

STUDIES ON THE INSECT SPECIES IN DIFFERENT GENOTYPES OF COWPEA AT KAFR EL-SHEIKH

Helal, R. M. Y. *; G. A. El-Mezayyen and A. M. Nassef

* Entomology Dept. Fac. of Agric. Kafr El-Sheikh, Tanta University

Agric. Res. Center, Plant Protect. Res. Inst., Sakha Agric. Res. St.

ABSTRACT

The study was conducted at the experimental farm of the Faculty of Agriculture, Kafr El-Sheikh, Egypt. Experiments were carried out on different genotypes of cowpea in two summer plantations 2001 and 2002. Results indicated that the forty three genotypes of cowpea harboured 11, 10 and 3 species of insect pests, beneficials and visitor insects, respectively belong to 20 families in 11 orders during 2001 season. In 2002 season, thirty three genotypes of cowpea was found to harbour 11, 12 and 4 species of insect pests, beneficials and visitor insects, respectively. These species are belonging to 22 families and 10 orders. *Aphis craccivora* Koch., *Chrysoperla carnea* (Steph.) and *Apis mellifera* (L.) were the dominant species in cowpea genotypes and represented by 42.60, 31.20 and 46.67% of pests, beneficial and visitor insects in the first season, respectively. In the second one *A. craccivora* Koch., *Monomorium pharaonis* (F.) and *A. mellifera* (L.) were the dominated and represented by 78.27, 52.24 and 46.15% of pests, beneficials and visitor insects, respectively. It could be stated that each dominant and subdominant species which differently affected population diversity. Diversity indices were 2.8761 and 1.0983 for pests and beneficial insects in It 85 K-105-2 and It Tvu-12349 genotypes in the first season, respectively. In the second one diversity indices were 1.4294 and 1.5616 for pests and beneficial insects in 90 K-284-2 and It 83s 911 genotypes, respectively. The relative abundance of species in each genotype had an effect on diversity index values.

INTRODUCTION

Cowpea is one of the most important leguminous vegetable crops in Egypt. Recently, its cultivated area was rapidly increasing. However, the production of this crop has been constrained by the limitations imposed by insect pests and diseases, which cause serious damage. The total number of pest, predator and parasitoid species, differ among crops and proportion of species also varied (El-Hawary *et al.*, 1995). The relationship between species diversity and ecological processes can change quantitatively and qualitatively with environmental context (Cardinale & Nelson, 1999). Survey of insect pests, predators and parasitoids associated with cowpea varieties were reported by Saleh *et al.*, 1972; Rahman, 1977; Helaly *et al.*, 1982-83; Hassan *et al.*, 1985; Hamouda, 1993; El-Sayed, 1993 and Abdel-Alim, 1994.

The present investigation aims to study insect fauna, pests, beneficial and visitors as affected by genotypes of cowpea in Egypt and to see of species diversity as related to cowpea genotypes.

MATERIALS AND METHODS

This study was conducted at the experimental farm of the Faculty of Agriculture, Kafr El-Sheikh, Egypt. Experiments carried out in two summer plantations 2001 and 2002. Forty three and thirty three genotypes of cowpea

were cultivated and among of them three national varieties namely: It 83D-

442, It 93K-513-2, 86F-2089-5, It E-Brown, It 95 m-278, It 85F-3139, It 85 F-1380, It 95 K-1088-4, It Brown, 95 K-It 56-3., It 85s-872, It 95 m-48, It 82 D-889, It 83s-911, It Tvu-12349, It 86 D-880, It 95 m-306, It 92 KD-357-2, It 85 K-105-2, It 84-D-448, It 93 K-693-2, It 93 K-686-2, 90 K-284-2, It 95 m-120, It 95 K-526-2 It 84 D-448, It 95 K-204-11, Cream-7, It 87 D-376-4, It 93 K-513-2, It 86 F-2062-5, Fetriat, It 86 F-2062-5, It 98 K-573-3, It 95 K-2011-11, It 82 E-16, It 85 F-1380, It 95 K-207-21, It 86 F-2014-1, Azmerly, It 83-S-872, It 84 D-448, and It 85 F-3139. The genotypes of cowpea were obtained from International Institute of Tropical Agricultural in Nigeria (IITA).

