

## ***Mordwilkoja vagabunda* (Walsh, 1863) a New Record for Turkey Aphid (Hemiptera, Aphididae: Pemphigini) Fauna**

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### **ABSTRACT**

*Mordwilkoja vagabunda* (Walsh, 1863), Poplar Vagabond Aphid was sampled for the first time on *Populus nigra* in Bartın Province of Turkey. It was also determined as new record for the Turkey's aphid fauna.

*Keywords:* *Mordwilkoja vagabunda*, first record, *Populus nigra*, Turkey.

### **INTRODUCTION**

Aphids are sucking insects. They feed by the phloem sap of the plants. Some of them form galls, these species are called gall forming aphids. The form of the gall can be attributed to chemical substances present in aphid saliva. The composition of saliva differs in each species and therefore in the way it affects leaf development (Forrest and Dixon, 1975). These species live inside the galls. Galls not only give protection to the aphid, but may also provide a better food source. A gall provides sheltered protection for the aphid from insect predators and parasitoids. The aphid feeding may influence the metabolism of the plant causing physiological changes that could improve the food quality (Capinera, 2008).

*Mordwilkoja vagabunda* (Walsh, 1863) is the only species of the genus *Mordwilkoja*. It is a gall forming aphid (Noma et al., 1996) and has a holocyclic life cycles. The life cycle of the species has to be reported eg. Overwinters as sexual egg. One following another generations in the seasonal cycle of *M. vagabunda* are egg, fundatrix, fundatrigenia, alienicola, sexupara and sexual (Ignoffo and Granovsky, 1961). An overwintering egg in an old gall encloses in the spring when the host tree resumes new growth. The first generation individuals, fundatrix, migrates from the gall to an opening bud where it feeds on the apical meristem. The feeding transforms the leaf stipule meristem into a dense irregular mass which eventually encloses the aphid. At this time, the gall becomes necrotic and external surface of the gall becomes dry, splitting to form openings into the interior of the gall. Exit holes allow mature winged fundatrigeniae, alates to migrate from the cottonwood to an undetermined summer host plant. There are possibly two or three generations on the secondary host. After

then return to cottonwood hosts and enter into the old galls. (Ignoffo and Granovsky, 1961; Noma, 1995; Tillesse et al., 2008).

In autumn the galls don't fall but turn woody and black, remain on the tree the following year (Harper, 1959). Black galls hang on the trees after the leaves have fallen and produce an unsightly appearance in the winter. Since the aphids return to the old galls and lay eggs in them, the same trees are often infested year after year while trees nearby remain uninfected (Anonymous, 1991).

This is about the insect's host information from different authors are as follows: *Lysimachia terrestris*, *L. vulgaris*, *L. nummularia* (Primulaceae) (Blackman and Eastop, 2006b), cottonwood tree (*Populus* spp.) (Blackman and Eastop, 2006a; Noma, 1995; Smith, 1971), *Populus deltoides* (Guyton, 1924; Ignoffo and Granovsky, 1961), aspen and other *Populus* species (Cranshaw et al., 1994; Anonymous, 1991), in Canada, this species is on *P. tremuloides* (Tillesse et al., 2008). Cottonwood species means are *Populus deltoides*, *P. fremontii*, *P. nigra* species in general (Anonymous, 2009b). All of them are belong to the *Aigeiros* subgenus (Yin et al., 2008). However, an information about the host species noun is *P. nigra* of this insect is not found yet in Europe and Turkey.

Adults are approximately 4,76 mm long, yellow-green, pear-shaped, with relatively long antennae and delicate, membranous wings. Nymphs are wingless, smaller and paler than adults (Cranshaw et al., 1994).

## MATERIALS AND METHODS

Galls samples were collected from three *Populus nigra* in Bartın (Table 1). Two of the trees which is infected close to (6-7m) each other and third one is far (nearly 3 km) of them. Different stages of gall formation photos were taken with Samsung Pro-815 on the tree and adult and nymph were put under the Olympus SZX7 microscope and photographed with a digital camera. Preparation and identification of samples were carried out according to Blackman and Eastop (2006a, 2006b) and Anonymous (1991). Systematic knowledge and synonyms of determined species were taken from Remaudière and Remaudière (1997).

Table 1. Collecting information of *M. vagabunda* in Bartın.

