

PRELIMINARY STUDY OF ECONOMIC INSECTS ON GALL OAK TREES AT NORTH CYPRUS AND NORTH IRAQ

Hazhar Omar Hamad*, Shaheen Abbas Mustafa
and Wayne John Fuller***

* European University of Lefke, Graduate School of Engineering, Health & Social Science Department of Horticultural Production and Marketing, CYPRUS.

** Kirkuk University, College of Agriculture, Department of Forestry, Kirkuk, IRAQ. E-mail: shahinkifre@yahoo.com

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ABSTRACT: The current study was carried out during 2015 at two country, north Cyprus and north Iraq. Various sampling techniques were used to collect different stages of insects from all oak parts (root, stem, branches and leaves). The study revealed the presence of 5 insect species belonging to 3 order and 5 families. The intensity of infestation varied from regions to another depending on tree age, agricultural practices and variation in food preferences for gall oak by insects. The results of field study showed a highest infestation by oak leaf cutter, *Euproctis* spp., on gall oak trees in northern of Cyprus and Iraq with a mean infestation reached (30.0, 67.5 %) respectively and a total mean were (86.7 %), followed gall oak wasp, *Andricus* spp. (25.0, 56.2 %), respectively with a total mean (72.2%), and oak fruit weevil, *Curculia* spp. (7.5, 20.0%) respectively, total mean (12.0%), while there was a lowest infestation for oak moth, *Lymantria dispar* L. with infestation mean reached (0 and 5.0%) respectively and total mean were (6.8%). Generally, the percentage of the infestation were highly on gall oak trees in north Cyprus with a general infestation mean reached (50.5%) compared with insect infestations in north Iraq were (45.8%), respectively. Field study results showed variation of infestation by gall oak insects according to the kind of insect, climatic conditions and the part of plant that has been infested, the most insects were observed from the beginning of April month until end of October in both region, with highly infestation in month July and August were reached (70, 85 and 68, 75%) respectively, at mean temperature (29.0, 35.7c° and 29.0, 35.1) respectively, relative humidity (47.0, 44.7 and 50.0, 48.7%) and precipitation (1.0,0 and 0,0) respectively. While a least infestation at month October and March were reached (15 and 10%) respectively, during study season.

KEY WORDS: Infestation, economic insects, gall oak, Cyprus, Iraq

Quercus infectoria L., is considered as important economic trees belongs to the family Fagaceae which is distribution in northern and western regions of the world. It grows slowly, deciduous and non-resistant for highly temperature (Abdullah, 1988; Dawood, 1979). However, it also a very beneficial tree for industrial use and used locally for a variety of purposes, mainly as constructional timber in round for village hutments, as poles for shuttering work, paper, pulp, tannins, veneer, lumber, particleboard and soil stability water resources (Ahmed, 1984; Qasir et al., 1985; Abdullah et al., 1990; Suleman, 1991; Mohammed et al., 1998; Nazemi et al., 2008; Mufty, 2006). The loss resulting from insects infestations in the forests is twice that of the loss resulting from the impact of forest diseases and seven times the loss resulting from impact of forest fires (Swailema & Maroof, 1981). In Cyprus, there are three native kinds of oak, the Aleppo Oak (*Quercus infectoria*) the endemic Golden Oak (*Quercus alnifolia*) and the Kermes Oak (*Quercus coccifera*) (Thigood, 1987; Pantelas, 1998). FAO (1972) reported that are 22 species of *Andricus* spp., on gall oak trees in the

mountainous regions of Iraq and all parts of the tree are susceptible for infestation. Four kinds of oak trees distributed in north Iraq which are, *Quercus infectoria* Oliv. (gall oak), *Q. aegilops* L. (normal oak), *Q. libani* Oliv. (Libani oak), *Q. macrothacca* (mountain oak) and it is cover more than 80% of forests area. However, natural oak forests are reduced as a result of human activities, random cutting, heavy grazing and wars in the past years and addition to the effect of insects infestation on forests degradation. These insects injure trees either, directly by sucking their sap and robbing them of food and or indirectly by disseminating plant diseases and making the trees so weak that they cannot withstand the attack of the more dangerous borers (Robert, 1972; Zandi, 2007; Aljubury, 2013). The objective of this study is investigate for injury insects causing economic loss for gall oak trees in both region, north Cyprus and north Iraq for studying their economical importance and planning for their biological control and integrated pest management technique application in the future.