The experimental area was designed in a completely randomized block design with four replicates. Each plot was 12 m², including 4 rows, each of 4 m length and 75 cm width and two plants per hill with 30 cm apart.

Fertilizers and the other cultural practices were applied according to the common recommendations with no pesticidal treatments throughout the experiment. Cowpea genotypes were cultivated on June, 16th adjacent soybean, cotton and maize.

Sampling was taken from each genotypes when the plants were 14 days old and continued weekly intervals. Every sample consisted of 10 seedlings per genotype that were randomly selected weekly and the number of insects were counted from 6 a.m. until 8 a.m. Starting for the fifth week after sowing, samples of 20 leaves were randomly picked up at weekly intervals from every genotype then transferred to the laboratory in cloth bags to be examined and number of insects in each taxonomic group was counted and data was expressed as total numbers.

Most identifications were done by the staff of the Classification Research Department, Plant Protection Research Institute, Agriculture Research Center, Ministry of Agriculture and Land Reclamation, Egypt.

Shannon-Weaner diversity index (S.W.I.) was used to measure diversity of arthropod pest species as it is the one most commonly used (Price, 1984). The index was calculated for species and families in each genotype. The Shannon-Weaner index according to the following equation:

$$H_s = \sum_i^S P_i \log P_i$$

H_s = The symbol for the amount of diversity in a group of species, in this case the category of classification used in the species (hence the subscript S) but other categories could be used as well it may be applicable to families, orders, etc.

S = Number of species within sample.

P_i = The proportion of the ith species in the total sample, it measures the relative abundance and ranges between 0.00 to 1.00.

Log_e = Natural logarithm, the negative sign is added to make the come out positive value = 2.718.

This function was derived independently by Shannon and Weaner and is sometimes mislabeled as the Shannon-Weaver function in the ecological literature (Krebs, 1978).

RESULTS AND DISCUSSION

I. Survey of insect species in genotypes of cowpea:

a. Insect pests:

Results in Tables (1 & 2) revealed the presence of 11 species of insect pests species affiliated to 8 families and 6 orders from the forty three genotypes of cowpea in the first season compared with 11 species of insect pests belonging to 8 families and 5 orders in the second one at Kafr El-Sheikh region. In the first season (Table 1), order Homoptera was the most dominant order includes Aphididae, Aleyrodidae and Cicadellidae families. Aphididae was represented by *Aphis craccivora* Koch. showing 42.60% as total. Aleyrodidae was represented by *Bemisia tabaci* (Genn.) and accounted for 24.72% as total. The least recorded homopterous family was Cicadellidae, represented by *Empoasca* spp. and comprised 24.52%.

Table (1): Total numbers of insect pests, beneficial and visitor insects sampled from forty three genotypes of cowpea during 2001 season at Kafr El-Sheikh region.