Tree Species	Location	Coordinates	Altitude(m)	Date
<i>Populus nigra</i>	Bartın University Campus	41° 35' 43" N 32° 20' 51" E	72	05.06.2009
<i>Populus nigra</i>	Bartın University Campus	41° 36' 04" N 32° 21' 11" E	74	05.06.2009
<i>Populus nigra</i>	Cumhuriyet Street	41° 37' 25" N 32° 19' 28" E	15	10.06.2009

## RESULT AND DISCUSSION

Remaudière *et al.* (2006) declared about 410 aphid species in Turkey. Recently Görür *et al.* (2009) identified six new aphid species from Eastern Black Sea Region

of Turkey and they declared that Turkish aphid fauna raised up to 446 species. Toper Kaygin et al. (2010) added three new species. But they didn't mentioned record of *Mordwilkoja vagabunda* from Turkey. In Bartın, Toper (1995) has recorded 16 insect species on poplar trees, Kaygin et al. (2008a) have identified 34 insect species damage on ornamental plants and saplings, Kaygin et al. (2008b) have identified altogether 31 aphid species on woody plants, and Kaygin et al. (2009) have identified 28 aphid species on herbaceous and shrub plants. So far this species has not been recorded from any parts of the Turkey.

### **Subfamily: Pemphiginae**

Tribe: Pemphigini Herrich-Schaeffer, 1854

Genus: *Mordwilkoja* Del Guercio, 1909

Species: *Mordwilkoja vagabunda* (Walsh, 1863)

= *oestlundi* T.D.A. Cockerell, 1906 (*Pemphigus*) (Remaudière and Remaudière, 1997).

It generally colonize on cottonwoods (*Populus deltoides*) in USA. Despite that, no record has been given yet on *Populus nigra* from Turkey and Palearctic region. So, it is the first record from Turkey at the same time. Only one record from Europe on the *Lysimachia vulgaris* L. (Primulaceae) in Germany and Poland (Holman, 2009). It indicates that, *Lysimachia vulgaris* is potential secondary host of *M. vagabunda*.

There are a variety of body forms, sizes, and colours for vagabond gall aphids depending on their age and generation. The easiest way to identify the vagabond gall aphid is by its association with galls (Noma et al., 1996; Figs. 1a, b).

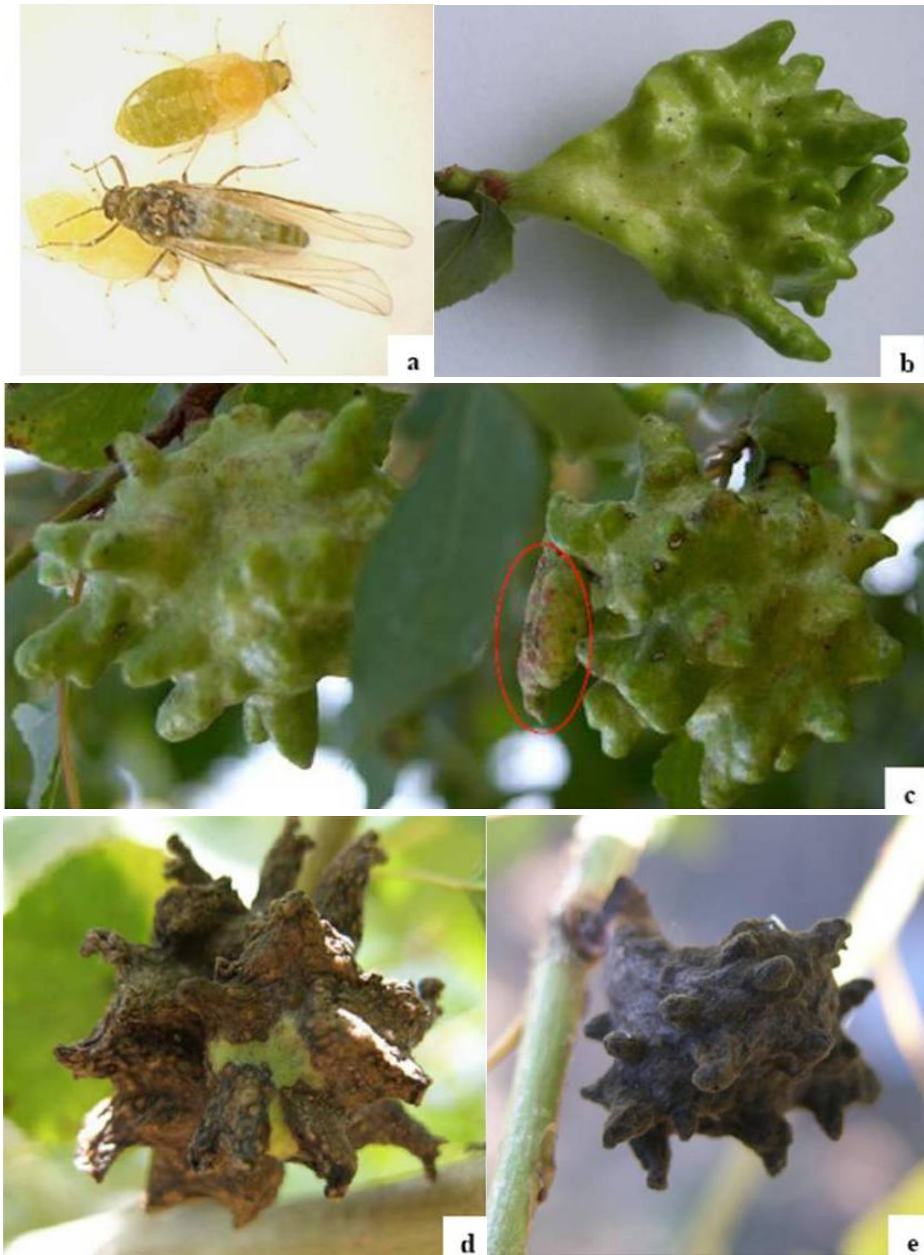
Aphids overwinter as egg that hatch in spring about the time new leaves expand. Young nymphs move to new shoots where they feed on sap. Initially infested leaves are reddish; later they become twisted and hollow (Anonymous, 2009a; Figs. 1c).

