



Araştırma Makalesi / Research Article

Determination of Beneficial Insect and Mite Species in the Vineyard Areas of Hazro District (Diyarbakır)

Hazro İlçesi (Diyarbakır) Bağ Alanlarındaki Faydalı Böcek ve Akar Türlerinin Belirlenmesi

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ABSTRACT

There are many insect and mite species from different order and families that cause damage to vineyards. Therefore, it is important to use biotechnical methods as well as biological and chemical control in a certain combination in the fight against harmful species in order to preserve the natural balance between living things in the ecosystem. In this way, it will be possible to protect and support the beneficial insect and mite fauna in the fight and control of harmful insects. For this purpose, the study was carried out weekly in two vineyards of 10 decars each between 2021-2022 years to check beneficial insect and mite species in the vine yard areas in Hürriyet and Yazgı neighborhoods of Hazro District of Diyarbakır Province. In this study, prey species were collected using the sweep net, Japanese umbrella, as well as the visual inspection method. The study yielded findings on *Coccinella septempunctata* (Linnaeus), which belongs to the Coccinellidae (Coleoptera) family, as well as *Hyperaspis quadrimaculata* (Redtenbacher), *Hippodamia variegata* (Goeze), and *Chrysoperla carnea* (Stephens), all of which belong to the Chrysopidae (Neuroptera) and *Macaroeris nidicolens* (Walckenaer, and Th), belonging to the Salticidae (Araneae) family. A total of 6 predator species, including *Xysticus* sp. belonging to the (Araneae) family, needs to be clarified.

ÖZ

Bağlarda zarar yapan farklı takım ve familyadan çok sayıda böcek ve akar türü vardır. Geleneksel tarım üretiminde zararlı türlerin olumsuz etkilerinden korunmaya yönelik yapılan önemli aktivitelerden biriside bitki koruma uygulamalarıdır. Dolayısıyla ekosistemde canlılar arasında

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var olan doğal dengenin korunması amacıyla zararlı türlerle mücadelede biyoteknik yöntemleri yanı sıra biyolojik ve kimyasal mücadeleyi belirli bir kombinasyon içinde kullanmak önemlidir. Bu şekilde zararlı böceklerin mücadelesinde ve kontrol altında tutulmasında faydalı böcek ve akar faunasının korunması ve desteklenmesi mümkün olacaktır. Bu amaç doğrultusunda, çalışma Diyarbakır İli, Hazro İlçesi, Hürriyet ve Yazgı mahallelerindeki, bağ alanlarındaki faydalı böcek ve akar türleri saptamak için, 2021-2022 yıllarında, her biri 10'ar dekar olan 2 bağda, haftalık olarak yürütülmüştür. Çalışmada, gözle kontrol yönteminin yanı sıra, darbe yöntemiyle atrap ve japon şemsiyesi kullanılarak, predatör türler, toplanmıştır. Çalışma sonucunda Coccinellidae (Coleoptera) familyasına ait *Coccinella septempunctata* (Linnaeus), *Hyperaspis quadrimaculata* (Redtenbacher), *Hippodamia variegata* (Goeze), Chrysopidae (Neuroptera) familyasına ait *Chrysoperla carnea* (Stephens), Salticidae (Araneae) familyasına ait *Macaroeris nidicolens* (Walckenaer, ve Thomisidae (Araneae) familyasına ait *Xysticus* sp. olmak üzere toplam 6 adet predatör tür belirlenmiştir.

1. INTRODUCTION

Grapes, one of the earliest domesticated fruit species, are a significant source of nutrition for humans, offering fresh, dried, and various other uses. They are also one of the most widely cultivated plants globally due to their adaptability to a range of climates and soils and the ease of their propagation methods [1].

According to the World Food and Agriculture Organization (FAO), as of 2020, viticulture was conducted on approximately 6.9 million hectares of land worldwide. Spain led the way, accounting for 13.4% of the global production area, followed by China, France, Italy, and Türkiye. In 2020, global fresh grape production increased by 1.34% compared to the previous year, reaching a total of 78 million tons. China was the leading producer, with a production of 14.8 million tons, followed by Italy with 8.2 million tons and Türkiye with 6.8 million tons. In 2020, grape production in Türkiye was estimated at 4.2 million hectares [2].

