# EVALUATION OF FABA BEAN GENOTYPES FOR YIELD AND ITS COMPONENTS USING SELECTION INDEX

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## ABSTRACT

The experiment was carried out at the farm of Filed crops Department, College of Agricultural engineering sciences, Duhok University in season 2018-2019 to construed selection index for (Reina, Lattikia, Hadiba, Giza and Aquadocia).  under different levels of phosphorus fertilizer(The experiment was laid out in factorial experiment using Randomize Complete Block Design with three replications. The results exhibited that all selection indices include the grain yield gave relatively efficiency, the best selection index were grain yield, number of pods plant$^{-1}$ and number of seeds pods$^{-1}$, so that we can using these characters as criteria's of selection of faba bean genotypes. Also the results showed that the highest mean selection index was 216.26 for lattikia genotype and differs significantly  over all other genotypes.

The heritability broad sense was high for all studied characters and ranged between 0.94 to 0.99. Regarding to the genetic advance as mean gave high values for first pod height (57.10), grain yield plant$^{-1}$ (43.97), number of main branches plant$^{-1}$ (33.92) and number of pods plant$^{-1}$ (31.52) and medium for plant height, days to 75% flowering, number of nodules plant$^{-1}$ and number of seeds pod$^{-1}$. So that we can using these desirable characters to improve the faba bean genotypes.

**Key words**: Faba Bean, Production, Selection Index, Phenotypic, Genotypic.

## INTRODUCTION

Genetic improvement mainly depend on the amount of genetic variation existing in the plant population which is a ubiquitous property of feature of all species in nature. The genetic variation found in the germ plasm of a crop, its assessment is pre-requisite for working any effective breeding program, these genetic variability might be either heritable or non-heritable. The estimation of variability due to heritable component is most important because it would be a guide for selection of parents for crop improvement programs of the population. Thus, the genetic variation for agronomic characters is the key component of breeding programs for expression the gene pool of faba bean and others crops. Loos and siddique, (1997) reported that yield improvement is a major breeding objective of most crop improvement programs in faba bean. The success of any plant breeding program depend on the choice of genotypes capable of producing progeny with desired characters combination yield in faba bean, similar to the other crops yield, is complex character and constitute by many of morphological and physiological characters that correlated with others (plant height, pod per plant,

biological yield, harvest index, 100 -seed weight, days to flowering and maturity) are the most important characters in faba bean improvement for increasing seed yield due to direct and indirect correlation with seed yield.

Arshad *et al*.,(2001) and sawar *et al*.,(2004) work on selection index and generally interested improving more than one trait or improving one trait without affecting the performance of outers, and when selection is practical and the correlation of that trait with others is high and undesirable correlated responses may occur for those traits not using in selection criteria. There are three methods have been used to improve several traits but the method using by Hazel and Lush, 1942 is the most efficient method for improving several quantitative characters. selection for superior genotypes depend on the yield a lone was less efficient because the yield and yield components were a complexity characters (Sindhu *et al*., (1985a) and Sindhu *et al*., (1985b).Johnson *et al*., (1955) and Yassin, (1973) reported that the direct selection was in effective due to large environment-genotypes interaction. success in crop breeding program in also depending up on the isolation of genetically superior genotypes based on the amount of variability present in the original population, also the breeder will be able to select the desirable combination of genes. Many desirable characters using from breeder's in faba bean program such as yield, yield components, protein content and quality are under the control of many genes and the environmental factors. Some studies have been carried out on the effectiveness of different selection criteria. approaches for improvement of faba bean characteristics by several investi-gators  such as, Nisa and Cengiz, (2011) ; Solieman and Regheb, (2014) ; Yasin and Esrael, (2017) and Kirous (2018).

The objective of this study was to construct several selection indices among eight character of faba bean genotypes and to compare that efficiency with that form the direct selection for grain yield in order to find a simple and useful to be used in the estimation of five faba bean genotypes.

## MATERIALS AND METHODS

The material study consisted of five genotypes of faba bean.The experiment was carried out at the field of College of Agricultural engineering sciences, Duhok University during season 2018-2019.. Grain of five genotypes (Reina, Lattikia, Hadiba, Giza and Aquadocia)  were sown in rows, 3 long for each experiment unit, 0.30 m between rows and 0.10m between plants. The date of planting was 27/11/2018. Through seed bed preparation $p_2o_5$. fertilizer were application at rate of 0, 23, 46, and 64 kg /ha. The data were recorded on a random sample of five guard plants on, plant height cm first pod height cm, days to 75% flowering, number of main branches number of pod / plant, number of seeds / pod, number of nodules / plant and wet grain yield per plant.