Order	Family	% group	Species	Stage*	Total No.	% group
I. Insect pests						
Diptera	Agromyzidae	0.1	<i>Liomyza</i> spp.	L	36	0.10
Hemiptera	Pentatomidae	0.61	<i>Nezara viridula</i> (L.)	N,A	216	0.61
Homoptera	Aleyrodidae	24.72	<i>Bemisia tabaci</i> (Genn.)	N,A	8735	24.72
	Aphididae	42.60	<i>Aphis craccivora</i> (Koch.)	N,A	15055	42.60
Lepidoptera	Cicadellidae	24.52	<i>Empoasca</i> spp.	N,A	8666	24.52
	Noctuidae	7.412	<i>Earias insulana</i> (Bois.)	A	3	0.008
			<i>Autographa</i> spp.	L	2	0.006
			<i>Spodoptera littoralis</i>	L	2586	7.32
			<i>S. littoralis</i>	E	28	0.07
Orthoptera	Acrididae	0.03	<i>S. exigua</i>	L	3	0.008
			<i>Aiolopus strepens</i> (Latr)	A	10	0.03
Thysanoptera	Thripidae	0.008	<i>Thrips tabaci</i> (Lind.)	N,A	3	0.08
Total pests		100			35343	100
II. Beneficial insects						
Coleoptera	Coccinellidae	14.80	<i>Coccinella undecimpunctata</i> (R.)	A	10	4.00
			<i>Scymnus interruptus</i> (Goez.)	A	18	7.20
			<i>S. syriacus</i> (Mars)	A	9	3.60
			<i>S. syriacus</i> (Mars)	A	5	2.00
Diptera	Staphylinidae	2.00	<i>Paederus affierii</i> (Koch.)	A	2	0.80
Dictyoptera	Syrphidae	0.80	<i>Metasyrphus corollae</i> (F.)	A	2	0.80
Hemiptera	Mantidae	0.80	<i>Mantis religiosa</i> (L.)	N,A	7	2.80
Hymenoptera	Anthocoridae	2.80	<i>Orius</i> spp.	A	3	1.20
Neuroptera	Vespidae	1.20	<i>Polistes gallica</i> (L.)	L,A	78	31.20
Odonata	Chrysopidae	31.20	<i>Chrysoperca</i> (Steph.)	A	4	1.60
True spiders	Aeschnidae	1.60	<i>Hemianex ephippiger</i> (Selys)		112	44.80
Total beneficials		100			250	100
III. Visitor insects						
Diptera	Tabaenidae	33.33	<i>Tabanus tabeniola</i> (Pal. B)	A	5	33.33
Hymenoptera	Apidae	46.67	<i>Apis mellifera</i> (L.)	A	7	46.67
	Andrenidae	20.00	<i>Andrena</i> spp.	A	3	20.00
Total visitors		100			15	100

*L: larvae, N: Nymph, A: Adult, E: Egg masses

Table (2): Total numbers of insect pests, beneficial and visitor insects sampled from thirty three genotypes of cowpea during 2002 season at Kafr El-Sheikh, region.

Order	Family	% group	Species	Stage*	Total No.	% group
I. Insect pests						
Diptera	Agromyzidae	0.03	<i>Liomyza</i> spp.	L	50	0.03
Hemiptera	Pentatomidae	0.05	<i>Nezara viridula</i> (L.)	N,L	72	0.05
Homoptera	Aleyrodidae	16.81	<i>Bemisia tabaci</i> (Genn.)	N,A	25461	16.81
	Aphididae	78.30	<i>Aphis craccivora</i> (Koch.)	N,A	118535	78.27
Lepidoptera	Cicadellidae	4.53	<i>A. gossypii</i> Glover	N,A	42	0.03
			<i>Empoasca</i> spp.	N,A	6856	4.53
	Noctuidae	0.275	<i>Earias insulana</i> (Bois.)	A	3	0.002
			<i>Autographa</i> spp.	L	3	0.002
			<i>Spodoptera littoralis</i> (Boisd.)	L	397	0.26
Orthoptera	Acrididae	0.005	<i>S. littoralis</i>	E	12	0.008
			<i>S. exigua</i>	A	4	0.003
			<i>Aiolopus strepens</i> (Latr)	N,A	9	0.005
Total pests		100			151444	100
II. Beneficial insects						
Coleoptera	Coccinellidae	29.65	<i>Coccinella undecimpunctata</i> (R.)	A	9	1.55
			<i>Scymnus interruptus</i> (Goez.)	A	89	15.34
			<i>S. syriacus</i> (Mars)	A	74	12.76
Diptera	Staphylinidae	0.52	<i>Paederus affierii</i> (Koch.)	A	3	0.52
			<i>Metasyrphus corollae</i> (F.)	A	1	0.17
Dictyoptera	Mantidae	0.69	<i>Mantis religiosa</i> (L.)	A	4	0.69
Hemiptera	Anthocoridae	1.21	<i>Onus</i> spp.	N,A	7	1.21
			<i>Monomium pharaonins</i> (F.)	A	303	52.24
Hymenoptera	Vespidae	0.35	<i>Polistes gallica</i> (L.)	A	2	0.35
Neuroptera	Chrysopidae	10.17	<i>Chrysoperla carnea</i> (Steph.)	L,A	59	10.17
Odonata	Aeschnidae	0.52	<i>Hemianex ephippiger</i> (Selys)	A	3	0.52
			<i>Ischnura senegalensis</i> (Ramb.)	A	1	0.17
True spiders	Coenagrionidae	4.31		A	25	4.31
Total beneficial		100			580	
III. Visitor insects						
Coleoptera	Anthicidae	15.38	<i>Anthicus crinitus</i> (Laf.)	A	2	15.38
Diptera	Tabaenidae	23.08	<i>Tabanus tabeniola</i> (Pal. B)	A	3	23.08
			<i>Andrena</i> spp.	A	2	15.39
Hymenoptera	Apidae	46.15	<i>Apis mellifera</i> (L.)	A	6	46.15
Total visitors		100			13	100

