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Insect Species Damage on Ornamental Plants and Saplings of Bartin Province and Its Vicinity in the Western Black Sea Region of Turkey

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Abstract: The objectives of this study were to identify harmful insect species, understand their biology, assess their damage potential and target plants and define distribution areas. There are a lot of native or cultured ornamental plants in Bartın and its surrounding (Çaycuma, Zonguldak, Karabük, Mengen, Devrek). These plants are herbaceous and woody species. Specimens were collected from various cultured and non-cultured plants. A total of 34 species belonging to 20 families of 5 orders were identified. The order *Hemiptera* was represented by the highest number of species (19 species), followed by *Coleoptera* (8), *Lepidoptera* (4), *Orthoptera* (2), and *Dermaptera* (1). Insect samples were collected from plants by net traps, special insect aspirators, and various insect traps. The identified species have been stored in the collection room of the Forest Entomology and Protection Unit, Bartın Forestry Faculty, Zonguldak Karaelmas University (Z.K.U.), Turkey. This is the first detailed study about insect species causing damage on ornamental plants and saplings of Bartin province and its vicinity, although similar studies of different regions exist. This research makes a very important contribution to the insect fauna of Bartin, its environs and Turkey. Twenty four of the identified species were new for Bartın

and its vicinity, while the remainder had been previously recorded in different parts of Bartın.

Keywords: Bartın, biology, harmful insects, ornamental plants, young trees.

1. Introduction

The rise in migration from villages to urban cities, resulting in rapid growth of cities, with concrete buildings, apartments, business centres, the walls separating the private estates from one another and paved roads have impacted the natural landscape space and created generally unsightly structures. Therefore, in order to form more appealing living areas and to reduce daily stress and troubles, ornamental plants have been used in parks and gardens, along the highway medians, on balconies and in houses. However, there are many harmful factors damaging to such plants and one of the most important such factors are insects.

The aim of this study was to identify the insect species responsible for damage to saplings and ornamental plants in the province of Bartın and its environs. For that reason, research has been carried out in that province and its close environs, such as Safranbolu, Karabük, Çaycuma, Devrek and Mengen. In this region, many herbaceous and woody ornamental plants are cultivated in parks and gardens, which are either regional or were imported from other regions for landscape design purposes. Woody plant saplings have been used in parks and gardens as well as in the afforestation areas and highways. Cultivating these materials and ensuring their long-term permanence with regards to landscape beautification is a crucial issue. It has been observed that in the parks and afforestation areas intensely damaged by the insects, the plant productivity, landscape unity and aesthetics have been devastated.

Toper [1] has identified 16 insect species on poplar trees in Bartın. Lodos *et al.* [2] have listed a total of 178 species of *Scarabaeoidea* in Turkey between 1979-1987. Thirty nine of these species were collected in Bartın and its vicinity. Arslan [3] has recorded about 25 insect species cusing damage to elm, common alder, maple and willow in the Bartın region. Özkazanç [4] has recorded 16 insect species damaging to oak, beech, and hornbeam trees in Bartın forests, but so far there has not been any recorded study of insect species damaging to ornamental plants and saplings in Bartın. Özbek *et al.* [5] have given information about pests of vineyards, orchards and ornamental plants. Toros [6] and Toper [7] have treated park and ornamental plants pests, damages and controls in their instruction books.

It is estimated that hazardous organisms and micro-organisms like plant diseases, insects and weeds cause 33.7% economical damage before and after the harvesting season. The distribution of this damage could be broken down into due to 12% plant diseases, 12% to insects and 10% to weeds. This ratio makes up about one third of the world's plant production potential including ornamental plants. The economical losses due to plant diseases in the Unites States reached 9.1 billion dollars. The insects caused 7.7 billion dollars and weeds caused 6.2 billion dollars of damage [8].

The maritime temperate climate affects the province of Bartın. The summer seasons occasionally have a high relative humidity ratio and a regular temperature while the winter seasons are seasonably characterized by the climate of Black Sea. However, as a river surrounds the province, the relative

humidity is often recorded as remarkably high. According to the meteorological data, the temperature in summer ranges between 23 and 25 ^{o}C while in winter, it ranges from 0 to 10 ^{o}C. The average annual number of rainy days ranges from 100 to 130, and the regional humidity ratio is approximately 75% [9]. It was within this environment that most of the research was undertaken.

2. Material and Methods

The main material of this study covers the ornamental plants, saplings and young trees existing in the province of Bartın and its vicinity and the insects damaging them. The research, dating back to 2004 and 2005, has been carried out initially in the campus of Z.K.U. Bartın Faculty of Forestry and in all of the gardens, parks, afforestation areas, greenhouses and afforested parts of the highways in the province of Bartın. Having been detected throughout the field trips arranged on various days, the insect species were collected, brought to the lab and put into the collection boxes prepared. The location place, date, and the host plant of each sample was recorded and it was photographed with a Nikon camera. A SMZ-U Stereomicroscope was used to photograph much smaller insects.

