ESTIMATION OF MORPHOLOGICAL, TECHNOLOGICAL AND INSECT INFECTION CHARACTERS OF SOME FLAX GENOTYPES

Sanaa S.H* and H.A.Saleh**

*** Fiber Res. Sec. Field Crops Research Institute**

****Plant protection Research Institute Agricultural Research Center, Egypt.**

ABSTRACT

Nine of flax genotypes were tested in Etay El-Baroud Agric. Res. Station, ARC, Egypt, in 20010/11and 2011/12 winter seasons to study their morphological manifestations and insect infection of some flax genotypes. Comparisons among genotypes, also, were made to find out their variability in seed yield and its components. All genotypes were tested in lab. before planting for standard germination, accelerated ageing, electric conductivity, seedling growth and chemical characters.Giza8 genotype gave the highest dry weight / plant after 75 and 90 days from sowing, while, S 533/39/5/11 was the lowest genotype, at harvesting time, Giza 8 genotype was superior over all flax genotypes in total plant height, technical stem length, and fiber yield /faddan. While, S413/1/3/2 ranked first, regarding such characters, with the exception of seed yield and its components. S533/39/5/11was superior in oil %, compared to the genotypes under study. Phenotypic and genotypic variance recorded high estimates in seed yield / faddan, number of seeds/plant, oil yield / faddan, fiber yield / faddan and was slightly high in total plant height. On the other hand, straw yield / faddan and seed yield per plant had the lowest estimates. Heritability values, in broad sense, were high in magnitude for seed oil percentage, 1000 seed weight, total plant height and oil yield / faddan. While, number of capsules and seeds/plant and seed yield/plant showed higher levels of expected genetic advance from selecting the top 5% of superior individuals. . Also, during seasons of experimentati Six genotype were chosen to evaluated of infestation with the aphids, Green bug *Nezara viridula* L. and the mean percentage of infestation by The cereal tortrix moth *Cnephasia sp*. The mean values of infested by three insects showed that, the genotype Escalina was the most significant susceptible to *aphids* infestation followed by Sakha2 ,Giza8, Marlir, Sakha1 and Sakha3. Also Escalina genotype was the most significant susceptible to Green bug *N. viridula* followed by Giza8, Sakha1 , Sakha2, Sakha3, and Marlin more over than, Escalina genotype was higher percentage of infestation by The cereal tortrix moth *Cnephasia sp*. followed by Giza8, Sakha1, Sakha3, Marlin and Sakha2. Moreover than, non significant correlation were found in three insect infestation with six genotypes on yield components. Except in case of % Oil with *N. viridula* which showed negative correlation

INTRODUCTION

Flax crop *(Linum usitatissimum* L) is a traditional source of fiber and oil. In Egypt, it, also, ranked the second after cotton in planted area. It is well known that the high variability is a prerequisite for crop breeding to select the high yielding flax genotypes. Recently, it is difficult to increase flax planted area in

Egypt due to the competition of other winter crops; i.e., wheat and Egyptian clover. Hence, plant breeders made great efforts for raising the flax productivity by growing the best cultivars especially in oil yield, which became insufficient to cover the local consumption. Egypt imports about 50% annually from its oil. Oil content of flax seeds varies from 34.3 to 45.0% (Green and Marshall,1981),while, protein content of flax seed –meal represents about 30% of the total dry matter (Morrison,1961). Moreover, Jenkins (1995) studied five cultivars of flax seed meals and found that their crude fiber content ranged from 0.8 to 14.5%. Now, our goal in flax seed improvement in Egypt is developing high yielding cultivars with higher oil and protein contents and lower crude fiber .Evaluation of promising strains is an important and necessary for the development of improved flax seed strains.

Some of these insects are major pests of regular occurrence and cause serious damage, i.e. the aphids Wise *et. al.*(1995). Lamb *et. al.* (1997) And other's are minor species. i.e Green bug *Nezara viridula*. L., Satpathi (2003) and Khalafallah *et. al.* (2005). Also the mean percentage of infestation by the cereal tortrix moth *Cnephasia sp*. Fritzsche (1959) . Find targeted the impact of these insects on six genotypes of flax to determine susceptibility of these genotypes of insect infestation.

The objective of the present study was to determine the morphological manifestations and some genetic parameters among nine flax genotypes in relation to economic characters. In addition, to evaluate the performance of these genotypes of flax for their seed yield potential. Moreover than , the flax plant is attacked by several insects pests cause the most significant losses.

MATERIALS AND METHODS

Two field experiments were carried out at Etay El-Baroud Agricultural Research Station, ARC, Egypt, during the two successive winter seasons of 2010/11and 2011/12. Sowing dates were November 9^{th} and 14^{th} in the first and second seasons, respectively, using a randomized complete block design, with four replications, for nine flax genotypes; i.e., Giza8, Sakha1, Sakha2, Sakha3, Marlin, Escalena, S533/39/5/11, S420/140/5/11,S413/1/3/2. The normal cultural practices of flax were applied. The following estimations were made:

A- Growth characters: After 75 and 90 days from sowing, ten guarded plants were taken at random from each plot (plot area was 6 m^2) to measure the vegetative growth; i.e., plant height (cm.) and dry weight / plant (g.). At full maturity, other ten guarded plants were taken at random from each plot to study the straw and seed yield and its components, as follows:

B- Straw and Seed yields their components:

1-Straw yield and its components:

Plant height (cm). Technical length (cm)**.**

Upper branching zone length (cm). Straw yield / plant (g).

Straw yield/fad. (tons). Fiber yield / fad (kg).

