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ARAŞTIRMA MAKALESİ **RESEARCH ARTICLE**

Determination of The Loss Ratio on Some Melon Varieties From The Melon Fly, *Myiopardalis pardalina* (Bigot, 1891) (Diptera: Tephritidae)

Kavun sineği, *Myiopardalis pardalina* (Bigot, 1891) (Diptera: Tephritidae)'nin Bazı Kavun Çeşitlerindeki Zarar Oranının Belirlenmesi

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Abstract

It is wel known that the homeland of the Melon (*Cucumis melo*), which is a one-year reptile body, belonging to the Cucurbitaceae family, is Asia. Iran, Caucasus, Turkey, Afghanistan and melon species that are encountered in the wild in Turkistan form and is believed that it was spread to the world from the regions concerned. Melon fly, *Myiopardalis pardalina* (Bigot, 1891) (Diptera:Tephrtidae) is one of the most important pests in melon grown areas in the Southeastern Anatolia Region. When the melon approximately reaches the size of a hazelnut, the larvae hatched from the eggs that have been left by the female in the fruit shell feed on the flesh and move towards the house of fruit seed with the tunnels they open, leading to various damages. Such damaged melons are not preferred by consumers. Moreover, invincible losses decrease the commercial market value of melon. In this research, data related to different methods of struggle of melon fly which has caused significant economic losses in Southeastern Anatolia region were obtained in the nature conditions. This study was carried out in Diyarbakır Province Çınar District Şükürlü Village (Diyarbakır city, Turkey) in 2018-2019 under field conditions. Four melon varieties (Balhan, Balözü, VT21B and the local variety Winter melon "sliced" local genotype "VN2136") were taken into the experiment and designed with 3 replications. In order to determine the damage rate of the melon fly, 100 fruits were checked in each melon variety parcel. Control procedures were carried out weekly, counts were made and continued until the end of the season. Fruits with dishes were removed from the application plots. In the experiment studies carried out to identify the number of holes in the melon fruits, it was detected that there was no difference when considering the hole number between Balözü, Balhan, Local (winter melon "sliced" local genotype "VN2136") and VT21 melon varieties. when the data collected from this study were under analysis it was revealed that, the lowest number of holes was found in Domestic (Winter melon "sliced" local genotype "VN2136") melon varieties, and the highest hole number was found in Balözü melon variety. In this study, the damage rates of melon fly on some melon varieties were determined.

Keywords: *Myiopardalis pardalina*, Melon varieties, Damage rate, Diyarbakir, Turkey.

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Öz

Cucurbitaceae familyasına bağlı olan tek yıllık kavunun (*Cucumis melo* L.) anavatanının Asya olduğu bilinmektedir. İran, Kafkasya, Türkiye, Afganistan ve Türkistan'da vahşi doğada rastlanan kavun türlerinin ilgili bölgelerden dünyaya yayıldığı düşünülmektedir. Güneydoğu Anadolu Bölgesi'nde kavun yetiştirilen alanlarda en önemli zararlıların başında Kavun sineği, *Myiopardalis pardalina* (Bigot, 1891) (Diptera: Tephritidae) gelmektedir. Ayrıca kavunda thrips gibi birçok çok Bitki Koruma sorunları da meydana gelmektedir. Kavun meyveleri fındık büyüklüğüne ulaştığında Kavun sineği dişi bireyleri tarafından meyve kabuğuna bırakılan yumurtalardan çıkan larvalar, meyve etiyle beslenmekte ve açtıkları tüneller içinde meyve çekirdek evine doğru ilerleyerek çeşitli zararların ortaya çıkmasına neden olmaktadır. Böyle zarar gören kavunların tüketiciler tarafından tercih edilmemesi ve yenilmemesi sonucunda kavunun ticari pazar değeri düşmektedir. Bu nedenle Güneydoğu Anadolu Bölgesi'nde önemli ekonomik zarar neden olan Kavun sineği ile farklı mücadele yöntemlerine ilişkin çalışmalar yapılmıştır. Bu çalışmada ise dört kavun çeşidinde (Balhan, Balözü, VT21B ve yerel çeşit olan Kışlık kavun "dilimli" yerel genotip "VN2136") Kavun sineği'nin zarar oranı incelenmiştir. Deneme 2018-2019 yıllarında Diyarbakır ili Çınar ilçesine bağlı Şükürlü köyünde 3 tekerrürlü olarak kurulmuştur. Kavun sineği'nin zarar oranı her bir kavun çeşidi parselinde meyve fındık büyüklüğüne ulaştığında 100 adet meyve kontrol edilerek meyvedeki delik sayısı kaydedilerek belirlenmiştir. Kontrol işlemleri haftalık yapılmış ve sayımlara mevsim sonuna kadar devam edilmiştir. Her kontrolde bulaşıklı meyveler uygulama parsellerinden uzaklaştırılmıştır. Yapılan değerlendirmede her iki yılda da Balözü, Balhan, Yerli (Kışlık kavun "dilimli" yerel genotip "VN2136") ve VT21 kavun çeşitlerindeki bulaşma oranı ve delik sayısı açısından istatistiksel olarak bir fark olmadığı belirlenmiştir. Ancak sayısal olarak en düşük delik sayısı Yerli (Kışlık kavun "dilimli" yerel genotip "VN2136") kavun çeşidinde, en yüksek delik sayısı ise Balözü kavun çeşidinde saptanmıştır. Bu çalışma ile kavun sineğinin bazı kavun çeşitlerindeki zarar oranları belirlenmiştir.