Aphids (winged and wingless), gathered with a thin brush made of sable, were put into 70% alcohol. The specimens were preserved using Hille Ris Lambers's method [10]. For the preservation of scale insects, the Potassium Hydroxide method [11] was used.

For the preservation and collection of other insects, the method of Çanakçıoğlu [12] was used and the identification of insects was carried out using different literature sources [6, 7, 13-18]. Sarıbaş, Kaya and Yılmaz identified the host plants. Ornamental and Houseplants [19], Botanica [20], Biotopes Mapping in Bartın Province and near vicinity [21], Houseplants [22] and The Most Beautiful Wild Flowers of Turkey [23] were principally used as the source for the identification of some plants.

3. Results

3.1 Harmful insects in Bartın and its vicinity

According to the evaluated research results, it has been observed that the *Rosa* sp., *Lonicera* sp., *Populus* sp., *Salix* sp., *Dieffenbachia amoena seguine* 'Tropic Snow', *Nerium oleander*, *Abies bornmülleriana*, *Pinus pinaster*, *Euonymus latifolius, Euonymus japonicus cv.* "Aureopictum", *Ficus starlight*, *Malus* sp., *Thuja* sp., *Morus pendula*, *Cyclamen* sp., *Freesia* sp., *Tulipa* sp. were the most frequently encountered species of saplings and ornamental plants cultivated in the houses, parks, gardens, greenhouses and afforestation areas throughout the studied region. For the design of parks, open spaces and landscape, it has been noted that *Rosa* sp., *Tulipa* sp., *Euonymus latifolius, Euonymus japonicus cv.* "Aureopictum" had been widely used by the Official Municipality of Bartın.

The insects identified in the investigation areas have been classified using the methods of Çanakçıoğlu [12] and, Richards and Davies [24]. The insects damaging the young trees and ornamental plants have been listed above in terms of their genus, families and orders with their collection date and place.

Coleoptera

Chrysomelidae

- *Chrysomela populi* L.: Its eggs were found on the campus of Bartın Faculty of Forestry (BFF) on June 4th, 2004, laid on the lower surface of the leaves of *Populus nigra*. The larvae hatched from these eggs on June 8th, 2004. Two pupas were detected on June 19th, 2004; adults were noted on June 23rd, 2004. In Zonguldak-Çaycuma, the adults, mature larvae, pupae and eggs were observed on 27 July 2005 on leaves of *Populus nigra*. Çanakçıoğlu and Toper [25] have observed this insect on *Populus* sp., grown along the road between Bartın and Safranbolu, on July 4th, 1995.
- *Crepidodera aurata* Marsh.: This insect has been seen in Ağdacı Village-Faculty Campus on May 30th, 2004 and in Karaköy district, on *Salix babylonica* and *Salix alba*, on July 6th, 2004 (Figure 1). Çanakçıoğlu and Toper [25] have collected this insect on *Populus x euramericana*, grown along the road between Bartın and Çaycuma.

Figure 1. *Crepidodera aurata* larvae and their damages [26].

- *Plagiodera versicolora* Laich.: This species has been observed on *Salix cinerea* L., in the Karaman Tableland, on June 24th, 2004, and on *Salix* sp, at 30th km. of Bartın-Zonguldak road, on June 30th, 2004. The adult insects were feeding on the leaves. Toper [27] has stated that in 1998, this insect was epidemically damaging *Salix cinerea* L. and *Populus tremula*, grown in Ardıç, Sökü, Aşağıyayla, Ahmet Usta, Karaman Tableland, Cubulludere, Karakışla, which are districts close to Bartın and Karabük.

Curculionidae

- *Pissodes piceae* Illig.: The adult insect and its larvae have been found on *Abies bornmülleriana*, at Ahmet Usta Gorge on July 31st, 2004. Toper Kaygın [28] has found adult insects on *A. bornmuelleriana*, in Ahmet Usta-Kayzerbaşı district (970 m) on June 19th, 1997; its young larvae in Ovacuma-Karandere (860 m) district, on July 9th, 1997; and adults and larvae at Ahmet Usta Geon (935 m) on July 31st, 1997 and in Ahmet Usta-Kayzerbaşı (975 m) on August 6th, 1997.