2-Seed and oil yields and its components :

Number of capsules / plant. Number of seeds / capsule.
Number of seeds / plant. Seed index (g).
Seed yield / plant (g). Seed yield/fad.
Oil content (%). Oil yield/ fad (kg).

A combined analysis was performed for each character over the two seasons, as described by Snedecor and Cochran (1967). A combined analysis for the two seasons was done according to the procedures outlined by Le-Clerg *et al* (1966).

Homogeneity test of variance was computed by Bartlett's methods for combined analysis, it was assumed that the error variance for all characters The form of the combined analysis over seasons and the expectations of mean squares are found in tables inside the text

.It would be expected that the sources of variations of seasons and genotypes had fixed effect because the ranking of each of the best flax genotypes and favorable year will be taken into considerable.

C- Genetic parameters: Statistical analysis was done, on plot mean basis, to obtain estimates of phenotypic and environmental variances, as follows:

Phenotypic variance ($2\sigma ph$) = $2\sigma g + 2\sigma e$. (Mathur *et al,.* 1971).

Genotypic variance ($2\sigma g$) = ($2\sigma^2 E + 2 rog$) - $2\sigma^2 \div r$ (Burton and Vane, 1953).

Where: $2\sigma^2 g$ = Genotypic variance.

$2\sigma^2 E$ = Error variance.

r = Number of replications.

Environmental variances ($2\sigma^2 E$) =$2\sigma ph - 2\sigma g$ (Mathur *et al*,. 1971).

Heritability (in broad sense) was estimated by the formula suggested by Hanson *et al*,. (1956), as follows:

Heritability = $2\sigma^2 g \div 2\sigma ph \times 100$.

The genetic coefficient of variance (G.C.V) = $\sqrt{2\sigma^2 g} \div \times 100$.

The phenotypic coefficient of variance (P.C.V) = $\sqrt{2\sigma ph} \div \times * 100$.

The expected genetic advance from selection (G.A), where:

G.A=$2\sigma g \div 2\sigma ph * k$.

G.A %was calculated as a percentage between G.A and the general mean ($\overline{X}$) of the characters.

D-Insects studies

The flax plants may be infested from the time of emergence to maturity by various insect species cause the most significant losses. To keep damage low, fields should be examined regularly, and controls applied when we need it. The following species are potentially damaging but often occur in low a number to cause economic loss.

The six tested varieties Giza 1 , Sakha 1 , Sakha 2 , Sakha 3 , Marlin , and Escalena genotype were evaluated during 2010/11 and 2011/12 seasons at (Etay-Elbaroud) Agricultural research stations, A.R.C., tolerance to infestation with the *Aphids*,(*Macrosiphum euphorbiae* and *Rhopalosiphum maidis*), Green bug *Nezara viridula* L. and the mean percentage of infestation by the cereal tortrix moth *Cnephasia sp*. as cultivated in 756 m2 was divided into 18 plots each measuring 6 X7 m for each genotype was represented as 3 plots (replicates) . Estimated of the infestation by aphid ,(*M. euphorbiae* and *R. maidis*) and *N .viridula* was based on count number of existed insect /10 plants weekly since appeared the insects on the flax plants which appeared in few numbers on flax plants1st January and increased gradually to reach a highest value in the 3rd week of February. While the infection by *Cnephasia sp*. appeared in few numbers in 1st week of February and increased gradually to reach a highest value in the 1st week of March. Percentage of infestation was calculated weekly and recorded

The randomized complete block design was followed in the whole experimental area. The tested genotypes were exposed to normal field condition without using insecticides during the experimental period.

F-test and L.S.D. values according to Fisher (1954). And Data collected were subjected to proper statistical analysis of randomized complete blocks design according to method described also simple correlation analysis by Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

A - Growth characters:

Mean values of total plant height and dry weight/plant after75and 90days from sowing in nine flax genotypes of 2010/11and 2011/12seasons were combined and presented in Table (1):

Means followed by same letter are not significant at 0.05level.

Analysis of variance at 75 days, indicated that the mean values of, total plant height and dry. weight/plant did not reach the level of significance.

However, total plant height ranged from 61.87cm, for S533/39/5/11, to 69.75cm for Giza 8.The. General mean, over all genotypes, was 64.44cm and the C.V **%** value was 4.78%. Dry weight/plant ranged from 0.59g, for Escalena, to 0.90 g, for Giza 8, whereas, the general mean, over all flax genotypes, was 0.69g, with a C.V % value of 14.18%.

Concerning the two mentioned characters, at 90 days from sowing, the results indicated significant differences. Total plant height ranged from 74.53cm, for S. 420/140/5/11, to 89.65cm for Giza8, with a general mean over all genotypes of 82.11cm and a C.V value 7.17%, while, dry weight/plant ranged from 0.82g for S533/39/5/11 to 1.74g for S413/1/3/2, and the general mean was 1.161g among

the nine flax genotypes. The C.V value was found to be in high magnitude (22.85%).

Generally, the commercial cultivar (Giza 8) ranked first, according to plant height and dry weight/plant at 80 and 95 days from sowing. Meanwhile, Giza S533/39/5/11was the lowest value in a dry weight/plant at the same two ages.

B- Straw and Seed yields and their components:

1-Straw yield and its components:

Plant height, technical stem length, upper branching zone length, straw yield/plant, as well as per faddan, and fiber yield/faddan at maturity stage, are presented in Table (2).

