Population Density of Leaf Miner Lirimoyzatrifoliiand Cotton Aphid Aphis Gossypiiinfesting Castor Oil Plant Ricinuscommunis

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Abstract— *A field study was conducted at plant protection department, college of Agriculture/University of Baghdad to determine castor oil plant pestsRicinuscommunis, for the period between 2/9/2014 to 17/6/2015.*

Results showed that castor oil plant (Ricinuscommunis) was infested by the castor oil plant leaf minor Lirimoyzatrifolii and cotton aphidAphis gossypii.The highest population densities of the leaf minor at western side were 6.8 insect/leaf and the lowest were 0.6/leaf dated in 30/4,7/5 and17/6 , respectively.Whereas,the highest population densities at northern side were 5.6 insect /leaf recored in 9/9 while The lowest population densities of the leaf minor at northern side were 0.3 insect/leaf dated in 10/6,17/6 and 30/4 respectively. The highest population densities of the leaf minor at southern side were7.5 and the lowest were0.3insect/leaf dated in 3/6 , 2/1 respectively. At eastern side, the highest densities were 5.6 insect/leaf dated in2/9 and the lowest were 0 in 10/6 respectively. For cotton aphid, the highest population densities were for the northern side with4.2 cm2/leaf discdated in 2/9and the lowest were 0 cm2/leaf disc dated in12/4 and 30/4 . Whereas they were 4.8cm2/leaf disc in 19/11 and 0cm2/leaf disc in 30/1and 30/4 for western as highest and lowest densities respectively the highest population densities for the eastern sides were 3.6 in 19/11 while the lowest population density were 0.3 in 23/1 ,30/1 , 22/2 ,23/4 and 7/5 ,the highest population densities for the southeren side were 7cm2/leaf discin 23/4 while the lowest population density were 0.2 in 9/9 respectively. The highest incidence was for the parasite Pediobiusmetalicus. While, the hymenopteran Neochrysochairsformosa, Digylphuscrassinervis and Pediobiusmetalicus were reported to parastize on castor oil leaf minor.

Keywords— Lirimoyzatrifolii, Aphis gossypii , Ricinuscommunis

I. INTRODUCTION

Castor oil plant (*Ricinuscommunis*) belongs to the family *Euphorbiaceae*, is a shrub with five lobe leaves given a hand palm shape. About 50% of fruit weight contains an oil substance (Medical Encyclopedia, 2016).*Euphorbiaceae* is one of the biggest plant families as it includes 300 genera and 5000 species (Chiej, 1984). It is distributed worldwide, specifically in tropical area and extends to moderate area in North and South hemispheres, including tropical area of America and Africa (Banderjee et al 1990). About 44 genera belong to this family have been reported in Iraq. Seed of many euph or biaceous plants (like castor oil *Ricinuscommunis*) are very important due to their medical uses. Oil extracted from the seed contains several fatty acids including ricinoleic, oil and palmitic acids. it includes ricinine chloride as well. Castor oil is a very strongand effective laxative and used to treat skin scars, hay fever and other allergies (Duke and Ayensu, 1985). Castor oil plant is infested by several pest including the leaf minor *Lirimoyzatrifolii* and mites besides various diseases (W. and C. 2012) and (Z. et al 2012). Sharma et al (1980) indicated the presence of holes induced by *Lirimoyzatrifolii* females when oviposit .The tunnel made by larva feeding looks like a clear strip of about (0.25-1.5mm) in diameter inside the leaf. It damages the mesophilic tissue causing leaf drop. Chemical treatment controls (30-60%) of this pest when applied. While Stegmaier referred in (1995) that *Lirimoyzatrifolii* is well-known pest attacks celery, Chrysanthemum and 55 host plants and has wide range hosts in Florida. *Lirimoyzatrifolii*isa very important pest on cotton, castor oil plant, tomato and cowpea. The life cycle rates range between 19.19 to 24.69 and 21.32 to 27.59 days for male and female, respectively. Whereas, fertility rate ranges between 64.1 to158 eggs and ovi position ratio ranges 1:537 to 1:855 (Sushila et al 1997). Anjani in (2005) showed the leaf minor *L.trifolii*can damage the mesophilic tissue and turn the parenchyma tissue into a white stripwhich affect photosynthesis process then destroy leaves of castor oil plant *Ricinuscommunis*.Palumbo (2012) reported *L.trifolii* and *L.sativae* have more than 55 host plants as they attack several hosts and spend the summer on cotton *Malva*spp and annual crops. Capinera et al (2014) revealed pupae and adults feed on plant sap using their piercing-sucking mouth parts and reach phloem conductive elements which cause disruption in plant function, weaken the plant and leaf yellowing and drop. Aphids produce honey dew which drops on leaves and other plant parts then will be coated with sooty mold growth and dusts. These sooty coatings will reduce photosynthesis, respiration and transpiration processes of covered plant parts. Due to the *Lirimoyza*sp incidence on castor oil plants at the study location alongside the injury caused by this pest on several crops, this

study was initiated to determine population density of the *L.trifolii* leaf minor and cotton aphid on castor oil plants, and to identify and calculate the percent of their parasitoides

