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Survey and Enumeration of Pests on Pomegranate Tree with Reference to its Parasite in Al-Taif City

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Abstract: In Al-Taif city pomegranate tree attack by various pests including twelve piercing sucking, two boring and one chewing insects. The highest infestation by aphids and thrips were recorded on the leaf more than the fruits. There was no significant variation between total mean of total aphids infestation in all investigated area during fruiting sea sons 2008, and 2009. While total infestation of Thrips were recorded highly significant variation Al-Shafa during 2008; and moderate significant variation (355.4/50 leaves and fruits/tree). At middle Al-Taif during 2009. There are a positive relationship between the population density of parasite (syrphid fty) and its prey (aphids).

Key word: pomegranate pests, aphid, thrips, syrphid fly.

INTRODUCTION

Pomegranate tree is the famous tree in Al-Taif city, because it has an economic important and consider one of the most natural resources in this area rather than of others in kingdom of Saudi Arabia. The pomegranate tree is mentioned in a holy Quran for its beneficial to human health. Recently, the products of pomegranate tree (including, peels, juice, leaves, seeds, flower.. etc.) have medicinally and industry importance. (Negi *et al*., 2003; Kulkarni *et al*., 2004; Malik *et al*., 2005; Neurath *et al*., 2005; Suner *et al*., 2005). Climatic factors in Al-Taif city is suitable for cultivation pomegranate tree, so there are a large area specialized for its cultivation. Pomegranate tree attack by various pests which decreased quality and quantity of its products (Morton, 1987). There is no researches was carried on the pomegranate tree in Al-Taif city so this study aims to survey and estimate population density of insects which attack it.

MATERIALS AND METHODS

The experiment was carried out at four direction (North–Al-Rodaf–Al-Shafa–and middle) for two Successive fruiting seasons (2008–2009) in Al-Taif city.

To survey insect attack pomegranate tree was followed a visual or inspection methods, Mohamad and Al-seidae (2003). To enumerate the most common insects which attack pomegranate tree collected randomly samples from (leaves, flowers, stem branches and fruits); then put them in plastic sacks and investigate under laboratory conditions. The investigation was carried out every twice weeks during fruiting seasons of pomegranate tree from first May to last August.

RESULTS AND DISCUSSION

Survey and Diverse Distribution of Insect Species Attack Pomegranate Tree:

Results of inspections of different parts of pomegranate tree in Tables (1 and 2) indicated that there are fifteen insect species were recorded At Al-Taif city during fruiting seasons (2008 – 2009). There are four insect species recorded on leave, including *A. punicae*, *E. granati*, *S. granati* and *E. americanus* At all investigated area; while others as *A. citri*, *A. aurantii* and *S. phillyreae* were recorded only at Al-Rodaf and Middle Al-Taif, during fruiting season 2008 – 2009. In case of Insect species attack pomegranate flowers, noticed that there are eight species; three of them as *A. punicae*, *E. americanus* and *V. livia* observed at all investigated area during fruiting seasons of 2008 and 2009.

On other hand, the pomgeranate fruits attack by nine insects species (Six piercing sucking, Two boring and one chewing insect species); Five of them as *A. punica*, *P. maitimus*, *E. americanus*, *V. livia* and *E.*

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ceratonina were noticed at all investigated area, during fruiting seasons (2008 – 2009). In addition to four insect species were recorded on stem; one of them as *E. granati* was observed at all investigated area.

Generally, the diverse distributions of fifteen species are recorded on various parts of pomegranate tree at four investigated area as described in Figs. (1 to 4). The highest numbers of insect species noticed at both middle Al-Taif and Al-Rodaf , being (83.3 and 66.7 %) species at fruits stem; (53.3 and 46.7 %) species at fruits; (53.3 and 66 %) at flower and 25 % at leaves during fruiting season 2008 – 2009 respectively. The lowest number of species noticed at both Al- Shafa and North Al–Taif which recorded approximately the same percentages of insect species at stem and flower (33.3 and 8.3 %). On the other hand, there are slight different in members of insect species which recorded at fruits (33.3 and 40 %) and flower (33.3 & 26.7) during fruiting seasons (2008 – 2009), respectively. from the obtained results can be concluded that there are fifteen insect species attack various parts of pomegranate tree and not equally distribution at four investigation area in Al–Taif city.