Table (2): Straw yield and its associated characters of nine flax genotypes at harvesting time (Combined analysis of 20010/11and 2011/12 seasons)

characters / Genotypes	Total plant height (cm)	Technical stem length (cm)	Upper branching zone length (cm)	Straw yield / plant (g)	Straw yield/fad. (tons)	Fiber yield / fad (kg.)
Giza 8	106.16 [a]	86.91 [a]	19.25 [a]	2.120 [a]	3.23 [a]	422.20 [a]
Sakha 1	93.06[b]	73.71[b]	19.35 [a]	1.480[b]	3.00 [a]	358.60[b]
Sakha 2	89.15[b]	72.60[b]	16.55[b]	1.410[b]	2.69[b]	325.60[b]
Sakha 3	95.70[b]	75.45[b]	20.25 [a]	2.430 [a]	3.35 [a]	402.60 [a]
Marlin	102.30 [a]	86.15 [a]	16.15[b]	1.630[b]	3.11 [a]	377.30[b]
Escalena	88.32[b]	74.83[b]	13.49[c]	1.700[b]	2.98 [a]	357.12[b]
S. 533/39/5/11	88.50[b]	73.43[b]	15.07[b]	2.680 [a]	3.30 [a]	400.15 [a]
S. 420/140/5/11	90.85[b]	75.04[b]	15.41[b]	1.716[b]	3.10 [a]	379.06[b]
S. 413/1/3/2	89.45[b]	72.11[b]	17.34 [a]	1.340[b]	2.59[b]	302.50[b]
Mean average	93.72	76.69	16.98	1.834	3.038	374.13
L.S.D. (5%)	4.90	4.81	3.49	0.880	0.59	34.34
C.V. (%)	7.15	7.45	12.35	26.45	9.01	12.75

Mean followed by the same letter are not significant at 0.05 levels.

Analysis of variance showed significant differences among flax cultivars, regarding all six characters; i.e,. straw yield and its components .In relation to total plant height character, the commercial cultivar, Giza 8, was the tallest one (106.16cm.), but, Escalena was the shortest (88.32cm.). The general average over all cultivars was 93.72cm, with a C.V.value of 7.15%. With respect to technical stem length, mean values ranged from 72.11 cm for, S8/2, to 86.91cm for Giza 8. The general average overall genotypes was 76.69cm, with , a C.V .value of 7.45%.Regarding the length of upper branching zone, Sakha3 ranked first (20.25cm), followed by Giza8 (19.25cm), Skha1 (19.35cm), S413/1/3/2(17.34cm),Skha2 (16.55cm),Marlin(16.15),S. 420/140/5/11 (15.41cm), S. 533/39/5/11 (15.07cm), while, the shortest one was Escalena (13.49cm). The general average was 16.98cm with a C.V value of 12.35%.Concerning straw

yield/plant, the results showed that it ranged from2.680g for S. 533/39/5/11. The general average overall flax genotype was 1.83g with a C.V value of 26.45%, which appeared to be in a high magnitude. Owing to straw yield/faddan, the data showed an approximately similar trend with the results of straw yield/plant. This character ranged from 2.69tons, for Sakha 2, to 3.30 tons for Escalena. Meanwhile, the general average overall genotype was 3.048 tons, with a C.V. value of 8.91%. Fiber yield/faddan ranged from 302.50 kg., for S. 413/1/3/2,to 422.20 kg. for Giza 8 and the general mean was 374.13kg, with a C.V .value of 12.75%.

As a conclusion for the above mentioned results in relation to straw yield and its components, Sakha3 ranked first in zone length character. While the commercial cultivar ,Giza 8,ranked first in total plant height, technical stem length and fiber yield/faddan and the second in straw yield/plant ,as well as per faddan and the third in upper branching zone . These results are in harmony with those obtained by Abd El-Daiem(2004) ,El-Deeb (2002), El-Deeb (2006), El-Deeb (2007)and Mustafa(1999) who reported that there were varietal differences in flax straw yield and its associated characters.

2-Seed and oil yield and its components:

Table (3) Seed and oil yields and its associated characters of nine flax genotypes at harvesting time from the combined analysis of 2010/11and 2011/12 seasons.

Genotypes	Number. of capsules / plant	Numberof seeds/Capsule	No of seeds / plant	Seed index (g)	Seed yield plant/ (g)	Seed yield/ fad. (kg)	Oil (%)
Giza 8	8.64 [a]	8.53	70.06 [a]	5.51	0.35	425.00	37.65
Sakha 1	11.25 [a]	8.12	77.66 [a]	6.16	0.47	481.00	36.81
Sakha 2	9.08 [a]	6.65	55.30	7.45	0.43	594.00	40.77
Sakha 3	10.95 [a]	8.53	84.54 [a]	7.74	0.67 [a]	490.00	41.63
Marlin	13.90 [a]	9.22	112.59 [a]	9.08 [a]	1.14 [a]	767.00 [a]	40.32
Escalena	7.95	7.46	54.54 [a]	6.51	0.37	434.00	31.09
S. 533/39/5/11	9.95 [a]	7.49	69.70 [a]	7.99[a]	0.59 [a]	478.00	37.50
S. 420/140/5/11	11.42 [a]	6.91	69.11 [a]	8.68 [a]	0.99 [a]	633.00	43.01 [a]
S. 413/1/3/2	11.19 [a]	7.91	87.50 [a]	7.45	0.84 [a]	650.00	37.05
Mean average	10.48	7.86	75.66	7.39	0.65	550.22	37.65
L.S.D(5%)	5.42	**N.S**	48.75	1.14	0.67	110.00	0.24
C.V. (%)	18.54	11.22	22.14	10.31	35.20	10.80	15.30

Mean followed by the same letter are not significant at 0.05 level.

