EVALUATING EFFICIENCY OF SEVEN TRAP TYPES USED IN SURVEY OF INSECT PESTS AND THEIR NATURAL ENEMIES INHABITING RICE FIELDS

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ABSTRACT

The survey which was carried out at the experimental farm of Rice Research & Training Center and Economic Entomology Dept., Kafr El-Sheikh Fac. of Agric., Tanta University during two successive seasons; 2003 and 2004. Revealed the presence of 138 insect species in rice fields. In the current study, the vacuum machine captured the greates number of insect species (84) followed by the malaise trap 74. Then 53, 52, 43, 36 and 33 species were collected by sweeping net, photoelector, pit-fall trap, light trap and fine screen trap, respectively. Arranging (S.W.) values in a descending order revealed that the highest indexes were recorded for photoelector (3.67) and vacuum machine (3.66) followed by malaise trap (3.62), light trap (3.15), while index calculated for sweep net was the lowest (2.98).

Data demonstrating the efficiency of the traps in collecting different orders of insects revealed that, sweeping net was most efficient in collecting Coleoptera followed by Hymenoptera. Photoelector was most efficient for collecting Hymenoptera, and Homoptera. Pit-fall trap in collecting Hymenoptera followed by both Orthoptera and Coleoptera. Vacuum machine, Hymenoptera followed by Coleoptera. Malaise trap, Hymenoptera followed by Coleoptera. Light trap, Coleoptera, followed by Lepidoptera. Fine screen trap, was especially efficient for collecting aquatic insects; Coleoptera, followed by Hemiptera. However insect living in soil or water and other which might be active at night would be also collected in the vacuum machine trap. Those insects were also collected by pit-fall trap, fine screen trap and light trap. In addition, fine insects which might be damaged by power of suction of the vacuum machine become not valid for mounting and taxonomic studies. Those insects could be collected safty malaisa trap or photoelector trap.

INTRODUCTION

The rice plants, allover the world, are liable to attack by several insect pests. Those insects could be divided into three groups. The first is harmfull insects the second is predators and the third group is parasitoids (Sherif, 2002). It is worthily to mention that studies dealing with surveys of insect rice fauna in Egypt are few. In this respect, Ali (1978) using sweeping net, collected only 47 insect species. Lutfallah (1974) recorded 22 insect species using insect net. Studies on the main rice insects and their natural enemies have been carried out for a long time in different countries (Shah 1995, Rubia *et al.*, 1997 and Sontak and Dash; 2000; Sutherland *et al.*, 2003 and Tan *et al.*, 2004). As for as the author is aware, it is the first time to carry out a survey in Egypt using seven sampling methods at a time. Recently, a fin fiber screen has been used in surveying the aquatic insect in rice fields (Anonymous 2004).

The current study was undertaken throughout 2003 and 2004 seasons at the experimental farm and laboratory of Economic Entomology Dept. Faculty of Agriculture, Kafr El-Sheikh, Tanta University and Rice Research and Training Center (RRTC), Sakha, Kafr El-Sheikh to investigate the following topics:

1. Surveying insect pests and their natural enemies inhabiting rice field by seven trap types.
2. Evaluating efficiency of the trap types used in the survey.

MATERIALS AND METHODS

1. Survey of insect pests and their natural enemies inhabiting rice fields by seven traps:

Survey on an area of one fed. was prepared for this study, sown by Sakha 101 rice variety on May 5th 2003 season and on May 10th 2004 season. All recommended agricultural practices were followed during the growing season without insecticide applications. Samples were initiated for every plantation two weeks after planting and continued every other week until harvest using the different following methods. Specimens were primarily identified by Rice Research and Training Center (RRTC), to order, family and species and confirmed by Taxonomy Research Department at Plant Protection Research Institute.

1.1. Sweep net:

During seasons, 2003 and 2004, insects fauna were surveyed from rice fields using the sweep net technique. Sweep net was used for collecting insects weekly. At weekly intervals, beginning from 20 May up to 2 Oct., the occurring insects were collected in 50 double strokes per time. The insects harbored in bags were anesthetize, and bags were transferred to the laboratory. Visually or using the binocular microscope, the collected insects were examined, classified and counted. The surveyed insects were classified into order, families, and species. Averages of collected Insects per 50 double strokes, throughout the rice seasons, were calculated.

1.2. Photoelector:

Photoelector is a fine technique designed and used by Csaba (2000) in Hungary to separate minuet specinicens-mainly parasitoids by an excellent manner, highly suitable for identification purposes. The photoelector contains three parts; the first part is metal, conic the second part is a metal, slinder and the third part made of dark blue cloth, attached to at two glass jars. A small jar is attached to the first part for examining minute insects. Anther larger jar is attached to the net cylinder for examining bigger insects. The photoelector catch was transferred to the laboratory, emptied in a glass jar for anesthetizing by chloroform. The insects were kept into vials containing 75% ethyl alcohol for examining, discrimination, storing, identifying and counting.