Estimation Population Density of Aphids and Thrips Attack Pomegranate Tree:

The Data in Table (3) showed that leaves and fruits of pomegranate tree attacked by aphid and thrips at all investigated area. The highest infestation by aphids and thrips were recorded on the leaf more than the fruites but it's almost not significant ($P > 0.05$) in all investigated area.

Average numbers of aphids on leaves ranged between 268.6 and 326 individuals/40 leaves/shoots, but on fruits the average numbers of aphids ranged between 77.7 and 138.9 individuals/10 fruits/tree, at Al-Rodf, Al-Shafa and Middle Al-Taif during fruiting seasons 2008 respectively. There was no significant ($P > 0.05$) variation between total mean of aphids infestation at all investigated area during fruiting seasons 2008.

Also , average number of thrips on leaves was recorded more than on fruits but there was no significant ($P > 0.05$) , except in case of average number of thrips which was recorded the highest significant ($P < 0.01$) at Al-Shafa Then the highest number of thrips was reached to 1076.6 40 leaves/4 shoots at Al- Shafa during fruiting seasons 2008. In addition to the total mean of infestation of thrips was recorded the highest significant ($P < 0.01$) at Al-Shafa, reaching to 1164.2/50 leaves and fruits/tree; comparing with total mean of infestation, reaching to 137.57 and 215.5/50 leaves and fruits/tree at middle Al-Taif and Al-Rodf, during fruiting seasons 2008 .

During 2009, it was noticed that the average numbers of aphids was moderate significant ($P < 0.05$) variation, being 632.3 individuats/40 leaves/4 shoots, comparing with average numbers of aphids on fruits, being 84.7 individuals/10. fruits/tree, At middle Al-Taif There was no significant ($P > 0.05$) between total mean of aphid infestation at investigated area during fruiting season 2009 .

On the other hand, average numbers of thrips was recorded the moderate significant ($P < 0.05$) variation, reaching 250.3/40 leaves/4 shoots/tree, comparing with average numbers of thrips reached to 5.1/10 fruits/tree at middle Al-Taif respectiety So, the total infestation of thrips was recorded moderate significant ($P < 0.05$), reaching 355.4/50 leaves and fruits/tree comparying with total infestation of thrips was 183/50 Leaves and fruits tree at Al-Rodf.

The obtained results agree with Avanda *et al.*, 2007 who recorded that there are 13 sucking pests feeding on Pomegranate tree in India, including seven belong to Homoptera, one to Hemiptera and three to Thysznoptera.

Avanda (2007) recorded that the seasonal revealed that aphid, Thrips and white fly infestation were maximum during (2^{nd} January, 2^{nd} February and 2^{nd} April), at Karnata State India.

Flucluation Population of Parasite (Syriphid Fly, Chrysoperla Carnea Stephres) with its Prey (Aphids) at Al-rodf During Fruiting Seasons (2008 – 2009):

It is obvious in Figs. (5 and 6) that the parasites (syriphid fly) appeared in end May with low numbers then a sharp increase in the population density was observes beginning of June (Summer), showing the peak of parasite, then parasites suffered a decline in population on leaves, except in case of fruits the population density of parasite was observed beginning in May and decline during 2008. On the other hand the weekly abundance of aphids on leaves was observed in end May with high numbers then a sharp decrease in the population density was noticed beginning of June, while weekly abundance of aphids on fruits was shown at the end of May with low numbers and starting to increase gradually density was noticed ending June, showing the peak of prey (aphids) decrease, during fruiting seasons 2008.

During 2009, It is clear that there are two peaks for both parasite (syriphid fly) and its prey (aphid) appeared on leaves beginning of June and July; while on fruits was observed one peak to parasite ending to May and prey at ending of June as described in Figs. (7 and 8).

All these previous observation may indicate a clear parasite – prey relationship. In general, there was a positive relation between the population density of prey and its parasite.

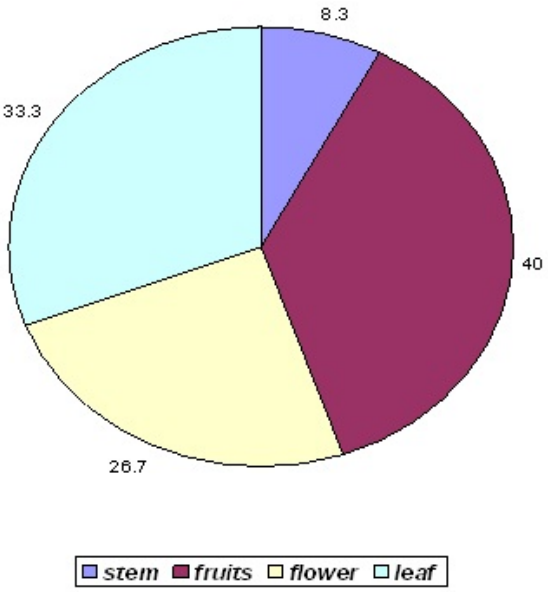

Fig. 1: Percentage of insect species infested pomegranate treeat Al-shafa during fruiting seasons 2008-2009.