*L: larvae, N: Nymph, A: Adult, E: Egg masses

Order lepidoptera ranked the second place and represented by only one family. Noctuidae included the cotton leafworm; *Spodoptera littoralis* (Boisd.) (Larvae & Egg masses), the lesser cotton leafworm; *S. exigua* (Hb.) (larvae) *Autographa* spp. (larvae), and *Earias insulana* (Bois.) (adults) composing 7.39, 0.008, 0.006 and 0.008% as total, respectively.

Hemiptera ranked the third category and was represented by Pentatomidae which included the green stink bug only; *Nezara viridula* (L.) comprised 0.61% of the total insect pests.

Diptera ranked the fourth order and was represented by family Agromyzidae (*Liomyza* spp. reaching 0.10%).

Order Orthoptera was the fifth category and was represented by Acrididae [*Aiolopus strepens* (Latr) composed 0.03%].

Thysanoptera was the least abundant order and was represented by Thripidae [*Thrips tabaci* (Lind.) composed 0.008%].

In the second season, 2002 data in Table (2) indicate that Homoptera was dominant represented by three families. Aphididae which included two aphid species, *A. craccivora* showing 78.27% as total and *Aphis gossypii* Glover was found in 0.03% as total. *B. tabaci* accounted for 16.81% as total. *Empoasca* spp. belongs to leafhoppers were found in 4.53%.

Only one lepidopterous family was recorded being Noctuidae. Noctuids, were represented by *S. littoralis* (Larvae & Egg masses) reaching 0.268% of the total insect pests, *S. exigua* (Hb.), *Autographa* spp. and *E. insulana* composing 0.003, 0.002 and 0.002% as total, respectively.

Hemiptera ranked the third order with only one family, i.e. Pentatomidae which include one species, *N. viridula* showing 0.05%.

Order Diptera ranked the fourth with only one family Agromyzidae represented by *Liromyza* spp.; 0.003% of the total.

Orthoptera was the least counted order with only one family being Acrididae, *A. strepens* (0.005%).

It is noticeable that pests were higher than beneficial and visitor insects composing 99.26 and 99.61% of the total catch in the first and second season, respectively. Several investigators recorded many insect pests associated with leguminous vegetable crops, i.e. El-Kifl *et al.* (1974) recorded 19 insect species on faba bean plants at Giza governorate. El-Sayed (1993) recorded 21 insect species in cowpea early and late summer plantations at Shebin El-Kom, Menoufia governorate while El-Hawary *et al.* (1995) recorded 13 insect pests on soybean plants at Kafr El-Sheikh. Variation in the recorded insect pests among investigators may be due to crop, location differences and annual weather fluctuations and probably some unknown factors.