Scarabaeidae

- C*etonia aurata* L. has been found on the stem of *Rosa* sp., close to the ground level, on the campus of BFF on June 4th, 2004. Lodos *et al.* [2] have recorded this insect in Bartın, Central province.
- *Melolontha melolontha* L. has been observed on April 25th, 2004 on the branches of *Malus* sp. which were planted in the garden of Boğaziçi Hotel and its adults were found on stems of *Cupressus sempervirens*, in the same garden.
- *Oxythrea cinctella* (Schaum): Lodos *et al.* [2] have recorded this insect in Bartın, Central province. This species has been observed while feeding on *Scabiosa* sp. and *Anthemis cretica* pollens, along the Bosphorus Road on June 8th, 2005.
- *Polyphylla fullo* L.: Lodos *et al.* [2] have recorded this insect in Bartın-Ulus and Zonguldak Central province. This species have been found on the ground at Karaköy district on July 8th, 2004 and on *Morus alba "pendula"* in the garden of the Halil Yaz Facility on May 26th, 2004 and July 18th, 2004.

Dermaptera

Forficulidae

- *Forficula auricularia* L. has been collected on *Fragaria vesca* in the garden of a house built on Kanlıırmak Street on April 22nd, 2004 and also on *Rosa* sp. planted in the garden of Official Directorate of Agriculture.

Hemiptera

Pentatomidae

- *Graphosoma italicum* L.: Five or six of these species were observed on flowers of *Coriandrum sativum* (Coriander); these insects were noticed on June 19th, 2004 in the garden of a house situated in the city centre.

Aleyrodidae

- *Trialeurodes vaporariorum* Westw.: During the field trip, many white flies were observed on *Aucuba japonica* in Yalı district of Gazhane Park, on April 24th, 2004. They flew off when the branches were disturbed. The formation of a sooty mould (fumajin) has been observed on the leaves of the plant, due to the heavy production of honey dew.

Aphididae

- *Aphis fabae* Scop.: It has been found on saplings of *Philadelphus* sp. (Hydrangeaceae) in Devrek Nursery on May 9th, 2005.

- *Aphis farinosa* J. F. Gmelin: It has been collected on *Salix alba*, on the campus of the Bartın Faculty of Forestry on May 10th, 2005.
- *Aphis gossypii* Glov.: Adult insects and nymphs have been observed on saplings of *Hibiscus mutabilis* in Devrek Nursery on May 9th, 2005. In addition to this record, this insect has been also encountered on May 11th, 2005 on *Hibiscus syriacus cv. "blue bird"*, planted in the garden of the Facility Establishment of the Official Municipality of Bartın.
- *Aphis nerii* Boyer de Fonscolombe: Found on *Nerium oleander* in the garden of the Facility Establishment of the Official Municipality of Bartın, on May 11th, 2005.
- *Macrosiphum rosae* L.: During the field trips, it has been found on roses in Gazhane Park, on April 27th, 2005 and in the garden of the Facility Establishment of the Official Municipality of Bartın and in the garden of the Vocational School for Girls on March 2nd, 2005.
- *Myzus persicae* Sulz.: During the field trip, it has been found on newly emerging shoots and on the underside of the leaves of *Cyclamen* sp. on January 6th, 2005, in the garden of a house situated in Kırtepe district. The adults and many nymphs have been also collected on the branches, shoots and flowers of *Freesia* (Hybrid), in the greenhouse of the Bartın Faculty of Forestry on April 4th, 2005 (Figure 2).

Figure 2. *Myzus persicae* damaging on *Freesia*.

Cercopidae

- *Cercopis vulnerata* Rossi: It has been found on honeysuckle on the campus of the Bartın Faculty of Forestry on May 03rd, 2004 and detected while resting on leaves of *Cotoneaster horizontalis* on April 24th, 2004, in Gazhane Park.
- *Philaenus supumarius* L.: Observed on the faculty campus on April 25th, 2004 on herbaceous flowering plants bearing a foamy secretion,. It has been found as an adult insect on June 14th, 2004 and on May 17th, 2005. Foamy secretions have been found extensively on the shoots, branches and leaves of *Salix alba* and *Salix* sp.

Chaitophoridae

- *Chaitophorus leucomelas* Koch: During the field trips, it has been found on the *Populus nigra*, on the faculty campus on May 16th, 2005. The gall has been also detected on the leaves.

Cicadellidae

– *Cicadelle viridis* L.: It has been observed on the undersurface of *Populus* sp. leaves and on wild grasses near the roses, in Ağdacı Village, Faculty Campus, on May 30th, 2004.

Coccidae

– *Coccus hesperidum* L.: It has been found in the BFF on April 29th, 2004 and on *Dieffenbachia amoena seguine 'Tropic Snow'* (Dieffenbachia) in one of the offices of the faculty building on February 9th, 2005. Due to the high population density, it has been observed that the vivid green colour of these plants' leaves has gradually faded away and the plant died as no protection has been provided. In our following observations, it has been found that these insects have also settled on the leaves of *Spathiphyllum* plant, which was cultivated next to Dieffenbachia and covered the upper surface of its leaf with their secretion (Figures 3 a and b).

