



(RESEARCH ARTICLE)



Investigation of entomological pests in important cultural plants growing in Batman province and applications in integrated control

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Abstract

In this study, various pests were detected in wheat, corn, pistachio, cotton, and vineyards, which are important cultural plants grown in Batman provinces and districts of Turkey, and the ways of integrated pest management were investigated. Between 2011 and 2016, the application of chemical struggles was carried out with the control program carried out with the support of the state. It has been determined that the program usually takes place in widely grown crop plants and fields. In addition, training was given to many producers, farmers, and technical staff. It was emphasized that by making an integrated struggle for many plants produced, the importance of destroying common pests will increase the agricultural production of the region and contribute to the economy. The aim of this study is to determine the entomological pests commonly seen in important cultural plants grown in Batman province, to implement integrated control methods, and to make programs and practices that will ensure that necessary precautions are taken in the future.

Keywords: Entomological pests; Grasshopper; Integrated; Chemical control; Batman

1. Introduction

Insects, which are at the head of the most crowded groups in the living world, are divided into many teams. The grasshoppers, which are the subject of our research, are among the insect species belonging to the Orthoptera (*Straight-winged Insects*) order. Grasshoppers are shown as the most important species of the Orthoptera order. Considering their general characteristics, it is striking that they have a very strong head, thorax, and abdomen. The bite-chewing features of their mouth structures and their long wings and their migration to long distances have caused these species to be among the most dangerous species for agricultural areas. Most grasshoppers cause serious damage to plants and especially to agricultural products. Recently, it has been determined that the neighboring countries close to our country have caused serious damage to agricultural products in our country and especially in the countries in the African continent and the Middle East countries. It has been determined by researchers that certain species that act as a herd threaten plant production very seriously [1, 2].

In many countries of the world, locusts invade and plunder tens of thousands of hectares of land every year and prevent crops from being cultivated. For this reason, it causes hundreds of thousands of people face hunger. According to the information obtained, as of March 2020, the extent of the destruction of the desert locust (*Schistocerca gregaria*), one of the locust swarms that started from the countries in the horn of Africa and reached the borders of our country, was revealed because of the researches. Every year, in many regions of our country, invasions by different species cause serious crop losses and economic damage [3].

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The field mouse, which is another pest, usually has a stocky body, a large head, a flattened nose, and short ears. The tail is short compared to the body. The back feathers are dark gray on the underside and brown, and red above. The abdomen is white or off-white. The body is 9-18 cm, the tail is 2-5 cm long and the body weight is 30-60 grams [4]. The control method, which includes agricultural processes that make the life of field mouse pests difficult, and reduce or prevent their reproduction, are cultural measure [5]. In addition, there are mechanical and physical control, and biological and physical control methods [6].

2. Material and methods

In this study, poisonous bait, zinc, phosphide, and vaseline were used as materials, especially in drug control. This study, within the framework of the data of Batman Agriculture Provincial Directorate; Between 2011 and 2016, Batman province central villages with Integrated pest management principles in an area of approximately 100 thousand decares; Demirlipinar, Yediyol, Akça, Balpınar, Çarıklı, Yaylıca, in the town of Beşiri; In Değirmenüstü, Yenipınar, Yarımtaş, Yalınkavak, Oğuz, Kozluk District; Surveys were carried out in an area of 80 thousand decares in Derince, Beşkonak, Beybağı, and Yazpınar localities, and where necessary, pesticides were used within the framework of chemical control. It has been determined that 16 kg of pesticides have been used in a total area of 400 decares for the grasshopper species of Orthoptera fauna as the most pests in the relevant areas.

3. Results and discussion

The results were carried out in the form of control methods applied in the field, pesticide applications, farmer training, and pest detection. Data on vole control in Batman between the years 2011-2012 and 2014-2015 are presented in Table 1.

Table 1 Field mouse struggle [7]

Years of manufacture	Program (da)	Survey area (da)	The fighting area (da)	Amount of poison bait used (kg)	Amount of zinc, phosphide used (kg)	Vaseline used (lt)
2011-2012	200000	200000	240000	1200	24	
2012-2013	200000	200000				
2013-2014	200000	200000				
2014-2015	200000	200000	60000	300	6	7,5
Total	800000	800000	300000	1500	30	7,5

When Table 1 is examined, between the 2011-2012 season and the 2014-2015 season, 200000 decares were included in the program in all seasons, and 200000 decares of surveys were carried out in all of them. In the 2011-2012 season, 240000 decares struggled, and in the 2014-2015 season, 60000 decares struggled. 24 kg of zinc phosphide was used in the 2011-2012 season and 6 kg in the 2014-2015 season. The amount of poison bait used is 1200 kg in the 2011-2012 season and 300 kg in the 2014-2015 season. 7.5 liters of Vaseline was used in the 2014-2015 season.

