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Insect diversity in the drumstick tree *Moringa oleifera* (Lam), (Moringaceae) fields.

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Abstract

The incidence and faunistic composition of insect pests and associated predators on the drumstick tree (*Moringa oleifera* (Lam) were studied during 2013/2014 and 2014/2015 in Sekem Company farm in Belbeis, Sharkia Governorate, Egypt. Sampling was done using conventional methods that include direct counts, Sweeping net and yellow sticky traps. Collections were inspected weekly during the spring, summer and winter. Data obtained cleared that 32 species belonging to 30 genera, 22 families and 9 orders were associated with *Moringa oleifera* (Lam). The insect pests were more dominant than the predators. The most dominant pests were piercing sucking insects (*Empoasca desipienus* (Paoli), *Colocoris* sp., *Thrips tabaci* (Lind.), *Aphis craccivora* Koch and *Nysius ericae*). The most dominant predators were *Hemianax ephippiger* Selys, *Coccinella undecimpunctata* L, *Ischnura senegalensis* Ramb and *Metasyrphus corollae* (Fabri).

Keywords: Insect, diversity, *Moringa oleifera*

Introduction

Moringa oleifera (Lam) synonym *M. pterygosperma* (Gathn): Moringaceae, is a fast growing drought resistant and slender softwood tree. It is found widely distributed in both tropical and subtropical areas. It is commonly known by several names in different countries such as horse the miracle tree (Palada and Chang, 2003; Radovich 2009). Moringa is one of the world's most useful plants. It is a highly nutritive crop, the tender pods, leaves and flowers of which are used as popular vegetables in cuisines for their distinctly inviting flavor superiority over perennial types, and the crop has adapted to varied agro ecosystems and farming systems .Rajangam *et al* (2001) were of the opinion that Moringa is best with many production constraints and limiting factors including vulnerability to pests including caterpillars, aphids, fruitflies and mitesd diseases. For example, several authors have reported various insect from other parts of the globe, particularly in India, Hawaii (USA) and China (Sivagami and David, 1968; Anjaneya Murthy and Regupathy, 1992; Rajangam *et al*., 2001 Fuglie and Sreeja, 1998; Palada and Chang, 2003 Radovich, 2009; and TNAU, 2008). *Moringa oleifera* is currently gaining popularity at medicinal crop in Egypt. There is a dearth of information on different insect pests and associated fauna of this important crop in Egypt and Africa in general. Thus the major objective of the present studies was conducted to investigate and generate some basic information on the potential pests that are likely to cause serious economic damage and loss as well as the beneficial fauna (natural enemies) in moringa fields under Egyptian conditions.

Material and Methods

The experiment of this investigation was conducted at Sekem Company farm in Belbeis, Sharkia Governorate, throughout two consecutive seasons of 2013 / 2014 and 2014 / 2015. One medicinal plant the drumstick tree *Moringa oleifera* (Lam), (Moringaceae) was planted by the end of June 2012. An area about half feddan was chosen for surveying of insect pests attacking that plant and their associated natural enemies. Normal agricultural practices were carried out and no chemicals were used in controlling measures. Successive samples were taken weekly starting from the first week of April till first week of the April of 2013 and 2015 season using conventional methods that include:

1-Direct counts: Twenty five plants were chosen randomly, three leaves per plants were selected at three different levels for direct counting of present insects.

2-Sweeping net: Twenty five double strokes were taken from cardinal directions of the field and transferred to the laboratory for inspection. Every captured sample was put in a glass jar containing sodium cyanide to kill the insects.

3-Yellow sticky traps: Sticky cards measuring 20×10 cm steady fixed on a long stalks were distributed at a rate of 4 traps and put in the middle of the cultivated area. Then the traps (yellow cards) were replaced weekly and transferred to the laboratory for insects 'identification.

Specimens were collected and sealed in plastic bags and returned to the laboratory, pinned or preserved in alcohol for later identification. All specimens were classified to their respective orders, families, genera and species whenever possible.

Results and Discussion

Survey of insects occurring on *Moringa oleifera* (Lam)

Field survey of insects prevailing on the medicinal plant drumstick tree *Moringa oleifera* (Lam) was carried out for two consecutive seasons (2013/2014) and (2014/2015) at Sekem company farm in Belbeis, Sharkia, Governorate. **Table (1)** shows a list of the insects found on *Moringa oleifera* (Lam) during (2013/2014) and (2014/2015). Data revealed the presence of insect species belonging to 22 families and 9 insect orders. Coleoptera was represented by the highest number of species (8) followed by Hemiptera (7), Lepidoptera (6), Homoptera (4), both Diptera and Odonata (2) while Thysanoptera, Orthoptera and Neuroptera were represented by one species for each. Among the surveyed insects, 24 species were recorded as pests injurious to the plant. They were *Lampides bateicus* L, *Venisa cardui* L , *Pectinophora goossypilla* (Saunders) , *Chrysodeixis chalcits* (Esper) , *Etiela zinckenella* Tr , *Earias insulana* Boisd , *Calocoris sp.* , *Lygus genelltus* H.sch , *Greontides pallids* (Ramb) , *Spilotethus pandurus* (Scop) , *Nysius ericae* (Schill) , *Oxycarinus hyalinipenuis*(Costa) , *Nezara viridula* (Westwood) , *Aphis craccivora* Koch , *Aphis gossypii* (Glover) , *Empoasca desipienus*(Paoli) , *Bemisia tabaci* Gerrarius , *Acrotylus insubricus* Scop , *Heterodrus abyssimns* Candeze , *Carpophilus hemipters* (L), *Simoxylon ceratonia* L , *Aphodins lividus* Olivier , *Thrips tabaci* (Lind.) and *Musca domestica* Linn. While 8 species were predatory insects, (natural insect enemies). *Coccinella undecimpunctata* L, *Coccinella septempunctata* L, *Hippodamia variegata* Geze, *Scymnus interruptus* Geze, *Metasyrphus corollae* (Fabricius), *Chrysoperla carnea* Stephens, *Hemianax ephippiger* Selys *and Ischnura senegalensis* Ramb.

