Journal Tikrit Univ. For Agri. Sci. Vol. (15) No.(1) – 2015
ISSN-1813-1646

ESTIMATING OF GENETIC PARAMETERS AND CONSTRUCTION OF SELECTION INDICES FOR EXOTIC AND ENDOGENOUS MAIZE GENOTYPES.

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ABSTRACT

Key words:
Genetic parameters,Maize genotypes,Selection index.

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Selection index state how and which trait should be chosen.21's maize genotypes sown at the field crops station\college of Agriculture\University of Tikrit,using Randomized Complete Block Design with three replications to estimate genetic parameters for grain yield(x_1) and it's components :ear. plant^{-1}(x_2),rows.ear^{-1}(x_3),grains.row^{-1}(x_4),500-grains weight(x_5) and grain percentage(x_6)as well as distinguishing superior selection index and genotype. The results showed significant differences among genotypes for grain yield,ears.plant^{-1},grains. row^{-1} and 500 grains weight. Genetical and environmental variances were closely in most studied traits, while positive highly significant genetic correlations were found between grain yield and each no.ears.plnt^{-1} and 500grains weight. Also no.ears.plant showed high significant correlation with 500grains weight and grain percentage. While phenotypic correlations were neglected and mostly negative except positive significant correlation between grain yield per plant and grain percentage .Low values of H^2b.s. in most traits companied with moderate percentage of genetic advance(21.32 ,18.94%)in ears.plant^{-1} and grain yield respectively. Responses for combined selection were more important especially in ears.Plant^{-1}and 500 grains weight that can be taken as important traits composed the superior selection index.The best genotype was (DKC6677)followed by Tauste,NK sweedish,Hay al-shemal, and Drachma as compared with the other genotypes.Predomenant genotypes can be used for improving grain yield and its components by using the best specific selection index(I_{125}) .

تقدير المعالم الوراثية وانشاء ادلة انتخابية لتراكيب محلية وأجنبية من الذرة الصفراء

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الخلاصــة

كلمات مفتاحية:
المعالم الوراثية ، تراكيب الذرة الصفراء ، الادلة الانتخابية.

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يبين الدليل الانتخابي أهم الصفات التي يجب أن تنتخب فضلا على تمييز التراكيب الوراثية المتفوقة.زرعت 21تركيب وراثي أجنبي ومحلي في حقل المحاصيل الحقلية/كلية الزراعة/جامعة تكريت باستخدام تصميم القطاعات العشوائية الكاملة وبثلاثة مكررات لتقدير المعالم الوراثية لصفات حاصل الحبوب ومكوناته: عدد العرانيص. نبات$^{-1}$ وعدد الصفوف.عرنوص$^{-1}$ وعدد الحبوب .سطر$^{-1}$ ووزن 500حبة ونسبة الحبوب بالاضافة الى تحديد افضل دليل انتخابي وأفضل تركيب وراثي.ظهرت فروق معنوية بين التراكيب الوراثية في صفات:حاصل الحبوب وعدد العرانيص.نبات$^{-1}$وعدد الحبوب.سطر$^{-1}$ ووزن 500حبة.كانت التباينات الوراثية والبيئية متقاربة في معظم الصفات المدروسة بينما ظهرت ارتباطات وراثية عالية المعنوية وموجبة بين صفة حاصل الحبوب وكل من صفة عدد العرانيص.نبات ووزن 500حبة وكذلك بين صفة عدد العرانيص.نبات وكل من صفة500حبة ونسبة الحبوب ، بينما كانت الارتباطات المظهرية غير معنوية ومعظمها سالبة عدا الارتباط الموجب والمعنوي بين حاصل الحبوب للنبات(غم) والنسبة المئوية للحبوب .كانت تقديرات نسبة التوريث بالمدى الواسع منخفضة في معظم الصفات وقد ترافقت هذه النتيجة مع نسب متوسطة من التحسين الوراثي(21.32و18.94) في صفتي عدد العرانيص. نبات$^{-1}$وحاصل الحبوب على التوالي . الزيادة المتوقعة للانتخاب المرافق كانت موجبة ومهمة عند الانتخاب لصفتي عدد

العرانيص.نبات ووزن 500حبة واللتان تعدان أهم صفتين تدخلان في تركيب الدليل الانتخابي المتفوق بالاضافة الى صفة حاصل الحبوب(I_{125}).تفوق التركيب DKC6677على سائر التراكيب الاخرى عدا Tausteو NK وSweedishوHay Al-ShemalوDrachma التي تلته في الاهمية والتي يمكن اختيارها مع الدليل الانتخابي المتفوق (I_{123})في تحسين صفات الحاصل ومكوناته لتراكيب الذرة الصفراء المدروسة.