Analysis of variance of all traits and pairs using procedures describe by Gomez and gomez (1984) and estimate phenotypic and genotypic, covariance of phenotypic and genotypic by using expected mean square from analysis of variance and covariance, Also estimate the following parameter, genetic and phenotypic correlation,

Broad sense heritability, Expected genetic advance, and genetic advance as mean. The method of constructing the selection indicates were carried out according to Miler etal., (1958) and the comparison between the genotypes means using Duncan's Multiple Range Test (DMRT).

## RESULTS AND DISCUSSION

Table 1. revaluated the analysis of variance for eight characters of faba bean genotypes. It exhibited that the phosphorous fertilizer, faba bean genotypes and their interaction were worthy significant for plant height, first pod height, days to 75% flowering, number of nodules plant[-1], main branches plant[-1],number of pods plant[-1], number of seeds pod[-1] and wet grain yield plant[-1].

The results in Table 2. showed the mean performance of five genotypes at different rates of phosphorus fertilizer for plant height, the tallest plant among all genotypes was produced by Giza at 6.9 kg ha^{-1} phosphorous fertilizer with value 130.33 cm, followed by Hudiba at the same rate of phosphate fertilizer, whiles the shortest plant was recorded by Rein a genotype at zero fertilizer. Concerning to first pod height, the Giza and Hudiba were produced the maximum Values (31.66 and 26.66) at rat 69 kg ha^{-1} $p_2o_5$. fertilizer and the Rein a genotype gave the minimum pod height (10.00cm) at zero phosphate. For days to 75% flowering the earliest genotypes was recorded by Rein at 69 kg ha^{-1} phosphate with value 84.66 days, while the latest flowering produced by Giza genotype at zero phosphate. Regarding the number of nodule plant[-1], the Giza genotypes gave the maximum number of nodules with value 97-33 at rate 69 kg ha^{-1} $p_2o_5$., phosphorous cp/ plays important roles in nodulation and biological nitrogen fixation, photosynthesis and nutritional values of Legumes including faba bean, also it has been shown that the induction of plant histidine acid phytase (HAP) gene depends on p sufficiency in faba bean considerable induction of phytase activities in nodules. These results in agreement with the results proved by Haling *et al*., (2016); Nasto *et al*., (2017); and Makoudic *et al*., (2018). The results in the same table clarified the number of main branches plant[-1], from this table observed that the Giza genotypes produced the maximum number of branches (6.33) at rate 69 kg ha^{-1} $p_{2o5}$. For the number of pod plant[-1], the largest number of this trait produced by Lattikia at 46 kg ha^{-1} $p_2o_5$., whereas the smallest number of the main branches remarked by Giza genotype at zero phosphate fertilizer. Similar results were indicated by several authors like Boll *et al*., (2000); Ragab *et al*.,(2010) ; Bakty *et al*.,(2011) and Endalkachew *et al*., (2018). whose found the addition of phosphate fertilizer was due to an increase in the number of pod plant[-1] and this trait considerable the major yield components which effected to the final seed yield.

The seeds per pod[-1] was very considerable among the faba bean genotypes and phosphorous nutrition, for interaction effect of faba bean genotypes are rate of phosphate on seeds per pod[-1] the same Table exhibited that Lattia genotypes was relatively superior (4.43%) Reina (3.23), Hudiba (3.26),Giza (3-00) and Aquaduica (3.43) with application at rate 69 kg ha^{-1} $p_2o_5$, this character is a genetic trait and it is in flounced by phosphorous nutrition. From this Table we also notice that the highest

grain yield (287.96) was produced by Lattikia at 46 kg ha$^{-1}$ $p_2o_5$, while the lowest grain yield 85.5g recorded by Rein genotype at Zero $p_2o_5$.. The increasing grain yield depend on the increase in major components such as number of pods per plant and number of seeds per pod. This traits were un affected by addition of phosphate fertilizer and the kind of genotypes was more over effected in grain yield. The researchers; Lupwayi *et al.*,(2011) and Endalkachew *et al.*,(2018), demonstrated similar results for the singe trait