MATERIALS AND METHODS

Two study populations are located in the North Cyprus (altitude 500-900) and North Iraq (altitude 600-1000). Oak forests of an average tree age of 30-40 years, a different ecological substratum (Dawood, 1979). We sampled the trees for insect fauna using hand, beating, and net collection methods. A field study was held to find out the most important insect pests that attack Oak trees in northern of Cyprus and northern Iraq. Periodical monitoring of the Oak trees and monthly samples collection started from the beginning of April month to the end of October with a mean temperature, relative humidity, precipitation reached between 10-29°C, 47-77%, 76-1 mm and 7.3-35.7°C, 77.7-43.7%, 8-158 mm respectively in both region during 2015. In the study (10) trees of each in north Cyprus and north Iraq were sampled manually from the different parts of oak trees' stem, branch, leaf and fruit. The common insects were identified by naked eyes or magnifying lens, some samples were examined in plant laboratory by light microscope and samples identified according to previous classification keys (Baronstev, 1998) and scientific references (Robert, 1972; Knopf, 1972; Swailem & Adel, 1977; Swailem & Al-Marouf, 1981). The Erbil insect museum was consulted for the purpose of identification of those insects species which were not identifiable using the above methods, all samples taken randomly from each tree and in different direction (Arab, 2003). The infestation percent of insects on the different parts of trees were calculated using the following equation (Lashenko & Bavlenov, 1988).

$$\% \text{ Infestation / insect} = \frac{\text{Number of infested parts with insects}}{\text{Total number of examined parts}} \times 100$$

The statistical data processing was conducted using the statistical software program – SAS 9.1 (SAS Institute, 2002). Descriptive statistics for the primary parameters were calculated. Each locality was analyzed separately. The estimation of statistical significance ($p < 0.05$) of the different level sources was conducted using t, test analysis of variance (ANOVA). Post hoc testing of the significant effects was carried out using Tukey's test.

RESULTS AND DISCUSSION

Field observation showed Table (1) shows the results of field observation for

the economic insects in northern of Cyprus during the season of 2015, namely, oak moth, *Lymantria dispar* L., oak leaf cutter, *Euproctis* spp., gall oak wasp, *Andricus* spp., and oak fruit weevil, *Curculia* spp. The major insect pests that were oak leaf cutter, *Euproctis* spp., on the gall oak with highest infestation on tree parts of oak (stem, branches, fruit, leaf) were (20, 20, 30, 50%), respectively with mean infestation reached (30%), followed gall oak wasps, *Andricus* spp. (70, 20, 10,0%) respectively, mean infestation (25%), while the lowest number was, oak moth, *Lymantria dispar* L. (10,0,0,0%) and (2.5%) followed oak fruit weevil, *Curculia* spp. (0, 20,0, 10%) respectively with mean infestation reached (7.5%).

In northern Iraq, data presented in table (2) revealed that the oak leaf cutter, *Euproctis* spp., and gall oak wasp, *Andricus* spp., were the most common insects with highest infestation on the oak parts were (75, 60, 50, 85%) and (85, 90, 50,0 %), respectively with mean infestation (67.5, 56.2%) respectively, followed, oak fruit weevil, *Curculia* spp. (0,20, 60,0%), mean infestation (20%) and oak stem borer, *Cermbyx dux* F. (30, 40, 0,0%) respectively and mean infestation were (20%), while the lowest number was, oak moth, *Lymantria dispar* L. (20,0, 0,0%) respectively with infestation (5.0%).

