about 7.65 and 5.71 ton/ha-1 in Thi- Qar location for both years 2011 and 2012 respectively (Table 5, 6), The reason for superiority of a Single cross Cadz in Al-Muthanna location and synthetic 5018 in Thi- Qar location of seed yield basically due to their superiority in seed number/row with non-significant differences in rows number/ear.

**Table (5) Effect of interaction between Location and Genotype on some growth and yield traits and its components in 2011.**

Location	Trait	%75 flowering	Plant Height (cm)	Leaf area (cm <sup>2</sup> )	No. Ears/ plant	No. rows/ ear	No. seeds/ row	Seed Weight (gm)	Seed yield (ton/ha )
	Genotype								
AL- Muthanna	Single cross Cadz	66.66	158.33	434.16	1.32	13.55	35.33	0.217	7.14
	Double cross 2052	64.00	165.55	442.50	1.32	11.99	31.55	0.230	5.56
	Tri-cross 3003	64.00	160.55	439.16	1.20	12.88	27.10	0.203	4.89
	Synthetic 5015	64.00	149.44	370.41	1.43	13.77	31.99	0.167	5.22
	Synthetic 5016	68.33	161.10	427.91	1.20	12.66	32.44	0.180	4.23
	Synthetic 5017	68.33	151.10	513.33	1.10	13.33	29.99	0.170	3.88
	Synthetic 5018	64.33	152.77	429.25	1.22	12.44	28.10	0.173	3.82
Thi- Qar	Single cross Cadz	61.66	156.77	436.75	1.20	14.59	20.66	0.150	3.12
	Double cross 2052	61.00	137.21	478.33	1.43	13.99	22.88	0.093	3.01
	Tri-cross 3003	61.33	144.99	365.83	1.76	15.22	20.10	0.107	3.14
	Synthetic 5015	61.66	146.66	423.66	1.76	15.55	18.55	0.117	3.35
	Synthetic 5016	63.33	143.33	369.00	1.20	15.33	23.55	0.093	2.68
	Synthetic 5017	60.00	185.77	612.66	1.33	15.55	25.55	0.147	4.11
	Synthetic 5018	61.00	155.22	408.00	1.77	14.66	25.55	0.127	7.65
	L.S.D	3.28	33.94	97.57	0.38	N.S.	3.26	0.022	1.66

**Table (6) Effect of interaction between Location and Genotype on some growth and yield traits and its components in 2012.**

Location	Trait	%75 flowering	Plant Height (cm <sup>2</sup> )	Leaf Area (cm <sup>2</sup> )	No. Ears/ plant	No. rows/ ear	No. seeds/ row	Seed Weight (gm)	Seed yield (ton/ ha )
	Genotype								
AL- Muthanna	Single cross Cadz	65.23	155.45	438.43	1.33	14.32	33.23	0.222	7.36
	Double cross 2052	66.03	166.36	446.78	1.22	12.67	32.19	0.243	6.02
	Tri-cross 3003	65.79	162.78	436.89	1.20	14.12	26.48	0.191	4.45
	Synthetic 5015	66.39	151.80	376.30	1.33	15.03	30.67	0.201	6.18
	Synthetic 5016	70.46	163.12	429.89	1.22	13.68	33.29	0.178	4.55
	Synthetic 5017	71.00	150.34	517.45	1.11	14.89	31.49	0.198	4.98
	Synthetic 5018	65.14	154.03	426.53	1.20	13.01	29.45	0.188	4.12
Thi- Qar	Single cross Cadz	62.99	157.87	440.36	1.22	15.38	24.38	0.176	3.98
	Double cross 2052	60.56	139.01	475.38	1.43	14.12	25.49	0.101	3.03
	Tri-cross 3003	62.52	145.56	372.69	1.43	14.89	22.37	0.123	3.21
	Synthetic 5015	60.38	145.78	420.79	1.66	15.04	23.28	0.156	4.35
	Synthetic 5016	61.89	145.00	373.78	1.22	16.34	26.89	0.187	4.72
	Synthetic 5017	62.50	183.92	621.78	1.33	15.11	29.04	0.181	5.23

	Synthetic 5018	63.34	157.27	411.30	1.78	15.89	28.46	0.145	5.71
	L.S.D	3.89	31.76	89.86	0.32	N.S.	4.53	0.018	1.72

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