Figure 3. (a) *Coccus hesperidum* on Dieffenbachia leaf. (b) *Coccus hesperidum* on Dieffenbachia stem and leaf stalks.

– *Coccus longulus* (Dauglas): It has been observed on *Spathiphyllum* (Peace Lily), in the employee residence of the Bartın Faculty of Forestry on August 26th, 2004. They generally settled on the leaves of the plant however, they were also observed on feeding on the flowers and peduncles.

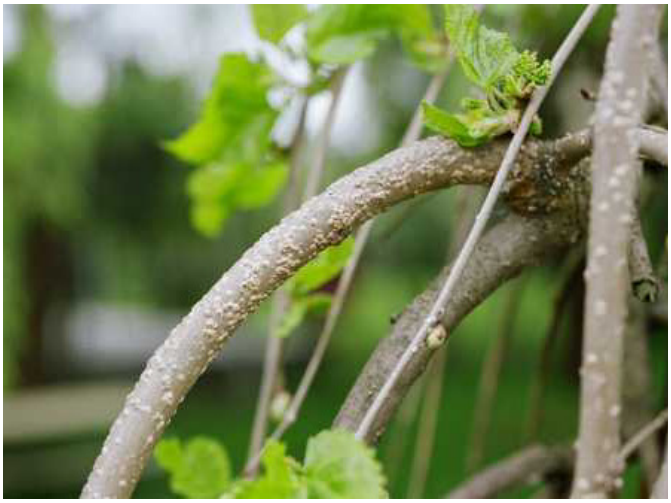
Diaspididae

– *Leucaspis pusilla* Löv.: During the field trip, these were observed on *Pinus pinaster*, on the campus of BFF on May 23rd, 2005 (Figure 4).

Figure 4. *Leucaspis pusilla*'s damage on *Pinus pinaster* needles.

– *Pseudaulacaspis pentagona* Targ-Toz: They have been found during the field trips on *Morus alba "pendula"*, in the garden of the Directorate of Agriculture. These insects collectively settled on the leaf sheaths (Figure 5).

Figure 5. A *Morus alba* "pendula" infested by *Pseudaulacaspis pentagona*.



– *Unaspis euonymi* Comst: During the field trip, these insects have been observed in number on the leaves of shoots of *Ficus starlight*, planted in the one of the offices of the faculty building on February 3rd, 2005. They also settled on the upper and bottom surfaces of the leaves, around the major and side veins, on the edge of the leaves and petiole. The cochineals were 1.5 mm high and tawny coloured. The cochineals, which were found on *Euonymus latifolius* ve *Euonymus japonicus cv. "Aureopictum"* cultivated in the garden of Kemik Housing Estate on September 20th, 2004 and at Cumhuriyet Square on March 17th, 2005, were settled commonly on the shoots, branches and leaves of the cherry laurel. The nymphs and nymphal skins were observed to be scattered on the major and side veins and almost all over the leaf surface (Figure 6).

Lachnidae

– *Eulachnus rileyi* Willms.: This species were collected on the saplings of *Pinus pinea*, planted behind the bust of Atatürk in the campus of BFF on May 4th, 2005 and behind the BFF Library on

June 1st, 2005. As a result of sucking of the insects, the leaf points were blanched, and even some parts of the leaf were desiccated. Resin leaks were observed on some spots, as a result of the insect's sucking activity.

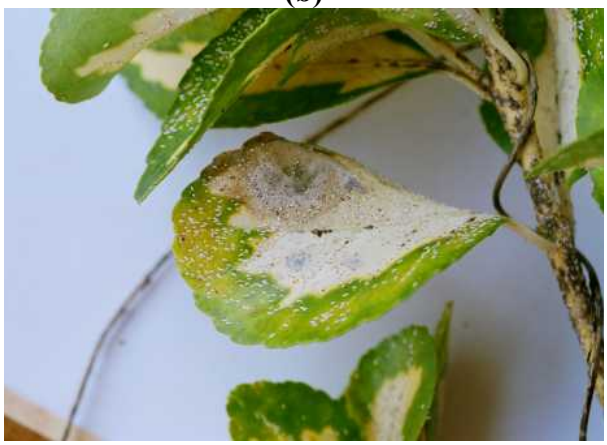
Pseudococcidae

– Have been observed on samples of stinging nettles, collected from a garden of a house in Kırtepe district on September 20th, 2005 however the species couldn't be identified.

Figure 6. Damage caused by *Unaspis euonymi*: (a) on *Ficus* satarlight; (b) on *Euonymus japonicus cv. "Aureopictum"*; (c) on *Euonymus latifolius*.