Table (1): Analysis of variance for eight traits of faba bean genotypes

| S.O.V | Df | Ms | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Characters | | | | | | | |
| | | Plant height cm. | First pod height cm. | Days to 75% flowering | No. of nodular plant$^{-1}$ | Main branches plant$^{-1}$ | No. of Pod plants$^{-1}$ | No. of Seed pod | Wet grain yield |
| Replicative | 2 | 13.9 | 6.86 | 0.86 | 22.86 | 0.11 | 0.22 | 0.01 | 60.18 |
| Phosphorous A | 3 | ** 32961 | ** 170.06 | ** 98.86 | ** 2097.66 | ** 2.46 | 136.22 | ** 1.09 | ** 9382.04 |
| Genotypes B | 4 | ** 1649.76 | ** 312.20 | ** 455.89 | ** 776.65 | ** 6.87 | 144.15 | ** 1.40 | ** 15207.53 |
| A X B | 12 | ** 13.70 | ** 7.63 | ** 7.45 | ** 45.27 | ** 6.69 | 13.311 | ** 0.15 | ** 1604.79 |
| Error | 38 | 4.45 | 1.84 | 2.93 | 3.09 | 0.13 | 0.57 | 0.008 | 5.02 |

*.and ** significant at 0.05 and 0.01 levels respectively

Table (2): Performance of five faba bean genotypes for yield and some agronomic characters at different phosphorus levels.

| Combination | Mean | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Characters | | | | | | | |
| | PH cm | FPH Cm | 75. fl. | N. Nod. | M.br. | N. pod plant | N. seed pod | KYP |
| $P_0 V_1$ | 91.66 i | 10.00 i | 93.66 f | 52.00 i | 3.00 E | 17.23 i | 3.00 i | 126.40 m |
| $P_0 V_2$ | 162.66 fg | 13.00 gh | 100.66 bc | 51.33 i | 3.33 De | 21.96 ef | 3.10 ghi | 172.86 f |
| $P_0 V_3$ | 115.60 d | 17.33 De | 103.00 ab | 56.33 h | 4.00 Cd | 20.23 gh | 3.00 i | 87.50 h |
| $P_0 V_4$ | 112.33 d | 18.66 de | 104.66 a | 62.33 g | 5.00 B | 16.50 i | 2.56 J | 141.53 k |
| $P_0 V_5$ | 96.33 h | 11.33 hi | 90.33 gh | 54.33 hi | 5.00 B | 19.20 h | 3.00 I | 167.33 g |
| $P_1 V_1$ | 108.00 e | 14.33 Fg | 97.66 de | 70.9 e | 4.00 Cd | 18.9 i | 3.00 I | 87.2 n |
| $P_1 V_2$ | 108.66 e | 14.66 fg | 97.33 de | 70.66 e | 4.00 Cd | 23.50 d | 3.60 c | 197.10 d |
| $P_1 V_3$ | 118.66 c | 119.33 d | 98.66 cd | 78.00 d | 4.00 Cd | 20.93 fgh | 3.08 hi | 162.93 h |
| $P_1 V_4$ | 108.00 e | 17.83 de | 94.33 f | 72.00 e | 4.83 B | 19.91 gh | 2.98 I | 146.46 J |
| $P_1 V_5$ | 97.00 h | 13.33 gh | 90.66 gh | 62.66 g | 4.00 Cd | 20.90 fg | 3.13 g.i | 167.46 g |
| $P_2 V_1$ | 97.00 n | 14.66 fg | 89.00 h | 67.00 f | 4.00 Cd | 21.13 gf | 3.10 ghi | 135.43 L |
| $P_2 V_2$ | 112.33 d | 16.66 ef | 95.66 ef | 77.66 d | 4.00 Cd | 36.60 a | 4.23 b | 287.96 a |
| $P_2 V_3$ | 120.66 c | 23.66 c | 100.66 bc | 86.00 c | 4.00 Cd | 24.86 c | 3.3 edf | 188.63 e |
| $P_2 V_4$ | 125.33 b | 25.66 cb | 99.66 cd | 86.33 c | 6.00 A | 20.66 fg | 3.40 | 159.50 h |
| $P_2 V_5$ | 100.00 gh | 14.66 fg | 86.00 i | 72.66 e | 3.33 De | 25.40 c | 3.40 de | 228.23 b |
| $P_3 V_1$ | 98.66 h | 14.00 g | 84.66 i | 70.66 e | 4.66 Bc | 20.63 fg | 3.23 F | 124.63 m |
| $P_3 V_2$ | 113.33 d | 19.33 d | 92.66 fg | 78.33 d | 4.66 Bc | 32.26 b | 4.43 a | 210.26 c |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $P_3 V_3$ | 125.66 b | 26.66 b | 99.00 cd | 92.33 b | 4.66 Bc | 25.93 c | 3.26 e-g | 139.20 k |
| $P_3 V_4$ | 130.33 a | 31.66 a | 100.66 bc | 97.33 a | 6.33 A | 21.26 gf | 3.00 i | 154.96 i |
| $P_3 V_5$ | 105.33 ef | 18.00 de | 85 i | 72.33 e | 4.66 Bc | 23.16 de | 3.40 d | 194.66 d |

Mean with each other column followed by the same letter are not significant at 0.05 and 0.01 probability.
PH: plant height. FPH: first pod height. fl: flowring %. N.Nod: number of nodes. M.br: main branches. N.seeds/pod: number of seeds/pod.