Table 2 Grasshopper fighting situation in Batman [7]

District	Village area	field of struggle (da)	Amount of pesticide used (kg)
Kozluk	Derince	150	6
Kozluk	Beşkonak	125	5
Kozluk	Beybağı	75	3
Kozluk	Yazpınar	50	2
Total		400	16

As seen in Table 2, the highest combat area was in Derince village (150 decares). Beşkonak village, on the other hand, is in second place in the fight against locusts at 125 da. The number of pesticides used in Derince, Beşkonak, Beybağı, and Yazpınar villages was 6, 5, 3, and 2 kg, respectively.

Considering the state aid locust program in 2015 and the drug situation, while the program in the fight against locusts is 2000 decares, the amount of work is 400 decares. The active substance as a medicine is Cypermethrin. The need for the program in 2016 is 1600 decares. The foundation date of the current drug is 2020 and 64 liters have been determined.

An integrated study was carried out in Batman in 2014 on wheat, pistachio, cotton, and corn. The integrated struggle that took place in 2014 is given in Table 3.

Table 3 Integrated struggle 2014 realization status [7]

Integrated Pest management	District	Locality (Village)	Program		Applied		Number of trained farmers
			Number of gardens	Area (decare)	Number of gardens	Area (decare)	
Wheat	Center	Demirlipınar	20	13000	20	13000	40
	Center	Çarıklı	7	3000	7	3000	10
	Center	Yaylıca	8	4000	8	4000	14
	Total		35	20000	35	20000	64
Pistachio	Beşiri	Değirmenüstü	1	100			10
	Beşiri	Yenipınar	1	100			30
	Beşiri	Yarımtaş	1	100			20
	Beşiri	Yalınkavak	1	100			10
	Beşiri	Oğuz	1	100			14
	Total		5	500			84
Cotton	Center	Akça	2	3000	1	300	24
	Total		2	3000	1	300	24
Corn	Center	Demirlipınar	4	9000	3	14000	54
	Center	Yediyol					
	Center	Akça					
	Center	Balpınar					
	Total		4	9000	3	14000	54

As can be seen in Table 3, the entire program in the integrated struggle with wheat has been realized and a total of 64 farmers have been trained. Pistachio integrated control program was not realized, but 84 farmers were trained. 10% of the cotton integrated control program in terms of area and half of the number of gardens has been realized. In the Egyptian integrated control program, 75% of the number of gardens was realized, much more than the area was realized.

3.1. Wheat Integrated Struggle Application (2015)

In 2015, the "weed broadleaf" pest was combated on 20000 decares, the "weed narrow-leaf" pest on 20000 decares and field mouse disease on 300 decares of land by means of chemical control in wheat integrated control 2015.

Wheat was planted on a total of 779058 decares in 2015. An integrated struggle on 20000 decares was carried out with 50 farmers and 2 technical staff. The struggle was made with 2.35% of the total planting. Circles were used in combat.

The struggle was applied to 35 gardens and fields and addressed to 85 farmers. During the struggle, 40 farmers and 4 technical personnel were trained.

3.2. Corn Integrated Struggle Practice (2015)

Control of weed pests was carried out in 2000 decares by chemical spraying. In the program, the entire application was implemented in 2000 decares with 5 producers.

Corn plant was planted on 51689 decares and integrated cultivation was carried out in 2000 decares with 5 producers and 2 technical staff. The struggle was made with 2.31% of the total planting.

3.3. Pistachio Integrated Struggle Application (2015)

In the integrated control of pistachios, "*Capnodis spp* (Seedling bottom worm)" disease and pest were combated by chemical spraying in 500 decares, and by trapping (Pheromone) branch moth (*Kermania pistacella* pest) in 500 decares.

Pistachio was planted on a total of 35000 decares in 2015. An integrated struggle on 500 decares was carried out with 10 farmers and 2 technical staff. 1.42% of the total planting has struggled. The trap was used in combat. During the struggle, 8 farmers and 4 technical staff were trained.