(a)

(b)



(c)

Lepidoptera

Libytheidae

– *Libythea celtis* Laich.: Its larvae have been found on *Alnus glutinosa ssp. Glutinosa*, grown next to the Ataköy Facilities on the Bartın to Mengen road on May 9th, 2005. Of the two larvae collected

as samples, one of them turned into a pupa on May 11th, 2005, while the other changed to pupal stage on May 16th, 2005 and both became adults on May 24th, 2005.

Lymantriidae

- *Lymantria dispar* L.: Çanakçıoğlu and Toper [25] have reported this insect on *Populus* x *euramericana* (02.06.1995) in Bartın-Amasra. Özkazanç [4] has observed *L. dispar* on oaks in Bartın and Karabük in 1996. During the field trips, three larvae of this insect have been identified towards the end of May 2004 on weeds near the willow trees planted in the Bartın Faculty of Forestry campus.

Saturniidae

- *Saturnia pavonia* L.: The adult insect has been found on weeds during the field trips carried out on the campus of the Bartın Faculty of Forestry on 22 April 2004.

Thaumetopoeidae

- *Thaumetopoea pityocampa* Schiff.: The larvae in bladders have been observed on the branches of *Pinus brutia* and *Pinus nigra* on March 7th, 2004, in the garden of the Official Directorate of Forestry Chief Office, and in the gardens of Arıt, Dumanlı, Yenihan and Kozcağız Forestry Management Offices.

Orthoptera

Gryllidae

- *Gryllus desertus* Pal.: Çanakçıoğlu and Toper [25] have recorded this insect on *Populus* x *euramericana* in Bartın-Karaköy, in 1995. They have been found on annual herbaceous plants in the garden of the employee residence of BFF on 03 July 2005.

Gryllotalpidae

- *Gryllotalpa gryllotalpa* L.: Çanakçıoğlu and Toper [25] have observed this insect in Bartın-Karaköy on 06 July 1995. During the field trips, they were observed while picking up the ground among the strawberries in Gaffar Village. Their nymphs were on roots of *Tulipa* sp. and *Ranunculus* sp., in Gazhane Park on April 24th, 2005. This insect was also observed among weeds in Hendekyanı district, on April 21st, 2005 and was identified near a field, situated on the road of Ağdacı Village, Bartın Faculty of Forestry, on May 18th, 2005.

3.2 *Host plants – Insect species*

Insect species damage on ornamental plants and saplings of Bartin province and its vicinity are presented in Table 1.

Table 1. Harmful insect species and their collected time, host plants, and locality.

Name of Species	Host Plants	Locality	Collected time
Libythea celtis	*Celtis australis*, *Alnus glutinosa* ssp. *glutinosa*	Mengen, Ataköy Facilities	May 9th, 2005
Chrysomela populi	*Populus nigra*	Bartın Faculty of Forestry (BFF)	June 4th, 2004
Crepidodera aurata	*Salix babylonica, Salix alba*	Ağdacı Village, BFF Karaköy	May 30th, 2004 July 6th, 2004
Plagiodera versicolora	*Salix cinerea* *Salix* sp.	Karaman Tableland Bartın-Zonguldak road	June 24th, 2004 June 30th, 2004
Pissodes piceae	*Abies bornmülleriana*	Ahmet Usta Gorge	July 31st, 2004
Graphosoma italicum	*Coriandrum sativum*	Bartın city centre	June 19th, 2004
Aphis fabae	*Philadelphus* sp.	Devrek Nursery	May 9th, 2005
Aphis farinosa	*Salix alba*	Bartın city centre	June 19th, 2004
Aphis nerii	*Nerium oleander*	Facility Establishment of the Official Municipality of Bartın	May 11th, 2005
Aphis gossypii	*Hibiscus mutabilis, H. syriacus cv. "*blue bird"	Devrek Nursery Bartın city centre	May 9th, 2005 May 11th, 2005
Myzus persicae	*Cyclamen* sp.*, Freesia* sp.	Bartın city centre BFF	January 6th,2005 April 4th, 2005
Macrosiphum rosae	*Rosa* sp.	Gazhane Park	April 27th, 2005
Chaitophorus leucomelas	*Populus nigra*	BFF	May 16th, 2005
Leucaspis pusilla	*Pinus pinaster*	BFF	May 23rd, 2005
Unaspis euonymi	*Euonymus latifolius, E. japonicus cv. "Aureopictum", Ficus starlight*	BFF Bartın city centre	Febr. 3rd, 2005 Sept. 20th, 2004 March 17th, 2005
Eulachnus rileyi	*Pinus pinea*	BFF	May 4th, 2005 June 1st, 2005
Thaumetopoea pityocampa	*Pinus brutia, Pinus nigra*	Arıt, Dumanlı, Yenihan and Kozcağız	March 7th, 2004
Cetonia aurata	*Rosa* sp.	BFF	June 4th, 2004
Melolontha melolontha	*Malus* sp., *Cupressus sempervirens*	Bartın city centre	April 25th, 2004

Table 1. Cont.