Southeastern Anatolia contributes significantly to Turkey's overall production, accounting for 17.97% of the total output. Diyarbakır, one of the key provinces in the region, is a major player in viticulture, as indicated by Karataş et al. (2015). According to TUIK's 2021 data, Diyarbakır cultivates grapes on a grand total of 171,675 decares, with a grape production quantity of 100,727 tons and an average yield of 630 kg per decare [3].

In the Hazro district of Diyarbakır, 3,400 decares are dedicated to grape cultivation, resulting in a harvest of 3,060 tons. Although the Mazruni variety is common in the area, 11 local grape varieties are also grown. The popular local Mazruni variety, which is widely cultivated in Diyarbakır and enjoyed in the region, is among these varieties. Locally, grapes are traditionally used to make molasses, fruit pulp, and walnut sausages [4].

Unfortunately, several diseases and pest species pose a significant threat to grape production in Turkey. These pests can damage the buds, flowers, stems, matures, roots, stems, and leaves of vines. Additionally, chemical control methods employed to combat these harmful species can have detrimental effects on human health and the environment. Therefore, it is crucial to develop sustainable and effective strategies to manage these pests and protect grape crops.

2. MATERIAL AND METHOD

The subject matter of this study encompasses vineyard plots spanning 10 decares in the Yazgı and Hürriyet neighborhoods of the Hazro district in Diyarbakır province. These areas were deemed suitable for the study's aims. Furthermore, the study employed a range of equipment, including Japanese umbrellas, traps, killing bottles, mouth aspirators, petri dishes, eppendorf tubes, paper bags, and culture containers (70%), as well as alcohol and other laboratory materials.

2.1. Visual Inspection Method

During the vegetation period in both vineyards, buds, flowers, leaves, shoots, stems and clusters were visually inspected from 4 different directions of randomly selected vines, according to the phenological periods of the plant, and the beneficial individuals found there were collected with the help of forceps or a mouth aspirator. Those in the adult stage were killed in the killing bottle, and those in the pre-adult stage were taken together with the plant parts they were found in and cultured in the laboratory, allowing them to transition to the adult stage. Adult individuals obtained as a result of the culturing process were classified and prepared for diagnosis.

2.2. Sampling by Pulse Method

To collect specimens of predator and parasitoid species, beneficial individuals were struck into the Japanese umbrella using a stick with a rubber tube attached to its end. This was done by hitting one branch from four different directions in the vineyards, which were randomly selected and counted using a specific method. Two strikes were made in total. In addition, in both vineyards, a suitable number of traps was shaken to catch the species on the weeds. Among the individuals who fell into a Japanese umbrella and were caught with a trap, the smaller ones were collected with a mouth aspirator, and the larger ones were collected with forceps and a brush and transferred to killing bottles. After they were killed in the vials, they were placed in Petri dishes with the necessary label information and brought to the laboratory.

3. RESULTS AND DISCUSSION

Predation types determined in the vineyard trial areas in the Hürriyet and Yazgı neighborhoods in Hazro District from 2021-2022 to are reported in Table 1.

Table 1. Beneficial species determined in Hürriyet and Yazgı vineyard areas in 2021-2022 years

ORDER	FAMILY	SPECIES
Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i> (Linnaeus)
		<i>Hyperaspis quadrimaculata</i> (Redt.)
		<i>Hippodamia variegata</i> (Goeze)
Neuroptera	Chrysopidae	<i>Chrysoperla carnea</i> (Stephens)
Araneae	Salticidae	<i>Macaroeris nidicolens</i> (Walckenaer)
	Thomisidae	<i>Xysticus</i> sp.