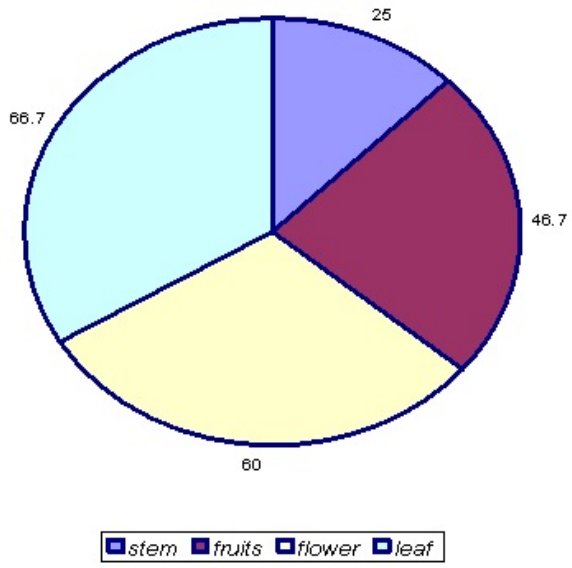

Fig. 2: Percentage of insect species infested pomegranate treeat Al-Rodf during fruiting seasons 2008-2009.

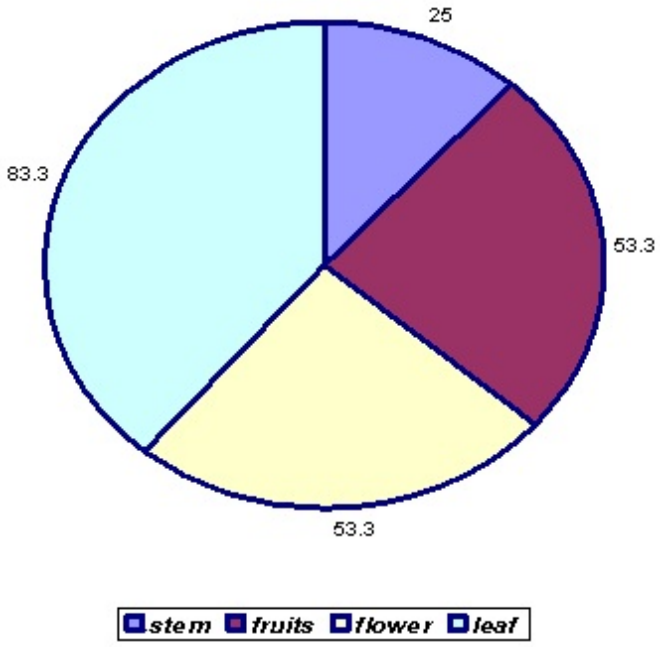

Fig. 3: Percentage of insect species infested pomegranate treeat Middle Al-Taif during fruiting seasons 2008-2009.

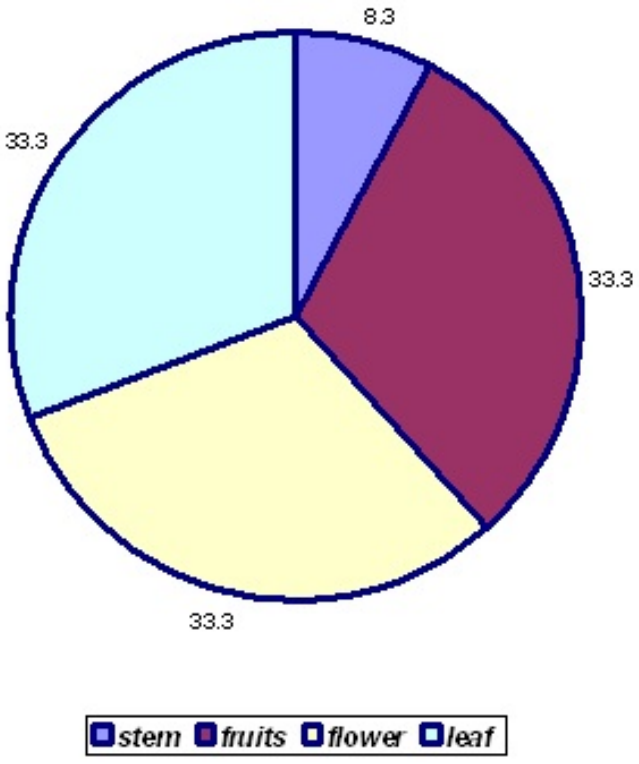

Fig. 4: Percentage of insect species infested pomegranate treeat Noth Al-Taif during fruiting seasons 2008-2009.