II. MATERIAL AND METHOD

This study was conducted in university of Baghdad at Al-Jaderyaa district from the period between 2/9/2014 to 17/6/2015. Five plants were selected at location then 3 leaf samples were collected weekly in all four directions (northern, southern, eastern and western). These directions were located based on magnetic compass. Samples were placed in plastic bags then conveyed to laboratory for pest identification and counting. Other samples, from University of Baghdad and El-Aamil district, were stored in 1L plastic containers covered with Organza cloth and fixed by rubber band then pests and parasitoides were collected and sent to Iraqi natural history museum for identification.

Parasitism: parasite pupae, feces mass were observed, in addition to circular holes made by the terminal edge of upper surface of tunnel. These tunnels are made by the parasite adult after emerge (Zachariah, 2006).

Parasitism percentage was calculated based on the following equation:

$$\text{Parasitism \%} = \frac{\text{No of leaf host parasitized}}{\text{total no of leaves}} \times 100$$

III. RESULTS AND DISCUSSION

Figure (1) shows the fluctuation of the leaf minor *Lirimoyzatrifolii* population density on castor oil plant *Ricinuscommunis* in the four directions (north, south, east and west).The highest population densities of the leaf minor at western side were 6.8 insect/leaf and the lowest were 0.6 /leaf dated in 30/4,7/5 and17/6 , respectively. Whereas, the highest population densities at northern side were 5.6 insect /leaf recorded in 9/9 while The lowest population densities of the leaf minor at northern side were 0.3 insect/leaf dated in 10/6 , 17/6 and 30/4 respectively. The highest population densities of the leaf minor at southern side were 7.5 and the lowest were 0.3 insect/leaf dated in 3/6, 2/1 respectively. At eastern side, the highest densities were 5.6 insect/leaf dated in 2/9 and the lowest were 0 in 10/6 respectively. Statistical analysis showed significant differences between towards at level 0.05. The reason for southern side preferences because of shade availability to escape high temperature or due to the availability of preferable host or photoperiod suitable for its activity (Al-Azawi et al, 1990).

