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Determination of Harm Forms in Grain Fields of the Genus *Platycleis* Fieber, 1853 (Orthoptera: Tettigoniidae) in Güroymak, Bitlis, Türkiye

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Abstract: In this study, species belonging to the genus: *Platycleis* Fieber 1853 which have shown large population increases in agricultural lands and especially in cereal products in recent years, have been identified and species identifications have been made. Species identified are *Platycleis affinis* Fieber, 1853, *P. intermedia* Serville, 1838 and *P. escalerai escalerai* Bolivar, 1899. These species reach a density of 30-50 per m^2 in the lands where they are found, and it has been determined that they damage plant products. Although the numbers reached by the species could not reach a herd-like reproduction, it was determined that they caused damage after a certain density. However, it has been observed that they cause economic loss in products. It has been determined that these species increase the damage size by intensifying in certain periods on the crops they damage, wild wheat, wheat, barley, and corn plants. In-plant protection against these pests, preventive measures within the framework of integrated pest management principles, cultural control practices, and the use of biological control agents at the focal point show significant results that appear to have been taken.

Platycleis Fieber, 1853 cinsine ait bazı türlerin tahıl arazilerinde zarar biçimlerinin belirlenmesi, Güroymak, Bitlis, Türkiye

Anahtar Kelimeler
Platycleis, Tarım, Zararlı, Biyolojik mücadele

Öz: Bu çalışmada, son yıllarda başta tahıl ürünleri olmak üzere tarım arazilerinde büyük popülasyon artışları gösteren ve zarara neden olan *Platycleis* Fieber, 1853 cinsine ait türler tespit edilerek teşhisleri yapılmıştır. Teşhisi yapılan taksonlar; *Platycleis affinis*, Fieber, 1853; *P. intermedia* Serville, 1838 ve *P. escalerai escalerai* Bolivar, 1899' dir. Bu türlerin bulundukları arazilerde m^2'de 30-50 adet arasında bir yoğunluğa ulaşmakla birlikte bitkisel ürünlere zarar verdikleri tespit edilmiştir. Türlerin ulaştıkları sayılar sürü şeklinde bir çoğalmaya ulaşamasa da bu yoğunluktan sonra zarar oluşturdukları belirlenmiştir. Ayrıca ürünlerde ekonomik kayba neden oldukları görülmüştür. Bu türlerin zarar verdikleri ürünler; buğdaygillerden yabani buğday, buğday, arpa ve mısır'dır. Bu çalışma ile bu türlerin ürünlerin belli dönemlerinde bitkiler üzerinde yoğunlaşarak zarar boyutunu artırdıkları tespit edilmiştir. Bu zararlılara karşı bitki korumada, entegre zararlı yönetimi ilkeleri çerçevesinde koruyucu önlemler, kültürel mücadele uygulamaları ve odak noktada biyolojik mücadele ajanlarının kullanımının sonucunda önemli sonuçlar elde edildiği, daha hızlı sonuç alınmak istenirse son uygulamalar olarak çeşitli bitkisel kaynaklı ekstraklar ile biyopestisitlerin kullanılmasıyla da zararlılar ile mücadelede etkin sonuçlar alındığı görülmektedir.

1. INTRODUCTION

Insects, which constitute a large part of the biological diversity on earth, are an important group in the ecological and economic lives of humans and other living things. Members of this group are found almost everywhere from the equator to the poles, from deserts to forests, from high mountain areas to low plains, from swamps to caves, from cold water sources to agricultural areas, and from our homes to hot springs [1].

Insects are a class with very different characteristics from all living. The species has been always dominant in systematics and deserves to be a superior living group

with its population characteristics and various other adaptation differences. Grasshoppers, which stand out with their many features, are in the Orthoptera order and show different characteristics from other orders among insects. Grasshoppers are an essential component of both healthy and degraded grassland ecosystems. Many of these insects are found in natural and anthropogenic habitats (pastures, wetlands, agricultural fields, lawns, etc.). Grasshoppers stimulate plant growth, participate in the nutrient cycle, and play an important role in food chains [2,3,4,5,6]. Some locusts are proposed as ecological indicators of ecosystem qualities and the effectiveness of ecological networks [7]. On the other hand, when their populations reach catastrophic proportions, locusts are among farmers' most devastating enemies. Locust epidemics (infestation); occur with *Schistocerca gregaria* (Forskål, 1775), *Nomadacris septemfasciata* (Serville, 1838), *Locusta migratoria* Linnaeus, 1758, *Calliptamus italicus* (Linnaeus, 1758) and *Dociostaurus maroccanus* (Thunberg, 1815). Locusts continue to occur in abundance on all continents except Antarctica, affecting the livelihoods of one in ten people in the world. Today, locust outbreaks are decreasing in frequency and size with better control and implementation of preventive strategies [8,9]. However, the invasions of the herds continued in certain years. During the 2003–2005 outbreak of the Desert locust *S. gregaria* in Africa, more than eight million people experienced crop loss of around 80% to 100% [10]. Broad-spectrum neurotoxins have been used on a total of 13 million hectares in 22 countries on three continents to combat locust swarms. Such transcontinental operation, including food aid for the infested population, has cost the world community more than half a billion dollars [1].