Poplar vagabond aphid feeds on the sap of *Populus nigra* as primary host, causing galls on the branch. When the galls mature they change colour from green to brown, after then black. We did not have a chance collect samples on potential secondary host (Figs. 1 b, d, e).

As this species samples were found only on 3 poplar species in study area, *Mordwilkoja vagabunda* does not require any attention in terms of control. It doesn't normally kill trees but can severely reduce their aesthetic value.

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Figs. 1 a-e. a) Adult (winged) and nymphs (termed fundatrix) of *M. vagabunda* (11.VI.2009), b) Green gall formation of *M. vagabunda* (05. VI.2009), c) Reddish, twisted and hollow infested leaves of *Populus nigra* (10.VI.2009, d) Brown gall formation of *M. vagabunda* (19.VI.2009) e) Black gall formation of *M. vagabunda* (24.VII.2009).

## REFERENCES

- Anonymous, 1991, *Common Pests of Trees in Ontario*. Ontario Ministry of Natural Resources. Queen's Printer, Toronto, 84.
- Anonymous, 2009a, *Poplar Vagabond Aphid-Mordwilkoja vagabunda*. <http://www.unl.edu/nac/insects/gall/page6.pdf>. 03.08.2009.
- Anonymous, 2009b, *Populus* section *Aegiros*. [http://en.wikipedia.org/wiki/Populus\\_sect.\\_Aegiros](http://en.wikipedia.org/wiki/Populus_sect._Aegiros). 23.11.2009.
- Blackman R.L., Eastop V.F., 2006a, *Aphids on the World's Trees, An Identification and Information Guide*. CAB International in association with The Natural History Museum, England, VIII+987.
- Blackman R.L., Eastop V.F., 2006b, *Aphids on the World's Herbaceous Plants and Shrubs. Volume 2, The Aphids*. John Wiley&Sons, Ltd. Natural History Museum, England, VIII+1439.
- Capinera, J. L., 2008, *Encyclopedia of Entomology*, 2nd edn, Volume 4, Springer Science+Business Media B.V., Florida, 4346.
- Cranshaw, W., Leatherman, D., Kondratieff, B., 1994, *Insects That Feed on Colorado Trees and Shrubs*, Colorado State University Cooperative Extension, Bulletin 506A, Colorado, USA, 176.
- Forrest, J. M. S., Dixon, A. F. G., 1975, The induction of leaf-roll galls by the apple aphids *Dysaphis devecta* and *D. plantaginea*. *Annual Applied Biology*, 81: 281-288.
- Görür, G., Işık, M., Akyürek, B., Zeybekoğlu, Ü., 2009, New Records of Aphidoidea from Turkey. *J. Ent. Res. Soc.*, ISSN: 1302-0250, 11 (3): 1-5.
- Guyton, T.L., 1924, A Taxonomic, Ecologic and Economic Study of Ohio Aphididae. *The Ohio Journal of Science*, Vol. XXIV, No.1: 30.
- Harper, A. M., 1959, Gall Aphids on Poplar in Alberta I. Description of galls and distributions of Aphids. *Canadian Entomologist*, 9:489-496.
- Holman, J., 2009, *Host Plant Catalog of Aphids, Palaearctic Region*. ISBN: 978-1-4020-8285-6, Springer Science+Business Media B.V., 1216.