Anahtar Kelimeler: *Myiopardalis pardalina*, Kavun çeşitleri, Zarar oranı, Diyarbakır, Türkiye

1. Introduction

It is well known that the homeland of the Melon (*Cucumis melo*), which is a one-year reptile body, belonging to the Cucurbitaceae family, is Asia. Iran, Caucasus, Turkey, Afghanistan and melon species that are encountered in the wild in Turkistan form and is believed that it was spread to the world from the regions concerned. The homeland of this plant, known as Cantaloupe melon, which is known and discerned in Europe and America today, is Van and Diyarbakır region, and it is recognized that melon seeds spread to Italy and then to other countries of the world (Anonim, 2011).

Turkey is ranked second in the world in melon cultivation (Anonim, 2019a). Melon production is implemented on an area of approximately 750 thousand decares in our country, and Adana comes first as the province where it is produced the most. In 2018, the average melon yield per decare was 2.386 kg and the melon production was reported to be 1.753.942 tons (Anonim, 2019b). Melon is consumed in different ways (as fresh table fruit, jam, cake, ice cream, fruit juice, yoghurt with fruit, pickles, soup, fruit salad, perfume industry, etc.) (Aras, 2015; Keçe and Kamber, 2016).

During the cultivation of melons, many plant protection problems arise. In addition, many Plant Protection problems such as thrips occur in melon (Kaplan and Bayhan, 2017). In Turkey, Azerbaijan, Iran, Armenia, Pakistan, Afghanistan and India (northern part) there is an important pest on the melon fruit namely: *Myiopardalis pardalina* (Bigot, 1891) (Diptera: Tephritidae) and the last 10 years in Central Asia (Uzbekistan, Kazakhstan, Turkmenistan and Tacikistan), it creates significant economic losses. Although studies on melon flies are not sufficient in the world and have been known in the Caucasus, Middle East and West Asia for about 100 years, their economic importance has not decreased due to the fact that the producers do not know much about this pest (Anonim, 2009).

The Tephritidae family, which is affiliated to Diptera and includes many species, is a family that has spread over wide areas in the world. Species relate to this family generally include species that cause economic damage in some fruit species. Since the larvae of the species belong to the Tephritidae family generally feed on the fruits of cultivated plants or wild plants, these are called "fruit flies". In the world, 481 genera belonging to Tephritidae family and 4.400 species belonging to this genus have been identified. In the Palearctic Region, 900 species belonging to 137 genera adhere to this family, and in our country, a total of 167 tephritid species were determined in studies conducted until 2020 (Görmez and Kütük, 2020). Fruit flies feed on plant parts such as fruit (pulp, seed), stem, flower, bud, root and leaf (Khalid, 2008).

Although the main host plant of *Myiopardalis pardalina* is melon, it is also fed in other plants of the Cucurbitaceae family [watermelon, gherkin, cucumber and some weeds (*Cucumis trigonus* Roxb*., Ecballium elaterium* (L.)) (Anonim, 2013).

The aim of this study is to determine the damage rates of melon fly on melon varieties. The results obtained will form the basis of similar studies to be conducted on this subject.

2. Material and Methods

2.1. Plant production

Seeds of melon kinds were planted in viols to be used in trials in the yards at Dicle University, Faculty of Agriculture, Department of Horticulture. Ready-made peat was placed in the trays and one seed was planted in each tray from the seeds of the melon kinds discussed in the study. Trays were checked regularly every day. Trays were irrigated at two-day intervals.

Soil cultivation and herbicide (Touchdown Premium, Glyphosate diammonium salt) application was conducted on the field in Şükurlu village (Çınar-Diyarbakır) where the study was done. Thus, the land was made fitted out for melon seedling planting. The seedlings grown in the yards environment were transported to the land in Şüküre village (Çınar-Diyarbakır, Turkey) where doctoral studies were going to be managed during the period with 4-6 seasons and melon seedlings were planted.