B. Beneficial insects:

Data in Tables (1 & 2) show the presence of 10 species of beneficial insects in 8 families and 7 orders in the first season compared with 12 species of beneficial insects in 10 families and 7 orders in the second one at Kafr El-Sheikh. Data in Table (1) showed the presence of the beneficial insects in the first season 2001. Neuroptera was the dominant order and was represented by only one family; Chrysopidae as *Chrysoperla carnea* (Steph.) recorded 31.20 of the total beneficial insects population.

Coleoptera was the second largest group and contained two families, being Coccinellidae and Staphylinidae. Coccinellidae is represented by *Scymnus interruptus* (Goez), the ladybird beetle; *Coccinella undecimpunctata* (R.) and *Scymnus syriacus* (Mars) in 7.80, 4.00 and 3.60% as total, respectively. Staphylinidae is represented by *Paederus alfieri* (Koch.) (2.0% as total).

Order Hemiptera ranked the third and represented by family; Anthocoridae only represented *Orius* spp. comprising 2.80% of the total beneficial insects. Odonata was represented by *Hemianex ephippiger* (Selys) Aeschnidae as 1.60% of the total.

Order Hymenoptera was represented by *Polistes gallica* (L.). Vespidae (1.20%). Order Diptera and Dictyoptera were the least recorded

orders presented by *Metasyrphus corollae* (F) (0.80%) and *Mantis religiosa* (L.) (0.80%). True spiders comprised 44.8%.

In the second season, Hymenoptera was the largest group, represented by two families, Formicidae as *Monomorium pharaonis* (F.) which was considered as the most dominant species (52.24%) and *P. gallicae* (0.35%).

Order Coleoptera was the second group represented by Coccinellidae and Staphylinidae families which included four species, coccinellids as *S. interruptus*, *S. syriacus* and *C. undecimpunctata* reached 15.34, 12.76 and 1.55 of the total beneficial insects population, staphylinid as *P. affierii* (0.52%).

Neuroptera was the third largest group and contained only one family, being Chrysopidae, represented by *C. carnea* (10.17% as total).

Order Hemiptera ranked the fourth and represented by family, Anthocoridae only represented *Orius* spp. comprising 1.21% of the total beneficial insects. Dictyoptera was represented by *Mantis religiosa* (L.) Mantidae as 0.69% of the total.

Order Odonata was represented by two families, i.e. Aechnididae and Coenagrionidae which included one species each, being *Hemianex ephippiger* (Selys) and *I. senegalsis* as 0.52 and 0.17% of the total beneficial insects, respectively. Order Diptera was the least recorded order represented by *M. corollae* (0.17%). True spiders comprised 4.31%. Several investigators recorded many beneficial species associated with leguminous vegetable crops, i.e. El-Sayed (1993) recorded 8 predators and 10 parasites species in cowpea early and late summer plantations at Shebin El-Kom, Menoufia governorate. Sherif et al. (1994) recorded ten species of predators and three hymenopterous parasitoids on faba bean at Kafr El-Sheikh while El-Dakhakhni et al. (1995) recorded 13 beneficial insect species on soybean plants at the same region. In the current study that beneficial insects were very minor in comparison with insect pests composing 0.70 and 0.38% of the total catch in the first and second season, respectively. This may be due to species composition, crop duration and toxic applications of pesticides (El-Mezayyen, 1998).

C. Visitor insects:

Data in Tables (1 & 2) revealed the presence of 3 species of visitor insects belonging to 3 families and 2 orders compared with 4 species of visitor insects in 4 families and 3 orders in the first and second season at Kafr El-Sheikh, respectively. Hymenopterous was the major represented by two families, Apidae as *Apis mellifera* (L.) (46.67 & 46.15% as total) in the first and second seasons, respectively. Andrenidae was included, *Andrena* spp. only (20 & 15.39%). Diptera ranked second and represented by only one family being Tabanidae in one species namely *Tabanus taeniola* (Pal. B) (3.33 & 23.08%) in the first and second season, respectively. Coleoptera was the least order including only one family being Anthicidae which represented by *Anthicus crinitus* (Laf.) (15.38%) in the second season. Visitor insects reaching 0.04 and 0.04% of the total catch in the first and second season,

respectively. Sherif *et al.* (1994) recorded 6 visitor insects on faba bean plants at Kafr El-Sheikh while El-Mezayyen (1993) recorded 3 visitor insects on soybean plants at the same region.