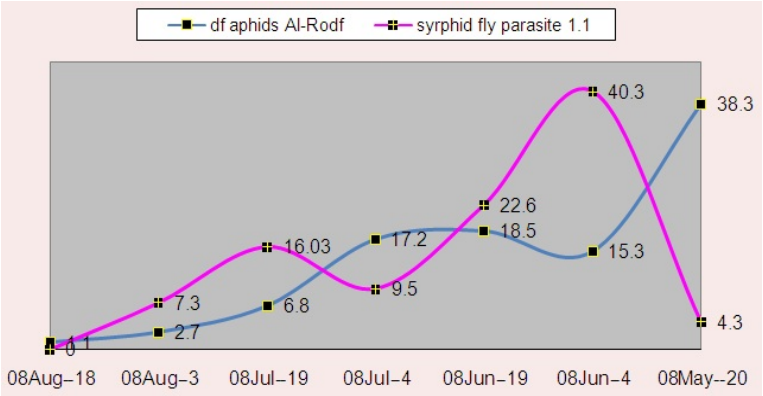

Fig. 5: Fluctuation of aphids and syrphid fly on leaves of pomegranate tree during fruiting seasons 2008 at Al=Rodf.

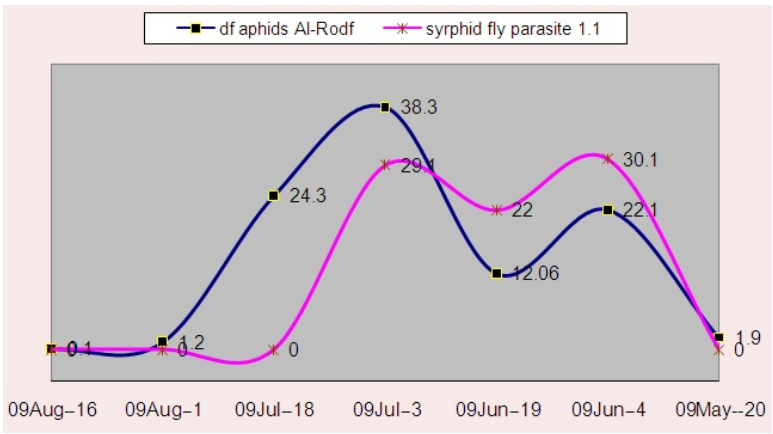

Fig. 6: Fluctuation of aphids and syrphid fly on leaves of pomegranate tree during fruiting seasons 2009 at Al=Rodf.

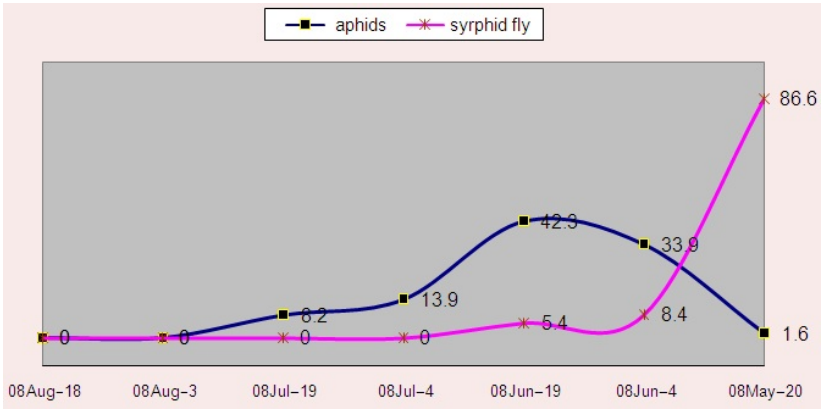

Fig. 7: Fluctuation of aphids and syrphid fly on leaves of pomegranate tree during fruiting seasons 2008 at Al=Rodf.

