



A study on percentages of damage ratios of the European corn borer (ECB), *Ostrinia nubilalis* (Hübner) (Lepidoptera: Pyralidae) on sweet corn cultivars

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ABSTRACT

The European corn borer (ECB), *Ostrinia nubilalis* (Hübner) (Lepidoptera: Pyralidae) is one of the most important pest of grain corn and sweet corn in Turkey. The objective of this study was to assess percentage damage ratios of the ECB on stalk and corncobs of various sweet corn varieties in Reyhanlı district of Hatay province of Turkey. The studies were carried out in 2015-2016 with four different sweet corn varieties including Caremelo, Vega, Merit and Batem. After two years of the study, the ECB larvae caused significant damages on stalk and corncobs of all sweet corn varieties. The percentage damage of stalk and corncobs varied for each of the sweet corn varieties in both years. In the first year, the highest percentages of stalk damage ratios were recorded on Batem (32.45), followed by Vega (19.85), Merit (17.07) and Caremelo (16.72). In the second year, the highest percentages of stalk damage ratios were observed on Merit (59.34), followed by Caremelo (51.65), Batem (45.09) and Vega (35.49). In the first year, the largest percentages of corncobs damage ratios were recorded on Vega (25.73), followed by Batem (16.74), Caremelo (12.11), and Merit (9.30). In the second year, the highest percentages of corncobs damage ratios were observed on Caremelo (14.31), followed by Merit (13.72), Batem (9.98) and Vega (8.93). In conclusion, the largest percentages of stalk + corncobs damages ratios were observed on Batem (49.19), followed by Vega (45.58), Caremelo (28.83) and Merit (26.37) in 2015, while the highest percentages of stalk + corncobs damages ratios were recorded on Merit (73.06), followed by Caremelo (65.96), Batem (55.07) and Vega (44.42) in 2016.

Key words: The European corn borer, *Ostrinia nubilalis*, sweet corn, Turkey.

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INTRODUCTION

Sweet corn (*Zea mays* L. var. *saccharata* Sturt) is one of the most popular vegetables in the USA, Canada, Australia, India and other Asian countries. Sweet corn is a variety of maize with a high sugar content [1]. The taste of sweet corn kernels is 25-30% sweeter than normal corn. At optimum market maturity, sweet corn will contain 5 to 6% sugar, 10 to 11% starch, 3% water-soluble polysaccharides and 70% water.

Sweet corn also contains moderate levels of protein, vitamin A (yellow varieties) and potassium [1,2]. The European corn borer (ECB), *Ostrinia nubilalis* (Hübner) (Lepidoptera: Pyralidae) is known as one of the most important pests of grain corn and sweet corn [3,4]. This pest spends overwinters as a fully-grown larva in the stems and ears of corn plants [3,5]. As the weather warms in the spring, the larvae pupate and emerge later as adult moths [5]. These adults mate and the females lay eggs on the underside of the corn leaves [3]. Depending on different locations and temperature, they have two to four generations per year [3,5,6]. The ECB larva is a serious pest of both sweet corn and grain corn causing

significant damages on leaf feeding, leaf sheath and collar feeding, stalk tunneling and ear damage [3,5,7,8]. Percentage of damaged plants and counts of larvae per plant have been widely used to assess the effect of ECB infestations on grain yield of maize [3,9]. The purpose of the current study was to determine percentages of damage ratios of the ECB, *Ostrinia nubilalis* (Hübner) (Lepidoptera: Pyralidae) on sweet corn cultivars in Reyhanlı district of Hatay province of Turkey.