The spawning period of grasshoppers is 10 days, and their number varies between 80-180 individuals. They reach adulthood in about 6-7 weeks. The most effective factor in the formation of grasshoppers is temperature. While the temperature is between 25-35 ºC under optimum conditions, it can sometimes rise to 35 ºC. Annual total locust loss is between 5% and 65% for various reasons. About 10% of these are habitat-based, 3-4% cannot spawn, 40% become prey, and 10% are mold, bacteria, etc. shows features. The number of grasshoppers increases 400 times during the summer months. It is reported that they destroyed the food of 35 thousand people in 1 day and traveled 150 km. It has been reported that the number of locusts in 1 km^2 is between 40-80 million [11].

2. MATERIAL AND METHOD

In this study, the visual inspection method, gauze trapping method and pitfall trap method were used to obtain specimens. In the visual control method, by going diagonally in the area where the survey was made, the above-ground organs of the plant in the agricultural lands were visually examined, and samples were collected from the nymphs and adults of the species belonging to the order Orthoptera. In the pitfall trap method, before the harmful species in the nymph stage are transformed into winged form, wide and deep pits are opened in front of them in the field, and the sample species are ensured to fall into these pits and are caught in this way and taken into insecticide boxes. This method, within the framework of plant protection control methods, is an important application in controlling the population numbers of winged grasshoppers until the 2nd nymph stage and in all life stages of wingless forms, and in neutralizing harmful species. The gauze trapping method is applied as a method that allows catching winged grasshoppers and obtaining samples in this way by using a 30x45 cm circle and a device made of tulle wrapped around this circle with a handle attached to it. Samples of this study were collected between April and September of 2019-2021. The study was carried out over two years and 12 months. Areas where the land is densely built; It was ensured that the sample species were obtained collected and analyzed under laboratory conditions in the wheat fields located in the Güroymak district and rural areas between the of Bitlis and Muş provinces. [Figure 4].

3. RESULTS

Classis: Insecta
Ordo: Orthoptera
Subordo: Ensifera
Family: Tettigoniidae Krauss, 1902
Genus: *Platycleis* Fieber 1853

The structure of the head is generally small and the pronotum is flat. Wings specifically front ones usually mottled, and hind wings are transparent and plain. The ovipositor is in an upward direction. The first part of the titulators is spineless (Figure 1). Carinas are usually prominent in metazoa and the significant difference between species is determined by the wing structure and color. The average length of the ovipositor is between 9-17 mm [Figure 2,3] [12,13].

Figure 1. *Platycleis affinis* Fieber 1853 [14].

Figure 2. Figure 2. *Platycleis affinis* Fieber 1853 [15].

Figure 3. Figure 4. *P. escalerai escalerai* Bolivar, 1899 [16].

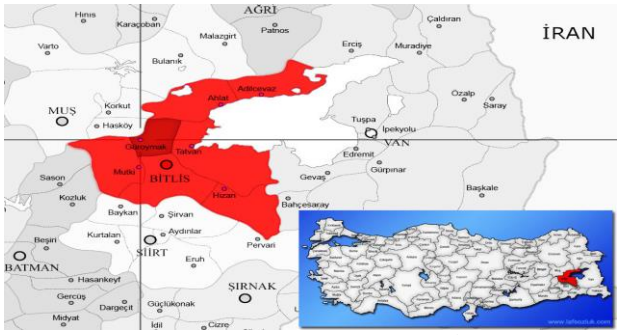

Figure 4. Figure 1. Research area in Bitlis-Güroymak.

4. DISCUSSION AND CONCLUSION

Genus *Platycleis* is the structure of the head generally small and the pronotum flat. The wings, specifically the front ones, are usually spotted, while the hind wings are transparent and plain. The ovipositor is pointed upwards. The first part of the titilators is spineless. Carinae are generally evident in metazoans, and the significant differences between species are determined by the wing structure and color. The average length of the ovipositor is between 9-17 mm. Grasshoppers appear as a systematic category that causes the most damage in agricultural production within the class of insects. With its biological characteristics and adaptation abilities to climatic changes, it can spread to very wide areas. It can reach very large populations, especially due to its herd-forming abilities, and can destroy many other plant products, especially cultivated plants, by living and acting together. It has been understood that the increase in the reproductive capacity of grasshoppers depending on the developmental stages is mainly because of atmospheric events, especially the increase in temperature and precipitation are the determining factors in this situation. It is seen that drought conditions experienced in certain periods can also lead to an increase or decrease in grasshopper populations. It should not be forgotten that swarm movements of locusts threaten the lives of many people and have increasing importance in terms of food security. It has been determined that when they form a herd, they consume enough food for thousands of people in one day, and they move very fast and travel very long distances. Taking precautions against locusts within the framework of scientific methods, applying warning and monitoring systems effectively, and timely implementing control strategies-methods in plant protection are seen as inevitable. Some of the natural enemies of locusts have undertaken certain tasks in biological control. Certain bird species in nature are among the most important of these creatures. It is known that there are partridge, crow, stork, starling, and goldfinch species that gather in flocks to reduce the species population of grasshoppers, especially during the nymph period. It has been determined that the birds known as starlings among the people seriously affect the grasshopper population in a flock and their harmful potential is extremely reduced. Several Orthoptera species were identified as primary pests, and their populations were found to be under pressure from their natural enemies. By recognizing and managing these natural enemies very well, it will be ensured that residue problems do not occur without the need for chemical control. As a result, ensuring the continuity of ecological balance, protecting natural resources, and preventing them from being damaged can be achieved with these measures.

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