Mean values of seed yield and its components, in addition to seed oil percentage are presented in Table (3)

Analysis of variance showed significant differences in number of capsules/plant, number of seeds/plant, weight of seed index, seed yield/plant as well as per faddan, seed oil percentage and oil yield/faddan. However, the number of seeds/ capsule did not reach the level of significance

The general mean was 10.48., 7.86, 75.66, 7.39, 0.655, 550.22, 37.65 and213.30**,** with C.V. values of 18.54, 11.22, 22.14, 10.31, 35.20, 10.80, 15.30 and 23.40% for the eight characters, respectively. The data showed no significant differences among the nine flax genotypes, but, S.413/1/3/2 ranked the first in the seven characters; while, the number of capsules/plant was 13.90, number of seeds/plant was9.22, number. of seeds/plant was 112.59,weight of 1000 seeds was9.08 g, seed yield/plant and per faddan was1.140 and767.00kg and oil yield/faddan was 309.25,respectively. But, S. 533/39/5/11 produced approximately the maximum values of oil % (43.01). Meanwhile, Escalena gave the lowest value (7.95 for number of capsules/plant, 54.54 for number of seeds/plant, 31.09% for seed oil percentage and134.32 for oil yield/faddan).

As a conclusion for the results, S. 413/1/3/2ranked first in all seven seed characters, which exceeded the other genotypes. While, Giza 8 and435/11 produced, approximately, the minimum mean values.

C-Genetic parameters:

Phenotypic, genotypic and environmental variances for characters, derived from the analysis of variance, are presented in Table (4). Estimates of phenotypic and genotypic variances were in a high magnitude for seed yield/faddan, number of seeds/plant, oil yield/faddan, fiber yield/faddan and the total plant height, with the comparison of straw yield/plant, as well as per faddan and the seed yield/plant, which had the lowest values.

The calculated values for the parameters phenotypic coefficient of variation (P.C.V.), genetic coefficient of variance (G.C.V.), heritability and genetic advance as a percentage of mean, are given in Table (5). This table shows that the P.C.V., as well as G.C.V., values ranged from 3.53, for oil (%) and technical stem length, to 42.97 and 34.72. For number of seeds/plant. A relatively high values of G.C.V. were observed for number of seeds/plant, seed yield/plant, number of capsules/plant and straw yield/plant. While, number of seeds/capsule, total plant height, fiber yield/ faddan, seed oil percentage and technical stem length showed the lowest G.C.V. values.

Heritability values, in broad sense, ranged from 23.33%, for number of seeds/capsule, to 98.52% for seed oil percentage.

Table (4) Phenotypic, genotypic and environmental components of variance for fourteen characters of nine flax genotypes.

Characters	Variance		
	Phenotypic	Genotypic	Environmental

Total plant height (cm)	19.18	15.56	3.62
Technical stem length (cm)	7.85	4.83	3.02
Upper branching zone length (cm)	3.89	2.30	1.58
Straw yield / plant (g.)	0.19	0.11	0.08
Straw yield/fad. (tons)	0.12	0.08	0.04
Fiber yield / fad (kg)	241.52	89.06	152.46
Number of capsules /plant	10.20	7.72	2.57
Number of seeds/ capsule	0.62	0.12	0.50
Number of seeds / plant	970.16	702.56	267.60
Seed index (g)	0.57	0.47	0.10
Seed yield / plant (g)	0.04	0.02	0.02
Seed yield/fad. (kg)	3113.30	2117.50	995.79
Oil content (%)	1.78	1.67	0.10
Oil yield /fad (kg	846.72	686.55	160.17

Expected genetic advance, from selecting the top 5% of superior individuals, varied from 5.09, for number of seeds/capsule, to 68.24 for number of seeds/plant. Number of seeds/plant, number of capsules/plant, seed yield/plant and straw yield/plant showed relatively higher levels of expected genetic advance than the other characters. The technical stem length gave the lowest values of genetic advance. Similar findings were reported by Panse (1957).

Table (5): Phenotypic coefficients of variation (P.C.V.),genotypic coefficients of variation (G.C.V.). estimates of heritability and genetic advance expected from selection as (%) of mean (G.A) for fourteen characters of nine flax genotypes.

Characters	**P.C.V.**	**G.C.V.**	**Heritability (%)**	**Expected (%) of mean**

Total plant height (cm)	5.45	5.02	93.45	9.52
Technical stem length (cm)	4.29		70.92	5.68
Upper branching zone length (cm)	13.18	3.44	68.33	16.89
Straw yield / plant (g.)	28.78		68.48	36.85
Straw yield/fad. (tons.)	10.31	10.40	74.08	14.32
Fiber yield / fad (kg.)	7.15		44.60	6.05
Number of capsules / plant	33.39	22.69	86.39	54.04
Number of seed / capsule	11.64		23.33	5.09
Number of seeds / plant	42.97	8.47	83.45	68.24
Seed index (g)	10.29		94.72	17.90
Seed yield / plant (g)	36.21	4.62	64.25	13.50
Seed yield/fed. (kg)	9.73		78.3/8	14.27
Oil (%)	3.53	29.56	98.52	7.22
Oil yield/ faddan (kg)	12.90		89.25	22.59
		2.06		
		34.72		
		9.55		
		30.34		
		7.88		
		3.53		
		11.90		

D- Effect of flax Genotypes on infested plants by some insects.

