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Investigating the Effect of Planting Time Change on Damage of Borer *Sesamia Critica* and *Pyrausta Nubilalis* in Four Different Varieties of Corn

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Abstract: *This research was carried out at the Research Center for Agricultural Jihad and Natural Resources center of Golestan province and Farm No. 1 of Gorgan University of Agricultural Sciences and Natural Resources in 2011 and 2012. In this research, we used four cultivars of single Cros 704, Single Cross 403, sweet Maize hybrid variety chayse and Sweet Maize Variety (Armaghan 66), which was designed as split plot design and based on data on the number of polluted bushes and severity of pollution. Taking notes of different maize varieties were 30, 45 and 60 days after sowing date, respectively. Regarding the significance of infection severity in different planting dates in 2011 and 2012, and by comparing the mean comparison table in these two years, it was found that from the 3 selected time periods for corn planting, we had the least infection in the first date of 15 June and the highest level of infection in the last sowing date, August 15th.*

Keywords: *Corn, Pollen severity, Corn borers and planting date.*

INTRODUCTION

Corn is the third cultivated crop after wheat and rice. Most of the corn is used as a product for livestock feed but this plant is an integral part of the human food basket. The origin of corn is related to at least 7,000 years ago, The plant was cultivated as a small leafy teosint in Mexico. The name of the maize is probably from mahis meaning the source of life, Modern corn is known as maize and corn.

According to the latest FAO estimate and forecasts by the International Center for Institute on Maize and Wheat (CIMMYT), corn needs have increased globally from 558 million tonnes in 1995 to 50% increase in 2020.

Corn has grown significantly in Iran in recent years due to its role and importance in poultry diet (70-95% of poultry meal). It has reached the level of cultivation from 64076 to 276378 hectares and its production from 412.157 thousand to 1,955 million tons during the years 1993-1999.

Corn borers are the cause of photosynthesis of leaves. Reducing the product occurs as a result of the death of the central bud, early aging of the leaves, abnormal flow of vessels, which is characterized by direct damage to the lungs. The second type of damage is related to the fungal and bacterial contamination that they cause to crush the tissues (Tende et al., 2005).

Apart from genetic factors, corn stem borer attack can be affected by plant age and environmental factors. Attack of corn borer has less importance for early sowing corn than late planting corn. However, late planting

of corn will be more damaging to early planting, when the pest population reaches its peak, maize is more attractive to pests (Balvar *et al*., 2002).

In Galicia, Spain, the first generation of corn borer appears around the months of March and April, but the planted corn is not attacked by larvae. The cultivated corn, in September, comes in large numbers, attacked by the second generation of Sesamia nonagriodes (Monetti *et al*., 2001).

Crop control based on changing planting date is one of the old methods for combating stem borers. To better effect, this method should be combined with one of the other control methods to keep pest populations under the level of economic damage. Studies have shown that the effect of sowing date has been effective in the occurrence and extent of Sesamia calamitis population in Benin (Adda *et al*., 2009).

According to studies of the corn borers (*coniesta igneturalis*) from the Pyralidae family in 1983 to 1985 causing damage to millet fields in Nigeria, the effects of planting date were studied on the reduction of damage to the period. According to the data collected in the years 83 to 85, the least amount of millet damage was due to (the best time to plant millet) the time interval between 10 July and 2 August (Ajay and Labe, 2008). Also, the lowest corn Pollution was observed in the first planting date coincided with the beginning of July by *Chilo partellus*.

Several formulations have been proposed for controlling Chilo partellus, mainly granulated and emulsified from organic phosphorus pesticides. Also, these organic phosphorus pesticides are used to control pests of fruits and vegetables and other agricultural pests. Among these pesticides, Chloriaeurophus was used effectively in corn, when Dimtoat was used as an insecticide against pests in maize in the United States (Anwar & Tahir, 2007).

At present, Naloronean insecticides (10EC), tetovaric (sc 3), autophone proxies (10EC) are used to spray on leaves and Dyazinon g5 as granules to control this stem borer.