Oxythyrea cinctella	*Scabiosa* sp., *Anthemis cretica*	Bosphorus Road	June 8th, 2005
Polyphylla fullo	*Morus alba* "pendula"	Karaköy	July 8th, 2004
		Bartın city centre	May 26th, 2004 and July 18th, 2004
Forficula auricularia	*Fragaria vesca, Rosa* sp.	Bartın city centre	April 22nd, 2004
Trialeurodes vaporariorum	*Aucuba japonica*	Bartın city centre	April 24th, 2004
Cercopis vulnerata	*Lonicera* sp., *Cotoneaster horizontalis,*	BFF	May 03rd, 2004
		Bartın city centre	April 24th, 2004
Philaenus supumarius	*Salix* sp.	BFF	April 25th, 2004
			June 14th, 2004
			May 17th, 2005
Cicadelle viridis	*Populus* sp.	Ağdacı Village	May 30th, 2004
		BFF	
Coccus hesperidum	*Dieffenbachia amoena seguine 'Tropic Snow'*	BFF	April 29th, 2004
			Febr. 9th, 2005
Coccus longulus	*Spathiphyllum* sp.	BFF	August 26th, 2004
Pseudaulacaspis pentagona	*Morus alba* "pendula"	Bartın central province	April 29th, 2004
Pseudococcidae	*Urtica dioica*	Bartın central province	Sept. 20th 2004
Lymantria dispar	*Salix* sp.	BFF	May 30th 2004
Saturnia pavonia	*Salix* sp.	BFF	April 22th, 2004
Gryllus desertus	weed	BFF	July 03rd 2005
Gryllotalpa gryllotalpa	*Fragaria vesca,*	Gaffar Village	April 24th, 2005
	Ranunculus sp., *Tulipa* sp.	Gazhane Park	April 21st, 2005
		Bartın central province	May 18th, 2005

4. Discussion

According to the previous research carried out in the province of Bartın and its vicinity, it has been observed that ornamental plants and saplings have been widely and beneficially used both in indoor and outdoor living spaces (such as gardens and balconies) of private and official establishments in order to embellish the environment and to form much more attractive and appealing living areas. This has created a considerable demand for ornamental plants and this demand has been satisfied by forests, nurseries and shops that cultivate and sell ornamental plants.

In this research, it has been determined that among the seasonal ornamental plants, *Rosa* sp., *Populus* and *Salix* species, *Euonymus*, *Dieffenbachia*, *Pinus*, and *Morus alba* "*pendula*"' are subjected to the most intense insect damage. As far as this study is concerned, 34 harmful insect species

belonging 6 genus and 20 families have been identified in the regional parks and gardens where the ornamental plants are cultivated. It has been also observed that *Unaspis euonymi* Comst, *Macrosiphum rosae* L., *Chrysomela populi* L., *Thaumetopoea pityocampa* Schiff., *Aphis gossypii* Glov., *Philaenus supumarius* L., *Crepidodera aurata* Marsh., *Gryllotalpa gryllotalpa* L. and similar species have been the most numerous. *Leucaspis pusilla* Löw., *Plagiodera versicolora* Laich., *Melolontha melolontha* L., *Polyphylla fullo* L., *Lymantria dispar* L., *Thaumetopoea pityocampa* Schiff., *Trialeurodes vaporariorum* Westw and *Gryllotalpa gryllotalpa* L. can be classified among the primary physiologically damaging insects that have been distinguished in this research.

The most damaging species detected in the genus Lepidoptera living in the afforestation areas and saplings planted areas by means of landscaping design has been *Thaumetopoea pityocampa*. Despite its low density, *Lymantria dispar* is one of the species that makes its presence be felt almost every year. These moths must be monitored in terms of their biology, expansion and hosts. Although almost every reference book state that the species named as *Libythea celtis* feed on the leaves of *Celtis australis,* it has been observed in the field trips and laboratory studies that the caterpillars of this moth also eat the leaves of *Alnus glitunosa* ssp*. glutinosa*.

The damage caused by *Plagiodera versicolora* of genus *Coleoptera*, which was almost an epidemic disease for willows and aspens in previous years must be taken into consideration for uture plant protection. The adult and larvae of this insect pest caused damage to leaves by eating and skeletonising them. Moreover, they can cause severe retardation of growth and they sometimes cause host death. *Chrysomela populi* also damages the leaves of poplars. When in large numbers occur they destroy shoots and decrease wood quality. As a result, when the woody shoots are not fully bloomed, they are negatively affected by frost, so special attention that is required to minimise the damage of poplar saplings. The damage that *Crepidodera aurata* caused was by making holes on the leaves and skeletonising. It has been noted that although *Cetonia aurata*, *Melolontha melolontha*, *Polyphylla fullo* species were found in the province every year, the numbers were low and their damage is low compared to other species except *Melolontha melolontha*.