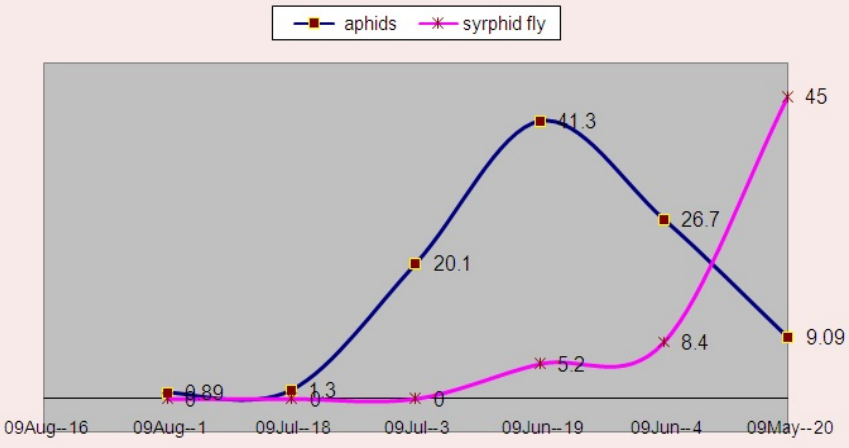

Fig. 8: Fluctuation of aphids and syrphid fly on leaves of pomegranate tree during fruiting seasons 2009 at Al=Rodf.

Table 1: Survey of piercing sucking pests species attack pomegranate tree at different regions in Al-Taif City .

Scientific name	Common name	Investigated area	Part of plant on which insect was noticed on			
			Leat	Flower	Fruit	Stem
Aphis punicae (Passerini) = A. punicella	Pomegranate green Aphid	Al-shafa	+	+	+	-
		Al-Rodaf	+	+	+	-
		Middle al Taif	+	+	+	
		North al-Taif	+	+	+	-
Eriophyes granati	Pomegranate leaf blister mites	Al-shafa	+	-	-	+
		Al-Rodaf	+	-	-	+
		Middle al Taif	+	-	-	+
		North al-Taif	+	-	-	+
Aleurotrachilus citri	Citrus white fly	Al-shafa	-	-	-	-
		Al-Rodaf	+	-	-	-
		Middle al Taif	+	-	-	-
		North al-Taif	-	-	-	-
Siphoninus granati (pres and Hosn)	Pomegranate white fly	Al-shafa	+	-	-	-
		Al-Rodaf	+	-	-	-
		Middle al Taif	+	-	-	-
		North al-Taif	+	-	-	-
Pseudococcus maitimus	Grape mealy	Al-shafa	-	-	+	-
		Al-Rodaf	-	+	+	-
		Middle al Taif		+	+	-
		North al-Taif		-	+	-
Aonidiella aurantii (Mask)	Red scale	Al-shafa	-	-	-	-
		Al-Rodaf	+	-	-	+
		Middle al Taif	+	-	-	-
		North al-Taif	-	-	-	-
Pseudococcus citri (Risso)	citrus mealy bugs	Al-shafa	-	-	-	-
		Al-Rodaf	-	+	+	-
		Middle al Taif	+	+	+	-
		North al-Taif	-	-	-	-
Lepidosaphes beckii (Newin)	Citrus mussel scale	Al-shafa	-	-	-	-
		Al-Rodaf	-	-	-	+
		Middle al Taif	-	-	-	+
		North al-Taif	-	-	-	-

(+++)= sever infestation (++)= moderate infestation (+)= slight infestation (-)= no record

Table 1: Continue.

Scientific name	Common name	Investigated area	Part of plant on which insect was noticed on			
			Leat	Flower	Fruit	Stem
Amyelois transitella	Leaf footed plant bugs	Al - Shafa	-	-	-	-
		Al- Rodaf	-	-	-	-
		Middle al Taif	+	-	+	-
		North al-Taif	-	-	-	-
Echinothrips americanus (Morgan)	Black Amircan Thrips	Al - Shafa	+	+	+	-
		Al- Rodaf	+	+	+	-
		Middle al Taif	+	+	+	+
		North al-Taif	+	+	+	-
Selenothrips phillyreae	Red banded thrips	Al - Shafa	+	+	+	-
		Al- Rodaf	+	+	+	-
		Middle al Taif	-	-	-	-
		North al-Taif	-	-	-	-
Typhlocyba sp.	tree leafhopper	Al - Shafa	-	-	-	-
		Al- Rodaf	+	+	-	-
		Middle al Taif	+	+	-	-
		North al-Taif	-	+	-	-

(+)=infested; (-)= no record; *First necord on pome granate in Al-Taif Saudia Arabia.