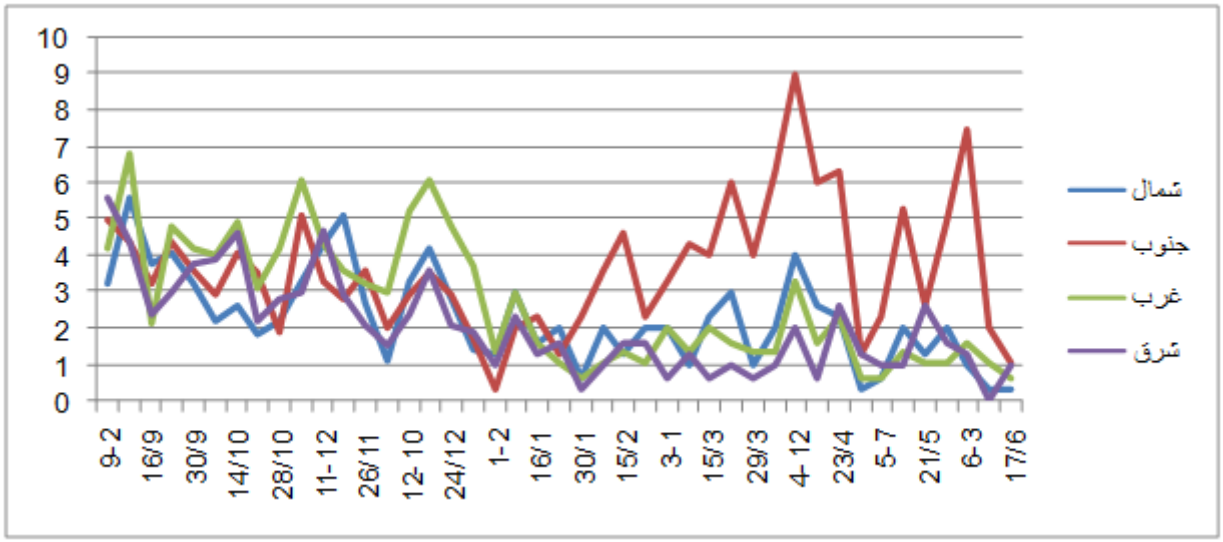

FIGURE 1: POPULATION DENSITY OF CASTOR OIL PLANT LEAF MINOR LIRIMOYZATRIFOLII

Results in figure (2) revealed the population density of the cotton aphid *Aphis gossypii* increased in the beginning of the season at all plant directions then gradually decreased. It increased in 11/9 then decreased at the end of December. It should be noticed that there are four peaks for this insect, the first in 2/9 and the last in 23/4.the highest population densities were for the northern side with 4.2 cm^2/leaf disc dated in 2/9and the lowest were 0 cm^2/leaf disc dated in 12/4 and 30/4. Whereas they were 4.8cm2/leaf disc in 19/11 and 0cm2/leaf disc in 30/1and 30/4 for western as highest and lowest densities respectively the highest population densities for the eastern sides were 3.6 in 19/11while the lowest population density were 0.3 in

23/1,30/1, 22/2,23/4 and 7/5,the highest population densities for the southeren side were 7cm^2/leaf disc in 23/4 while the lowest population density were 0.2 in 9/9 respectively.

Statistical analysis showed significant differences at level 0.05.The reason for southern side preference because of shade availability, high humidity and new leaf growth(Al-Azawi et al, 1990).

