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# Zoological and Entomological Letters

## Utilization of pomegranate flower phenology in determining the pest management timing of *Cimbex quadrifasciata* Müller, 1766 (Hymenoptera: Cimbicidae)

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### Abstract

The study was conducted in Eğıl and Hani provinces of Diyarbakır in 2021. *Cimbex quadrifasciata* Müller, 1766 (Hymenoptera: Cimbicidae), which causes significant damage to almond trees, was observed in nature, and the phenology of the flowers of the pomegranate trees around was examined and the pest biology and the phenology of the pomegranate flower were compared. As a result of the study; while the pomegranate flower is in bud form, the 1<sup>st</sup> larval stage, when the pomegranate flower is in mid-blooming state, the 3<sup>rd</sup> larval stage, and when the pomegranate flower is fully bloomed, the 5<sup>th</sup> larval stage were observed. This study has the characteristics of being the first study which reveals the relationship between pomegranate flower phenology and *C. quadrifasciata*'s larval stages. The results of the study are important in terms of the biological period of the pest with the time and selection of the pesticide to be discarded, by using it in predictive early warning studies of the pest.

**Keywords:** pomegranate flower phenology, almond, *Cimbex quadrifasciata*, prediction and early warning

### Introduction

Almond is one of the important fruit species for our country. There have been significant increases in almond cultivation in recent years (Anonymous, 2021) <sup>[1]</sup>. However, since the demand for almonds cannot be met domestically, they are being imported. Recently, the area of almond production has been increasing rapidly around the world. The countries that produce the most almonds are listed as USA, Spain, Iran and Morocco. Significant plant protection problems in almond agroecosystems have led to economic losses. One of these pests; *Cimbex quadrifasciata*, Müller, 1766 (Hymenoptera: Cimbicidae) is a very important pest in Turkey and around the world. Bolu *et al.*, (2005) <sup>[2]</sup> determined a total of 205 species belonging to 11 orders and 56 families in their study in the almond fields of Diyarbakır, Elazığ and Mardin provinces. Among these species, *C. quadrifasciata* was determined as the dominant species with a rate of 51%. This pest causes significant damage in almond fields. This species is especially harmful to almonds in the region, as well as cherries, apricots, peaches and pears. Until now, there is no effective practice in the fight against this pest. Synthetic insecticides against the pest are applied randomly, and these applications negatively affect the beneficial insects in the agroecosystem (Ecevit, 1988) <sup>[3]</sup>. It is important to determine the period when this pest begins to emerge in nature and to identify the fighting time, both in terms of the effectiveness of the fight against the pest and in terms of reducing the number of pesticides to be discarded. It is known that the blooming periods of the plants observed in the same period in nature are important in terms of being host to parasitoids. It has been proven in the fight against many pests that the phenology of the plant in which the pest is found is important in prediction and early warning studies. However, no study has been conducted in which the relationship of phenological periods in different plants with the biological period of a pest of another plant growing in the same region has been observed. In this respect, the connection between the appearance of *C. quadrifasciata* in nature and the state of flowers in pomegranate trees is important since this study serves as a model for prediction and early warning studies in pest control.

### Material and Methods

The studies were conducted in Hani and Eğıl provinces in Diyarbakır between the dates of

03.05.2021 and 15.06.2021. In each province, the relationships between pomegranate phenology and biological states of the pest were examined by analyzing one tree in almond orchards and one pomegranate tree which have been infested by a pest. The larvae were collected from almond trees and their numbers and biological periods were recorded. (Table 1 and 2). Besides, by examining of the blooming of the pomegranate flowers, pomegranate flower phenology and larvae biological stages were compared. In each orchard, 100 pomegranate flowers on 10 branches of the pomegranate trees were examined and their blooming states were recorded. The biological states of the *C. quadrimaculata* larvae which were collected by the impact

method from 50 trees that were chosen randomly every week and the phenological status of 100 pomegranate flowers in the pomegranate orchards were checked.

**Result and Discussion**

As a result of the study, when the pomegranate flower is in bud form the 1<sup>st</sup> larval stage, when the pomegranate flower is averagely bloomed the 3<sup>rd</sup> larval stage, and when the pomegranate flower is fully bloomed the 5<sup>th</sup> larval stage was in dense. Larval stages are shown in Figure 1, and the number of larvae depending upon the provinces are shown in Table 1 and Table 2 according to the blooming stages.



**Fig 1:** Pomegranate Flower Status and *Cimbex quadrimaculata* Müller, 1766 larval stages.

**Table 1:** Number of larvae/period of *Cimbex quadrimaculata* pomegranate flower period (Eğil province)

Sampling Date/ Pomegranate Flover Status	BUD State	Medium bloom	Full bloom
3.05.21	0	0	0
10.05.21	32 ex./1.stage larvae	0	0
17.05.21	42 ex./1.-2. stage larvae	11 ex./2.stage	0
21.05.21	0	86 ex./2.3. stage larvae	0
27.05.21	o	112 ex. /3. stage larvae	0
03.06.21	o	66 ex./4.stage	0
10.06.21	o	24 ex./4.stage	134 ex. /5.stage larvae
15.06.21	o	o	162 ex. /5.stagelarvae

**Table 2:** Number of larvae/period of *Cimbex quadrimaculata* pomegranate flower period (Hani province)

Sampling Date/ Pomegranate Flover Status	BUD State	Medium bloom	Full bloom
3.05.21	3 ex.	0	0
10.05.21	64 ex./1.stage larvae	0	0
17.05.21	89 ex./1.-2. stage larvae	0	0
21.05.21	0	166 ex./3.stage larvae	0
27.05.21	0	182 ex. /3.stage larvae	0
03.06.21	0	88 ex./4.stage	0
10.06.21	0	92 ex./4.stage	182 ex. /5.stage larvae
15.06.21	0	0	315 ex./5.stage larvae

Consequently, this study has the characteristics of being the first study which reveals the relationship between pomegranate flower phenology and *C. quadrimaculata*'s larval stages. The data of this study are important in terms of early warning and prediction in farmer conditions. According to the blooming status of the pomegranate plant, it can be estimated which biological stages of the pest in these provinces are dense in nature. The data are important for the fighting time of this pest and the selection of the insecticide.

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