

Research Article

Damage ratio of the Asian chestnut gall wasp, *Dryocosmus kuriphilus* Yasumatsu, 1951 (Hemiptera: Cynipidae) in Samsun Province of Türkiye: First ReportBurak Akyüz ^{1*}, İslam Saruhan ^{2*}, Ümit Serdar ¹¹ Ondokuz Mayıs University, Faculty of Agriculture, Department of Horticulture, Samsun-Türkiye² Ondokuz Mayıs University, Faculty of Plant Protection, Department of Horticulture, Samsun-Türkiye**ABSTRACT**

The Asian chestnut gall wasp *Dryocosmus kuriphilus* Yasumatsu (Hymenoptera, Cynipidae) is a critical pest that threatens chestnut cultivation. The chestnut gall wasp causes yield losses by deforming the buds of the infected trees. This pest, which was first detected in Italy in 2002 in Europe, was seen in Gacık village of Yalova province in 2014 in Türkiye. In the following years, it spread to Bursa, Istanbul, Sakarya, Kocaeli, Balıkesir, Bilecik, Düzce, Giresun, Bartın, Zonguldak, Sinop and İzmir provinces. In this study, the orchard of chestnut gene resources belonging to the Ali Nihat Gökyiğit research station in Samsun province was examined for the presence of the Asian chestnut gall wasp. As a result of the study, the presence of the Asian chestnut gall wasp was determined in the cultivars 'Marigoule' and 'Macit 55'. As a result of the counts made in 50 cm parts of the branches, it was determined that the presence of chestnut gall wasp is in a higher population in the 'Marigoule' cultivar than in the other cultivars. However, the invasion in Samsun is at the early stage.

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isaruhan@omu.edu.tr**1. Introduction**

Chestnut (*Castanea sativa* Mill.) is an important nut that grows worldwide (Soylu, 2004). It affects human life in the past as it is today (Conedera et al., 2004). In historical periods, chestnut culture in various parts of Europe has been so indispensable for the survival of mountain communities that these cultures have been described as 'chestnut civilizations' (Gabielli, 1994). People can benefit from its nuts, timber, and honey (Soylu, 2004). However, there are some pests and diseases that threaten chestnut cultivation. One of the significant and most popular pests is *Dryocosmus kuriphilus* Yasumatsu (Hymenoptera: Cynipidae). It is commonly known as the Asian chestnut gall wasp (ACGW).

The first damage of the ACGW was recorded in China in 1941 (Zhang et al., 2009). It was first noted in Europe in Italy in 2002 (Brussino et al., 2002). After 12 years, in 2014 the ACGW damage was observed in Yalova province of Türkiye for the first time (Çetin et al., 2014). As of 2022, gall wasp has been noted in the provinces of Yalova, Bursa, İstanbul, Sakarya, Kocaeli, Balıkesir, Bilecik, Düzce, Giresun, Bartın, Zonguldak, Sinop and İzmir in Türkiye (Çetin et al., 2014; Mıcık and İpekdağ, 2021; Mıcık et al., 2021; Yıldız et al.,

2020). Also, other province are in the risk to face with this pest.

In this study, chestnut genetic research orchard of the Ali Nihat Gökyiğit research station in Samsun was observed for the ACGW.

2. Materials and methods

The field study was conducted in 2022 in the Samsun province of Türkiye. The chestnut orchard is in the Ali Nihat Gökyiğit research station (coordinates: 41° 23' 53" N; 36° 03' 34" E). In the orchard, 'Akyüz', 'Ali Nihat', 'Bouche de Betizac', 'Macit 55', 'Marigoule' cultivars and BL genotype were examined for the ACGW. For each cultivar and genotype, 15 plants were observed. The galls on ten branches, 50 cm were randomly counted in the trees where the gall wasp was detected.

The study was designed with three replications and each replication had five plants. Percent values were subjected to AsinH transformation. Data were analyzed statistically in RStudio (2021.09.0+351 Release for macOS) package program, and Duncan Multiple Range Test determined the significance level of the differences between the means.

3. Results and discussion

The collected galls were examined and *D. kuriphilus* was identified. The ACGW was only observed in the cultivars ‘Macit 55’ and ‘Marigoule’ cultivars (Figure 1). No galls were observed on other cultivars or genotypes (Table 1). However, Çil (2018) tested these cultivars and genotypes in the Yalova province of Türkiye and found that only the ‘Akyüz’ cultivar was resistant to the ACGW (Çil, 2018). Furthermore, the ‘Marigoule’ cultivar was the most sensitive cultivar among the tested ones, as Sartor et al. (2015) and Çil (2018) stated. Unlike, Çil (2018), no galls were observed on the ‘Ali Nihat’ cultivar and BL genotype (Table 1). However, in the study of Çil (2018), the actual damage was observed in the second year.

Table 1. Infected plant ratio according to the cultivars and genotype

Cultivar/Genotype	Infected plant ratio (%)
Akyüz	0.00 b*
Ali Nihat	0.00 b
BL	0.00 b
Bouche de Betizac	0.00 b
Macit 55	25.00 a
Marigoule	60.00 a
P	***

*Different letters within the same column are statistically significant (Duncan test, P<0.01).

In addition, the orchard in the the Ali Nihat Gökyiğit research station was designed mainly for adaptation studies. In the orchard, there are other cultivars and genotypes. As the invasion is in the beginning stage, the ACGW population is low. Therefore, they could be attracted to more sensitive cultivars like ‘Marigoule’.



Figure 1. The appearance of the galls in the ‘Marigoule’ cultivar.

The number of galls was only counted in damage plants. The ‘Marigoule’ cultivar had the highest number of galls, 10.82. It was followed by ‘Macit 55’ cultivar with 1.04. In the ‘Marigoule’ cultivar, the number of galls is higher than in other cultivar (6 galls/twig) (Battisti et al., 2013) (Table 2). ‘Macit 55’ cultivars number of galls in 50 cm branch is low due to the ACGW damage is in the beginning stage. In Sinop city, a neighbor of Samsun, 17 galls per 50 cm chestnut branch was counted (Mıcık and İpekdağ, 2021).

Also, this data shows that the ACGW damage in Samsun is in the beginning stage.

Table 2. Number of average galls on a 50cm branch according to the cultivars and genotype

Cultivar/Genotype	number of average galls on a 50 cm branch (pieces)
Akyüz	0.00 c*
Ali Nihat	0.00 c
BL	0.00 c
Bouche de Betizac	0.00 c
Macit 55	1.04 b
Marigoule	10.82 a
P	***

*Different letters within the same column are statistically significant (Duncan test, P<0.01).

4. Conclusion

The ACGW is a harmful invasive pest, and it spreads quickly. As it is the first report in Samsun, the invasion is in the beginning stage. Even no galls were observed in sensitive cultivars or genotypes. Therefore, the development in the coming years should be followed closely and biological control should be started. Biological control with *Torymus sinensis* Kamijo (Hymenoptera Torymidae) is promising however this parasitoid infects the ACGW eggs. So it should be released after the invasion of the ACGW. Also, in early stage of the invasion, green pruning can be applied to reduce damage ratio.

Compliance with Ethical Standards

Conflict of Interest

As the author of article declare that there are no conflicts of interest with respect to the research, authorship, and/or publication of this article.

Authors’ Contributions

Burak Akyüz: Methodology, Investigation, Conceptualization, Writing - original draft. **İslam Saruhan:** Methodology, Review and editing. **Ümit Serdar:** Methodology, Review and editing.

Ethical approval

Not applicable.

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Data availability

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Consent for publication

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