Table 2: Survey of boring and chewing insect species attack pomegranate tree at different regions in Al-Taif City.

Scientific name	Common name	Investigated area	Part of plant on which insect was noticed on		
			Flower	Healthy fruit	Cracke fruit
Virchola livia	pomegranate butter fly	Al - Shafa	+	+	+
		Al- Rodaf	+	+	+
		Middle Al Taif	+	+	+
		North Al-Taif	+	+	+
Ectomyelois ceratonia	carob moth or calyx pomegranate moth	Al - Shafa	-	+	+
		Al- Rodaf	-	+	+
		Middle Al Taif	-	+	+
		North Al-Taif	-	+	+
Batophila sp.	Flea beetle	Al - Shafa	+	+	+
		Al- Rodaf	-	-	+
		Middle Al Taif	-	-	-
		North Al-Taif	-	-	-

(+) = infested; (-)= no record

Table 3: Population density of piercing sucking insects attacking pomegranates trees at different regions in Al Taif City during fruiting seasons 2008 .

Investigation Date Area	Aphid						Thrips					
	(means of immature and mature stages / 40 leaves/4 shoots- or/ 10 (cracked or healthy fruits/tree)											
	Al-Rodf		Middle Al Taif		Al - Shafa		Al-Rodf		Middle Al Taif		Al - Shafa	
	Fruit	leaf	Fruit	leaf	Fruit	leaf	Fruit	leaf	Fruit	leaf	Fruit	leaf
20/5/2008	280	0.0	46	29	720	16	200	56	0.0	70	240	0.0
4/6/2008	316	455	324	125	288	330	1160	163	10.0	92	484	23
19/6/2008	428	684	1120	225	348	411	2468	171	440	53	96	61
4/7/2008	192	646	612	137	324	135	2884	85	264	13	244	143
19/7/2008	64	290	128	24	128	80	532	86	14	7	152	32
3/8/2008	0.0	18	52	4	52	0.0	200	52	0.0	0.0	0.0	10
18/8/2008	0.0	0.0	0.0	20	0.0	0.0	92	0.0	0.0	0.0	24	0.0
Means	299^{a}	182.9^{a}	326^{b}	77.7^{a}	268.6^{a}	138.9^{a}	1076.6^{c}	87.6^{a}	10.4^{a-}	33.57^{a-}	177.1^{a}	38.4^{a}
Total infestation mean		403.7^{a}		481.9^{a}		407.5^{a}		1164.2^{c}		137.57^{a}		215.5^{a}
Statistical analysis	$L.S.D_{0.05}$ = 243.3 $L.S.D_{0.01}$ = 336.1						$L.S.D_{0.05}$ = 524.6 $L.S.D_{0.01}$ = 637.6					

Means with the same letters haven't significant difference (P> 0.05)

Table 4: Population density of piercing sucking pests attacking pomegranates trees at different regions in Al Taif city during fruiting seasons 2009.

Investigation Date Area	Aphid				Thrips			
	(means of immature and mature stages / 40 leaves/4 shoots- or/ 10 (cracked or healthy fruits/tree)							
	Al-Rodf		Middle Al Taif		Al-Rodf		Middle Al	
	Fruit	leaf	Fruit	leaf	Fruit	leaf	Fruit	leaf
20/5/2009	132	52	68	0.0	120	106	20	16.0
4/6/2009	698	13	800	128	680	163	252	112
19/6/2009	1800	244	436	356	268	167	106	18
3/7/2009	1108	131	1384	552	184	85	260	134

Table 4: Continue.

18/7/2009	464	86	880	269	232	126	152	122
1/8/2009	152	67	43	18	176	89	32	20
16/8/2009	72	0.0	4	12	92	0.0	31	6.0
Mean	632.3^{b}	84.7^{a}	516.4^{a}	190.7^{a}	250.3^{b}	105.1^{a}	121.9^{a}	61.1^{a}
Total infestation	717^{a}		764.3^{a}		355.4^{b}		183^{a}	
Statistical analysis	$L.S.D_{0.05}$ = 478.22					$L.S.D_{0.05}$ =131.4		
	$L.S.D_{0.01}$ = 629.5					$L.S.D_{0.01}$ = 173.03		

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