Table 3 showed that the analysis of variance of five faba bean genotypes and mean of genotypes as a mean to different rates of phosphorous fertilizer. The results in the same table exhibited substantial for all of the studied characters. From this table we also recognized that the Hudiba genotype gave highest plant and latest days to 75% flowering, while the Giza genotype record the maximum number of nodules plant[-1] (81.75), maximum of number of main branches plant[-1] (5.75) and number of pod plant[-1] (19.33) but the Latit kia genotype produced maximum number of seeds pod[-1] and wet grain yield plants[-1]. This results were acceptable with Zafar *et al*., (2011); Agloolik hani *et al*., (2012) and Tamence *et al*.,(2015).

Table (3): analysis of variance results for selection index values

| Source | DF | Sum of Squares | Mean Square | F Value |
|---|---|---|---|---|
| Rep | 2 | 29.84526 | 14.92263 | |
| Genotypes | 4 | 15159.13646 | 3789.78411 | 1882.62** |
| Error | 8 | 16.10428 | 2.01303 | |

The results in Table 4 referred the estimates of mean square from variance and co-variance analysis for estimation of total genetic and phenotypic Variance covariance for the eight Characters, these components used for calculation of genetic and phenotypic correlation, selection indicted, genetic advance that would be excepted from, selection and heritabilities.

The genotypic and phenotypic correlation coefficient among eight characters demons red in Table 5. The quite similar in most cases, and it was exhibited that genotypic correlations exceeded the phenotypic one for majority of cases. The results in the same table remarked that plant height is highly correlated (phenotypically and genotypically) positively with first pod height, days to 75% flowering and number of nodule plant[-1] whilst, the first pod height also correlated positively with days to 75% Flowering number of nodules and main branches plant[-1]. The grain yield per plant is highly correlated with number of pods plant[-1] and number of seeds pod[-1] indicating that these two characters are genetically associated with yield, this characters dependent association of this characters and other important ones such as grain yield is general

very useful to faba bean breeders a similar result were reported by Torres *et al*., (2006) and Mulualem *et al*., (2012).

Table 6 Clarified the estimation of genetic, environmental and phenotype variance, heritability broad sense and genetic advance for eight characters of faba bean genotypes. The heritability broad sense was high for all studied characters and ranged between 0.94% to 99%. Concerning to the genetic advance as mean gave high values for first pod height (57.10), grain yield plant$^{-1}$ (43-97), number of main branches plant$^{-1}$ (33.92) and number of pods plant (31.52) and medium for plant height, days to 75%. flowering, number of nodules plant$^{-1}$ and number of seeds pod$^{-1}$. For these characters due to their value we can using these characters as criterion of selection, comparable results were obtained by Sindhu *et al*., (1985a) and Sindhu *et al*., (1985b); El-Hady *et al.*, (1998) and Solieman *et al*., (2014).

The data in Table 7. Described the some selection index with relative efficiency over direct for yield for seven of these tested indices. The predicted genetic advance in yield for indices at 10%. Selection intensity score from 36.83 to 80.87 with efficiency 50.28 and 110.39. The best selection index consist from yield, number of pods per plant and number of seeds per pod, there for the better selection indices depend on the yield only to select the better faba bean genotypes. These results were in agreement with Johonson *et al*., (1955); Sindhu *et al*.,(1985b); Cerpona *et al*.(2010) and Kirose, (2018).

Data presented in Table 8. referred to the result analysis of selection indices for faba bean genotypes. The data of all genotypes analyzed using randomized complete block design, the same table was showed from F-test the genotypes mean square was highly significant this main significant differences in selection index means values among genotypes.

The results in the table 9, showed the differences between all genotypes using Duncans Multiple Range – Test and also the same table exhibited that the highest mean selection index  was 216.264 for lattikia genotype over all other genotypes, followed by  1 and  Giza with values 188.74 and 153.561  significant differences over all other genotypes. Finally it was concluded from this study that the better genotypes lattikia and Giza, the surpassed lattikia and Giza could be used in breeding programs to improve yield at faba bean and develop new hybrid with good productivity and quality performance to Iraqi environments.

