

**SURVEY AND POPULATION STUDIES OF INSECTS  
ASSOCIATED WITH ORNAMENTAL PLANTS BY USING  
SWEEPING NETS AND PITFALL TRAPS AT RIYADH  
METROPOLIS, SAUDI ARABIA**

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**Abstract**

A survey along with some studies on the population densities and relative abundance of insects associated with ornamental plants were conducted using sweeping nets and pitfall traps in Riyadh metropolis, Saudi Arabia, for a full year from December, 2006 to November, 2007. A total number of 2411 individuals, included thirty three species belonging to thirty genera, fifteen families and five orders, i.e. Coleoptera, Homoptera, Hemiptera, Hymenoptera and Orthoptera, were collected by the two methods. The largest numbers were observed during May, June and April. Also the largest number of species was belonging to the order Coleoptera (16 species), followed by the hymenopterans (7 species). Other orders were represented by varying number of species. The coleopterans were found to be the most abundant and dominant, constituting the majority of the catch (961 specimens, representing 39.9% of the total catch), followed by hymenopteran individuals (939 specimens, constituting 38.9% of the total catch). Insects of other orders were less abundant and were represented by small numbers of individuals, with the hemipterans constituting the minority of catch (4 specimens of two species).

Fifteen species belonging to fourteen genera, ten families and five orders were obtained throughout the year by using sweeping nets. While nineteen species belonging seventeen genera, six families and three orders were collected by pitfall trap.

**Introduction**

Surveying and studying populations, fluctuations and relative abundance of economic insects in some local areas are of significant value in insect pest management programs and give guide for further faunal studies. Two of the most convenient methods of carrying out such studies is by pitfall traps and sweeping nets which can be used in green houses, homes, orchards, flowers and vegetable gardens and everywhere that insects become annoying.

As ornamental plants enrich our lives every day and improve our environment, many authors reported in details some serious insect pests associated with these

plants (Ellis *et al.*, 2005; Moore and Hanks, 2004; Held and Potter, 2004 and Triplehorn and Johnson, 2005).

In Saudi Arabia, Al Maqooshy (1996) surveyed the aphids of ornamental plant in Riyadh region, recording 18 species of aphids associated with 74 ornamental plant species. Also, Al Ahmad (1989) surveyed the scale insects in the same region and studied the population dynamics and natural enemies of the dominant species. Ayoub (1959) discussed the insect pests of Saudi Arabia together with recommendations for their control. Issa and Helal (2000), Ali and El Saedy (1999), Hammad *et al.* (1965), Gafaar (1995), Al- Rajwy (1998) and Al-Menshawy and Hejazy (2001) surveyed and discussed the insect pests of the ornamental plants in some Arabian regions. The present work provide a survey together with same studies on population of insects associated with ornamental plants in Riyadh metropolis; Saudi Arabia by the pitfall traps and sweeping nets.

### **Materials And Methods**

This study was conducted for surveying and studying the population of insects associated with ornamental plants in Riyadh metropolis throughout a whole year (December, 2006 – November, 2007). Nine locations under investigation, each contains five gardens were selected for this study. These were: Olaya (36500 m<sup>2</sup>), Western area (45100 m<sup>2</sup>), Malaz (51900 m<sup>2</sup>), Eastern area (60300 m<sup>2</sup>), Rotate A (70000 m<sup>2</sup>), Rotate B (66250 m<sup>2</sup>), Northern area (69053 m<sup>2</sup>), Southern area (74100 m<sup>2</sup>) and Shemasi area (44590 m<sup>2</sup>). Two collecting methods, in this study, sweeping nets and pitfall traps. In the first method were used the standard insect nets made in USA by BioQuip company were used. In the second method, pitfall trap, was used as a plastic bottle of water, 1.5 liters. Then dig a hole at a depth of 40 cm to put the trap where, buried in the trap where the hole trap at the level of the soil surface. Number of 10 pitfall traps at each site were calculated.

In the laboratory the insects removed carefully from the traps and sorted, identified, counted and recorded. Data calculations of their annual numbers and percentages of abundance, were provided.

Metrological data of average monthly temperature and average monthly humidity during the period of the study are as follows:

<b>Months</b>	<b>Temperature (Avg.)</b>	<b>Humidity(Avg.)</b>
December 2006	16.53	59.54 %
January 2007	11.22	42.47 %
February2007	12.00	48.84 %
March 2007	19.52	26.78 %
April 2007	31.59	22.57 %
May 2007	34.85	26.05 %
June 2007	34.43	14.08 %
July 2007	37.03	15.43 %
August 2007	36.12	12.52 %
September 2007	33.49	16.06 %
October 2007	25.46	22.16 %
November 2007	23.90	33.09 %

All taxa (Families, Genera and species) were arranged alphabetically according to their taxonomic position. Insects were identified based on identification keys, materials kept in the insect collection of the Plant Protection Department, College of Food and Agriculture Science, King Saud University and the collection of Regional Centre for Research on Agriculture and Water Ministry of Agriculture, KSA, and by special taxonomists in UK, USA and Egypt.