2.2. Determination of damage rateof the Melon fly in melon varieties

The experiment was administrated in Diyarbakır Province, Çınar District, Şükurlu Village in 2018-2019 under field conditions. In order to determine the damage rate of the melon fly, 100 fruits were checked in each melon variety parcel in 2018 and 2019. Control procedures were performed weekly, counts were made and continued until the end of the season. Fruits with dishes were removed from the application plots every sampling date. Four melon varieties (Balhan, Balözü, VT21B and the local variety Winter melon "sliced" local genotype "VN2136") were taken into the experiment and designed with 3 replications. The parcel size has been taken as 60 m2. Trials were conducted on a total area of 720 m2 in 180 m2 for each of the local genotype "VN2136" melon varieties of Balhan, Balözü, VT21B and the local variety Winter melon "sliced". There is a 2 m safety strip margin between application repetitions. It is arranged to be 2m between the rows and 1m above the rows in the planting of the plots. In total, a trial was established on an area of 1020 m^2 with safety strips. During the growing season, no insecticide spraying was applied in the experimental fields.

2.3. Determination of contamination rates of the melon fly in melon varieties in field conditions

The experiment was conducted in Diyarbakır Province, Çınar District, Şüküre Village, in field conditions in 2018-2019. In order to determine the damage rate of the melon fly, 100 fruits were checked one by one in each melon variety parcel in 2018 and 2019. The counts in the trial area were made once a week and these counts continued until the end of the season. Fruits with dishes have been removed from the parcels every sampling data. Four melon varieties (Balhan, Balözü, VT21B and local genotype (winter melon "sliced" local genotype "VN2136")) were taken into the experiment and designed with 3 replications.

2.4. Determination of number of holes in melon varieties of the melon fly under field conditions

It was carried out under field conditions in the village of Şüküre Village in Çınar district of Diyarbakır in 2018-2019. 100 fruits were checked for each melon variety parcel. The counts were made weekly and continued until the end of the season 4 melon varieties (Balhan, Balözü, VT21B and local genotype (winter melon "sliced" local genotype "VN2136")) were taken into the experiment and designed as 3 replications *(Figure 1).*

Figure 1. Melon species used in the trials (Balhan, Balözü, VT21 and Local (Winter melon "sliced" local genotype "VN2136")

2.5. Evaluation of Data

All the data obtained from these studies were analyzed using the analysis of variance (ANOVA) ready-made statistical software (SPSS IBM, SPSS Statistics 26 version). Comparison of the means was made according to Duncan (at the level of $P \leq 0.05$). Also, Excel program was used for mathematical operations.

3. Results and Discussion

3.1. Determination of contamination rate of the melon fly in land conditions

It was discoverd that there is no difference considering the melon fly and the contamination rate between Balözü, Balhan, Yerli (Winter melon "sliced" local genotype "VN2136") and VT21 melon kinds. The lowest Contamination rate of 5.29% was uncovered in the VT21 melon variety. The highest contamination rate of 8.24% was dicoverd in the Balözü melon varieties in 2018 *(Table 1).*

Table 1. The ratio of melon dish fruits among some melon varieties of Myiopardalis pardalina in 2018 in Diyarbakır province (100 fruits)

Sampling dates Melon varieties	20/07/ 2018	27/07/ 2018	03/08/ 2018	10/08/ 2018	17/08/ 2018	24/08/ 2018	31/08/20 18	Mean ± SE
BALÖZÜ	2.33	6.00	9.33	10.00	10.67	10.00	9.33	8.24±1.13 a
BALHAN	2.00	3.67	5.33	4.00	2.67	10.00	17.33	6.43±1.20 a
LOCAL VARIETY	3.00	5.67	8.00	8.67	9.33	5.33	1.33	5.90±0.99 a
VT21	1.00	3.00	4.67	4.33	4.00	8.00	12.00	5.29±1.26 a

* Different letters in the same column constitute statistically different groups (P <0.05)

The studies for 2019 were implemented using the same method (100 fruit control) conducted in 2018. Counts were made by checking 100 fruits a week and continued until harvest.

Balözü, Balhan, Local (Winter melon "sliced" local genotype "VN2136") and VT21 melon kinds did not differ in terms of the rate of contamination by melon fly. The local (Winter melon "sliced" local genotype "VN2136") was determined with the lowest Contamination rate of 1.52% in the melon variety. It was determined with the highest contamination rate of 3.14% in the melon variety VT21 *(Table 2).*

Table 2. The ratio of melon dish fruits among some melon varieties of Myiopardalis pardalina in the province of Diyarbakır in 2019 (100 fruits)