- Ignoffo, C.M., Granovsky, A.A., 1961, Life history and gall development of *Mordwilkoja vagabunda* (Homoptera: Aphidae) on *Populus deltoides*. *Annals of the Entomological Society of America*, 54: 486-499.
- Noma, T., 1995, Biology and cultural control of *Mordwilkoja vagabunda* (Homoptera:Aphididae) infesting Cottonwood in southeast Wyoming. MSc thesis, Department of Plant, Soil and Insect Sciences and Graduate School of the University of Wyoming, 58.
- Noma T., Wangberg J.K., Brewer M.J., 1996, Basic description of the poplar vagabond gall aphid's identification, life cycle, damage, and management options. University of Wyoming Cooperative Extension Service Laramie, Wyoming, 2.
- Remaudière, G. & Remaudière M., 1997, *Catalogue of the World's Aphididae*, ISBN: 2-7380-0714-7, ISSN: 1150-3912, Inra, Paris, 473.
- Remaudière G, Toros S, Özdemir I., 2006, New Contribution to the Aphid Fauna of Turkey (Hemiptera, Aphidoidea), *Revue Française d'Entomologie* (N.S.), 28 (2): 75-96.
- Smith, C. F., 1971, The life cycle and redescription of *Mordwilkoja vagabunda* (Homoptera: Aphididae). *Proceeding of the Entomological Society of Washington*, 73(4): 359-367.
- Tillesse V., Nef L., Charles J., Hopkin, A., Augustin S., 2008, *Damaging Poplar Insect (Internationally Important Species)*, FAO International Poplar Commission, Rome, Italy, 105.
- Toper A., 1995. Insects Damage on Poplar Trees in Bartın. M.Sc. Thesis, Zonguldak Karaelmas University.
- Toper Kaygın A., Sönmez Yıldıız H., Ülğentürk S., Özdemir I., 2008a, Insect Species Damage on Ornamental Plants and Saplings of Bartın Province and Its Vicinity in the Western Black Sea Region of Turkey. *International Journal of Molecular Science*, 9: 526-541.
- Toper Kaygın A., Gorur G., Cota F., 2008b, Contribution to the Aphid (Homoptera:Aphididae) Species Damaging on Woody Plants in Bartın, Türkiye. *International Journal of Natural and Engineering Science* 2(1): 83-86, <http://www.nobelonline.net/UserFiles/File/14Atoper.pdf>

- Toper Kaygin A., Gorur G., Sade F. C., 2009, Aphid (Hemiptera: Aphididae) Species Determined on Herbaceous and Shrubs Plants in Bartın Province in Western Black Sea Region of Turkey. *African Journal of Biotechnology*, Vol. 8 (12): 2893-2897.
- Toper Kaygin, A., Gorur, G., Cota, F., 2010, New records of aphid fauna in Turkey. *Journal of Insect Science*. Vol. 10, Article 5. <http://www.insectscience.org/10.5/i11536-2442-10-5.pdf>
- Yin T., DiFazio S., Gunter L., Zhang X., Sewell M., Woolbright S.A., Allan G., Kelleher C., Douglas C., Wang M., Tuskan G., 2008, Genome structure and emerging evidence of an incipient sex chromosome in *Populus*. *Genome Research*, 18(3): 422–430.

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