### **Results and Discussion**

Survey of the insects associated with the ornamental plants of Riyadh city public gardens during a full year (December 2006- November 2007) using sweeping nets and pitfall traps revealed the presence of thirty three insect species within thirty genera of fifteen families in five orders. These species are alphabetically arranged according to orders, families and species and they are listed with the locality in table (1), sweeping net with months in table (2) and pitfall traps with months in table (3) together with their numbers.

From these tables, the order Coleoptera formed the largest number of species (sixteen species within five families), order Hymenoptera (seven species of four families), order Homoptera (five species of two families), Orthoptera (three species of three families), whereas order Hemiptera represented by two species.

From table (1), the highest number of species was trapped from Southern and Shemasi locations (16 species for each), followed by Eastern, Rotate road A. and Rotate road B locations (each 13 species), then Olaya location (12 species). The lowest number of species was trapped from Western, Malaz and Northern locations (9 species).

It is to be noted that only three species were trapped from eight locations, these were *Gonocephalum soricinum* (Coleoptera: Tenebrionidae), *Apis florae* (Hymenoptera: Apidae) and *Polistes watti* (Hymenoptera: Vespidae); three species from seven locations, these are: *Mesostena puncticollis* and *Gonocephalum orientalis* (Coleoptera: Tenebrionidae) and *Camponotus sp.* (Hymenoptera: Formicidae); one species from six locations, *Aiolopus sp.* (Orthoptera: Acrididae); two species from five locations, namely: *Gonocephalum soricinum* (Coleoptera: Tenebrionidae) and *Cataglyphis harteni* (Hymenoptera: Formicidae) and two species were trapped from four different locations, which were *Adesmia cancellata* and *Opatroides punctulatus* (Coleoptera: Tenebrionidae). On the other hand, two and three locations recorded 8 species for each, while five different species were trapped from two different locations.

Also, the data indicates that the highest number of insects were trapped from Shemasi location (661 specimens), followed by Southern location (450 specimens), and Eastern location (406 specimens), and then Rotate road A location (220 specimens), Considerable numbers were trapped from Malaz, Northern and Rotate road B locations (213, 156 and 140 specimens, respectively), the lowest numbers were obtained from Olaya and Western locations (93 and 72 insects, respectively).

From table (2), the total number of trapped insects by sweeping net 756 individuals, the highest numbers of insects were obtained during June, May and April (301, 131 and 107 individuals, respectively), while the relatively lowest numbers during July, August, November and September (10, 21, 23 and 25 individuals, respectively). Relatively small numbers were collected during, February, March, October and December (36, 35, 32, and 28 individuals,

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respectively) and the very few individuals were trapped during January (7 individuals only). The largest number of individuals attributed to order Homoptera (483 individuals, representing 63.89% of the total annual catch), these insects were highly active and most abundant during the period from April to June with two major peaks of abundance during April and June (78 and 260 insects, respectively), followed by insects of order Hymenoptera (242 individuals, constituting 32.01% of the total catch), nearly the majority of these insects were trapped during March to June with two major peaks of abundance during May and June (55 and 34 insects, respectively). Orders: Orthoptera, Coleoptera, and Hemiptera were represented by smaller number of individuals (21, 6 and 4 individuals, constituting 2.78%, 0.79% and 0.52% of the total catch, respectively).

The cicadellid species, *Nephotettix cincticeps*, was the most abundant and dominant of all species, with a total annual number of 146 individuals, constituting 19.31% of the total annual catch, individuals of this species were largely active and most frequent during April and May (32 and 71 individuals, respectively). *Delphacodes* sp. came next in abundance with nearly equal numbers (136 individuals), active and most frequent during months April and June (38 and 89 individuals, respectively).

Table (3), show the species collected by pitfall traps, the total number of trapped insects was 1655 individuals, the highest numbers of insects were obtained during May, June and January (524, 178 and 172 individuals, respectively), while the relatively lowest numbers during November, February, September and March (58, 70, 72 and 80 individuals, respectively). Relatively small numbers were trapped during April, December, August and October (138, 132, 98 and 94 individuals, respectively) and the very few individuals during July (39 individuals only). The largest number of individuals was belonged to order Coleoptera (955 individuals, representing 57.7% of the total annual catch), these insects were highly active and most abundant during the period from April to October with two major peaks of abundance during May and June (199 and 169 insects, respectively), followed by insects of order Hymenoptera (697 individuals, constituting 42.11% of the total catch), nearly the majority of these insects were trapped during December to May with two major peaks of abundance during January and May (161 and 325 insects, respectively). Order Orthoptera was represented by smaller number of individuals (3 individuals, constituting 0.18% of the total catch). The formicid species, *Camponotus maculatus*, was the most abundant and dominant of all species, with a





Table (1): Cont.

