

## EVALUATION OF YIELD AND YIELD COMPONENTS IN SOME GENOTYPE OF FABA BEAN (*Vicia Faba L.*)

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### ABSTRACT

Four different genotype of faba bean with two different location were used to study ten yield parameters which were: plant high (H), branch number (BN/PI), grain length (cm), chlorophyll%, low land pod high(cm) pod number plant<sup>-1</sup> (PN/PI), grain length (cm), 100 seed per yield (gm), seed number pod<sup>-1</sup> (SN/P) and yield/plant (Y/PI). There were high significant differences were recorded for most parameters depending on the genotype and two position, which appear that Turkish variety at second location (research variety of agricultural college) recorded best value for most parameter under research.

### 1- INTRODUCTION

Faba bean (*Vicia faba L.*) consider one of the most important legumes for human and animals feeding (Bond *et al.*, 1985). Faba bean is diploid plant with a relatively few number of large chromosomes (2n= 2x=12) (Al- Barri and Shataya, 2013; Basger *et al.*, 2013 and Terzo poulos *et al.*, 2008). The Genetic variability of Faba bean is absolutely large due to the presence of intermediate crossing system between autogamy and allogamy (Hanelt and Mettin, 1984). Many investigation were reported high variability among faba bean genotypes and variations for growth characters, yield and yield compounds (Tageldin and Mehasen, 2004).

Alghamdi (2007) carried out a research in order to determine the genetic study of six faba bean genotypes and the results revealed that the studied genotypes significantly different for all of the characters including plant high, number of pods plants<sup>-1</sup>, number of seed plant<sup>-1</sup>, seed weight plant<sup>-1</sup> and seed yield.

This investigation was aimed to study the variability on growth trait, yield and its component of four Faba bean genotype (*Vicia faba L.* 2n= 12) at two different locations (field of crop college of agriculture and kamaka village) and also finding out the most acceptable genotype of faba bean adapted to the Kurdistan region. The agronomic performance for four faba bean genotype were compared in order to employ the best genotype (s) in breeding program for the betterment of new Faba bean cultivars.

### 2- MATERIALS AND METHODS

This investigation was holding during 2015-2016, at two locations (b1: first location in Kamaka village which is faraway 16 Km from duhok governorate (Longitude 43° 38'E", Latitude 51°56 'N". and second location (b2): Field of crop of agricultural college /UOD.

Experimental material comprised four genotypes of Faba bean (a1: Italy..a2: Spain.. a3: Turkish and a4: Duhok).

**Table (1):** Temperature, Rainfall, and relative humidity during 2015/2016 growing season at both location.

Moth	Max.Temp.(C°)		Mni.Temp.(C°)		Rainfall (mm)		RH (%)	
	B1	B2	B1	B2	B1	B2	B1	B2
November	16.2	18.7	6.0	6.8	86.4	59.5	66	72
December	10.8	13.5	1.1	7.2	92.6	87.0	65	74
January	6.9	10.6	-1.0	1.4	144.4	91.5	73	78
February	13.8	16.8	3.9	4.5	68.8	39.0	67	74
March	15.1	18.8	5.3	6.5	115.4	88.0	67	70
April	22.0	25.6	9.7	15.8	51.8	40.5	53	56
May	26.8	31.5	13.3	19.4	14.8	0.0	45	41

B1: First location (Kamaka Village) and B2: Second location research field of college agriculture.

**Experimental field:**

The seeds for four genotypes were sowing in (November 2015) by hand. Field exp. Were conducted in randomized complete block design (RCBD) with three replications. Each plot consisted of three rows with 5 M long and distance between them 40 cm. All agriculture operation was don during the growing season.

Estimated characters:

Nine plants for each plot were selected for estimation for all characters, plant high/cm,

branch number plant<sup>-1</sup>, chlorophyll%, pod length<sup>-1</sup> cm, low land pod high cm, pod number plant<sup>-1</sup> were first calculated before harvesting of selected plant. Selected plant were harvested by hand for measuring remaining trait which were grain length (cm), 100 seed plant<sup>-1</sup> (gm), seed number pod<sup>-1</sup> (gm) and yield plant<sup>-1</sup> (gm).