Table (4): Genotypic (upper) and phenotypic (lower) variance covariance between studied traits

|  | grain yld | pl ht | 1sg pod ht | 75% flo | nodule pl | main bra | pods pl | seeds pod |
|---|---|---|---|---|---|---|---|---|
| grain yield gm | 1266.621<br>1268.643 | -29.5398 | -41.1189 | -13.8639 | -50.952 | -4.41255 | 99.82978 | 10.06485 |
| plant height cm | -29.853 | 136.7365<br>138.9688 | 57.91458 | 70.36302 | 92.7776 | 5.661979 | 0.430833 | -0.82745 |
| 1st pod height cm | -40.9523 | 57.32708 | 25.67083<br>26.71042 | 28.34531 | 40.65781 | 3.016146 | -4.3049 | -0.74344 |
| 75% flowering | -13.1105 | 70.28854 | 28.81458 | 37.75729<br>38.45833 | 46.45313 | 2.542188 | 2.285938 | -0.17401 |
| nodules plant | -51.4354 | 93.14583 | 41.27812 | 46.62292 | 64.4125<br>65.3375 | 4.500521 | -4.41125 | -0.97802 |
| main braches | 4.22906 | 5.639583 | 3.061458 | 2.597917 | 4.498958 | 0.561458<br>0.595833 | -1.34448 | -0.1438 |
| pods per plant | 100.0335 | 0.244687 | -4.18708 | 2.317812 | -4.38823 | -1.29177 | 11.96841<br>12.10219 | 1.141026 |
| seeds per pod | 10.08723 | -0.77979 | -0.76781 | -0.16896 | -0.98469 | -0.14156 | 1.142458 | 0.11625<br>0.118708 |

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Table (5): Genotypic (upper) and phenotypic (lower) correlations between studied traits

|  | grain yld | pl ht | 1sg pod ht | 75% flo | nodule pl | main bra | pods pl | seeds pod |
|---|---|---|---|---|---|---|---|---|
| grain yield | 1 | -0.07098 | -0.22803 | -0.0634 | -0.17838 | -0.16547 | 0.810809 | 0.829444 |
| plant height | -0.0711 | 1 | 0.97752 | 0.979269 | 0.988589 | 0.646201 | 0.01065 | -0.20754 |
| 1st pod height | -0.22247 | 0.940938 | 1 | 0.91046 | 0.999859 | 0.794463 | -0.2456 | -0.43036 |
| 75% flowering | -0.05935 | 0.961459 | 0.899035 | 1 | 0.941953 | 0.552139 | 0.107534 | -0.08306 |
| nodules plant | -0.17865 | 0.977515 | 0.988094 | 0.930086 | 1 | 0.748374 | -0.15888 | -0.13061 |
| main braches | -0.15382 | 0.619764 | 0.767407 | 0.54271 | 0.721055 | 1 | -0.51865 | -0.56287 |
| pods per plant | 0.807317 | 0.005967 | -0.23288 | 0.107436 | -0.15605 | -0.48105 | 1 | 0.967344 |
| seeds per pod | 0.82198 | -0.19199 | -0.4312 | -0.07908 | -0.35357 | -0.53229 | 0.853164 | 1 |

Table (6): Components of variance, heritability and expected genetic advance for studied traits

|  | grain yld | pl ht | 1sg pod ht | 75% flo | nodule pl | main bra | pods pl | seeds pod |
|---|---|---|---|---|---|---|---|---|
| V g | 136.7365 | 25.67083 | 37.75729 | 64.4125 | 0.561458 | 11.96841 | 0.11625 | 1266.621 |
| V e | 2.232292 | 1.039583 | 0.701042 | 0.925 | 0.034375 | 0.133781 | 0.002458 | 2.02165 |
| V p | 138.9688 | 26.71042 | 38.45833 | 65.3375 | 0.595833 | 12.10219 | 0.118708 | 1268.643 |
| heritability | 0.983937 | 0.961079 | 0.981771 | 0.985843 | 0.942308 | 0.988946 | 0.979291 | 0.998406 |
| GA | 23.89423 | 10.23215 | 12.54217 | 16.41558 | 1.498381 | 7.08715 | 0.695056 | 73.25618 |
| GA% | 21.85114 | 57.10966 | 13.19997 | 22.92145 | 33.92561 | 31.52412 | 21.29895 | 43.87168 |

Vg: genetic variance, ve: environment variance, vp: phenotypic variance, h.b.s: heritability broad sense, GA: genetic advance, GA%: genetic advance   as mean.