II. Shannon-Weaner diversity index (S.W.) for species in genotypes of cowpea:

Data in Tables (3 & 4) presented the computed values of the Shannon-Weaner diversity indices in relation to genotypes of cowpea in which samples were taken. The S.W. diversity index for pests in the sampled genotypes was the highest in It 85 K-105-2 and It 95 K-204-11, being 2.8761 and 2.1090, respectively while in It Tvu-12349 and Cream-7, it the lowest, being 0.660 and 0.6235., respectively in the first season. The number of species in it were 6 species for the former genotypes while the latter genotypes harbored 7 and 5 species, respectively. Therefore, the values of S.W. for other tested genotypes differ with the number of species in each genotype. Similar trend was also noticed for pests in the second season, the S.W. diversity index for it was the highest in 90 K-284-2 and It 84 D-448, being 1.4294 and 1.37642 while in It 85 F-3139, it the lowest, being 0.1519, respectively. The number of species in it were 7 and 9 species for the former genotypes while the latter one harbored 3 species.

It could be concluded that each genotype has dominant and subdominant insect species which can affect on diversity index values. The relationship between species and ecological process can change quantitatively and qualitatively with environment context (Cardinale & Nelson, 1999).

Data in Tables (5 & 6) revealed the S.W. diversity index for beneficial species was the highest in It Tvu-12349 and It 92 KD-357-2 being 1.0983 and the number of species were 3 for each one while in It 95 K-1088-4 and Fetriat genotypes, it was the lowest, being 0.6363 and the number of species were 2 for each one, respectively in the first season. In the second season, similar results were also noticed, the S.W. diversity index in It 83s-911 and It Brown was the highest being 1.5616 and 1.4803 and the number of species were 5 and 9 for each one while in It 85 F-1380 was the lowest being 0.2336 and the number of species were 2. Similar results were obtained by El-Dakhakhni *et al.* (1995) who reported that clover had the highest number of beneficial insect species, 22 while cotton and soybean had the lowest one, 12 for each one. The S.W. for natural enemy species in the sampled crops was the highest in clover being 2.52 while in maize it was the lowest being 1.81. As for cotton and soybean it was 2.08 and 2.41, respectively. Also, El-Mezayyen (2001) indicated that the S.W. diversity index for pests, beneficial and visitors species in the sampled crops was the highest in alfalfa at Sebha being 1.6641, 0.6129 and 0.8222 while in the Egyptian clover at Kafr El-Sheikh, it was the lowest, being 0.6154, 0.5152 and 1.1480 and the number of species were 14, 11 and 5 for alfalfa while they were 13, 8 and 6 for the Egyptian clover, respectively.

Table(3): Shannon-Weaner diversity index as computed from data related species of insect pests on forty three of cowpea genotypes during 2001 season at Kafr El-Sheikh.