Effect of flax varieties on infested plants by aphids, *N.viridula* and the mean percentage of infestation by *Cnephasia sp.,* under environmental conditions were investigation during two seasons (2010/11 and 2011/12). The infestation by aphid and *N. viridula* appeared in few numbers on flax plants1st January and increased gradually to reach a highest value in the 3rd week of February. While the infection by *Cnephasia sp* appeared in few numbers in 1st week of February and increased gradually to reach a highest value in the 1st week of March.

Table (6) Effect the mean number of *Aphids* , *Nezara viridula* and percentage of infestation by *Cnephasia sp.* on Flax plant Genotyps (*L*. *usitatissimum*) during 2010-2011seasons

Treat	Aphids			Nezara viridula			Cnephasia sp.		
	2010 Season	2011 Season	Average	2010 Season	2011 Season	Average	2010 Season	2011 Season	Average
Giza 8	73.33bc	49.67b	61.50	111.33a	112.00a	111.67	10.33b	15.33a	12.83
Sakha 1	48.00cd	34.67c	41.33	73.33b	48.67b	61.00	5.33c	5.67bc	5.50
Sakha 2	86.67ab	70.00a	78.33	54.00c	47.00b	50.50	4.00c	4.00b	4.00
Sakha 3	40.00d	35.33c	37.67	36.00d	35.00b	35.50	4.67c	6.00b	5.33
Marlin	53.33cd	33.67c	43.50	35.00d	33.00b	34.00	4.33c	5.00b	4.67
Escalena	104.00a	68.00a	86.00	114.00a	121.00a	117.50	13.00a	16.00a	14.50
F. Value	14.30*	42.17*		345.55*	100.55*		59.33*	86.83*	
L.S.D.	20.64	8.2		6.12	12.45		1.54	1.84	

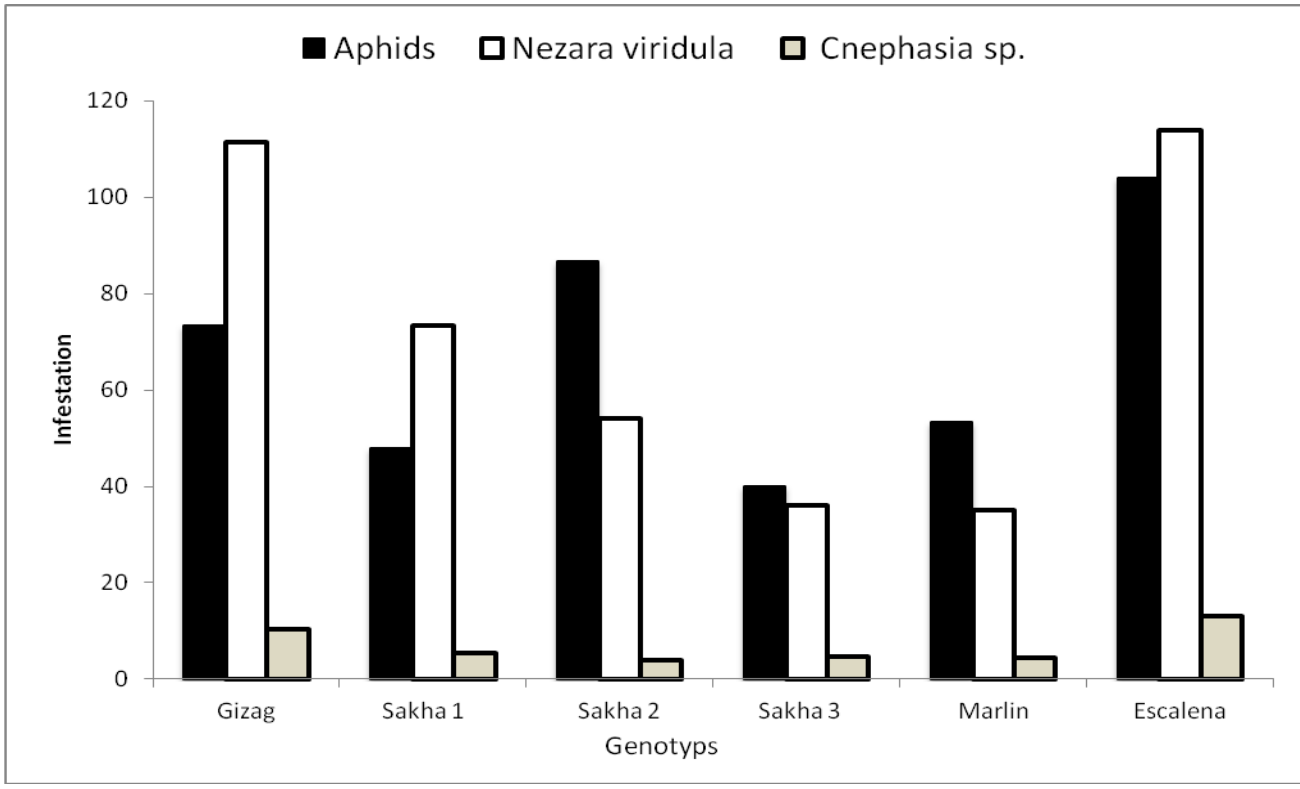

Fig (1) Effect the mean number of *Aphids* , *N. viridula* and percentage of infestation by *Cnephasia sp.* on Flax plant Genotyps during 2010 season.