1.3. Pit-fall traps:

For surveying insect species tending oftenly to move on the ground surface, pit-fall trap technique was used. Five water traps were distributed in an area of ½ fed. were located among rice in nurseries and paddy fields throughout the season. Each trap, in the form of a plastic tray, measured 2.5 liter size. The trap was filled with water and provided with some drops of a detergent (Tween 80) to help in capturing the insects. The traps were buried into the ground with their tops just at soil surface. Trapped insects were weekly collected and screened. Water in trays was changed after every sample. The surveyed insects were kept in glass vials having

75% ethyl alcohol and some drops of glycerin, and labeled for date, site and method of collection.

1.4. Vacuum machine (D-Vac):

The vacuum machine (D-Vac) has been widely used in entomological field studies (Haughton *et al.* 2003). The machine is powered by two- stroke engine, and provided with 11cm- diameter intake nozzle. At the opening of the nozzle, there is a converted conical gauze bag. At sampling, the nozzle is directed towards the rice plants to collect the inhabiting arthropods. The power of suction extracts the arthropods from the plants to be captured in side the conical bag. At the end of sampling, is a converted conical gauze bag (mesh < 0.5 mm). At sampling, the nozzle is directed towards the rice plants to collect the inhabiting arthropods. The power of suction extracts the arthropods from the plants to be captured in side the conical bag. At the end of sampling, the machine is turned off, and the conical bag is turned out the nozzle to empty the catch in plastic containers for examination. Each sample consisted of 5x5m. in 5 min. (use a stopwatch). Visually and using the binocular microscope, the collected insects were examined, classified and counted.

1.5. Malaise trap:

One of the most widely used insect traps was developed by the Swedish entomologist Rene Malaise and that now bears his name. Malaise trap is meshed fabric, open-sided, tent-like structures designed to collected flying insects in a container of 70% ethanol (Owen 1991). The net is erected at 90 degrees to natural insect flight line, like a hedge, rice field ride or fence-line. The trap is made from fine netting ribbon loops and guy-ropes – all supported by a 2m wooden pole and some strong tent pegs. The collecting vessel attaches to the tent using a made metal bracket, held in place by a metal ring-fastener (Csaba 2000). In the photo you can see the black walls topped with a white roof leading up to the white collecting bottle, attached to the top of the 2m pole. The trap packs down very small and the ironen poll from any surrounding vegetation. The only equipment needed is a hand-saw (for the polls) and a screwdriver (to tighten the ring fasteners). The trap is left to

collect 24 hours a day, the trap leave running for about three months at a time beginning from Jun., up to the end of Oct. was the collecting bottle changed every three days to prevent the alcohol dehydrating the softer-bodied specimens. The catch is usually taken to the laboratory and examined under a binocular microscope.

1.6. Light trap:

Catch of Robinson light trap was recorded for two successive seasons; beginning from May 1st till the end of Oct. The trap was operated at Mehallet Mussa region between dusk and dawn. Twice a week, in Sunday and Wednesday the catch was collected and all the number of insects were recorded as a weekly sample.

1.7. Water fine screen trap:

The insects were collected in the morning from water using a fine fiber screen net one week after rice sowing, and continued weekly till the drainage of water before harvest. Samples were placed in a plastic container filled directly with water of rice fields. The debris-free samples were preserved in 70% ethyl alcohol until identification. Insect classification was a achieved by aid of Taxonomy Research Department at Plant Protection Research Institute.

2. Evaluating the traps used in the survey:

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

$$H_s = \sum_i^s Pi \ \text{Log}\, P_i$$

H_s = The symbol for the amount of diversity in a group of species, in this case the category of classification used in this species (hence the subscript S).

S = Number of species within sample. P_i = The proportion of the i^{th} 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 referred as the Shannon-Waener function in the ecological literature (Krebs, 1978). Statistical analysis was carried out according to Duncan's Multiple Range test (Duncan, 1955)

RESULTS AND DISCUSSION

1. Survey insect pests and their natural enemies inhabiting rice fields by seven traps:

Insect pests and their associated natural enemies in rice fields were collected using seven techniques:

1.1. Sweep net:

Sweep netting is one of the most commonly and widely used procedures to sample arthropods on vegetation (Sherif 2002). Data in Table (1) revealed the presence of 6826 individuals belonging to 53 insect species, 32 families and 13 orders. The recorded insects were classified into two main groups; insect pests (30 species, 18 families and 9 orders) and natural enemies (17 predatory species, belonging to 13 families and 9 orders and 7 parasitoid species belonging to 3 families and only one order). Ali (1978) using sweeping net, collected only 47 insect species .