Genotypes	Pests species		
	Total No.	No.	S.W.
It 85 K-105-2	596	6	2.8761
It 95 K-204-11	749	6	2.1090
It 82-E-16	232	4	1.6833
It 93 K-513-2	315	4	1.3316
It 95 K-207-21	291	4	1.3048
It 95 K-526-2	309	7	1.2787
It 85s-872	927	8	1.2627
86 F-2089-5	797	7	1.2619
It E-Brown	1697	7	1.2508
90 K-284-2	523	4	1.2458
It 84 D-448	523	6	1.2234
It 95m-306	744	5	1.2037
It 85 F-1380	641	4	1.1677
It 83-S-872	914	5	1.1642
It 95 K-2011-11	143	4	1.1402
Fetriat	226	6	1.1141
It 85 F-3139	1076	7	1.0908
It 92 KD-357-2	1048	5	1.0864
It 93 K-693-2	548	6	1.0535
It 86 F-2014-1	733	6	1.0323
It 95 K-1088-4	418	7	0.9964
It 98 K-573-3	357	3	0.9599
It 85 F-3139	379	5	0.9312
It 85 F-1380	639	8	0.9138
It 83s-911	536	5	0.9074
It 84 D-448	1083	4	0.9066
It 82 D-889	403	5	0.8962
It 86 F-2062-5	268	4	0.8957
It 87 D-376-4	927	7	0.8728
It 84 D-448	1007	5	0.8590
It 93 K-686-2	658	5	0.8563
It 95m-278	1021	7	0.8525
Azmerly	1087	3	0.8146
It 86 F-2062-5	1525	6	0.8032
It 95 m-48	482	6	0.7788
It 95 m-120	1134	5	0.7651
It 86 D-880	706	4	0.7566
It Brown	3656	7	0.7376
It 93 K-513-2	489	5	0.6856
95 K-It 56-3	1346	5	0.6821
It 83 D-442	613	6	0.6784
It Tvu-12349	1752	7	0.6660
Cream-7	1721	5	0.6235

Table (4): Shannon-Weaner diversity index as computed from data related s pecies of insect pests on thirty three of cowpea genotypes during 2002 season at Kafr El-Sheikh.

Genotypes	Pests species		
	Total No.	No.	S.W.
90 K-284-2	281	7	1.4294
It 84 D-448	450	9	1.3762
It 85 F-1380	381	6	1.2594
It 95 K-526-2	384	7	1.2487
It 93 K-513-2	714	5	1.1714
It 95 K-2011-11	298	7	1.1350
Cream-7	614	4	1.1200
It 86 F-2062-5	368	4	1.0727
It 98 K-573-3	268	6	1.0630
It 86 F-2014-1	486	3	1.0502
Fetriat	571	4	1.0210
It 85 K-105-2	4196	6	1.0345
It 87 D-376-4	829	5	1.0071
It 95 K-1088-4	2202	7	0.9580
It 92 KD-357-2	2863	7	0.9381
It 82-E-16	316	5	0.9020
86 F-2089-5	1470	6	0.8889
It 84 D-448	2374	6	0.8302
It 82 D-889	4661	4	0.7903
It 93-K-693-2	1791	7	0.7869
It 83s-911	6791	5	0.7556
It 95 m-48	7519	6	0.4845
95 K-It 56-3	9610	4	0.4734
It 95 m-278	10393	4	0.4523
It 85s-872	7321	4	0.4400
It Tvu-12349	6911	4	0.4385
It 93 K-513-2	8473	5	0.3949
It 85 F-1380	10392	6	0.3641
It Brown	17386	4	0.3433
It E-Brown	14359	5	0.2554
It 83 D-442	10013	6	0.2532
It 86 D-880	6889	3	0.1551
It 85 F-3139	12809	3	0.1519

In the current study, it was anticipated that the relative insect abundance of species on each cow pea genotype may have an effect on diversity index values. Values of S.W. support such suggestion.

Table (5): Species of beneficial insects in relation to some genotypes of cowpea during 2001 season at Kafr El-Sheikh.

Genotypes	Beneficial insects		
	Total No.	No.	S.W.
It Tvu-12349	3	3	1.0983
It 92 KD-357-2	6	3	1.0983
It 93 K-513-2	4	3	1.0395
It 85 F-3139	6	3	1.0112
IT 86 D-880	6	3	1.0112
It 85 F-1380	6	3	1.0112
IT 95 K-204-11	5	3	0.9500
It 87 D-376-4	2	2	0.6930
It Brown	4	2	0.6930
It 840-448	2	2	0.6930
It 93 K-686-2	5	2	0.6728
It 83s-911	10	3	0.6388
It 83 D-442	6	2	0.6363
It 82 D-889	6	2	0.6363
It 95 K-1088-4	6	2	0.6363
Fetriat	3	2	0.6363

Table(6): Species of beneficial insects in relation to some genotypes of cowpea during 2002 season at Kafr El-Sheikh.