Table (7): Some selection indices with their relative efficiency.

| grain yld | plant ht | 1st pod height | 75% flowering | nodule per plant | No main bran | pods per plant | seeds per pod | GA | RE% |
|---|---|---|---|---|---|---|---|---|---|
| 0.9984 | | | | | | | | 73.25594 | 100 |
| 0.999235 | | | | | | -0.01051 | | 79.84925 | 109.0004 |
| 0.999708 | | | | | | | -0.1637 | 79.84927 | 109.0004 |
| 0.999625 | | | | | | 0.01154 | -0.26772 | 80.84921 | 110.3654 |
| | | | | | | 2.6779 | 59.0139 | 65.8978 | 89.95557 |
| | -16.0463 | 4.5929 | 4.7744 | 18.9665 | | | | 36.83928 | 50.28845 |
| 1.01369 | | | | | -0.74585 | 0.0216 | -2.44922 | 80.85413 | 110.3721 |
| 0.999272 | | | | 0.007629 | | -0.02259 | 0.153979 | 79.84932 | 109.0005 |
| 1.00105 | | -0.80462 | -0.44432 | 0.90867 | -1.09008 | | | 79.88411 | 109.048 |
| 1.05168 | | | | 0.28615 | -3.46211 | -1.22174 | 5.42278 | 80.8741 | 110.3994 |
| 1.04212 | 0.12585 | | | | -2.51368 | -0.82247 | 1.97669 | 79.86599 | 109.0232 |
| 1.04318 | | 0.40867 | | | -3.15497 | -1.08554 | 5.47082 | 79.86572 | 109.0229 |
| 1.01176 | -0.66247 | -1.30418 | -0.35318 | 2.29966 | -2.64478 | -0.75417 | 8.70195 | 79.90601 | 109.0779 |

Table (8): Analysis of variance results for selection index values

| Source | DF | Sum of Squares | Mean Square | F Value |
|--------|----|----|----|----|
| rep | 2 | 29.84526 | 14.92263 | |
| genotypes | 4 | 15159.13646 | 3789.78411 | 1882.62** |
| Error | 8 | 16.10428 | 2.01303 | |

Table (9): means of selection index values for the five genotype

| genotypes | Means of selection index values | Sequence of genotypes according to their preference |
|-----------|-----------|-----------|
| 1 | 129.011 e | 5 |
| 2 | 216.264 a | 1 |
| 3 | 143.931 d | 4 |
| 4 | 153.561 c | 3 |
| 5 | 188.740 b | 2 |

**تقييم تراكيب وراثية من الباقلاء للحاصل و مكوناته باستخدام دليل الانتخاب**

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**الخلاصة**

طبقت الدراسة في حقل قسم المحاصيل الحقلية التابع الى كلية علوم الهندسة الزراعية / جامعة دهوك خلال الموسم 2018-2019 لانشاء ادلة انتخاب في (Reina, Lattikia, Hadiba, Giza and Aquadocia ) وتحت مستويات مختلفة من السماد الفوسفاتي. اظهرت النتائج ان من بين ادلة الانتخاب الثمانية المستخدمة في الدراسة ان افضل الادلة كانت لصفات حاصل البذور وعدد القرنات في النبات وعدد البذور في القرنة ، وان اعلى دليل انتخابي بلغ 216.26 لصنف الباقلاء Lattikia والذي اختلف معنوياً عن بقية التراكيب الوراثية الاخرى كما اظهرت النتائج ان نسبة التوريث بالمعنى الواسع كانت عالية لكل الصفات وتراوحت بين 0.94-0.99 اما الفعل الوراثي منسوبا الى المتوسط كان عاليا لصفات ارتفاع اول قرنة بلغ (57.10) والوزن الرطب للنبات 43.97 وعدد الافرع الرئيسية للنبات (33-92) وعدد القرنات للنبات 31.52 وكانت قيمته وسط لكل من ارتفاع النبات وعدد الايام الى 75% تزهير وعدد العقد في النبات وعدد البذور في القرنة ولهذا يمكن استخدام هذه الصفات المرغوبة في تحسين هذه التراكيب الوراثية.

**الكلمات المفتاحية** : الباقلاء, الانتاج, الدليل الانتخابي, المظهرية, الوراثية.

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