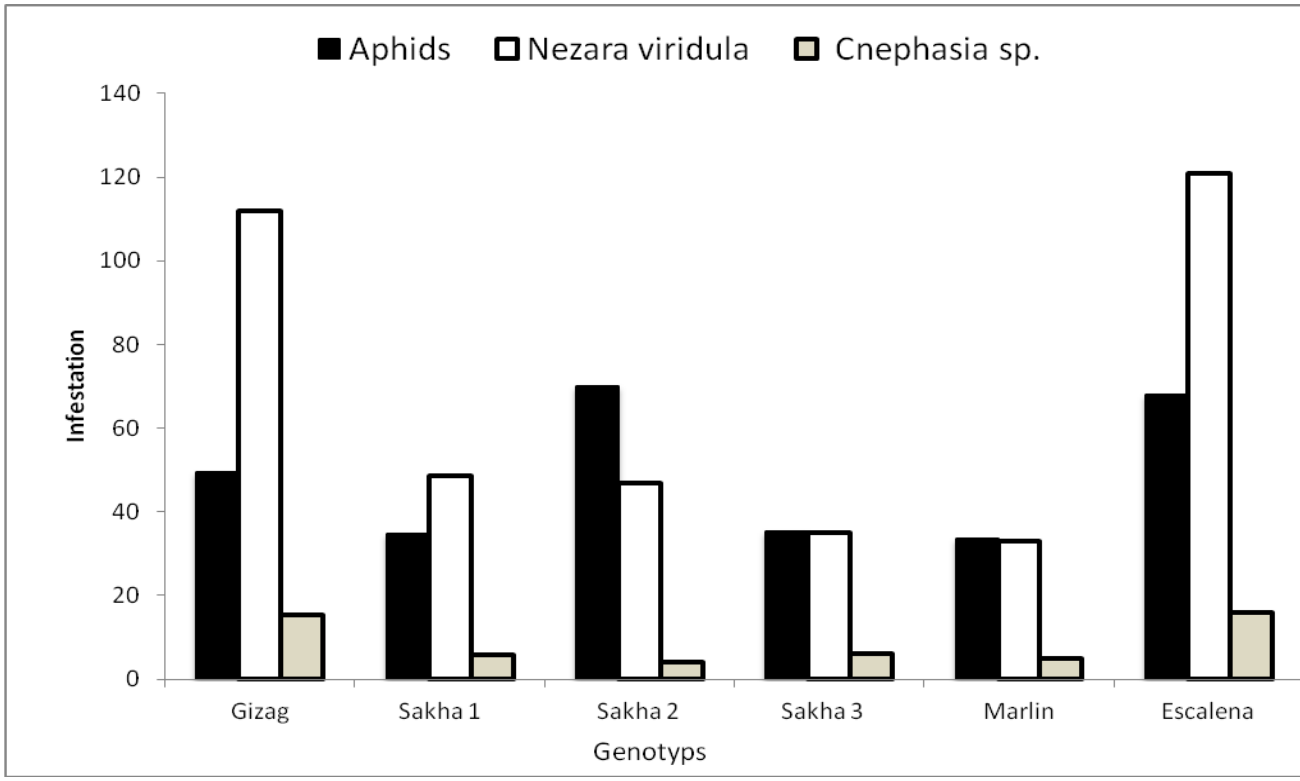

Fig (2) Effect the mean number of *Aphids* , *N. viridula* and percentage of infestation by *Cnephasia sp*. on Flax plant Genotyps during 2011 season.

D-1-<u>Effect of flax Genotypes on infested plants by *Aphids*.</u>

The date presented in Table (6) and Fig (1 , 2) showed that the abundance of aphids was high in the first season as compared with the second one 2011. The date clered that, in the first season, the Genotyp (Escalena) was the highest mean number individual of aphids which recorded 104 individuals /30 plants followed by (Sakha 2), (Giza 8) ,(Marlin),(Sakha 1) and (Sakha 3) which recorded 86..67, 73.33, 53.33, 48 and 40 individuals /30 plants, respectively.) while in the second season the highest mean number individual of aphids which recorded 70 individual /30 plants in (Sakha 2) followed by (Escalena),(Giza 8), (Sakha 3) ,(Sakha 1)and (Marlin) which recorded 68, 49.67, 35.33, 34.67 and 33.67 individuals /30 plants, respectively.

Statistical analysis of the date in the first season showed different significant in mean number of individuals between the (Escalena) and other tested varieties.

Also there were significant between the (Giza 8), ,(Sakha 1) and (Sakha 3) . Moreover there were significant differences between ,(Sakha 1) and ,(Sakha). While did not significant differences between (Sakha 1) , (Escalena) and (Giza 8), (Sakha 2) and (Sakha 1) and (Sakha 3) ,(Marlin) . In the second season the data showed different significant between the Escalena and both (Giza 8), (Sakha 1) , (Sakha 3) ,(Marlin) also 1and both (Sakha 1) , (Sakha 2),(Sakha 3) ,(Marlin) . While non significant differences between(Sakha 2) and(Escalena) also between (Sakha 1) and both (Sakha 3) , (Sakha 3) . The average of mean number of individual the aphids showed in same table which recorded, the highest value 86 individuals in (Escalena) followed by (Sakha 2) ,(Giza 8), (Marlin), (Sakha 1) , (Sakha3), which recorded 78.33 , 61, 50.50 and 35.50 individuals /30 plants, respectively. While the lowest value showed in Sakha 3 which recorded 37.67 individuals /30 plants. Lamb *et. al*. (1997) Reported that potato aphid, *Macrosiphum euphorbiae* is a host-alternating species and an important pest of Canadian flax. Populations of this aphid are highest in flax when the weather is warm and dry in July. **Wisea *et. al.***(1995) found that, The potato aphid, *M. euphorbiae* infests oilseed flax, when the crop is flowering and developing seeds. Field studies in cages, open plots, and commercial fields showed that the aphid can cause yield losses of 20% or more, but reduces the weight of individual seeds only slightly and has no effect on oil quality.