Introduction

Maize is one of the most important grain field crops, which used for human nutrition besides animal feed(Elsahookie,1990)Grain yield and its components affected by genetical and environmental factors that interrelated and developed sequentially at different growth stages. Breeding program depends mainly on the direction and magnitude of the association between yield and its components that provide basic information which was useful as indicators of more important ones under consideration and separate correlation relationships as a result selection will be more affective (Agarma ,2006).The association between traits may be measured by genotypic and phenotypic correlations depending on the types of studied materials and experimental design used. Knowledge of the size of association among traits of interested of fundamental importance in breeding program to allow genetic progress. Variability of genotypes is a key to crop improvement and essential success, however observed significant variation in important agronomic yield traits(Ali,1999;Abdulmula and Sabiel, 2007,Rafiq *et al*,2010 and Zirehzadeh *et al* 2011) especially ear no.plant^{-1}(Khayatnezhad *et al* 2010,Moradi and Azapour 2011) 100 grain weight (Ahmad *et al*,2011)Total ear weight (Valeria,2002)that referring of genetic diversity in grain yield and its components which often according to genetic distance (Showemimo,2004).Significant positive genotypic and phenotypic correlation observed in grain yield with no.grains.ear^{-1},grains.row^{-1} and ear diameter (Ali *et al*,2011;Beiragi *et al*,2011,Bello *et al*,2010,Yousif and Saleem,2001) rows. ear^{-1} and hundred grain weight(Bello *et al*,2010, Hefny,2011,Selvaraj and Nagarajan,2011, Yousif,2010).Although phenotypic correlation between grain yield with ear no., 100 grain weight and no. of grain.ear^{-1} were positive and significant (Khazae *et al*,2010) but the most important part of the significant positive values of genotypic correlation between grain yield and most yield components traits: (Khayatnezhad *et al*,2010,Lone *et al*,2010)especially kernels no. row^{-1}(Srekov *et al*,2011)ear length,grains. row^{-1},grains.ear^{-1},hundred grain weight (Selvaraj and Ngarajan,2011).Sometimes maize grain yield correlated non significantly negative with no. rows.ear^{-1} and perhaps significantly with ear length,kernals.row^{-1},total kernels no. ear^{-1} and1000 kernels weight (Zirehzadeh *et al*, 2011).

Grain yield of Maize positively and highly significant affected by ear length and ear weight(Oktem,2008)ears.plant^{-1}(Agarma,2006) ear length, no.rows .ear^{-1}(Moradi and Azapour, 2011,Selvaraj and Nagarajan,2011, zirehzadeh *et al*,2011)100 grains weight, grains no.row^{-1},grains no.ear^{-1},ear length and ear diameter (Rafiq *et al*,2010)500grains weight (Bahoush and Abbasdokht,2008, khayatnezhad *et al*,2010)ear weight, grains no.ear^{-1},100 grains weight(Bello *et al*,2010, Hefny, 2011,Zirehzadeh *et al*,2011) .Other traits may be increasing yield indirectly representing positive indirect effect on grain yield via ear no. and grains no.(Agarma,2006,Rafiq *et al*,2010)rows.ear^{-1}and 1000grains weight that regarded secondary important traits (Khayatnezhad *et al*,2010,Moradi and Azapour,2011)even though negative non-significant direct effect recorded for rows.ear^{-1}(Selvaraj and Nagarajan,2011)grains.row^{-1}, though positive indirect effect via ear weight.plant^{-1},100grains weight (Hefny,2011). Maize grain yield and it's components possess high heritability values in broad sense although low percentages of genetic advance in a diallel mating design (Al-Bang,2009,Anees,2009) while in three-way crosses heritability was low and moderate genetic advance(Anees,2009).The relationship between heritability and genetic advance not always in the same direction but moderate heritability estimates in grain yield companied with high genetic advance percentage of grains $no.ear^{-1}$and moderate in grain $yield.plant^{-1}$ and 500grains weight (Al-Abbasi,2009). Selection indices are the best techneque to determine selection criteria that clarifying relationships among traits and aim to select many traits simultaneously that mainly affected grain yield.It diminished efforts and increasing economic return of breeding program.Selection indices composed of many major yield components traits are more efficient than ones content one traits.Plant hight,1000grains weight and $no.grains.row^{-1}$are able to use as a selection index in maize for their large consideration on grain yield(Aziz *et al*,1998).High relative efficiency (108.83) obtained if selection index composed of:ear dimeter,no. $grains.ear^{-1}$and $no.ears.plant^{-1}$ and increasing of grain yield estimated value (179.6)for each cycle of selection(Vasic et al,2005).Grains $no.ear^{-1}$and $grains.row^{-1}$can be used as a selection index for improving maize grain yield (Biktash and Mohammad,2005). Selection index depends on scientific approach for increasing efficiency of breeding program, therefore, this study aims to estimate some genetic parameters and constructing several selection indices for exotic and endogenous maize genotypes.