Sampling dates Melon varieties	17/08/ 2019	24/08/ 2019	31/08/ 2019	07/09/ 2019	14/9/ 2019	21/9/ 2019	28/9/ 2019	Mean ± SE
BALÖZÜ	0.00	0.00	0.00	5.33	0.00	5.00	0.67	1.57±0.9 a
BALHAN	4.33	0.00	2.67	2.00	1.00	2.00	1.00	1.86±0.57 a
LOCAL VARIETY	0.00	4.00	0.00	0.00	3.00	3.00	0.67	1.52±0.6 a
VT21	5.33	2.67	5.33	0.00	4.33	2.00	2.33	3.14±0.86 a

* Different letters in the same column constitute statistically different groups (P <0.05)

In the study undertaken by Mete (2006) in Karaman province, Irikırkağaç, Kırkağaç 637, Kırkağaç 589, Hasanbey, Sarıkışlık, Ananas, Dalaman and Süperhıdır melon varieties were used and the difference between the damage rate on these varieties was statistically insignificant. Al-obaidi (2010) stated in a study he did in Baghdad (Iraq) that Melon fly preferred Sukary kind (5.20 insects / 3 plants) among 10 types of melon.

According to the results of this study; The lowest population of Ananas melon variety was 0.63 insects / 3 plants. As a result of a study conducted by Barış and Çobanoğlu (2013), it was reported that the damage rates

caused by the melon fly in İpsala and Kırkağaç melon kinds were around 20% in both kinds. The researchers also reported that there was no statistical difference between the varieties in terms of the damage caused by the melon fly. It is similar to the case stated by different researchers (Mete 2006; Barış 2011) and obtained from this study.

3.2.Determination of Number of Holes in Melon Types of Melon Fly Under Field Conditions

Balözü, Balhan, Local (Winter melon "sliced" local genotype "VN2136") and VT21 melon varieties were determined that there was no difference between melon fly and the number of holes. The local (Winter melon "sliced" local genotype "VN2136") was determined with the lowest number of holes in the variety of 26.19. In the Balözü melon variety, 53.19 was determined with the highest number of holes in 2018 *(Table 3).*

Table 3. Number of holes in melon among some melon varieties of Myiopardalis pardalina in Diyarbakır province in 2018 (100 fruits)

Sampling dates Melon varieties	20/07/ 2018	27/07/ 2018	03/08/ 2018	10/08 /2018	17/08/ 2018	24/08/ 2018	31/08/ 2018	Mean ± SE
BALÖZÜ	6.00	31.67	57.33	59.33	61.33	72.67	84.00	53.19±7.84 a
BALHAN	2.00	18.00	34.00	21.00	8.00	78.67	149.33	44.43±11.19 a
LOCAL VARIETY	8.33	15.67	22.67	28.67	34.67	36.00	37.33	26.19±6.8 a
VT21	5.67	17.67	29.33	21.33	13.33	61.33	109.33	36.86±13.48 a

* Different letters in the same column constitute statistically different groups (P <0.05)

The studies for 2019 were carried out using the same method (100 fruit control) conducted in 2018. Counts were made by checking 100 fruits a week and continued until harvest. It was stated that there was no difference connecting to the melon fly and the number of holes between Balözü, Balhan, Yerli (winter melon "sliced" local genotype "VN2136") and VT21 melon varieties. Local (Winter melon "sliced" local genotype "VN2136") was determined with the lowest number of Holes in the local melon variety of 3.29. In the Balözü melon variety, the highest number of Holes was determined with 17.05 *(Table 4).*

Table 4. Number of holes in melon among some melon varieties of Myiopardalis pardalina in Diyarbakır province in 2019 (100 fruit)

Sampling dates Melon varieties	17/08/2 019	24/08/2 019	31/08/2 019	07/09/2 019	14/9/ 2019	21/9/ 2019	28/9/ 2019	Mean ± SE
BALÖZÜ	0.00	0.00	0.00	72.00	0.00	38.33	9.00	17.05±10.93 a
BALHAN	5.67	0.00	3.33	18.67	12.33	0.00	2.33	6.05±3.07 a
LOCAL VARIETY	0.00	4.67	0.00	0.00	9.00	8.33	1.00	3.29±1.44 a
VT21	6.67	18.67	36.00	0.00	26.67	15.67	8.67	16.05±5.81 a

* Different letters in the same column constitute statistically different groups (P <0.05)

In the field studies carried out considering the number of holes in the melon fruits, it was determined that there was no difference considering the melon fly and the hole number between Balözü, Balhan, Yerli (winter melon "sliced" local genotype "VN2136") and VT21 melon varieties. When the data obtained from this study were examined, the lowest number of holes was found in Local (Winter melon "sliced" local genotype "VN2136") melon variety, and the highest hole number was found in Balözü melon variety.

In this study, according to the results obtained in 2018 and 2019, the damage rate in the local melon variety was lower than the other melon varieties.

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