1.2. Photoelector:

The obtained data are presented in Table (1) and markedly reveal that 2133 individuals belonging to 52 species of insects, 30 families and 10 orders were recorded by photoelector trap. These insects could be divided into four groups. The first is insect pests (27 species from 17 families and 7 orders) the second is natural enemies (8 predatory species belonging to 7 families and 6 orders, and 18 parasitoid species belonging to 8 families and only one order). In this method, sweep neting in corporated rapidly above plants enalls capture of fast minute flying insects, such as Hymenoptera (19) and Homoptera (9). Moreover, separating collected insects just after collection provides specimens highly suitable for mounting.

1.3. Pit-fall trap:

The pit-fall trap works on the principle that may low flying insects (Edwards and Thornton 2001). Data in Table (1) obviously revealed that the surveyed insects by pit-fall trap were 2789 individuals belonging to 43 species, 29 families and 11 orders at Kafr El-Sheikh region. The insect pests were represented by 16 insect species from 11 families and 6 orders. The species of insect predators were 22 from 16 families and 8 orders, and 5 parasitoid species belonging to 2 families and only one order.

1.4. Vacuum machine (D – Vac):

Vacuum machine (D-Vac) has been widely used in entomological field studies. It is most common passive, flight intercept traps. The one used in this inventory is modeled after the description given by Haughton *et al.* (2003). Vacuum machine works on the principle that all insects found in the field could be captured by power of suction. Results shown in Table (1) reveal that 11231 individuals belonging to 84 insect species, 47 families from 12 orders were recorded by this technique. Insect pests contained 29 species belonging to 17 families from 8 orders, while the predatory species were 26 belonging to 18 families and 10 orders, from which *Aeolothrips* sp. *Anthicus* sp., *Bembidion* spp. *Paederus alfierii* and *Philonthus* sp. were found in numerous numbers during the rice growing season. Parasitoids 30 species, 14 families and 2 orders were also collected.

1.5. Malaise trap:

The Malaise trap is used to ascertain the species diversity at a particular site and being a flight intercept trap (Marchiori and Penteado-Dias 2002), it is particularly good at catching species of flying insects individuals especially parasitoids (Csaba 2000). Results shown in Table (1) reveal that 2548 individuals belonging to 74 insect species, 43 families from 12 orders were recorded by Malaise trap. Insect pests contained 29 species belonging to 20 families from 9 orders, while the predatory species were 21 belonging to 13 families and 8 orders. Parasitoids (25 species, 12 families and 2 orders).

1.6. Light trap:

Light trap is effective for trapping night-active insects, primarily Lepidoptera (Sherif and Bastawisi 1997 and Hutchison and Weinzierl 2000). Typically, mercury vapor lamps are used, however other lamps can be used. Data in Table (1) revealed the presence of 3373 individuals belonging to 36 insect species, 17 families and 8 orders, as well as predators (12 species, 9 families and 6 orders).

1.7. Water fine screen trap:

Fine screen trap was most efficient in collecting several aquatic insect species which live in irrigation water and mud, mostly as predators (Anonymus 2004). Data in Table (1) present the surveyed aquatic insect fauna associated with rice plants in rice nurseries and fields using a fine screen trap at Kafr El-Sheikh reigon. They were 1226 individuals. belonging to 33 species, 17 families and 5 orders; Diptera, Hemiptera, Coleoptera and Odonata. These insects could be divided into two groups. The species of insect pests were 5 from 4 families and 2 orders, from which *Chironomus* sp., *Anopheles* sp., *Culex* sp., *Atylotus agrestis* and *Polymitarcys* sp. The insect predators were represented by 28 insect predators from 13 families and 4 orders Lutfallah (1974) recorded 22 insect species of aquatic insect by fin screen trap.

Table (1): Insect species and natural enemies and yearly average of number surveyed by different method in rice fields during two successive seasons 2003 and 2004.

Order	Family	Insect species	Number of insects						
			A	B	C	D	E	F	G
		1. Insect pest species:							
Coleoptera	Chrysomelidae	*Cassida vittata* Vill.	19	25	–	–	–	–	–
	Curculionidae	*Sitona lividipes* Fab.	13	11	–	–	–	–	–
	Elateridae	*Agrypnus notodonta* F.	–	–	–	–	–	34	–
		Lanelater notodonta F.	–	–	–	–	–	101	–
	Scarabaeidae	*Pachnoda fasciata* L.	–	–	–	–	–	18	–
		Pentadon isport L.	–	–	–	–	–	20	–
		Pentadon bispinosus L.	–	–	–	–	–	17	–
	Phalacridae	*Stilbus* sp.	84	27	–	–	19	–	–
Diptera	Chironomidae	*Chironomus* sp.	654	465	142	251	171	–	85
	Culicidae	*Anopheles* sp.	99	–	32	141	48	–	52
		Culex sp.	–	–	–	–	–	–	34
	Ephydridae	*Hydrellia prosternalis* Deeming	44	–	–	42	22	–	–
	Muscidae	*Musca domestica* L.	42	94	47	165	69	–	–
	Tabanidae	*Atylotus agrestis* Wied	63	74	54	–	41	–	43
Ephemeropte	Baetidae	*Baetis balcanicus* F.	421	247	45	214	36	–	–

Table (1): Cont.