<i>Pachymerus gonager</i>	1	0	3	0	0	0	0	0	0	4	0.17
<b>Coleoptera, Coccinellidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Coccinella undecimpunctata</i>	1	0	0	0	0	0	0	0	0	1	0.04
<b>Homoptera, Cicadellidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Empoasca lybica</i>	0	0	0	0	3	76	0	20	0	99	4.11
<i>Balclutha hortensis</i>	15	0	0	0	0	0	75	4	0	94	3.9
<i>Nephotettix cincticeps</i>	31	0	115	0	0	0	0	0	0	146	6.06
<b>Homoptera, Delphacidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Delphacodes sp.</i>	0	0	0	75	0	0	38	0	23	136	5.64
<i>Toya propinqua</i>	0	0	0	0	0	0	0	8	0	8	0.33
<b>Hemiptera, Pentatomidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Nezara viridula</i>	0	0	2	0	0	0	0	0	0	2	0.08
<i>Eysarcoris inconspicuus</i>	0	0	2	0	0	0	0	0	0	2	0.08
<b>Hymenoptera, Apidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Apis mellifica</i>	7	0	0	0	0	0	0	0	3	10	0.41
<i>Apis florea</i>	6	14	23	5	4	11	2	0	26	91	3.77
<b>Hymenoptera, Scoliidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Dielis collaris</i>	10	0	0	0	0	0	0	0	0	10	0.41
<b>Hymenoptera, Vespidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Polistes wattii</i>	0	25	14	7	24	3	25	12	21	131	5.43
<b>Hymenoptera, Formicidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Camponotus maculatus</i>	0	12	21	0	0	0	0	0	7	40	1.66
<i>Camponotus sp.</i>	2	5	0	42	11	0	0	0	95	155	6.43
<i>Cataglyphis harteni</i>	0	0	32	15 2	0	3	7	0	308	502	20.82
<b>Orthoptera, Gryllidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Gryllus domesticus</i>	0	0	0	0	0	1	0	0	0	1	0.04
<b>Orthoptera, Gryllotalpidae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Gryllotalpa gryllotalpa</i>	0	0	0	0	0	0	1	1	0	2	0.08
<b>Orthoptera, Acrididae</b>	-	-	-	-	-	-	-	-	-	-	-
<i>Aiolopus sp.</i>	1	0	0	7	0	1	1	10	1	21	0.87
<b>Total</b>	93	72	213	406	220	140	156	450	661	2411	-

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**Table (2): Numbers of species caught per months by sweeping net**

Order, Family & species	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul.	Aug.	Sep.	Oct.	Nov.	Total	%
<b>Coleoptera, Carabidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Bembidion sp.</i>	0	0	0	0	0	0	0	1	0	0	0	0	1	0.13
<b>Coleoptera, Bruchidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pachymerus gonager</i>	0	0	0	0	0	1	3	0	0	0	0	0	4	0.53
<b>Coleoptera, Coccinellidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Coccinella undecimpunctata</i>	0	0	0	0	0	0	1	0	0	0	0	0	1	0.13
<b>Hemiptera, Cicadellidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Empoasca lybica</i>	3	0	0	0	0	0	96	0	0	0	0	0	99	13.1
<i>Balclutha hortensis</i>	0	0	4	0	0	0	67	0	15	0	0	8	94	12.43
<i>Nephotettix cincticeps</i>	3	7	11	13	32	71	8	0	1	0	0	0	146	19.31
<b>Hemiptera, Delphacidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Delphacodes sp.</i>	0	0	0	0	38	0	89	0	0	9	0	0	136	17.99
<i>Toya propinqua</i>	0	0	0	0	8	0	0	0	0	0	0	0	8	1.06
<b>Hemiptera, Pentatomidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Nezara viridula</i>	0	0	0	0	0	0	2	0	0	0	0	0	2	0.26
<i>Eysarcoris inconspicuus</i>	0	0	0	0	0	2	0	0	0	0	0	0	2	0.26
<b>Hymenoptera, Apidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Apis mellifica</i>	0	0	0	0	0	3	4	0	0	3	0	0	10	1.32
<i>Apis florea</i>	0	0	21	17	8	27	12	0	0	0	6	0	91	12.04
<b>Hymenoptera, Scoliididae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Delis collaris</i>	0	0	0	0	0	0	0	0	0	0	10	0	10	1.32
<b>Hymenoptera, Vespidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Polistes wattii</i>	15	0	0	5	21	25	18	9	5	7	12	14	131	17.33
<b>Orthoptera, Acrididae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Aiolopus sp.</i>	7	0	0	0	0	2	1	0	0	6	4	1	21	2.78
<b>Total</b>	28	7	36	35	107	131	301	10	21	25	32	23	756	-