The presence of *Aphis farinosa*, *Aphis nerii*, *Macrosiphum rosae*, *Chaitophorus leucomelas*, *Aphis fabae*, *Aphis gossypii*, *Myzus persicae*, *Leucaspis pusilla*, *Unaspis euonymi*, *Eulachnus rileyi*, *Trialeurodes vaporariorum*, *Coccus hesperidum*, *Coccus longulus*, *Pseudaulacaspis pentagona*, *Cicadelle viridis*, *Philaenus supumarius* and *Cercopis vulnerata* species of the genus *Hemiptera* in the province has been confirmed. Compared to the other species, only the population of *Cercopis vulnerata* species has been marked as low. *Coccus hesperidum* has been observed as having a rather high population density on Dieffenbachia plants and thus causing the death of its host plant. *Unaspis euonymi* has been found in high numbers on the branches, stems and leaves of the cherry laurel (*Euonymus latifolius* ve *Euonymus japonicus* cv. *"Aureopictum"*), which is used abundantly in park and landscaping designs, and it has been observed that this insect causes the drying out of cherry laurels and severe retardation in their growth. It has been observed that the same insect is a pest on *Ficus starlight*, where it concentrates on the spot where the lamina is joined to the stem and on the bottom and upper surfaces of the leaves. However, as its population increases gradually, the damage it causes is more widespread leading to the early fall of leaves.

Although *Gryllotalpa gryllotalpa* of genus Orthoptera (Gryllidae) has been detected on the road between Ağdacı Village and Bartın Faculty of Forestry, the fact that it is widely disseminated

throughout the province can be also learnt from the villagers when they are asked to talk about the features of their environment. It is quite thought provoking that the rather good recognition of this insect by the inhabitants of this city, where 70% of its population is dependent on agricultural production, indicates the extent of the damage and harm that this insect causes. It has been also observed that the grasshopper of *Gryllus desertus* species does not cause much damage compared to the formerly mentioned one.

Forficula auricularia of order Dermaptera has been stumbled across in various places, and as yet, no significant damaging effects have been noticed.

When the insect species and their pests that are encountered and found in the province reconsidered, the necessity of giving priority to the global studies about the precautions related with the prevention of insect pests has come to the foreground. Firstly, the factors that pave the way for the causes and effects rises in the insect pest populations must be determined. Secondly, the biological control mechanisms that act against these insects must be investigated and put into practice. Thirdly, the predators feeding on harmful species, if any, must be protected and provided with reproduction and growth opportunities. Lastly, the application of an integrated pest management (IPM) strategy formed by incorporating other control techniques may be considered in the regions where the damage is highly visible.

In Bartın and its vicinity, as long as the utmost care is shown to the plants used indoors and outdoors spaces and necessary precautions are taken in case of the possible disasters caused by insect pests, much healthier and good-looking finer plants will surround our environment.

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References

1. Toper, A. *Insects damage on poplar trees in Bartın area*. M.Sc. Thesis, Zonguldak Karaelmas University, July 1995.
2. Lodos, N.; Önder, F.; Pehlivan, E.; Atalay, R.; Erkin, E.; Karsavuran, Y.; Tezcan, S.; Aksoy, S. *Faunistic Studies on Scarabaeoidea (Aphodiidae, Cetoniidae, Dynastidae, Geotrupidae, Glaphyridae, Hybosoridae, Melolonthidae, Ochodaeidae, Rutelidae, - Scarabaeidae) (Coleoptera) of Western Black Sea, Central Anatolia and Mediterranean Regions of Turkey*; Ege University Basımevi, Bornova: İzmir, Turkey.
3. Arslan, Y. *Insect species damaging on elm, common alder, maple and willow in Bartın province*. M.Sc. Thesis, Zonguldak Karaelmas University, August 1998.
4. Özkazanç, N. K. *Insects damage on oak, beech, and hornbeam trees in Bartın area forests*. M.Sc. Thesis, Zonguldak Karaelmas University, August 1998.
5. Özbek, H.; Güçlü, Ş.; Hayat, R.; Yıldırım, E. *Pests of vineyards, orchards and ornamental plants*. Atatürk University Publications No. 792. Faculty of Agriculture Department of Plant Protection, Atatürk University: Erzurum, Turkey, 1998.