Order	Family	Insect species	Number of insects						
			A	B	C	D	E	F	G
	Ephemeridae	*Polymitarcy* sp.	–	–	–	–	–	–	68
Hemiptera	Pentatomidae	*Eurygaster integriceps* S.	47	47	–	–	–	–	–
		Eysarcoris inconspicuus H.	66	19	–	–	–	–	–
		Nezara viridula L.	84	68	18	–	14	94	–
		Nysius ericae (Schill)	34	–	–	–	–	–	–
Homoptera	Aphididae	*Aphis* spp.	–	49	–	–	–	–	–
	Cicadellidae	*Balclutha hortensis* Lindb.	742	542	57	–	68	88	–
		Empoasca decedens Padi.	512	421	63	–	58	95	–
		Macrosteles assiumnilssoni L.	646	546	52	–	47	101	–
	Cixiidae	*Nephotettix modulatus* Mel.	441	351	74	–	39	66	–
	Delphacidae	*Oliarus sudanicus* Lall.	425	425	68	–	74	54	–
		Sogatella capatron Lall.	454	254	37	–	41	24	–
		Sogatella furcifera Horv.	754	533	86	–	67	65	–
		Sogatella vibix Fen.	554	351	43	–	38	43	–
Hymenoptera	Apidae	*Apis mellifera* L.	11	15	14	17	18	28	–
Lepidoptera	Lycaenidae	*Lampides boeticus* Linnaeus	–	9	16	–	25	–	–
	Gelechiidae	UID	–	–	25	64	57	–	–
	Hesperiidae	*Parnara matias* F.	–	–	46	141	88	–	–
	Noctuidae	*Agrotis ipsilon* L.	–	–	–	–	–	57	–
		Erias insulana Hb.	–	–	–	–	–	42	–
		Heliothis armigera L.	–	–	–	–	–	74	–
		Pectinophoragossypiella Led.	–	–	–	–	–	58	–
		Sesamia cretica Led.	–	–	–	–	–	42	–
		Spdoptera exigua (Hb.)	–	8	11	–	7	44	–
		Spdoptera littoralis (Boisd.)	–	5	9	–	3	67	–
	Pyralidae	*Chilo agamemnon* Bles.	–	–	25	–	112	609	–
		Ostrinia nubilalis (Hubn.)	–	–	–	–	–	94	–
Orthoptera	Acrididae	*Acrotylus insubricus* (Scop.)	12	32	18	14	10	–	–
		Aiolopus strepenes (Latr.)	25	25	16	10	9	–	–
		Anacridium aegyptium L.	5	11	7	5	3	–	–
		Euprepocnemis plorans (Charp.)	4	42	16	11	8	–	–
		Heteracris littoralis (Ramb.)	7	32	19	9	–	–	–
	Gryllidae	*Grylhus domesticus* F.	–	–	–	43	–	–	–
		Liogryllus bimaculatus F.	–	–	–	17	–	–	–
	Tettigonidae	*Conocephalus conocephalus* L.	15	55	33	–	11	–	–
Thysanoptera	Thripidae	*Florithrips traegardhi* Trybom	742	121	–	25	96	–	–
		II. Predators:							
Coleoptera	Anthicidae	*Anthicus* sp.	86	41	–	–	–	67	–
	Carabidae	*Bembidion* spp.	201	161	–	159	95	–	–
		Tachys sp.	24	23	–	18	14	–	–
	Coccinellidae	*Chilomenes vicina isis* Crotch	15	–	–	–	11	–	–
		Chilomenes vicina nilotica Muls.	17	–	–	–	9	–	–
		Coccinella undecimpunctata L.	18	11	–	–	8	–	–
		Rhizobius litura F.	34	41	–	–	18	–	–
		Scymnus interruptus Goeze.	57	66	–	23	24	–	–
	Dytiscidae	*Bidessus* sp.	–	–	–	–	–	–	35
		Bidessus major Sharp	–	–	–	–	–	–	32
		Canthydrus notula Erickson	–	–	–	–	–	–	18
		Cybister sp.	–	–	–	54	–	65	17
		Cybister tripancatus (Olivier)	–	–	–	16	–	54	14
		Eretes sticticus L.	–	–	–	–	–	–	48
		Herophydrus guineensis Aube	–	–	–	–	–	–	44
		Hyrovatus spp.	–	–	–	–	–	–	29
	Hydrophilidae	*Enochrus* sp.	–	–	–	–	–	–	48
		Enochrus tetraspilus Reg.	–	–	–	–	–	–	26
		Hydrous sp.	–	–	–	–	–	–	44
		Spercheus cerisyi Guerin	–	–	–	–	–	–	37
		Sternolophus solieri Solieri	–	–	–	–	–	–	47
	Staphylinidae	*Paederus alfierii* Koch.	301	351	–	103	34	351	–
		Philonthus spp.	271	311	–	105	21	241	–
Dermaptera	Labiduridae	*Labidura riparia* Pall.	7	11	–	14	–	–	–

Table (1): Cont.