MATERIALS AND METHODS

Trials were conducted in 2015-2016 at the Tel-Kalis Research and Application Center of Mustafa Kemal University in Reyhanlı district of Hatay province of Turkey. Plots were established by seeding on 12 April 2015 and 16 April 2016 to row beds at 70-cm row spacing. In both trials consisted of four different sweet corn cultivars were included: Caremelo, Vega (super sweet), Merit and Batem. Plot areas consisted of four beds, 5-m long. Experimental design was randomized complete block design with 3 replications. Irrigation was done as necessary by releasing water into rows and weed control were made mechanically by hand hoeing or tractor operated. No insecticides were used on plots in both years. In order to evaluate percentage damages of stalk and corncobs, two rows were selected from each of the replication and all the sweet corn plants were assessed. The percentages of stalk damage was calculated by dividing the number of infested plants by the total number of sampled plants in each plots to evaluate the percentage of damaged stalks for each of the variety. In addition, the percentage of corncobs damage was calculated by dividing the number of infested corncobs by the total number of sampled corncobs in each plots for each of the variety. The cultivars of sweet corn, planting dates, harvesting dates and the time from planting to harvesting (days) were given at table 1.

RESULTS

The percentage of damage ratios of ECB larvae were recorded on stalk and corncob of sweet corn in each of the sampling plot in 2015-2016. The ECB larvae caused significant damages on both stalk and corncobs of sweet corn varieties. In addition, the percentages of damage ratios on stalk and corncobs varied for each of the sampled varieties in both years.

In the first year, the highest percentages of damage ratios in stalk were observed on variety of Batem (32.45%), followed by Vega (19.85%), Merit (17.07%) and Caremelo (16.72%) (figure 1).

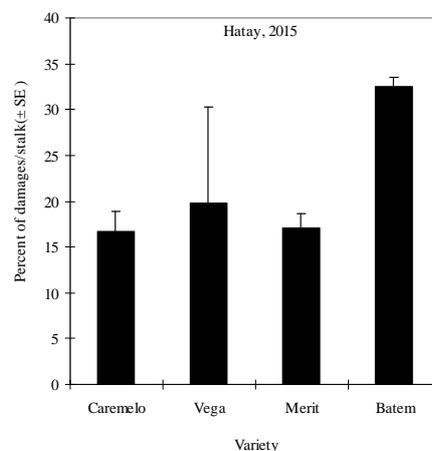


Figure 1: Percent of mean (\pm SE) damages in stalk on sweet corn varieties in Reyhanlı district.

The largest percentages of damage ratios in corncobs were observed on variety of Vega (25.73%), followed by Batem (16.74%), Caremelo (12.11%) and Merit (9.30%) (figure 2).

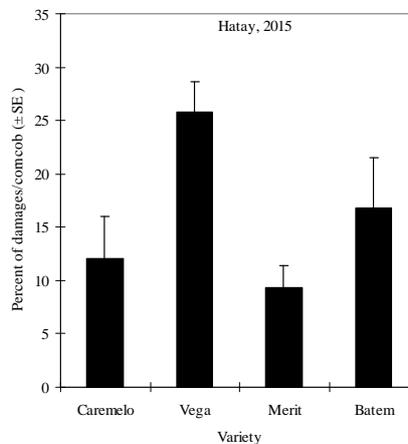


Figure 2: Percent of mean (\pm SE) damages in corncob on sweet corn varieties in Reyhanlı district.

In the second year, the highest percentages of damage ratios in stalk were observed on variety of Merit (59.34%), followed by Caremelo (51.65%), Batem (45.09%) and Vega (35.49%) (figure 3).

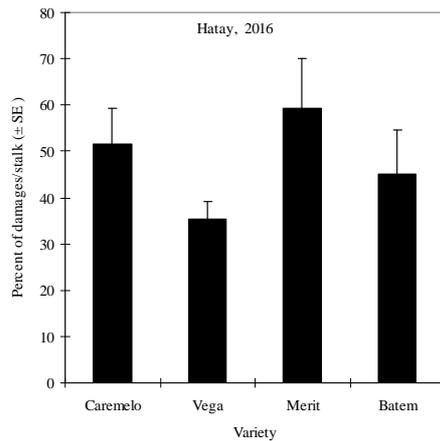


Figure 3: Percent of mean (\pm SE) damages in stalk on sweet corn varieties in Reyhanlı district.

The largest percentages of damage ratios in corncobs were observed on variety of Caremelo (14.31%), followed by Merit (13.72%), Batem (9.98%) and Vega (8.93%) (figure 4).