6. Toros, S. *Harmful Insects of Parks and Ornamental Plants*, 3rd Ed.; Agricultural Research Faculty, Ankara University: Ankara, Turkey, 1996; Publication No: 1450.
7. Toper, A. *Plant Protection*; Bartın Forest Research Faculty, Zonguldak Karaelmas University: Bartın, Turkey, 2001; Publication No. 18.
8. Ecevit, O.; Tuncer, C.; Hatat, G. *Plant Protection*, 4th Ed.; Ondokuz Mayıs University: Samsun, Turkey, 2002.
9. Anon. *Data of Bartın Meteorology Directorate, 2006*.
10. Hille Ris Lambers, D. On Mounting Aphids and Other Soft-skinned Insects. *Entomologische Zeitschr.* **1950**, *13*, 55-58.
11. Düzgüneş, Z. *Collecting, Preserving and Microscopic Preparation of Small Arthropods*; Ministry of Agriculture and Rural Affairs, General Directorate of Protection and Control: Ankara, Turkey, 1980.
12. Çanakçıoğlu, H. *Collecting-Preparation-Preserving and Identification of Insects*; Forest Research Faculty, Istanbul University: Istanbul, Turkey, 1993; Publication No. 3768.
13. Çanakçıoğlu, H.; Mol, T. *Forest Entomology, Harmful and Useful Insects*; Forest Research Faculty, Istanbul University: Istanbul, Turkey, 1998.
14. Demirsoy, A. *Entomology (Main Rules of Life, Invertebrata-Insects)*; Biology Department, Life Science Faculty, Hacettepe University: Ankara, Turkey, 1992; Volume 2, Part 2.
15. Gür, S. *Investigations on Trialeurodes vaporariorum (Westw.) (Hom. Aleyrodidae). Damaging on Raising with Commercial Purposes Ornamental Plants in Izmir and Surrounding Areas*; Ege University: Izmir, Turkey, 1992.
16. Özdemir, I.; Toros, S. Harmful Aphidoidea (Homoptera) Species on Seasonal Ornamental Plants in Parks in Ankara. *Türkiye Entomoloji Dergisi* **1997**, *21*, 283-298.
17. Toros, S. *Rose (Rosa spp.) Aphids*; Agricultural Research Faculty, Ankara University: Ankara, Turkey, 1992; Volume 42, Chapters 1-4.
18. Yaşar, B. *Investigations on Diaspididae and Coccidae (Homoptera: Coccoidea) Families Damaging on Ornamental Plants in İzmir*. Ph.D. Thesis, Ege University, 1990.
19. Kenber, L. A. *Ornamental and House Plants*, 3rd Ed.; Inkilap Publisher: Kayseri, Turkey, 1995.
20. Burnie, G.; Forrester, S.; Greig, D.; Guest, S.; Harmony, M.; Hobley, S.; Jackson, G.; Lavarack, P.; Ledgett, M.; McDonald, R.; Macoboy, S.; Molyneux, B.; Moodie, D.; Moore, J.; Newman, D.; North, T.; Pienaar, K.; Purdy, G.; Silk, J.; Ryan, S.; Schien, G. *Botanica*;, Könemann: Hagen, Germany, 1999.
21. Yılmaz, H. *Biotopes Mapping in Bartın Province and Near Vicinity*; Life Sciences Institute, Istanbul University: Istanbul, Turkey, 2001.
22. Veliağagil, H. T. *Houseplants*; Yedinci Publisher: Altınova/Yalova, Turkey, 2003.
23. Tekin, E. *The Most Beautiful Wild Flowers of Turkey*; Turkish Isbank Culture Publications, 2005.
24. Richards, O.W.; Davies, R.G. *IMMS' General Textbook of Entomolgy*, 10th Ed.;; Chapman & Hall: London, U.K., 1994; Volume 2: Classification and Biology.
25. Çanakçıoğlu, H.; Toper, A. *Insects of Poplar Trees in Bartın Area*; Forest Research Faculty, Istanbul University: Istanbul, Turkey, 1999; Series A, 49-2.

26. Toper Kaygın, A.; Yıldız, Y. A Threatening Species for Willows and Poplars in Bartın: *Crepidodera aurata* (Marsh.) (Coleoptera, Chrysomelidae). *Proceedings of the Second Plant Protection Congress of Turkey,* Isparta, 2007; p. 238.
27. Toper, A. Observations concerned biology of *Plagiodera versicolora* (Laich.) (Col., Chrysomelidae) and Damage on *Salix cinerea* L. in Bartın and Karabük. In *Proc. 3rd International Symposium on New and Nontraditional Plants and Prospects of Their Utilization*, Pushino: Moscow, Russia, 1999; pp. 231-233.
28. Toper, A. Some Harmful Insect Species Determined on *Abies bornmülleriana* Mattf. and Their Importance in the Western Blacksea Region. *Gazi Üniversitesi Orman Fakültesi Dergisi* **2003**, *3*, 153-164.