**3. RESULTS**

**Table (2):** mean square from analysis of variance for growth trait, yield and its component (*Vicia faba* L.) crop at two locations.

	d.f	Plant high cm	Branch number	chlorophyll	Pod length (cm)	Lowland pod high	Pod number plant <sup>-1</sup>	Grain length	100 seed wight yield <sup>-1</sup> gm	Seed number pod <sup>-1</sup>	Yield plant, gm
Replication	2	14.445	2.236	29.660	6.701	2.625	1.041	0.025	0.006	0.656	0.0065
Genotype(G)	3	185.179*	4.749*	45.019**	37.854**	54.111**	284.152**	0.102	0.004	2.038**	0.031
Location(L)	1	50.170*	145.533**	4.593	156.060**	16.666**	737.041**	2.281**	0.081*	0.510	1.161
GxL	3	62.068**	0.227	79.219**	14.987*	55.222**	112.708**	0.018	0.006	3.454**	0.029
Error	14	9.488	1.014	3.287	3.965	1.005	4.378	0.487	0.001	0.311	0.0051

\*, \*\* are significant at  $P \leq 0.05$  and  $P \leq 0.01$ , respectively

From table (2) it is clearly show that genotype have significant effects for all parameters except grain length and 100 seed Wight, also location has high significant effect in most parameter expect chlorophyll and seed number and in the interaction of genotype x location shoot high significant at 1% from all trait and 5% for pod length and not reached significant for the other traits.

Table (3). Clarify the effect of four genotype of faba bean (*Vicia faba* L.) and two location on the plant high (cm), branch number and chlorophyll characters. It is clearly perceived that each of the Turkish variety has significant effect on increasing plant high (99.32 cm), Spain variety in branch number plant<sup>-1</sup> (9.17) and Duhok variety for chlorophyll (48.98%). For three mentioned characters second location has significant effect for increasing them.

In the interaction between genotype x location Turkish variety and second location leads to record maximum value for plant high (100.97 cm), However Spain variety and second location set best value for each of branch number/plant and chlorophyll% (11.67 and 52.33%) respectively. These results describe the selection expectation within these four genotype to improve the performance through breeding program (Sharifi, 2015). Also Ahmed *et al.*, (2016) indicated that all growth parameters increased gradually by using different genotype. During harvest, plant high play important role in reducing yield loss and short genotype are more difficult to harvest mechanically than all genotype. (Magda and Shalaby 2000) and (Talaat and Abdallah, 2008).

**Table (3):** Effect of four genotype of faba bean (*Vicia faba* L.) and two location on the plant high (cm), branch number (BN/PI) and chlorophyll characters.

	plant height cm		branch number				chlorophyll%		
	a	b	a	b		a	b		
		b1	b2	b1	b2		b1	b2	
a1	82.67 e	89.93 cd	86.30 d	5.00 cd	10.43 ab	7.72 b	44.23 d	42.60 de	43.42 c
a2	93.33 bc	87.00 de	90.17 c	6.67 c	11.67 a	9.17 a	40.80 e	52.33 a	46.57 b
a3	97.67 ab	100.97 a	99.32 a	5.67 cd	10.20 ab	7.93 ab	45.70 cd	40.87 e	43.28 c
a4	90.33 cd	97.67 ab	94.00 b	4.67 d	9.40 b	7.03 b	49.77 ab	48.20 bc	48.98 a
b	91.00 b	93.89 a		5.50 b	10.43 a		45.13 a	46.00 a	

Table (4) Describe the effect of four genotype of faba bean (*Vicia faba* L.) and two location on the pod length (cm) low land pod (cm) and pod number plant<sup>-1</sup> (PN/PI) characters.

The data verify that Turkish variety has major role in rising low land pod (20.83 cm) and pod number plant<sup>-1</sup> (46.83), at the same time first variety Italy recorded best results for pod length character (23.33 cm). Concerning the effect of location on all characters, the second location has significant effect on pod length (22.27 cm) and pod number plant<sup>-1</sup> (43.58) whereas first location was superior on increasing lowland pod (17.33 cm), same table show the effect of interaction of between genotype and location, the table evident

that in all case second location (b<sub>2</sub>) has great role in all characters with Italy variety pod length (25.33 cm) and with Turkish variety for low land pod (21.67 cm) and pod number/plant (51.67 cm). Sadiki *et al.*, (2002b) and Sifi *et al.*, (2002) found that plant high has no significant variable for some *Vicia faba* genotype. Concerning number of seed/pod contrast of our result founded by Daure *et al.*, (2010) found no significant variability for some characters for 12 faba bean genotype. This parameters is depended on genotype (Sadiki *et al.*, 2002). Similar results belonging to yield/ plant were recorded by Sadiki *et al.*, (2002b), Daur *et al.*, (2010) and Thalji (2009).

**Table (4):** Effect of four genotype of faba bean (*Vicia faba* L.) and two location on the pod length (cm) low land pod (cm) and pod number/plant (PN/PI) characters.

	Pod length(cm)		Low land pod high(cm)			Pod number plant <sup>-1</sup>			
	a	b	a	b		a	b		
		b1	b2	b1	b2		b1	b2	
a1	21.33 bc	25.33 a	23.33 a	11.67 f	16.33 d	14.00 c	37.33 d	41.67 c	39.50 b
a2	14.00 e	22.83 ab	18.42 b	19.67 bc	10.67 f	15.17 bc	27.33 e	34.00 d	30.67 d
a3	16.33 de	22.50 ab	19.42 b	20.00 ab	21.67 a	20.83 a	42.00 c	51.67 a	46.83 a
a4	17.00 de	18.40 cd	17.70 b	18.00 cd	14.00 e	16.00 b	23.33 f	47.00 b	35.17 c
b	17.17 b	22.27 a		17.33 a	15.67 b		32.50 b	43.58 a	

Table (5) show the effect of four genotype of faba bean (*Vicia faba* L.) and two location on the grain length, 100 seed/yield (gm), seed number pod<sup>-1</sup> and yield plant<sup>-1</sup> (kg) characters.