According to the data presented in Table 1, a total of six beneficial species were detected in the trial areas. Specifically, three of these species belonged to the Coccinellidae family within the Coleoptera order, while one species belonged to the Chrysopidae family within the Neuroptera order, and another belonged to the Salticidae family within the Araneae order, with one species belonging to the Thomisidae family in the same order. These species are generally known to be predators. In a similar study, they conducted a study of 32 vineyards in the villages or towns of Erzincan Central district in 1997 and 1998. In these studies, the important beneficial insect species *Nabis punctatus* (L.), *Coccinella septempunctata* (L.), *C. quatuordecimpustulata* (L.), *Scymus apetzi* (Mulsant), *Psyllobora vigintidupunctata* (L.), and *Chrysoperla carnea* (Stephens) were determined in the vineyard areas. [5]. A study conducted in vineyards established in Hatay province between 2005 and 2009 reported a total of 10 useful species, six of which were from the Coleoptera, three from the Hymenoptera, and one from the Neuroptera order [6]. However, Özgen and Karsavuran [7] found one plant belonging to the Chrysopidae (Neuroptera) family, one plant belonging to the Thomisidae (Araneae) family, 1 plant belonging to the Erythraeidae (Acarina) family, one plant belonging to the Salticidae (Acarina) family, in the vineyard areas of Diyarbakır, Mardin and Elazığ provinces between 2006 and 2007. They were identified a total of 19 predator species, including two species belonging to the Araneae family and 14 species belonging to the Coccinellidae (Coleoptera) family. Additionally, Kaplan et al. [8] in a study conducted in the olive groves of Mardin Province, found Araneidae (4), Clubionidae (1), Dictynidae (1), Gnaphosidae (1), Eutichuridae (1), Linyphiidae (2), Prodidomidae (1), They reported that they identified 26 spider species belonging to the families Philodromidae (1), Salticidae (7), Theridiidae (3), and Thomisidae (4).

Species belonging to the Coccinellidae family were identified at the two locations where the study was conducted. Most species in the family Coccinellidae are predators. Larvae and adults have

been widely used in biological control in recent years because they feed on insects such as aphids, thrips, spider mites, and spider mites [9, 10, 11], each of which feeds on more than 30 harmful species, particularly aphids [12].

In vineyard regions where surveys were carried out, the adults and larvae of Chrysopidae family member *C. carnea* were frequently detected. Previous research has indicated that the adults of *C. carnea* primarily feed on nectar and pollen, while their larvae are predators of thrips, aphids, and small caterpillars [13]. According to reports, the larvae of *C. carnea* are also preyed upon by sweet potato and greenhouse whiteflies, spiders, leafhoppers, and a variety of harmful butterfly caterpillars, each of which has a development cycle of 2-3 weeks and can eliminate 200 or more pests or harmful eggs per week [14]. Kaya and Öncüer [15] and Yoldaş [16] have both documented that *C. carnea* is a polyphagous species, and its larvae consume thrips, aphids, crustaceans, lepidopter eggs and larvae, psyllids, larvae of the Chrysomelidae family, certain mite species, and whiteflies.

In the vineyard regions of the Hazro district, where the study was undertaken, one spider species belonging to the Salticidae family, as well as one each from the Araneae and Thomisidae families, were identified. Spiders are carnivorous and predatory groups that play a significant role in ecosystems by maintaining natural balance by feeding on harmful insects in the areas where they are found [17, 18, 19, 20, 21, 22, 23, 24]. According to the study conducted to determine the spider fauna and density in the vineyard areas of Mardin province, 24 spider species belonging to 10 families of the Araneae (Arachnida) order were identified [25]. Furthermore, the study aimed to determine the harmful and beneficial insect species and the population changes of some important species in three different grape varieties (Perlette, Hönüsü, and Red Globe) in the vineyard area of the Siirt University Kezer campus resulted in the identification of one species belonging to the order Neuroptera and five predator species, four of which belong to the order Coleoptera [26].

4. CONCLUSION

This research aimed to identify predator species in the vineyard areas of Hürriyet and Yazgı neighborhoods in the Hazro district of Diyarbakır Province, where the Mazruni grape variety is prevalent. The research findings will help reduce pest damage and minimize production losses for local producers. Additionally, the study aims to raise awareness about environmental protection in agricultural enterprises and to highlight the responsibilities of these businesses. Furthermore, the results of this study will be beneficial to organic grape producers in the region and will contribute to fostering environmental awareness in the local community.

CONFLICTS OF INTEREST

The authors that there are no conflicts of interest.

DECLARATION OF ETHICAL CODE

In this study, the authors assume that they comply with all the rules within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" and that they have not carried out any of the actions under the title of "Actions Contrary to Scientific Research and Publication Ethics" of the relevant directive.

AUTHORS' CONTRIBUTIONS

Ramazan SERMEN: Literature search, collection, compilation, and preparation of samples for diagnosis and article writing. Mehmet KAPLAN: Planning and management of the study, compilation, and article writing.

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