Table 1. Taxonomic list of insect species associated with moringa plants during (2013 / 2014 – 2014 / 2015) seasons.

NO.	Order	Family	Scientific Name	Status
1	Lepidoptera	Lycaenidae	*Lampides bateicus* L	Pest
		Nymphalidae	*Venisa cardui* L	Pest
		Gelechidea	*Pectinophora gossypiella* (Saunders)	Pest
		Noctuidae	*Chrysodeixis chalcits* (Esper)	Pest
			Earias insulana Boisd	″
		Pyralidae	*Etiela zinckenella* Tr	Pest
2	Hemiptera	Miridae	*Calocoris sp.*	Pest
			Lygus genelltus H.sch	″
			Greontides pallids (Ramb.)	″
		Lygaidae	*Spilotethus pandurus* (Scop)	Pest
			Nysius ericae (Schill)	″
			Oxycarinus hyalinipennis (Costa)	″
		Pentatomidae	*Nezara viridula* (Westwood)	Pest
3	Homoptera	aphididae	*Aphis craccivora* Koch	Pest
			Aphis gossypii (Glover)	″
		Cicadellidae	*Empoasca descipiens* (Paoli)	Pest
		Alyrodidae	*Bemisia tabci* Gerrarius	Pest
4	Orthoptera	Acrididae	*Acrotylus insubricus* Scop	Pest
5	Coleoptera	Elateridae	*Heteroderes abyssimus* Candeze	Pest
		Bostrychidae	*Carpophilus hemipters* (L)	Pest
			Simoxylon ceratonia L.	″
		scarabaeidae	*Aphodius lividus* Olivier	Pest
		Coccinellidae	*Coccinella undecimpunctata* L.	Predator
			Coccinella septempunctata L.	″
			Hippodamia variegata Goeze	″
			Scymnus interruptus Goeze	″
6	Thysanoptera	Thripidae	*Thrips tabaci* (Lind.)	Pest
7	Diptera	Muscidae	*Musca domestica* Linn	Pest
		Syrphidae	*Metasyrphus corollae* (Fabricius)	Predator
8	Neuroptera	Chrysopidae	*Chrysoperla carnea* Stephens	Predator
9	Odonata	Aeschnidae	*Hemianax ephippiger* Selys	Predator
		Agrionidae	*Ischnura senegalensis* Ramb	″

It is obvious from data presented in **Table (2)** that *Musca domestica* Linn constituted the greatest group as represented in number of individuals. The total number of this pest was 3889 individuals throughout the two seasons. The next common species on this plant was *Empoasca discipiens* (Paoli). Its total number during the two seasons was (560 individuals).

Table 2. Numbers of insect species occurring on moringa plants during (2013 / 2014 – 2014 / 2015) seasons.

Insect species	Season I 2013 / 2014				Season II 2014 / 2015				Total	Occurrence period
	Direct count	Yellow traps	Sweeping net	Total	Direct count	Yellow traps	Sweeping net	Total		
Calocoris sp.	4	173	84	261	36	115	39	190	451	Apr. – Dec.
Lygus genelltus H.sch	-	-	25	25	-	-	76	76	101	Apr. - Jan.
Greontide spallids (Ramb)	-	-	27	27	-	-	1	1	28	Oct. – Apr.
Spilotethus pandurus (Scop)	4	-	1	5	20	-	-	20	25	Apr. – Sep.
Nysius ericae (Schill)	3	54	43	100	9	107	70	186	286	Apr. - Jan.
Oxycarinus hyalinipennis (Costa)	-	-	2	2	-	-	2	2	4	Jun.- Aug.
Nezaea viridula (Westwood)	3	-	-	3	13	-	2	15	18	Jun. – Oct.
Aphis craccivora Koch	39	203	-	242	-	87	-	87	392	Apr. – Mar.
Aphis gossypii Glover	-	105	-	105	-	33	11	44	149	Apr. – Dec.
Empoasca descipiens (Paoli)	21	166	50	237	7	302	14	323	560	May- Mar.
Bemisia tabci Gerrarius	16	155		171	-	30	-	30	201	Apr. – Feb.
Thrips tabaci (Lind.)	8	434	-	442	-	-	-	-	442	Apr. - Jun.
Heteroderes abyssimus Candeze	-	20	-	20	-	42	-	42	62	May- Apr.
Carpophilus hemipters (L)	-	10	-	10	-	6	-	6	16	Apr. – Jun..
Simoxylon ceratonia L.	-	4	-	4	-	5	-	5	9	Apr. – Sep.
Aphodius lividus Olivier	-	2	-	2	-	-	-	0	2	Apr. – Mar.