The results prove that Italy variety recorded high rate in increasing grain length (3.07 cm), however Turkish variety inscribe maximum value for each of seed number/pod and yield/ plant (5.67 and 0.715kg) respectively, while Duhok variety has significant effect for 100 seed/plant (0.367 gm).

The same table show that first location has great effect on each of grain length (3.20 cm) and seed number/pod (5.08), as well as second location b2 has main result for remaining

characters (0.392 gm and 0.837 gm). But the interaction between two treatments, its clearly evidence that there were significant difference between interplay for Italy variety and first location for the grain length character (3.37 cm) and Duhok variety and second location for each of 100 seed/yield and yield/ plant (0.467 and 1.028 gm) respectively, and Turkish variety with first location has great effect for seed number pod<sup>-1</sup> only (6.67). Also similar results for different growth characters of Faba bean founded by many researchers (Tageldin and Mehasen, 2004); (Ulukan *et al.*, 2003); Alghamid and Ali (2004) and Alghamdi (2007).

**Table (5):** Effect of four genotype of faba bean (*Vicia faba* L.) and two location on the grain length, 100 seed yield<sup>-1</sup> (gm), seed number pod<sup>-1</sup> and yield plant<sup>-1</sup> (gm) characters.

grain length cm		100 seed yield gm		Seed number pod <sup>-1</sup>		Yield plant <sup>-1</sup> gm						
a	b	a	b	a	b	a	b					
	b1	b2	b1	b2	b1	b2	b1	b2				
a1	3.37 a	2.77 bc	3.07 a	0.300 bc	0.367 b	0.333 ab	4.33 cd	4.17 d	4.25 c	0.458 d	0.817 bc	0.638 ab
a2	3.10 ab	2.40 c	2.75 b	0.233 c	0.367 b	0.300 b	4.00 d	5.67 b	4.83 bc	0.380 d	0.733 c	0.557 b
a3	3.23 a	2.53 c	2.88 ab	0.300 bc	0.367 b	0.333 ab	6.67 a	4.67 b-	5.67 a	0.515 d	0.915 ab	0.715 a
a4	3.10 ab	2.63 c	2.87 ab	0.267 c	0.467 a	0.367 a	5.33 bc	4.67 b-	5.00 ab	0.380 d	1.028 a	0.704 a
b	3.20 a	2.58 b		0.275 b	0.392 a		5.08 a	4.79 a		0.433 b	0.873 a	

## CONCLUSION

These investigation clarify that there are significant differences between most characters for four genotype under study and the Turkish variety was recorded better result as compare to other remaining variety under cultivation in the field crop location of the college of Agriculture.

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#### پوخته

نهف قهكولينه هاته نه نجام دان ب نارمانجا خاندنا گهورينان لسهر سيفه تين گه شه كرنئ، به ره هم و پيگهاتين چار جورين جيني بين باقلا ( ) بو دو جهين جودا (كيلگه ها كوليژا چاندني و گوندي كه مه كئ). دهه پيغه رين به ره همئ هاته خاندن، دريژاهيا رووه كئ، ژمارين تايين رووه كئ، دريژاهيا دانه، كييشا 100 دانين به ره همئ، ژمارين دانا بو هر كه ليك و به ره ما هر رووه كه كئ. جياوازيه كا بلند هه بو بو پتريا بيغه ران ل گور جورئ جيني و دو جهان.

#### الخلاصة

اربعة تراكيب وراثية للفول (*Vicia faba* L.  $2n = 12$ ) في موقعين مختلفين (حقل كلية المحاصيل الزراعية وقرية كاماكا). استخدمت لدراسة عشرة معاملات للحاصل، ارتفاع النبات (H)، رقم الفرع (BN/PI)، طول الحبة (CM)، الكلوروفيل %، قرنات الأرض المنخفضة (CM) عدد القرنة / نبات (PN/PI)، طول الحبة (CM)، 100 بذرة لكل حاصل (kg)، عدد البذور / قرنة (SN/P) و الحاصل / نبات (Y/PI). كانت هناك فروق معنوية عالية سجلت لمعظم المعاملات اعتمادا على التركيب الوراثي وموقعين، والتي بينت على أن الصنف التركيبي في الموقع الثاني (البحث العلمي في كلية الزراعة) سجلت أفضل قيمة لمعظم المعاملات تحت البحث.