Order	Family	Insect species	Number of insects						
			A	B	C	D	E	F	G
	Spongiphoridae	*Labia minor* L.	6	9	–	10	–	–	–
Dictyoptera	Mantidae	*Mantis religiosa* L.	4	5	6	–	3	–	–
Diptera	Ephydridae	*Ephydra* sp.	–	–	–	–	–	–	41
	Stratiomyidae	*Stratiomysa* sp.	–	–	–	–	–	–	15
	Tipulidae	*Tipula* sp.	–	–	–	–	–	–	15
	Syrphidae	*Metasyrphus corollae* F.	29	61	24	–	14	–	–
		Sharophoria sp.	–	–	16	63	–	–	–
Hemiptera	Anthocoridae	*Orius* sp.	255	14	11	210	–	–	–
		Xylocoris sp.	18	–	–	–	–	–	–
	Belostomatidae	*Lethocerus niloticus* Stal.	–	–	–	36	–	341	16
		Limnogomus fieberi Mayr	–	–	–	–	–	–	12
		Blostoma niloticum Stal.	–	–	–	–	–	25	37
		Sphaerodema urinator Duf.	–	–	–	–	–	–	34
	Corixidae	*Micronecta plicata* Costa	–	–	–	–	–	–	25
		Sigara sp.	–	–	–	–	–	–	74
	Gerridae	*Lemnogomus aegypticus* Puton	–	–	–	–	–	–	25
	Mesoveliidae	*Mesovelia vittigera* Horv.	12	–	–	–	–	–	–
	Veliidae	*Microvelia* sp.	11	–	–	–	–	–	–
	Notonectidae	*Anisops* sp.	–	–	–	–	–	–	13
	Nepidae	*Ranatra vicina* Sign.	–	–	–	–	–	–	47
Hymenoptera	Sphgidae	*Ammophila* sp.	15	–	–	7	3	–	–
	Eumenidae	*Eumens maxillosus* L.	–	–	–	5	–	–	–
		Cataglyphis bicder L.	–	–	–	8	–	–	–
	Formicidae	*Monomorium* spp.	–	–	–	–	–	47	–
		Selenopsis latro For.	68	45	–	21	18	–	–
	Vespidae	*Polistes gallica* L.	14	–	–	10	1	–	–
		Polistes fedorata Kohl.		–	–	12	5	–	–
		Vespa orientalis F.	10	–	–	4	4	–	–
Neuroptera	Chrysopidae	*Chrysoperla carnea* Steph.	33	35	11	21	9	42	–
Odonata	Aeschindae	*Hemianax ephippiger* Burm.	–	–	18	–	36	63	24
	Agrionidae	*Ischmura senegalensis* Ramb.	97	84	54	58	55	97	87
	Libellulidae	*Crocothemis erythraea* Brulle	–	–	–	–	–	–	40
Orthoptera	Tettigoniidae	*Conocephalus conocephalus* L.	15	55	33	–	11	45	–
Thsanoptera	Aeolothripidae	*Aeolothrips* sp.	246	–	–	241	43	–	–
		III. Parasitoids:							
Diptera	Tachinidae	UID	18	–	–	–	10	–	–
Hymenoptera	Braconidae	*Apanteles* sp.	105	65	88	–	44	–	–
		Bracon sp.	214	47	64	–	18	–	–
		Cotesia sp.	88	68	79	–	22	–	–
		Habrobracon sp.	65	–	18	–	17	–	–
		Homoporus sp.	32	–	–	–	11	–	–
		Microbracon sp.	47	–	–	–	13	–	–
		Opius hedquisti Fisher	324	241	–	–	108	–	–
	Ceraphronidae	UID	54	–	–	–	–	–	–
	Dryinidae	*Echthrodelphax migratorious* Benoit	48	–	12	–	–	–	–
	Elasmidae	*Elasmus* sp.	89	–	53	–	33	–	–
	Encyrtidae	UID	87	–	–	–	17	–	–
	Eulophidae	*Hemiptarsenus* sp.	28	–	–	–	15	–	–
		Tetrastichus sp.	42	–	44	–	11	–	–
	Figatidae	UID 2	87	–	–	–	16	–	–
	Ichneumonidae	*Temelucha* sp.	46	–	–	–	28	–	–
	Mymaridae	*Anagrus* spp.	314	95	101	214	141	–	–
		Anaphes sp.	94	–	–	–	19	–	–

Table (1): Cont.