Materials and Methods

In order to select according to proper scientific statistics basis, many selection indices were constructed depending on grain yield index.21 exotic and endogenous maize genotypes were grown in a gypsum soil condition(Department of field crops\college of Agriculture\Tikrit University) for evaluating grain yield and it's components by using Randomized complete Block Design with three replicates. Seeds sown in15th July 2011 by using hills method with 0.75 and 0.25m inter and intra plant spacing. The amount of Nitrogen added was 240kg\h seplited in two parts: through the furrowing with whole phosphorus fertilizer(200kg P_2O_5\ha) and the second doses after 45 days of planting. whole the field and crop management performed as plant demands. The traits studied were:grain $yield.plant^{-1}$,$no.ears.plant^{-1}$,$no.rows.ear^{-1}$,$no.grains.ear^{-1}$,500 grains weight and grains percentages= grains weight/ grains +cobs wieght×100. Data analyzed according to Design which used (Dawod and Abdulyas,1990)for estimating significancy besides variance and covariance phenotypic components(Singh and Chaudhary, 2007).

Genotypic(rG) and phenotypic(rP) correlations Estimated by using the following formulas: $rG=\delta gy/\sqrt{(\delta^2 gx)(\delta^2 gy)}$; $rP=\delta Pxy/\sqrt{(\delta^2 Px)(\delta^2 Py)}$. Broad sense heritability was estimated as, $(H^2)= (\delta^2 g/\delta^2 p)\times 100$,and classified according the following grades :<40% =Low, 40-60% moderate,>60% high .(Ali,1999).Gain from selection$(GA)=K .H^2 .\delta p$. where K=2.06 in case of selection best 5% plants, δp:phenotypic standard devation. Dividing of GA on the mean of each trait ×100 resulting of GA percent of the mean as correlated response from selection of other trait $(CR_x)=K .rg .\sqrt{H^2_x} .\sqrt{H^2_y} .\delta p_y$. and it's percentage by dividing on mean yield($\bar{y}$..) multiplied by 100.(Robinson, 1966,cited from Al-Bang,2009).Selection indices cnstructed by using approach of (Miller *et al*,1958) in all possible cases (no.of selection indices=n!/x!(n-x)! ,n:all entries ,x : types of selection indices.Selection index$(I) =b_1.x_1 +b_2 ..x_2+\ldots b_n.x_n..$ where $b_1,b_2,b_3,\ldots$ =weights of traits.$x_1,x_2,x_3,\ldots$.= phenotypic values of traits.b values estimates $=[p\ ]^{-1}.[g\ ]$. where:$[p\ ]^{-1}$:Matrix inverse of variance and covariance phenotypic correlations. [g]: genotypic covariance of each trait with yield. Selection indices used for estimating GA through the flowing formula, $GA=K\sqrt{b_1g_1y +b_2g_2y+\ldots b_ng_ny}$. if GA <10 regarded low, 10-30:Moderate, >30:high. (Al-Addary,1999). Analysis of variance of genotypes values results from applying superior selection index performed according to (Dawod and Abdulyas,1990).The origin of crosses of maize studied genotypes stating in the following table(1).

Table(1)Origins of studied genotypes.