Genotypes	Beneficial insects		
	Total No.	No.	S.W.
It 83s-911	6	5	1.5616
It Brown	22	9	1.4803
IT 95 m-278	17	6	1.4525
It 85 F-3139	20	6	1.4394
Fetriat	10	5	1.3589
It 85 K-105-2	35	5	1.1060
It 95 K-526-2	12	5	1.0852
It 93 K-693-2	9	4	1.0703
IT 93 K-513-2	18	5	1.0502
cream-7	19	5	1.0210
It 86 F-2062-5	6	3	1.0112
It 84 D-448	19	4	1.0100
It 83 D-442	64	5	0.8813
It 86 D-880	6	3	0.8673
90 K-284-2	6	3	0.8673
It 98 K-573-3	12	4	0.8367
It 82 D-889	22	4	0.8222
It 95 m-48	16	4	0.8220
It 82-E-16	9	3	0.7584
It 85s-872	31	4	0.7497
It 92 KD-357-2	62	5	0.6810
86 F-2080-5	17	3	0.6777
It E-Brown	17	4	0.6596
It 93 K-513-2	19	3	0.6328
It 86 F-2014-1	7	2	0.4101
It 85 F-1380	16	2	0.2336

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دراسة عن الانواع الحشرية على اصناف مختلفة من اللوبيا في منطقة كفر الشيخ
رمضان مصرى هلال* ، جمال على المزين ، على ممدوح ناصف
* قسم الحشرات الاقتصادية كلية الزراعة بكفر الشيخ جامعة طنطا
معهد بحوث وقاية النباتات محطة البحوث الزراعية بسخا مركز البحوث الزراعية

أجريت هذه الدراسة بمزرعة كلية الزراعة بكفر الشيخ في الموسم الصيفي عام ٢٠٠١ ،
٢٠٠٢م بغرض حصر ودراسة التنوع في الانواع الحشرية المرتبطة بـ ٤٣ صنفا من اللوبيا
في الموسم الاول و٣٣ صنفا في الموسم الثاني منها ثلاثة اصناف محلية حيث تم الحصول عليها
من المعهد الدولي للمحاصيل الأستوائية بنيجيريا وتوصلت الدراسة إلى وجود ١١ ، ١٠ ، ٣ نوعا
في الموسم الاول بينما وجد ١١ ، ١٢ ، ٤ نوعا في الموسم الثاني من الافات والحشرات النافعة
والزئترات على اصناف اللوبيا في منطقة كفر الشيخ على التوالي.
ويبدو ايضا ان بعض الانواع الحشرية ذات سيادة اكثر من غيرها في كل صنف حيث
بلغت سيادة ثلاثة انواع ٤٢,٦٠ ، ٣١,٢٠ ، ٤٦,٦٧% وهي من البقوليات واسد المن ونحل العسل
على الترتيب في الموسم الاول بينما كانت في الموسم الثاني ٧٨,٢٧ ، ٥٢,٢٤ ، ٤٦,١٥% وهي
من البقوليات والنمل ونحل العسل على الترتيب من جملة الانواع المتحصل عليها بالنسبة للافات
والحشرات النافعة والزئترات في منطقة كفر الشيخ.
كانت قيم دلائل التنوع ٢,٨٧٦١ ، ١,٠٩٨٣ ، بالنسبة للافات والحشرات النافعة على
اصناف اللوبيا K 105-2 K-85 It ، K 12349 TvU-IT في الموسم الاول بينما كانت قيم دلائل
التنوع في الموسم الثاني ١,٤٢٩٤ ، ١,٥٦١٦ ، بالنسبة للافات والحشرات النافعة على اصناف
اللوبيا-284 K-90 It 83s-911. وجد أيضا أن التواجد النسبي لأنواع الحشرية في كل صنف لها
تأثير على قيم دليل التنوع.