Order	Family	Insect species	Number of insects						
			A	B	C	D	E	F	G
		Camptoptera sp.	52	–	–	41	16	–	–
		Gonatocerus spp.	34	25	52	54	12	–	–
	Platygasteridae	*Platygaster* sp.	25	–	17	–	11	–	–
	Pteromalidae	UID 2	78	–	96	–	66	–	–
	Scelionidae	*Platyscelio* sp.	41	–	25	–	–	–	–
		Trissolcus sp.	25	–	17	–	–	–	–
		Telenomus sp.	14	–	14	–	25	–	–
	Trichogramatid	*Oligosita* spp.	85	57	80	104	66	–	–
		Paracentrobia sp.	43	–	16	9	–	–	–
		Trichogramma evanscens West.	141	–	111	–	94	–	–
Average no. of individuals			1231	1826	2133	2789	2548	3373	1226

A = Vacuum machine B = Sweep net C = Photoelector D = Pit-fall trap E = Malaise trap F = Light trap G = Fine screen trap UID = Unidentified species

2. Evaluating the trap types used in the survey:

In the present work, seven techniques were used for collecting insects from rice fields. It is worth mentioning that according to the available literature, and as far as the author is aware, this is the first survey carried out in Egypt by seven methods at a time. The authors is quite sure that it is the first use of photoelector and perhaps malaise trap, especially in rice fields.

Survey which carried out by all the considered methods revealed as much as 138 insect species. Concerning the find of the traps used, it was found that the highest number of species (84 species) were collected by the vacuum machine followed by the malaise trap 74. Then, 53, 52, 43, 36 and 33 species were collected by sweeping net, photoelector, pit-fall trap, light trap and water fine screen trap, respectively (Table 2). The average highest number of individuals (11231) were captured by the vacuum machine, whereas the lowest number (1226) was recorded for water fine screen trap.

Shannon Weaner diversity index (S.W.) for insect species collected by seven methods:

Results calculated in Table (2) show the S.W. diversity index for insect species as an indicator for diversity of insect species collected by the seven considered methods. Arranging S.W. values in a descending order revealed that the highest indices were recorded for photoelector (3.67) and vacuum machine (3.66) followed by malaise trap (3.62), light trap (3.15), while index calculated for swnet was the lowest (2.98). Results indicated clearly that the number of recorded species goes in comparatively level with the S.W. diversity index. Accordingly, it could be stated that

the relative abundance of species in each method had an effect on the diversity index values, and the recorded values supports such suggestion.

Table (2): Shannon-Weaner diversity index for yearly average of insect species by seven methods during two seasons (2003 and 2004)

Collected methods	Total	No. of species	S.W.I.	Ranked
Sweep net	6826	53	2.98	7
Photoelector	2133	52	3.67	1
Pit-fall trap	2789	43	3.09	5
Vacuum machine	11231	83	3.66	2
Malaise trap	2548	74	3.62	3
Light trap	3373	36	3.15	4
Fine screen trap	1226	33	3.00	6

It is noticeable that nearly all orders of insects (13) were collected by all traps, however fine screen trap captured as little as insects of five orders (Diptera, Ephemeroptera, Coleoptera, Hemiptera and Odonata) (Table 3). On the other hand, three orders (Coleoptera, Dermaptera and Thysanoptera) and two others (Dicttyoptera and Homoptera) were not collected also by photoelector and pit-fall trap, respectively.

Data demonstrating the efficiency of the traps in collecting different orders of insects revealed that, sweeping net was most efficient in collecting Coleoptera (11 species) followed by Hymenoptera (9 species) which represent 20.8% and 17.00%, respectively. Photoelector was most efficient for collecting Hymenoptera (19 species), representing (36.5%) and Homoptera (8 species-15.4%). Pit-fall rap in collecting Hymenoptera (13-30.2%) followed by both Orthoptera and Coleoptera (7-16.2%) Vacuum machine, Hymenoptera (34-40.5%) followed by Coleoptera (13-15.4%). Malaise trap, Hymenoptera (30-40.5%) followed by Coleoptera (10-13.5%). Light trap, Coleoptera (10-27.7%) followed by Lepidoptera (9-25.0%). Fine screen trap, was especially efficient for collecting aquatic insects; Coleoptera (13-39.3%), followed by Hemiptera (9-27.3%) (Table 3).

Table (3): Numbers of species of different orders collected by various traps from Kafr El-Sheikh region during 2003 and 2004 seasons.