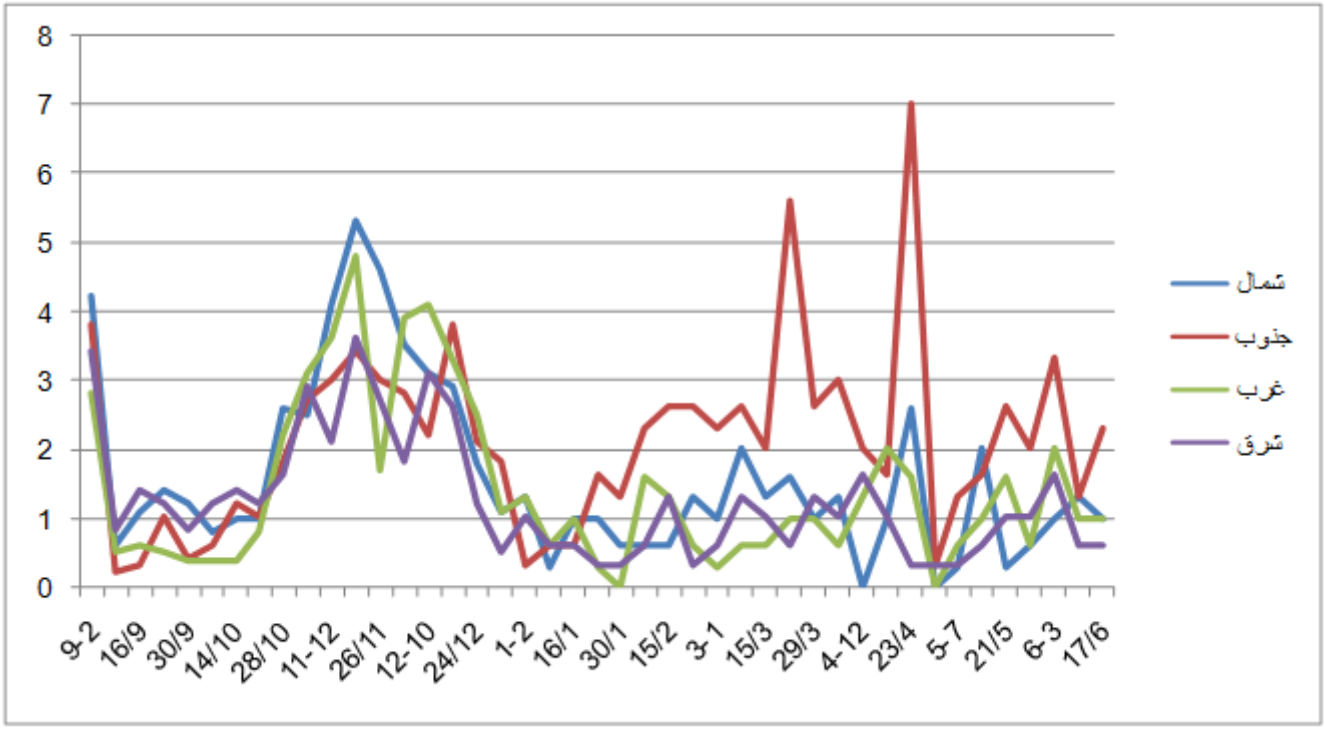

FIGURE 2: POPULATION DENSITY OF COTTON APHID APHIS GOSSYPII

Figure (3) shows that *L. trifolii* was attacked by hymenopteran parasites which isolated and identified. This study showed parasite female has a specific behavior for host selection and examination following organized steps prior to oviposition, which is one of biological control strategies (Al-Zubaidi, 1992). Three hymenopteran parasites were recorded (table 1) and parasitism ratios varied among species. They were 41%, 10% and 4% for *Pediobiusmetalicus*, *Digylphuscrassinervis* and *Neochrysochairsformosa* respectively. These parasites inhabit locally, which is one of successful characters for parasites which agreed with Al-Zubaidi, in (1992) who has recorded the parasitism percent for leaf minor parasites in the field. To conclude from the above results, the ability of parasite to find its host and the relation to host population density can assess parasite efficacy (Al-Zubaidi, 1992). Mohammed and Hanaa in (2013) have reported the parasitism of, *Digylphusisaea* (Walker), *Digylphuscrassinervis* Erdös, *Pediobiuspetallicus* (Nees), *Neohcrysocharisformosa* (Westwood), *Cirrospilusvittatus* Walker, *Halticopteracirculus* (Walker), *Opius sp*. and *Ratzeburgiola incomplete* Boucek,on the genus *Lirimoyza.*

TABLE 1
NATURAL ENAMIES OF LIRIMOYZATRIFOLII

الرتبة	العائلة	الاسم العلمي
Hymenoptera	Eulophidae	*Neochrysochairsformosa*
Hymenoptera	Eulophidae	*Digylphuscrassinervis*
Hymenoptera	Eulophidae	*Pediobiusmetalicus*

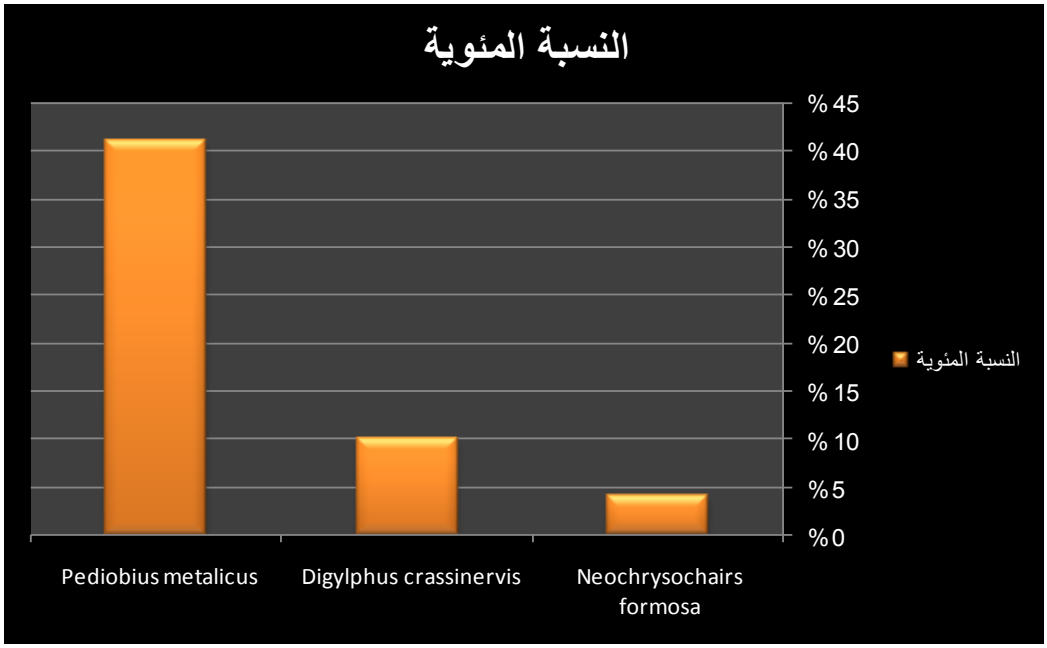

FIGURE 3: PARASITE PERCENTAGES

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