Table (3) showed the infestation percentage by insects on gall oak trees in both study regions (northern Cyprus and Iraq), the highest infestation was *Euproctis* spp. (46.1, 40.6%) respectively, total mean 86.7% followed *Andricus* spp. (25.0, 56.2%), total mean 72.2%, while the lowest infestation was *Lymantria dispar* L. (3.8, 3.0%) respectively, total mean (6.8%). From above mentioned information and through the field visits to both regions, the results of this study showed that the insect infestation were different according to type of insects, oak parts, and climatic conditions of regions, generally. The results of field study showed a high infestation by oak leaf cutter, *Euproctis* spp., on gall oak trees in northern of Cyprus and Iraq with a mean infestation reached (30.0, 67.5%) respectively and a total mean were (86.7 %), followed gall oak wasp, *Andricus* spp. (25.0, 56.2%), respectively with a total mean (72.2%), and oak fruit weevil, *Curculia* spp. (7.5, 20.0%) respectively, total mean (12.0%), while there was a lowest infestation for oak moth, *Lymantria dispar* L. with infestation mean reached (0 and 5.0%) respectively and total mean were (6.8%), these results of this phenomenon may be due to occurrence of differences in morphological features of tree leaves for oak species, chemical components and nutrition content (Al-Mallah et al., 2008). In addition to the insects infestation were variation between two study regions, generally, it was more in northern Cyprus compare to northern Iraq on gall oak trees. Generally, the results of this research indicate that variations in the susceptibility of poplar trees may be due to variation according to the food preferences of poplar species by insects, parts of plant, topography, altitude, and differential environmental factors. From above mentioned information and through the field visits to both regions, we find out that the insect infestation were different according to the oak parts, climatic conditions, and the regions. In general, the results of the present investigation are in agreement with those obtained by Mustafa (2011), who stated that the *Euproctis melania* L., a highest percentage with a mean reached 66,45% in Erbil governorates. The most insects on gall oak observed highly infestation during the summer months, especially July and Augusts were reached (70, 85 and 68, 75%) respectively, at mean temperature (29.0, 35.7^c and 29.0, 35.1) respectively, relative humidity (47.0, 44.7 and 50.0, 48.7%) and precipitation (1.0,0 and 0,0) respectively, While a least infestation at month October and March were reached (15 and 10%) respectively of both studied regions during study season. Generally, in this field study, the percentage of the infestation were highly on gall oak trees

in northern Cyprus with a general infestation mean were reached (50.5%) compared with insect infestations in northern Iraq were (45.8%), respectively. In table (2 and 3) oak leaf cutter, *Euproctis* spp., noted on different parts of the gall oak trees, in north Cyprus and north Iraq with a mean infestation reached (30.0, 67.5%) respectively, these results agreement with Mustafa (2011) who found that the oak trees are more susceptible and the infestation of oak leaf cutter (*Euproctis melania*) and the infection rate reached in the trees by the insect to 85%. Table (4) shows differences between both study regions, in north Cyprus, *Euproctis* spp., and *Andricus* spp., was present at highest density with a total mean infestation of 86.7 and 72.2% respectively, followed by *Cermyx dux* F. 22.0%, but the least was the *Curculio* sp., and *Lymantria dispar* L. reached 12.0 and 6.8% respectively. Wakamura et al. (2007) they used sex pheromone, Dimethyl pentadecyl-Isobut-yrate for the female of oak leaf cutter, *Euproctis* spp., in field conditions that shows a significant attractions by the males. Some parts of Iraq and Cyprus are suffering from inadequate environmental conditions due to the lack of rain and high temperatures and this causes high evaporation rates, which encourages insect pests to damage the trees. These areas, which suffer from the lack of water, their trees are less able to resist insect pests unlike strong trees which are resistant to harmful insects by the excretion of resins which hinder their entry into the tree.

From the present study, it is deduced that photophase and temperature play vital role in regulating the infestation percent of gall oak insects.