Insect orders	Sweep net	Photo-elector	Pit-fall trap	Vacuum machine	Malaise trap	Light trap	Fine screen trap	No. of total collected species
Coleoptera	11(20.8)	-	7(16.2)	13(15.4)	10(13.5)	10(27.7)	13(39.3)	31
Dermaptera	2(3.8)	-	2(4.7)	2(2.4)	-	-	-	2
Dictyoptera	1(1.9)	1(1.9)	-	1(1.2)	1(1.4)	-	-	1
Diptera	4(7.5)	5(9.6)	5(11.6)	7(8.3)	7(9.5)	-	7(21.2)	12
Ephemeroptera	1(1.9)	1(1.9)	1(2.3)	1(1.2)	1(1.4)	-	1 (3.3)	2
Hemiptera	4(7.5)	3(5.7)	2(4.7)	8(9.5)	1(1.4)	3(8.3)	9(27.3)	16
Homoptera	9(17.00)	8(15.4)	-	8(9.5)	8(10.8)	8(22.2)	-	9
Hymenoptera	9(17.00)	19(36.5)	13(30.2)	34(40.5)	30(40.5)	2(5.5)	-	39
Lepidoptera	3(5.7)	6(11.5)	2(4.7)	-	6(8.1)	9(25.0)	-	12
Neuroptera	1(1.9)	1(1.9)	1(2.3)	1(1.2)	1(1.4)	1(2.8)	-	1
Odonata	1(1.9)	2(3.8)	1(2.3)	1(1.2)	2(2.7)	2(5.3)	3(9.1)	3
Orthoptera	6(11.3)	6(11.5)	7(16.2)	6(7.1)	5(6.8)	1(2.8)	-	8
Thysanoptera	1(1.9)	-	2(4.7)	2(2.4)	2(2.7)	-	-	2
Total no. of species	53	52	43	84	74	36	33	138
Total no. of orders	13	10	11	12	12	8	5	

Concerning insect groups collected by various traps, it was found that the numbers of the first group (insect pests) were nearly the same, ranging between 27 and 30 species, with the exception of pit-fall trap and fine screen trap which captured only 16 and 5 species, respectively (Table 4).

Vacuum machine was most efficient in collecting predators (26 species), representing 30.6% of all species collected by this trap, followed by pit-fall trap (22), representing 51.1%, malaise trap (21) representing 28.0% and sweeping net (17), representing 32.1%.

As far as parasitoids are concerned, it was found that the highest number of parasitoids (30 and 25 species) were collected by vacuum machine followed by malaise trap (representing 35.3% and 33.3%, respectively). In case of photoelector just 18 species of parasitoid were collected, however of assessed as number of individuals relative to all collected individuals by one and the same traps (41.8), this calculated percentage for exceeded those collected by any of the other traps. Moreover, specimens were in highly qualified state for mounting and taxonomic proposes among all traps.

Table (4): Yearly average numbers and percentages of insect pests, predators and parasitoids of species and individuals collected by various traps from Kafr El-Sheikh region during 2003 and 2004 seasons.

Insect group	Sweeping net	Photoelector	Pit-fall trap	Vacuum	Malaise trap	Light trap	Screen trap
Pests							
Species	30 (56.6)	27 (50.9)	16 (37.3)	29 (34.1)	29 (38.6)	24 (66.6)	5 (15.15)
individuals	4904 (71.8)	1073 (50.3)	1169 (41.9)	7019 (62.6)	1299(50.4)	1935 (57.3)	282(23.00)
Predators							
Species	17 (32.1)	8 (15.1)	22 (51.1)	26 (30.6)	21 (28.0)	12 (33.3)	28 (84.84)
individuals	1324 (19.4)	173 (8.1)	1198 (40.3)	1892 (16.8)	436 (17.8)	1438 (42.6)	944(77.00)
Parasitoids							
species	7 (13.2)	18 (34.0)	5 (11.4)	30 (35.3)	25 (33.3)	--	--
individuals	598 (8.8)	887 (41.5)	422 (15.1)	2320 (20.6)	813 (31.9)	--	--
Total of individuals	6826 (100.0)	2133 (100.0)	2789 (100.0)	11231(100.0)	2548(100.0)	3373 (100.0)	1226(100.0)

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الملخص العربى

تقيم كفاءة سبعة أنواع من المصائد المستخدمة فى حصر الآفات الحشرية المتواجدة فى حقول الأرز وأعدائها الحيوية

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يعتبر الأرز من أهم محاصيل الحبوب الرئيسية فى مصر والعالم ، ويتعرض المحصول للإصابة بالعديد من الآفات أثناء مراحل نموه المختلفة. وتمثل الحشرات أحد أسباب الخسائر التى تحدث لمحصول الأرز.

ومن هنا كانت الدراسات المختلفة لهذه المجاميع الحشرية وأعدائها الحيوية ضرورة ملحة للحد من خطورتها وتحقيق إنتاجية عالية ولذلك تم إجراء هذه الدراسة فى مزرعة مركز البحوث والتدريب فى الأرز ومعمل الحشرات الاقتصادية بكلية الزراعة بكفر الشيخ -جامعة طنطا خلال موسمى ٢٠٠٣-٢٠٠٤م.