D-2-Effect of flax Genotypes on infested plants by Green bug.

Date presented in Table (6) and Fig (1 , 2) indicated that the abundance of green bug, *N. viridula* on flax plants was similar in both seasons (2010/11 – 2011/12). The ((Escalena)) flax variety was the most susceptible to *N. viridula* infestation in both seasons (2010/11 and 2011/12) with 114 and 121 individuals /30 plants, respectively followed by (Giza 8), (Sakha 1), (Sakha 2), and (Sakha 3) which received (111.33, 112),(73.33, 48.67),(54 , 47) and (36 ,35) individuals/30 plants in 2010 and 2011 seasons, respectively. While (Marlin) variety was the least susceptible to infested plants by Green bug. *Nezara viridula* (35 , 33) individuals/30 plants in 2010 and 2011 seasons respectively. Statistical analysis of the date appeared that, the data showed different significant in mean number of individuals between the (Escalena) , (Giza 8), varieties and all varieties in the 1st season . Also there were significant between the (Sakha 1)and **Sakha 2 , Sakha 3 , Marlin.** Moreover there were significant differences between **Sakha 2 , Sakha 3** and Marlin. While did not significant differences between (Giza 8), Escalena also between **Marlin** and , Escalena . In the 2nd season there were different significant in mean number of individuals between the Escalena , Giza 8 varieties and all varieties. And non significant between the Sakha1) (Sakha 2) , (Sakha3) and (Marlin). The average of mean number of individual the aphids showed in seam table which recorded the highest value 117 individual in (Escalena) followed by (Giza 8), (Sakha 2), (Marlin) ,

(Sakha 1) which recorded 78.33, 61.50, 43.50 and 41.33 respectively while the (Sakha 3) showed the lowest value which recorded 37.67 individual /30 plants. **Khalafallah et al.** (2005) In Egypt, *N. viridula* is widely spread all over the country attacking a wide variety of agricultural crops and many weed species. Twelve field crops, 10 vegetable crops and 14 weed species were found on 6 winter field crops (clover, faba bean, wheat, barley, flax and sugarbeet), and 7 annual winter weeds and 4 perennial weeds from November to March. **Satpathi**, (2003). Observed that, after 15th day from sowing *Nezara viridula* was considered as minor pest to linseed., **Khalafallah *et. al*.** (2005) recorded *N. viridula* is on 6 winter field crops (clover, faba bean, wheat, barley, flax and sugarbeet),

D-3-Effect of flax Genotypes on infested plants by *Cnephasia sp*.

Mean percentage of infestation (as cereal damage) caused by *Cnephasia sp.* on flax plants during 2010/11 , 2011/12 seasons, are listed in Table (6) and Fig (1 , 2)

Mean percentage of infestation by *Cnephasia sp*. In the 1st season. The highest percent of infestation was recorded 13% in Escalena) variety followed by Giza 8, Sakha 1, Sakha 3 and Marlin which recorded 10.33%, 5.33%, 4.67% and 4.33% respectively. While the Sakha 2 variety showed the lowest mean percentage of infestation which recorded 4 %. In the 2nd season, Mean percentage of infestation was The highest percent of infestation was in (Escalena) variety which recorded 16% in followed by Giza 8, Sakha 1, Sakha 3, , and Marlin which recorded 15.33% , 6% , 5.67% and 5%, respectively. While the (Sakha2) variety recorded the lowest mean percentage of infestation 4%Statistical analysis of the date appeared that, there were different significant in mean percentage of infestation between the (Escalena) and all varieties in the 1st season. While did not significant differences between Sakha 1 , Sakha 2 , Sakha 3 and Marlin .in the 2nd season there were different significant in Giza 8, Sakha 1 and all variety While non significant differences between Giza 8 and , Escalena. The average of mean percentage of infestation by *C. sp* . In seam table which recorded the highest value 117 individual in (Escalena) followed by(Giza 8) , (Sakha 1) , (Sakha 3) , (Marlin) , which recorded 12.83,5.50,5.33 and 4.67 respectively while the (Sakha 2) showed the lowest percent of infestation which recorded 4% / 30 plants.

Simple correlation coefficient for the relationship between insects infestation in six genotypes on yield components found in Table (7). They showed that, non significant correlation were found three insect infestation in six genotypes on yield components. Except in case of Fiber yield(Kg) with N. viridula and C. sp which showed negative correlation. **Middlekauff** (1949) reportedthat, the larvae of *Cnephasia longana* causing considerable damage to about 30% of flax plants. **Fritzsche** (1959) indicated that the larvae of *Cnephasia virgaureana* occurred in flax fields from mid-April to mid May . Also larvae rolled and webbed together to tips of the plant shoots and fed on young leaves or buds. **Isa and Awadallah**

(1973) estimated that the damage caused by *cnephasia spp.* To flax plantation was below the level at which control measures would be justified .

Table (7): Simple correlation values between yield components and population density of three insects on six flax genotypes during and 2011 seasons at Behera governorate.