Genotype	Type	Genotype	Type
DKC6677	U.S.A.	Prago	Spanish
Drachma	spanish	DKC6589	U.S.A.
May70	German	DKC6876	U.S.A.
Parat	Spanish	DKC6120	U.S.A.
DKC950	U.S.A.	Mavrik	Sweedish
Danya	Iraqi	Carella	Spanish
Hay Al-Shemal	Iraqi	Tauste	Spanish
CAD7	Spanish	Sarah	Iraqi
NK Sweedish	Sweedish	Bhooth 106	Iraqi
DKC6418	U.S.A.	Tietar	Spanish
5015	Iraqi		

Results and Discussion

Highly significant differences in grain yield compained with significant differences in ears.plant^{-1},grains.row^{-1}and 500 grain weight where resulted from analysis of variance (table 2).These differences among genotypes traits regarded as the basic material maize genotypes improvement (Abdulmula and Sabiel,2007,Ahmad *et al*,2011,Khayatnezhad *et al*,2010,Moradi and Azapour,2011,Rafiq *et al*,2010).

Table(2)Analysis of variance representing by M.S. for studied traits

S.O.V.	d.f.	Traits					
		Grain yield (g\plant)	Ears no. plant^{-1}	No. rows .ear^{-1}	No. grains. row^{-1}	500grains weight(gm)	Grain percentage(%)
Block	2	1392.295	0.211	0.901	75.407	581.55	54.748
Treatment	20	589.63**	o.1979*	1.667	41.412*	777.954*	33.462
Error	40	211.251	0.089	2.569	22.131	419.308	21.902

*:significant on 5%. **:significant on 1%.

Phenotypic and genotypic variance and covariance estimated according to experimental design then used for calculating genotypic and phenotypic correlation coefficients (table 3).Grain yield correlated genetically high significant and positively with each ears. plant^{-1},and 500grains weight. Also ears.plant^{-1}showed high positive significant genotypic correlations with 500grains weight and grain percentage ,and significant with grains.no.row^{-1}.

Table(3)Varience and covariances genetical(upper diagonal)and phenotypical (under diagonal) for studied characters

Characters	Grain yield (g\plant) (x_1)	No.ears. plant^{-1} (x_2)	No.rows. ear^{-1}(x_3)	No.grains. row^{-1}(x_4)	500grains weight(gm) (x_5)	Grains percentage(%) (x_6)
Grain yield (g\plant) (x_1)	126.126 337.377	1.215 ____	0.795 ____	5.899 ____	68.392 ____	-7.07 ____
No.ears. plant^{-1}(x_2)	____ 1.8	0.036 0.125	0.024 ____	0.212 ____	1.729 ____	0.296 ____
No.rows. ear^{-1}(x_3)	____ 0.925	____ -0.110	0.29 1.366	-0.034 ____	-6.868 ____	-0.846 ____
No.grains. row^{-1}(x_4)	____ 26.435	____ -0.269	____ 1.969	6.427 28.558	-8.873 ____	1.649 ____
500grains weight(gm)(x_5)	____ 84.535	____ -0.077	____ -5.06	____ -5.989	119.548 538.856	13.669 ____
Grains percentage(%) (x_6)	____ 48.954	____ -0.743	____ -0.156	____ -3.042	____ 11.162	3.853 25.755

However positive significant phenotypic correlations of grain percentage with grain yield indicating of large differences among genotypes in both grain and cobs portions and the effect of grain percentage in grain yield\plant. Most correlations with grain yield were positive that stating importance of this traits and efficient selection index which included besides strengthen breeding program, therefore care should be taken to the major important traits (no.ears.plant^{-1} and 500grains weight)and minor importance to the ear formation traits(no.grains.row^{-1},500grains weight and grain percentage).Negative correlations regardless effects except rows.ear^{-1},500grains weight and grain percentage traits.Non significant genotypic correlations even positive or negative(grain yield with rows.ear^{-1},grains. row^{-1},grains percentage and no.ears. plant^{-1}with no.rows.ear^{-1},and the latter with no.grains.row^{-1},grains percentage and ears.plant^{-1} with rows.ear^{-1} and rows.ear^{-1} with grains.row^{-1} and the latter with 500 grains weight and grains percentage).Phenotypic correlations between traits without grain yield were non significant even positive or negative(table 4).Non significant correlations between traits even genotypic or phenotypic leading to independence of selection and diminishing effects between each others. Simeller results about importance positive genotypic and phenotypic correlations than negative effects were recorded by Yousif and Saleem (2001) ;Bello *et al*(2010);Beiragi *et al*(2011)and Hefny(2011)

Table(4)Genetical correlations (upper diagonal)and phenotypical correlations(under diagonal) between grain yield and other characteristics.