Table (2) continued:

Insect species	Season I 2013 / 2014				Season II 2014 / 2015				Total	Occurrence period
	Direct count	Yellow traps	Sweeping net	Total	Direct count	Yellow traps	Sweeping net	Total		
Coccinella undecimpunctata L.	90	12	5	107	47	1	4	52	159	Apr. - Mar.
Coccinella septempunctata L.	3	1	-	4	1	-	-	1	5	Apr. - Jan.
Hippodamia variegata Goeze	4	1	1	6	-	-	-	-	6	Apr. - May
Scymnus interruptus Goeze	-	-	1	1	-	-	-	-	1	Nov. –Oct.
Metasyrphus corollae (Fabricius)	6	1	1	8	9	3	1	13	21	Apr. – Mar.
Hemianax ephippiger Selys	100	1	2	103	150	-	10	160	263	Jun.- Nov.
Ischnura senegalensis Ramb	27	-	1	28	22	-	3	25	53	Jun.- Nov.
Chrysoperla carnea Stephens	3	1	1	5	2	1	1	4	9	Apr. – Sep.
Musca domestica Linn	70	128	97	295	98	3425	71	3594	3889	Apr. – Mar.
Lampides bateicus L	44	10	12	66	70	11	5	86	152	May- Dec.
Venisa cardui L	39	-	3	42	64	-	4	68	110	Apr. – Dec.
Pectinophora gossypiella (Saunders)	11	-	-	11	-	-	-	-	11	Aug. - Sep.
Chrysodeixis chalcits (Esper)	3	-	-	3	2	-	-	2	5	Jun. –Oct.
Etiela zinckenella Tr	-	3	-	3	-	-	-	-	3	Nov. - Mar.
Earias insulana Boisd	2	-	-	2	-	-	-	-	2	Nov. – Mar.
Acrotylus insubricus Scop	24	-	5	29	98	-	2	100	129	Apr. – Mar.

Calocoris sp. was the third in rank; the total number of this pest was 451 individuals. The least number of insects was (*Aphodius lividus* Olivier and *Earias insulana* Boisd); total numbers of both in the two seasons were 2 individuals for each. The results are in agreement in genral with those of Ojiako *et al*. (2012) who determined that in the first four weeks, the variegated grasshoppers (*Zonocerus variegatus* L.), houseflies (*Musca domestica* L.) and the red wood ants (*Formica rufa* L.) were the major insects in the nursery. Also , their results agree with the findings of Ofelia Andrea *et al* (2015), Yusuf and Yusif (2014) ,Abdalla Abdalrahim *et al*.(2013), Mahesh Math *et al* (2013) and Okonkwo *et al*. (2013) who showed that the groups included (Class Insecta: Hymenoptera) black and orange-yellow ants; (Lepidoptera) hairy black/pink caterpillars; (Coleoptera) adult weevils , (Homoptera: Aphididae); lady beetles, green and brownish-black aphid, (Homoptera: Aleyrodidae) whiteflies. Others included (Dictyoptera: Mantidae) mantids; (Dictyoptera) cockroaches and (Odonata) dragonflies. The same results were obtained by Alao *et al* (2011) , Rajangam *et al*.(2001) and Sivagami and David (1968) who showed that incidence of the hairy caterpillars , *Metanastria hytraca* and *Taragama siva* the gram caterpillar , *Heliothis armigera* , the aphid , *Aphis craccivora* , the beetle borer *Diaxenopsis apomecynoides* and the fruit fly *Gitona* sp. on moringa.

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التنوع الحشرى فى حقول المورينجا

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أجريت هذه الدراسة لحصر فونة الحشرات وما يصاحبها من مفترسات على نبات المورينجا، وتم ذلك على مدى عامى 2014/2013 و2014/ 2015فى مزرعة سيكم ببلبيس بمحافظة الشرقية .مصروتم أخذ العينات بالطرق العادية متضمنة طريقة العد المباشر، وشبكة الجمع، والمصائد اللاصقة الصفراء . تم اخذ العينات اسبوعيا خلال فصول العام (الربيع والصيف والشتاء) وأوضحت النتائج التى تم الحصول عليها وجود 32 نوعا حشريا تنتمى إلى 30 جنسا و22 عائلة و 9 رتب.ووجد أن الآفات الحشرية السائدة أغلبها من الحشرات الثاقبة الماصة (الجاسيدز، البق الملون، تربس القطن، من البقوليات وبقة النبات). أماالمفترسات الحشرية السائدة فكانت الرعاش الكبير، أبو العيد ذو الإحدى عشرة نقطة،الرعاش الصغير وذبابة السرفس .