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LITERATURE CITED

- Arab, A. S.** 2003. Preliminary survey of economic insects and their insect predators on poplar trees at Euphrates region in Syria. Arab. J. Plant Protection, 21 (1): 39-42.
- Abdulla, Y. S.** 1988. Principles of Silviculture, College of Agriculture and forestry, Mosul Univ. Book house for publication and printing. 150 pp. (In Arabic).
- Abdullah, Y. S., Al-Kinnany & Al-Ashoo, J. A.** 1990. Effect of growth regulators (GA₃, IAA) and root pruning on growth of *Quercus aegilops* L. in Hammam Al-Alil., College of Agriculture and forestry, Mosul University, Mesopotamia J. Agric., 22 (4): 195-207 (In Arabic).
- Aljubury, R. A.** 2013. Studies of ecological and biological on poplar leaf worm, *Apatete aceris* in Mosul region, Ph. D. thesis, college of Agriculture and forestry, Dept. of forestry, Mosul University. 170 p.
- Ahmed, R. A.** 1984. Water in Plant Life. Book House for Printing & Publishing. Mousil University. Iraq (In Arabic).
- Barontsev, A. I.** 1998. Wood destroying insects. Lesnae bromoshlennoste. Moscow, (Russian). 175 pp.
- Dawood, D. M.** 1979. Dendrology of forest trees, Al-Cutub press Mosul University, College of Agric. and Forestry, Dept. of Forestry, 430 pp.
- FAO** 1999. Forest survey in the three governments. Erbil.
- Knopf, H. E.** 1972. Forest insects of Iraq. Univ. Mosul, College of Agric. and Forestry, Mesopotamia, J., 2 (1).
- Mohammad, M. A., Ahmad, B. A. & Abdullah, I. N.** 1998. Economic important of gall which composed by gall wasps on oak trees in north of Iraq. Science and education (No. 37, 1999) (In Arabic).
- Mufti, M. T.** 2006. Utilization of *Pinus brutia* Ten. and *Quercus aegilops* L., bark extract as adhesives for particle boards production, Ph. D. thesis, Mosul University, College of agriculture and forestry, 151 pp. (In Arabic).
- Mustafa, S. A.** 2011. Behavior and Ecological studies for Oak leaf Cutter, *Euproctis melania* Staud. (Lymantriidae Lepidoptera). Journal of Koye Uni., 20: 285-300 (In Arabic).
- Nazemi, J., Talebi, A. A., Sadeghi, S. E., Melika, G. & Lozan, A.** 2008. Species richness of oak gall wasps (Hymenoptera: Cynipidae) and identification of associated inquilines and parasitoids on two oak species in western Iran. North-west Jour. of Zoology, Oradea, Roania, 4 (2): 189-202.
- Pantelas, V.** 1998. Priority Areas for Forest Conservation in the Mediterranean Region for Cyprus. Project No. 9E0129.01, WWF.
- Qasir, W. A., Basim, A. A. & Salim, I. S. B.** 1985. Wood as raw material, Translated Book, Written by George Tsums, Mosil University, Page 325 (In Arabic).
- Reader-Roitzsch, J. E.** 1969. Forest Trees in Iraq. University of Mosul.

- Robert, H.** 1972. Forestry research, demonstrating and training, Erbil, Iraq. FO: DP/Iraq/68/518, Technical Report (No. 6), 146 pp.
- Wakamura, S., Tetsuya, Y., Yoshio, H., Hiroshi, T., Teruo, D., Yoshitsugu, N., Manabu, S., Akira, Y. & Kanae, K.** 2007. Sex pheromone of the oriental tussock moth *Artaxa subflava* (B). (Lepidoptera: Lymantriidae). Identification and field attraction. *Applied Entomology and Zoology*, 42 (3): 375-382.
- Suleman, Y. H.** 1991. Variation in vessel elements size and tissue proportion in three Iraqi oak. *J. King Saud Univ., Agric. Sci.*, 3 (1): 59-66.
- Swaillem, S. M. & Amin, A. H.** 1977. Forest insects and their host plants in Iraq, College of Agriculture and Forestry, Mosul Univ. Book house for publication and printing, 34 pp. (In Arabic).
- Swaillem, S. M. I. N. & Maroof, I. N.** 1981. Forest entomology, College of Agriculture, Mosul University (In Arabic).
- Thirgood, J. V.** 1987. Cyprus-A chronicle of its forests, land, and people. University of British Columbia Press, Vancouver.
- Zandi, Z. A. A.** 2007. Damage to biotic and abiotic natural forest in Shaqlawa-Arbil. Master, College of Agriculture-University Slahaddin.