Characters	Grain yield (g\plant) (x_1)	No.ears. plant^{-1} (x_2)	No.rows. ear^{-1}(x_3)	No.grains. row^{-1}(x_4)	500grains weight(gm) (x_5)	Grains percentage(%) (x_6)
Grain yield (g\plant) (x_1)	1	** 0.57	0.131	0.207	** 0.556	-0.32
No.ears. plant^{-1}(x_2)	0.277	1	0.235	* 0.44	** 0.833	** 0.795
No.rows. ear^{-1}(x_3)	0.04	-0.266	1	-0.024	** -0.86	** 0.8
No.grains. row^{-1}(x_4)	0.269	-0.142	0.315	1	-0.32	0.33
500grains weight(gm)(x_5)	0.198	-0.009	-0.186	-0.048	1	** 0.636
Grain percentage(%)	* 0.525	-0.414	-0.026	-0.112	0.094	1

*: significant on 5%, **:significant on 1%

Heritability estimates in broad sense were moderate in most traits especially grain yield.plant^{-1}(37.38%),no.ears. plant^{-1} (28.8%),no.grains.row^{-1}(22.5%)and 500 grains weight(22.18%)(table5). Large values of environmental variances resulting of diminishing heritability estimates and exaggerating environmental importance for such traits (Anees,2009).Genetic advance depends mainly on genotypic and phenotypic variance besides selection pressuer.Data showed moderate values of GA (18.94 and 21.32%) in grain yield.plant^{-1}and ears.plant^{-1}respectivly. While other characteristics were low in this genetic parameter.Grain yield would increased about(9.486,8.121 and3.045%)if selection applied on ears.plant^{-1},500grains weight and no.grains.row^{-1} respectively as a result of companied selection and high heritable traits correlated tightly with grain yield(table 4 and 5).

Table(5) Genetical parameters for studied characters.

Charecters	Means	Heritability ($H_{b.s.}$)	Genetic Advance (GA)	Percent of genetic advance (GA%)	Responses to companied selection(CR_x)	Percentage of responses to companied selection (CR_x%)
Grain yield (g\plant)	74.58	0.3738	14.13	18.94	_____	_____
No.ears. plant^{-1}	0.98	0.288	0.209	21.32	7.075	9.486
No.rows. ear^{-1}	12.84	0.1894	0.601	4.68	0.573	0.769
No.grains. row^{-1}	25.02	0.225	2.476	9.89	2.271	3.045
500grains weight(gm)	166.22	0.2218	10.6	6.37	6.056	8.121
Grains percentage(%)	72.02	0.1496	1.562	2.16	-2.862	-3.838

Selection index composed of summation weight values(b's) by it's phenotypic value of specific traits that composed.It state the differences among sets or dozens of important selected traits simultaneously than others. Wieght values(b's) of selection indices for different traits ranged from(1.256)-(-0.366)for grain yield which was positive except I_{125}.Indices without grain yield involve positive (b)values:12.187-0.179 except grains percentage in most studied selection indices . Estimating genetic advance according to each selection index considering the best 5%would increasing grain yield moderately (14.13%) focusing on grain yield only but higher GA(27.226,23.963,23.949,23.784,23.774and 23.681%)obtained from selection indicis included additional traits I_{125} ,I_{123456}, I_{12346}, I_{12456} ,I_{1246}, and I_{1235} respectivlly(table.6).

Table(6)Expected genetic advance and relative efficiency for selection indices.