Genotype	Aphids	Nezara	Cneph	Total plant height (cm)	Straw yield / plant (g)	No. of capsules / plant	No. of seeds /Capsule	No of seeds /plant	Seed yield plant/(g)	Oil (%)	Oil yield (kg)
Giza 8	61.5	111.67	12.83	106.16	2.12	8.64 a	8.53	70.06	0.35	37.65	160.01
Sakha1	41.33	61	5.5	93.06	1.48	11.25	8.12	77.66	0.47	36.81	177.05
Sakha2	78.33	50.5	4	89.15	1.41	9.08	6.65	55.3	0.43	40.77	242.17
Sakha3	37.67	35.5	5.33	95.7	2.43	10.95	8.53	84.54	0.67	41.63	203.98
Marlin	43.5	34	4.67	102.3	1.63	13.9	9.22	112.59	1.14	40.32	309.25
Escalina	86	117.5	14.5	88.5	1.7	7.95	7.46	54.54	0.37	31.09	134.93

correlation	**Aphids**			**-487**	**-0.35**	**-0.787**	**-0.751**	**-0.794**	**-0.573**	**-0.594**	**-0.384**
		Nezara		**0.007**	**0.045**	**-0.778**	**-0.234**	**-0.619**	**-0.696**	**-0.822**	**-0.799**
			Cneph	**0.089**	**0.232**	**-0.684**	**-0.058**	**-0.471**	**-0.536**	**-0.806**	**-0.754**

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تقدير الصفات المورفولوجية و التكنولوجية والاصابة الحشرية لبعض التراكيب الوراثية فى الكتان

سناء سعيد حسن *– حسام احمد صالح **
قسم بحوث محاصيل الالياف- معهد بحوث المحاصيل الحقلية*
قسم بحوث افات المحاصيل الحقلية-معهد بحوث وقاية النباتات **

الملخص العربى

تم اختبار تسعة تراكيب وراثية من الكتان بالمزرعة التجريبية لمحطة البحوث الزراعية بايتاى البارود – البحيرة- مركز البحوث الزراعية -مصر- فى تصميم قطاعات كاملة العشوائية فى اربع مكررات خلال موسمى شتوى ٢٠١٠/٢٠١١ ٢٠١١/٢٠١٢ لدراسة الخواص المورفولوجية وقياس بعض الثوابت الوراثية وكذلك الاصابة الحشرية لبعض التراكيب الوراثية لمحصول الكتان . ويمكن تلخيص اهم النتائج المتحصل عليهافيما يلى:-

اعطى الصنف" جيزة ٨" أعلى وزن جاف للنبات، بينما سجلت السلالة "س١١/٥/٣٩/٥٣٣" اقل القيم للوزن الجاف عند عمر ٧٥و٩٠ يوما من الزراعة ؛عند تمام النضج تفوق الصنف" جيزة ٨ "ايضا على باقى التراكيب الوراثية فى صفات الطول الكلى والطول الفعال ومحصول الالياف للفدان، بينما سجلت السلالة" س٢/٣/١/٤١٣ " أعلى القيم فى صفات البذرة ومكوناتها عدا صفة النسبة المئوية للزيت حيث تفوقت السلالة " س١١/٥/٣٩/٥٣٣ " عن باقى التراكيب الوراثية تحت الدراسة. وكانت تقديرات التباين الوراثى والمظهرى اعلى ما يمكن فى صفات محصول البذور / فدان و عدد البذور/نبات ومحصول الزيت/ ف و محصول الالياف / ف وبدرجة قليلة فى الطول الكلى، بينما كانت اقل ما يمكن لصفات محصول القش/ ف، ومحصول البذور/ نبات، واظهرت صفات نسبة الزيت و محصول البذور كنسبة مئوية لمحصول القش و وزن الالف بذرة و الطول الفعال و محصول الزيت للفدان اعلى تقديرات لنسبة التوريث بمعناها الواسع، بينما كانت اعلى التقديرات للنسبة المئوية للتحسين الوراثى الى المتوسط ولانتخاب اعلى(%)من النباتات المتفوقة فى عدد البذور/ نبات و عدد الكبسولات / نبات.

كذلك اشتملت الدراسة على تأثير حساسية ستة تراكيب وراثية تم انتخابها بمحطة بحوث ايتاى البارود خلال موسمى الدراسة ٢٠١١/١١، ٢٠١١/١٢ وهى جيزة ٨، سخا ١،سخا٢ ،سخا ٣، مارلين ، سكالينا . للإصابة بالمن ، البقة الخضراء ، حشرة النفاسيا حيث اظهرت النتائج التى تم التحصل عليها على الاتى :-

كان هناك معنوية بين التراكيب الوراثية المختلفة للإصابة بحشرة المن حيث سجل التركيب الوراثى اسكالينا اعلى حساسية للاصابة يليه سخا ٢، جيزة ٨ مارلين ، سخا ١ ، كما سجل التركيب الوراثى سخا ٣ اقل حساسية للإصابة بالآفة . كذلك اوضحت الدراسة ان متوسط الاصابة بحشرة البقة الخضراء وصلت الى اعلى قيمة لها فى التركيب الوراثى سكالينا والذى اظهر اعلى حساسية بالإصابة بالآفة يليه جيزة ٨ ، سخا ١، سخا٢ ،سخا٣، بينما سجل التركيب الوراثى مارلين اقل حساسية للإصابة بالحشرة . كذلك كان اعلى متوسط اصابة بحشرة النفاسيا كان فى التركيب الوراثى سكالينا والذى اظهر اعلى نسبة مئوية للإصابة بالآفة يليه جيزة ٨،سخا١،سخا٣، مارلين بينما سجل التركيب الوراثى سخا ٢ اقل حساسية للإصابة بالحشرة . كذلك لم تظهر الدراسة ارتباط بين الاصابة الحشرية فى الطرز المختلفة على مكونات المحصول فيما عدا الاصابة بالبقة الخضراء والتى اظهرت ارتباط معنوى سالب مع النسبة المئوية للزيت .