North Cyprus



North Iraq



Figure 1. Insect infestation on gall Oak tree in north Cyprus and north Iraq.

Table 1. Means of infestation percent by insects on gall oak, *Quercus infectoria* Olive in North Cyprus.

Scientific name of insects	Order	Family	Stem	Branch	Fruit	Leaf	Mean Infestation
<i>Lymantria dispar</i> L.	Lepidoptera	Lymantridae	10	-	-	-	2.5
<i>Euproctis</i> spp.	Lepidoptera	Liparidae	20	20	30	50	30
<i>Andricus</i> spp.	Hymenoptera	Cynipidae	70	20	10	-	25
<i>Curculio</i> sp.	Coleoptera	Curculioidae	-	20	-	10	7.5

Table 2. Means of infestation percent by insects on gall oak, *Quercus infectoria* Olive in North Iraq.

Scientific name of insects	Order	Family	Stem	Branch	Fruit	Leaf	Mean Infestation
<i>Lymantria dispar</i> L.	Lepidoptera	Lymantridae	20	-	-	-	5.0
<i>Euproctis melania</i> L.	Lepidoptera	Liparidae	75	60	50	85	67.5
<i>Andricus</i> spp.	Hymenoptera	Cynipidae	85	90	50	-	56.2
<i>Cermbyx dux</i> F.	Coleoptera	Cerambycidae	30	40	-	-	17.5
<i>Curculio</i> sp.	Coleoptera	Curculioidae	-	20	60	-	20

Table 3. Means of infestation percentage by insects of gall oak, *Quercus infectoria* Olive.

Scientific name of insects	Order	Family	Infestation %	Infestation %	Total Mean
			North Cyprus	North Iraq	
<i>Lymantria dispar</i> L.	Lepidoptera	Lymantridae	3.8	3.0	6.8
<i>Euproctis melania</i> L.	Lepidoptera	Liparidae	46.1	40.6	86.7
<i>Andricus</i> spp.	Hymenoptera	Cynipidae	38.4	33.8	72.2
<i>Cermbyx dux</i> F.	Coleoptera	Cerambycidae	11.5	10.5	22
<i>Curculio</i> sp.	Coleoptera	Curculioidae	-	12.0	12.0

Table 4. Means of infestation percentage by insects on gall oak trees, *Quercus infectoria*.

Months	North Cyprus				North Iraq			
	Infestation with Climatic factors				Infestation with Climatic factors			
	Infestation %	Temper. C°	Humidity %	Rain (mm)	Infestation %	Temper.	Humidity %	Rain (mm)
January	-	10	77	76	-	7.3	77.7	158.3
February	-	10.5	72	45	-	7.7	67.4	76
March	-	13	69	36	10	10.5	70.5	122.2
April	20	17	60	18	32	20.6	70.0	32
May	55	22	52	22	30	26.8	51.2	8
June	64	26	60	9	50	33.1	43.7	-
July	70	29	47	1	85	35.7	44.7	-
August	68	29	50	2	75	35.1	48.7	-
September	62	26	53	10	60	32.4	51.3	-
October	15	21	57	25	25	25.5	62.5	18
November	-	16	67	33	-	17.7	71.5	51
December	-	12	76	68	-	14.0	75.2	67