At present, Naloronean insecticides (10EC), tetovaric (sc 3), autophone proxies (10EC) are used to spray on leaves and diagnose g5 as granules to control this stem borer. However, effective control of pests is difficult with the use of liquid formulations. On the other hand, granular insecticide Dyazinon is used for corn stalks (Gunewardena and Madagola, 2010).

There are many control strategies to control stem borers, such as the use of resistant plants, different methods of biological control and habitat management. Currently, there is not much information available about the use of insecticides of plant origin.

In Spain, Juan and Contra found that extract of fruit and pea (Azadirachcta icdica) has an anti-nutritional effect on Sesamia nonagriodes larvae.

Yola (Quoted from Mashwani *et al*., 2011) observed that the granulation formulation is more effective than emulsion for control of stem borers. Seed treatments with carbofuran and endosulfan have been reported to be effective in controlling this pest (Mashwani *et al*., 2011).

Materials and Methods

This research was conducted during two seasons (2011 and 2012) at Golestan Agricultural Research Center and Natural Resources Research Center and Farm No. 1 of Gorgan University of Agricultural Sciences and Natural Resources.

In this study, we used four varieties of maize Single Cross 704, SC 403, hybrid varieties of sweet corn and sweet corn hybrid varieties give 66 chayse. In this design, the factors studied (planting dates and different cultivars) were carried out in 2 consecutive years in a split plot based on the number of infected plants and severity of infection and analyzed by SPSS 16 software.

In this plan, different cultivars were cultivated on June 15, July 15 and August 15. The draft took place on 30, 45 and 60 days after planting dates, respectively. The condition of the plants in corn was ranked according to the method of Chetreji *et al*. (1972), as follows (Table 1).

Table 1. Scoring based on the condition of plant contamination in corn and sorghum using the method of Chetreji *et al.* (1972)

Rating	Condition
1	Totally healthy bush
2	Plants that have one to two tiny holes on one or two leaves.
3	Plants that have a number of small or coarse holes on three to four leaves.
4	Plants that have tiny holes on almost 30% of the leaves and also, one to two sheets of tunnel on the main stream.
5	Plants that have been damaged are roughly 50% of their leaves.
6	Plants that have various lesions on 75% of the leaves.
7	Plants that are damaged in almost all leaves.
8	Plants that have the maximum leaf damage and will occur as the central bud rotates.
9	Plants that are damaged are completely dead.

Results and Discussion

Results for the number of infected plants

The results of the analysis of variance of the data obtained from the number of polluted plants are shown in Table (2).

As it can be seen, there was a significant difference between the sowing date ($p < 0.01$), and there was a significant difference between the cultivars at the probability level of one percent ($p < 0.01$). At the same time the interaction of year * planting date * varieties, there was no significant difference.

Table 2: Table of variance analysis data on the number of infected plants

SOURCE	DF	MS	F
Year	1	14.260	13.803^{ns}
Error a	6	1.927	1.865^{ns}
Planting date	2	47.698	46.168^{**}
Year * Planting date	2	1.135	1.099^{ns}
variety	3	9.288	8.990^{**}
Year * Variety	3	0.122	0.118^{ns}
Year * Planting date* Variety	12	1.319	1.277^{ns}
Error b	66	1.033	
Total	95		

In Table 3 are shown the results of statistical comparison As can be seen in the third planting date was the most significant amount of pollution and the lowest amount of pollution plants was observed on the first planting date.

The difference in treatments was in the case of pollution, which dates were sown in three different groups.

Table 3: Comparison of different planting dates using Duncan test at 5% level

Planting date	number of polluted plants
June 15	2.125 a
July 15	3.687 b
August 15	4.531 c

In Table 4, the comparison results are shown in different varieties and it was determined that the cultivars Armaghan 66 and Chase cultivars showed less pollution than two Single Cross 704 and Single Cross 403 cultivars.