Selection index components	Expected genetic advance	Relative efficiency
I_1=0.3738x_1	14.13	100
I_{123456}=1.3339x_1-39.2623x_2-1.5863x_3-1.7374x_4-0.0364x_5-4.1416x_6	23.963	169.58
I_{12345}=0.3245x_1+6.0373x_2+1.3342x_3-0.1104x_4+0.0881x_5	15.235	107.82
I_{12346}=1.2962x_1-37.7244x_2-1.3310x_3-1.6866x_4-4.0339x_6	23.9493	169.49
I_{12456}=0.6029x_1+32.5069x_2+1.3131x_4+0.2019x_5+0.768x_6	23.7842	168.324
I_{12356}=0.7785x_1-15.9652x_2-1.3524x_3+0.0362x_5-2.2387x_6	20.1862	142.86
I_{13456}=0.6287x_1+1.0848x_3-0.6031x_4+0.0641x_5-1.5619x_6	19.7619	139.857
I_{1234}=0.3546x_1+5.157x_2+0.9577x_3-0.1391x_4	14.7013	104.043
I_{1235}=1.1706x_1-8.1665x_2-1.1218x_3-0.0684x_5	23.6815	167.597
I_{1236}=0.2936x_1+20.3589x_2+1.996x_3-0.2331x_6	16.608	117.537
I_{1345}=0.3663x_1+0.8686x_3-0.1765x_4+0.0756x_5	14.7141	104.133
I_{1346}=0.6488x_1+0.8578x_3-0.6210x_4-1.5759x_6	19.542	138.301
I_{1456}=0.6264x_1-0.5270x_4+0.0549x_5-1.5519x_6	19.61	138.782
I_{1245}=0.3318x_1+4.9037x_2-0.0387x_4+0.0750x_5	14.921	105.603
I_{1246}=1.2560x_1-35.0461x_2-1.6988x_4-3.8735x_6	23.7747	168.256
I_{1356}=0.5588x_1-0.5442x_3+0.0677x_5-1.3818x_6	18.930	133.97
I_{1256}=0.7272x_1-12.9202x_2+0.0535x_5-2.0527x_6	19.9928	141.491
I_{123}=0.3424x_1+5.4863x_2+0.7919x_3	14.6362	103.582
I_{125}=-0.3669x_1+98.6315x_2+1.4786x_5	27.2260	192.682
I_{126}=0.7478x_1-13.4328x_2-2.0835x_6	19.8366	140.386
I_{134}=0.3873x_1+0.5982x_3-0.1932x_4	14.002	101.204
I_{135}=0.3662x_1+0.6125x_3+0.0752x_5	14.8030	104.954
I_{136}=0.3694x_1+0.3474x_3-0.1709x_6	14.2841	101.0905
I_{145}=0.3659x_1-0.1179x_4+0.0681x_5	14.5852	103.221
I_{156}=0.5535x_1+0.0681x_5-1.3562x_6	18.8878	133.671
I_{12}=0.3487x_1+4.6975x_2	14.5223	102.776
I_{15}=0.3463x_1+0.1097x_5	15.508	106.516
I_{16}=0.5712x_1-1.3602x_6	18.615	131.74

Relative efficiency differs among selection indices as output of type and number of whole GA's compared with grain yield selection alone.High GA of I_{125} traits led to the highest selection efficiency (192.682%) on the other sets of selected traits.Relative efficiency lower than yield neglegted(data not shown) Therefore,selected grain yield,ear.plant^{-1}and 500grains weight simultaneously will be more efficient than other traits of yield components.In addition of important grain yield in selection index formation according to Al-Abbasi(2009).Estimating superior selection index value for each trait and re analysis data revealed significant differences among studied genotypes (table 7).

Table (7)Analysis of variance for the superior selection index applied on studied genotypes Table

S.O.V.	d.f.	SS	M.S.	F calculated
Blocks	2	11686.478	5843.239	2.419
Genotypes	20	89219.990	4460.999	1.846 *
Error	40	96613.210	2415.330	

DKC6677 gave the highest range or value (398.411)which differed significantly from other genotypes except 26,15,13,5 that regarded the best genotypes according to the Duncan multiple range test for the I_{125} means values differences(table 8).

Table(8)Significant differences among genotypes means for the superior selection index.

No.	Genotypes	Selection index means	No.	Genotypes	Selection index means
1	DKC6677	398.411 a	11	DKC6589	311.309defgh
2	Tauste	378.689 ab	12	P3	306.672defgh
3	NK sweedish	370.785 abc	13	F2 CAD7	298.509defgh
4	HayAlshemal	353.182 abcd	14	DKC6876	296.632efgh
5	Drachma	349.404 abcde	15	Prajo	292.438fgh
6	Parat	339.504 bcdef	16	DKC6120	285.7fgh
7	Maverik	328.024bcdefg	17	Danya	282.948gh
8	May 70	327.641bcdefg	18	P7	280.283gh
9	DKC950	321.556 cdefg	19	Sarah♀	266.219h
10	5015	315.48 defgh	20	Z2	260.787h
			21	DKC6120	260.008h

Conclusions and recommendations: Significant genotypic correlations of grain yield with other traits can be taken as important indicator of selection traits.

Selection indices including grain yield are more important than others excluding it and the best selection index was :I_{125}(composed of grain yield,ears.plant^{-1} and 500grains weight). DKC6677,Tauste,NK sweedish,Hay alShemal, and Drachma genotypes possess superior yield advantages and predominant on the other genotypes .therefore ,Superior genotypes could be taken in consideration with I_{125} selection index.

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