**Table (3): Numbers of species caught per months by pitfall traps**

Order, Family & species	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul.	Aug.	Sep.	Oct.	Nov.	Total	%
<b>Coleoptera, Tenebrionidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Mesostena puncticollis</i>	2	1	23	47	91	30	48	30	21	14	43	46	396	23.9
<i>Thriptera crinita</i>	12	1	2	0	3	1	23	0	27	31	35	2	137	8.28
<i>Gonocephalum orientalis</i>	0	5	3	0	1	12	19	2	13	9	5	0	69	4.17
<i>Gonocephalum soricinum</i>	1	2	0	0	0	35	6	1	7	4	4	0	60	3.63
<i>Adesmia cancellata</i>	0	0	5	4	8	0	25	0	0	0	0	1	43	2.6
<i>Opatroides punctulatus</i>	0	0	2	0	5	73	5	0	20	12	4	0	121	7.31
<i>Trachyderma philistina</i>	0	0	0	0	4	0	25	0	3	2	0	7	41	2.48
<i>Pimelia arabica</i>	0	0	0	0	1	1	1	0	0	0	0	0	3	0.18
<i>Oxycara sp.</i>	0	0	0	0	0	37	3	0	5	0	0	0	45	2.72
<i>Alphitobius sp.</i>	0	0	0	0	0	5	0	0	0	0	0	0	5	0.30
<i>Tribolium confusum</i>	0	0	1	1	3	2	14	2	1	0	0	0	24	1.45
<b>Coleoptera, Scarabaeidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pentodon algerinum</i>	1	2	0	0	0	1	0	0	0	0	3	0	7	0.42
<i>Hybosorus illigeri</i>	0	0	0	0	0	2	0	0	0	0	0	0	2	0.12
<b>Coleoptera, Carabidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Bembidion sp.</i>	0	0	0	2	0	0	0	0	0	0	0	0	2	0.12
<b>Hymenoptera, Formicidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Camponotus maculatus</i>	33	7	0	0	0	0	0	0	0	0	0	0	40	2.42
<i>Camponotus sp.</i>	16	26	34	18	22	25	9	4	1	0	0	0	155	9.37
<i>Cataglyphus harteni</i>	67	128	0	7	0	300	0	0	0	0	0	0	502	30.33
<b>Orthoptera, Gryllidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Gryllus domesticus</i>	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06
<b>Orthoptera, Gryllotalpidae</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Gryllotalpa gryllotalpa</i>	0	0	0	0	0	0	0	0	0	0	0	2	2	0.12
<b>Total</b>	132	172	70	80	138	524	178	39	98	72	94	58	1655	-

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## الملخص العربي

حصر ودراسة التعداد الحشري للحشرات المصاحبة لنباتات الزينة باستخدام المصائد الهوائية والأرضية بمنطقة الرياض - المملكة العربية السعودية

على عبدالله الغرباوي

قسم علم الحيوان- كلية العلوم- جامعة الأزهر- القاهرة- مصر.

تم حصر ودراسة الكثافة العددية والوفرة النسبية للحشرات باستخدام المصائد الهوائية والأرضية في بعض حدائق مدينة الرياض لمدة عام كامل وذلك خلال الفترة من بداية شهر ديسمبر 2006 وحتى نهاية شهر نوفمبر 2007. أسفر الحصر عن وجود 33 نوعاً تحت 30 جنس تنتمي إلى 15 فصيلة تتبع خمس رتب حشرية. وكان أكثرها وفرة وانتشرا حشرات رتبة غمديه الأجنحة واحتلت أفراد النمل *Cataglyphus harteni* أعلى كثافة عددية في مجموع الحشرات حيث بلغت نسبتها 20.82 % من المجموع الكلي للحشرات (العدد الكلي 2411 حشرة).

وقد لوحظ تجميع العدد الأكبر للحشرات في الفترة من ديسمبر إلى يونيو ووصلت إلى قمة نشاطها ووفرتها خلال شهر مايو وكانت الحشرات أقل وجوداً خلال أشهر يوليو، سبتمبر ونوفمبر

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