بهدف حصر الآفات الحشرية المتواجدة فى حقول الأرز وأعدائها الحيوية باستخدام سبع انواع من المصايد مع تقيم فاعلية هذه المصائد كوسيلة من وسائل الحصر للمجاميع الحشرية وأعدائها الحيوية للحصول على مزيد من المعلومات التى تساعد فى تحديد ظهور الأنواع المختلفة من الحشرات وتقدير الكثافة النسبية لها مما يفيد فى وضع برنامج مكافحة متكاملة لحشرات الأرز.

وفيما يلى ملخص للنتائج المتحصل عليها :

١-حصر الآفات الحشرية المتواجدة فى حقول الأرز وأعدائها الحيوية:

تم حصر الآفات الحشرية المتواجدة فى حقول الأرز و أعدائها الحيوية باستخدام سبع طرق مختلفة هى: شبكة جمع الحشرات – Photoelector – المصائد المائية (مصائد الحفرة) – آلة الشفط (Vacuum machine) – مصيدة الماليز – المصيدة الضوئية – مصيدة المصفاة المائية , وفيما يلى عرض لهذه الطرق والحشرات التى جمعتها:

*** شبكة جمع الحشرات:The sweep net**

بلغ عدد الحشرات التى تم جمعها بها ٥٣ نوعا حشريا ما بين آفات وأعداء حيوية تنتمى إلى ٣٢ عائلة و١٣ رتبة.

*** Photoelector:**

من مميزات هذه الطريقة المحافظة على الحشرات من اى تلف حيث تم حصر ٥٢ نوع تنتمى إلى ٣٠ عائلة و١٠ رتب وكانت أكثر الرتب تواجدا غشائية الأجنحة.

* المصائد المائية : Pit-fall trap

تستخدم لقنص الأنواع التى تتواجد بالقرب من سطح التربة ويتم اصطياد الحشرات عن طريق ما يسقط فيها بالصدفة وبلغ عدد الحشرات المصادة بها ٤٣ نوعا حشريا تتبع ٢٩ عائلة و١١ رتبة .

* شبكة الشفط : Vacuum machine

تصلح هذه الشبكة لجمع أنواع الحشرات الصغيرة الحجم والكبيرة على السواء نتيجة قوة الشفط مثل نطاطات الأوراق والنباتات والطفيليات.وبلغ عدد الحشرات المجموعة ٨٤ نوعا حشريا تنتمى إلى ٤٧ عائلة و١٢ رتبة ، حيث كان عدد الآفات ٢٩ نوعا ، المفترسات ٢٦نوعا، أما الطفيليات فبلغ عددهم ٣٠ نوعا.

* مصيدة المالايز: Malaise trap

تعتمد هذه المصيدة على دخول الحشرات إليها بالصدفة. لذلك يفضل استعمالها للأنواع العالية النشاط مثل ذات الجناحين وغشائية الأجنحة.وكانت أعداد الحشرات ٧٤ نوعا إلى ٤٣ عائلة و١٢ رتبة.

* المصيدة الضوئية : Light trap

تستعمل هذه المصيدة فى تحديد ظهور أنواع الحشرات وتقدير الكثافة النسبية ، وتستخدم غالبا فى إصطياد الفراش والأفراد التى تطير ليلا أو فى ضوء ضعيف ، حيث تم جمع ٣٦ نوعا تنتمى إلى ١٧ عائلة و٨ رتب.

* مصيدة المصفاة المائية Water fine screen trap

وتستخدم هذه الطريقة بغرض جمع الحشرات المائية الموجودة فى حقول الأرز وأيضا فى قنوات الرى. بلغ عدد الحشرات التى تم جمعها بها ٣٣ نوعا حشريا تنتمى إلى ١٧ عائلة و ٥ رتب حشرية ، حيث بلغ عدد الآفات ٥ أنواع، أما المفترسات فبلغ عددهم ٢٨ نوعا حشريا.

وبناءا على ذلك فقد تم حصر ١٣٨ نوعا من الحشرات تنتمى إلى ٧٠ عائلة و ١٣ رتبة حشرية . وقد قسمت هذه الأنواع إلى المجاميع الآتية الآفات ، الأعداء الحيوية (مفترسات وطفيليات) ومن تقييم كفاءة هذه المصائد كوسيلة من وسائل الحصر للمجاميع الحشرية وأعدائها الحيوية وجد أن Vacuum machineجمعت اكبر عدد من الحشرات ٨٤ نوع تليها مصيدة المالايز ثم شبكة الجمع تليها Photoelector ثم pit-fall trap ثم المصيدة الضوئية وكان أقلها عدد fin screen trap٣٣ نوع.