3.4. Vineyard Integrated Struggle Application (2015)

Table 4 The situation of integrated struggle in 2015 [7]

Integrated Pest Management	District	Locality (Village)	Program		Applied		Number of trained farmers
			Number of gardens	Area (decare)	Number of gardens	Area (decare)	
Wheat	Center	Demirlipınar	20	10000	10	10000	36
	Center	Çarıklı	10	5000	10	5000	10
	Beşiri	Tepecik	5	5000	5	5000	5
	Beşiri	Bilek					
	Total		35	20000	25	20000	51
Pistachio	Beşiri	Değirmenüstü	1	100			3
	Beşiri	Yenipınar	1	100			15
	Beşiri	Yarımtaş	1	100			5
	Beşiri	Yalınkavak	1	100			3
	Beşiri	Oğuz	1	100			4
	Total		5	500			30
Corn	Center	Yediyol	2	1000	2	1000	6
	Center	Akça	1	500	1	500	5
	Center	Balpınar	2	500	2	500	5
	Total		5	2000	5	2000	16
Vineyard	Center	Suçeken	1	10	1	10	3
	Center	Gercüş	2	40	2	40	5
	Center	Kesmeköy					
	Total		3	50	3	50	8

In 2015, an integrated control was carried out against the diseases and pests of "Powdery Mildew (*Uncinula necator*", "Mildew (*Plasmopara viticola*)" and "Cluster Girdler (*Lobesia botrana*) by chemical spraying in vineyard integrated control, in an area of 50 decare each. Integration struggle was carried out on 50 decare with 3 farmers and 2 technical personnel. Combating was carried out with 0.07% of the total planting. During the struggle, 4 farmers and 3 technical personnel were trained.

In Batman, an integrated struggle was carried out in the fields of wheat, pistachio, corn, and vineyards in 2015 (Table 4).

As can be seen in Table 4, in the integrated control of wheat, 20000 decare were included in the program, all of which were realized and a total of 51 farmers were trained. 500 decare are planned for the integrated pistachio control program. The program did not take place, but 30 farmers were trained. In the corn integrated struggle, the entire 2000 decare area program has been realized and 16 farmers have been trained. In the vineyard integrated struggle, 50 decare were included in the program and realized. 8 people were trained.

4. Conclusion

Batman is a city located in the South-eastern Anatolia Region of Turkey, where agricultural products are made intensively, adjacent to Diyarbakır, Mardin, Siirt, and Şırnak provinces and where there are dense agricultural lands. In general, the center of the city and the rural areas close to it are plain-type areas with many large and small and in some places business lands. In recent years, it has been determined that there are various plant pests in peanut and vineyard areas, especially cereals, which are the most common products. Very important control methods, especially at the institutional level, have been applied against these pests and a significant level of success has been achieved.

In the province of Batman, a plant protection struggle was carried out against grasshoppers and voles, which are harmful in certain agricultural areas, in some central districts and villages of these districts between 2011 and 2016. Integrated control was carried out in wheat, pistachio, corn, and vineyard fields which are widely grown in the region. Wheat-integrated control was carried out chemically, and the entire program was successfully implemented in 2014 and 2015 in terms of the number of gardens and areas. Corn-integrated control was carried out by chemical spraying. While more than what was in the program in 2014, the whole program was realized in 2015. Pistachio integrated control was carried out using trap and chemical spraying methods. Vineyard integrated control was done by the chemical spraying method. While the vineyard was not included in the program in 2014, the entire program was realized in 2015. In the 2016 program, 20000 decare of wheat, 1000 decare of pistachios, 3000 decare of corn, and 80 decare of vineyards were included in the integrated struggle program. This situation shows that the integrated struggle with the important pests detected in the cultivated plants grown in Batman province will continue. The necessity of applying cultural measures and biological control methods within the framework of integrated control management against the grasshopper pest, which causes high damage especially to cereals and other economically important plants for many years, has emerged, but due to the serious damage due to measures not taken on time, the cost of inputs in chemical control has emerged. Entails a significant loss. In addition, while it is possible to reduce the field mouse pest below the economic damage level and keep it at the threshold with mechanical control methods rather than chemical control, the cost and damage may increase with the measures are not taken in time and the chemical control pesticides applied. It is recommended that manufacturers take these important points into consideration.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

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