Table 4: Comparison of different varieties based on pollution using Duncan test at 5% level

cultivars	number of polluted plants
Chase	2.791 [a]
Armaghan 66	3.0417 [a]
Single Cross 403	3.958 [b]
Single Cross 704	4 [b]

Results related to pollution severity

After converting the data on pollution plants that were done by subtraction, the data were converted to percentages, and finally, the severity of the infection was compared in different planting dates and among the cultivars. According to the results of analysis of variance, based on the severity of pollution, it was found that the severity of infection was significantly different in different planting dates at 1% level ($p < 0.01$). Also, there was a significant difference between cultivars at 1% level ($p < 0.01$) and the interaction effect of planting date * year was significant at 5% level (Table 5).

Table 5: Table variance analysis of data related to pollution severity

SOURCE	DF	MS	F
Year	1	9.456	0.354^{ns}
Error a	6	41.412	1.550^{ns}
Planting date	2	514.014	19.237**
Year * Planting date	2	132.161	4.946*
variety	3	180.183	6.743**
Year * Variety	3	4.221	0.158^{ns}
Year * Planting date* Variety	12	38.877	1.455^{ns}
Error b	66	26.720	
Total	95		

Comparing the mean of different planting dates based on the severity of infection shows that using Duncan test at 5% level (Table 6), the third planting date has the highest infection rate compared to the second and first planting dates.

Table 6: Comparison of different planting dates using Duncan test at 5% level

Planting date	pollution severity
June 15	9.527[a]
July 15	15.904[b]
August 15	16.921 [c]

Comparison of the average of different cultivars based on the severity of infection shows that using Duncan test at 5% level in Table 7, That the cultivators of Armaghan 66 and Chase have less pollution than Single cross 704 and Single cross 403.

Table 7: Comparison of meanings of different varieties in terms of pollution intensity using Duncan test at 5% level

cultivars	pollution severity
Armaghan 66 Chase Single Cross 704 Single Cross 403	11.507 [a]
	12.034 [a]
	16.38 [b]
	16.925 [b]

Regarding the significance of infection severity in different planting dates in 2011 and 2012, and by comparing the mean comparison table in these two years, it was determined that the first date of June 15th has the lowest infection rate and the last planting date is August 15 The highest level of contamination.
This is consistent with the findings of Ada et al. (2009) with 3 maize cultivation dates in the Southern Benin. The results showed that the least infection was observed in the first planting date (due to the environmental conditions of the Benin days after the first rainfall, and the amount of contamination with the stem borer was increased by delaying the planting date).
According to the results of the comparison of the average effect of planting date on the number of larvae in stems in 2011, it was determined that the third planting date had the highest number of larvae per stem and in 2012, the second and third sowing dates had the highest number of larvae compared to the date First planting, which corresponds to the results of Malvar *et al.* (2002). This may appear due to the larger stems of long-term hybrids or the preference of night-ribs for late-onset germplasm.
In a study by Plicher and Rice (2001) on the effect of planting date on isogenic corn and Bt corn, it was found that the length of the canals created in isogenic corn in early planting date was higher than the date of later planting, This is consistent with the results of this study. According to Plicher and Rice (2001), the prevalence of female nocturnal moths for spawning in trap crops is higher, which could be one of the reasons for increased contamination in late crops. Using the change of planting date in the management of Ostrinia nubilalis is a goal of reducing oviposition by night, but more importantly reducing or increasing the length of the canal in the target plant.
Among crop control strategies, changing planting dates is a very effective method for controlling stem borers in corn. Of course, if this is the same, there will surely be effective control with a different control method, such as the use of insecticides. Among the plant and chemical pesticides, if the plant pesticides are used, carefully studied and at appropriate doses, these toxins can show that appropriate control for stem borers. In general, the method of changing the planting date and the use of pesticides from plant origin is one of the methods for using integrated pest management programs that confirms the results of this research to some extent this important.

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