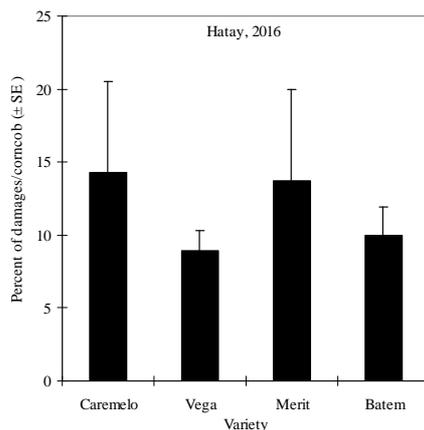


Figure 4: Percent of mean (\pm SE) damages in corncob on sweet corn varieties in Reyhanlı district.

DISCUSSION

The ECB larvae is a serious pest of both sweet corn and grain corn causing significant damages on leaf feeding, leaf sheath and collar feeding, stalk tunneling and ear damage [3,5, 7,8]. Several studies have been conducted to evaluate ECB larvae damage on maize in many countries [3,10-13]. The ECB larvae reduced maize yield by tunneling into the ear shank causing ears to drop before harvest and tunneling into stems reducing water and nutrient transfer [3]. Percentage of damaged plants and counts of larvae per plant have been widely used to assess

the effect of ECB infestations on grain yield of maize [3,9]. Bohn et al. [14] reported that the infestation level of ECB was assessed by the percentage of damaged plants and number of larvae per plant in each environment and greater than 95% of the maize plants were damaged by *O. nubilalis* in the Trebur area in Germany. In addition, Magg et al. [15] reported that the ECB larvae caused 20% yield loss on maize in Germany. The ECB larvae caused from 50 to 80% damage on maize grain in southern part of Poland [16]. Sabra et al. [17] reported that the ECB larvae caused damage in both ear and stalk at different levels of the plant. The total percent of infested plants with ECB were 29.2% (10.5 stalks + 18.7 ears) and 28.6% (10.3 stalks + 18.3 ears) in 2003-2004 seasons. The ECB larvae caused a loss in over 40% of the maize cultivation area in Poland [18]. Beres [19] reported that the greatest harmfulness of ECB larvae during the analyzed three-year period was recorded in sweet maize, of which from 89.5 to 93.0% of plants, and from 53.5 to 76.0% of cobs were damaged. Lower harmfulness of the ECB was recorded in fodder maize, of which from 58.0 to 80.2% of plants and from 29.5 to 42.2% of cobs were damaged by ECB larvae. Sorghum was the least infested and damaged species by *O. nubilalis*, with from 3.0 to 16.2% of its plants being damaged by larvae. In addition, the greatest broken stems damage rate was found in sweet maize (34.7 to 66.7%), followed by fodder maize (29.7 to 52.5%), and a very low damage rate was found for sorghum (0.7 to 1.5%) [19].

CONCLUSION

The present study was conducted to evaluate percentage damage ratios of ECB on four sweet corn varieties in Hatay province of Turkey. As a result of two-year investigations, this pest caused significant damages on all sweet corn varieties. The percentage damage of the ECB larvae was different in each of the sampling plot and variety. In addition, the ECB larvae damages on stalk and corncobs were different for each of the sweet corn variety. In 2015, the highest percentage of stalk damage was observed on Batem (32.45%), while the highest percentage of stalk damage was observed on Merit (59.34%) in 2016. Moreover, in 2015, the highest percentage of corncobs damage was observed on Vega (25.73%), while the highest percentage of corncobs damage was observed on Caremelo (14.31%) in 2016.

Table 1: The study was carried out in Reyhanlı district of Hatay province in 2015-2016.

Varieties	Planting Dates		Harvesting Dates		Days to Maturity	
	2015	2016	2015	2016	2015	2016
Caremelo	12 April	16 April	29 June	28 June	72	67
Vega	12 April	16 April	06 July	30 June	79	69
Merit	12 April	16 April	08 July	06 July	81	76
Batem	12 April	16 April	10 July	08 July	83	78

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