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Bt corn performance at different planting times

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Bt corn performance at different planting times

Abstract

A common question that I heard this winter was, "If I plant Bt corn, when should I plant it to get the most benefit out of the technology?" During 1996-1998, my graduate student and I conducted experiments at three Iowa locations (Ames, central; Lewis, southwest; and Nashua, north) to determine how Bt corn and non-Bt corn affected egg-laying by European corn borers and subsequent yield differences. YieldGard hybrids (event Bt11) and non-Bt corn were planted at three times: early (April 19-May 6), middle (May 6-May 21), and late (May 18-June 12).

Keywords

Entomology

Disciplines

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INTEGRATED CROP MANAGEMENT

Bt corn performance at different planting times

A common question that I heard this winter was, "If I plant Bt corn, when should I plant it to get the most benefit out of the technology?" During 1996-1998, my graduate student and I conducted experiments at three Iowa locations (Ames, central; Lewis, southwest; and Nashua, north) to determine how Bt corn and non-Bt corn affected egg-laying by European corn borers and subsequent yield differences. YieldGard hybrids (event Bt11) and non-Bt corn were planted at three times: early (April 19-May 6), middle (May 6-May 21), and late (May 18-June 12). The spread in these dates was larger than we desired because rains hampered plans at each location to plant at uniform 10-day intervals.

We found no differences in European corn borer egg densities between Bt and non-Bt corn during the first and second generations for all 3 years. The females could not detect a difference between Bt and non-Bt corn and they laid an equal number of eggs in both hybrids. However, significant egg-laying differences did occur among planting times. Between 50 and 100 percent of the eggs were laid in the early planting during the first generation. Between 40 and 65 percent of the eggs were laid in the late planting during the second generation. But, the relationship between egg density and larval survival was inconsistent. A high density of eggs did not always translate into greater tunneling and subsequent damage to the plant. This research was published and can be found at <http://esa.edoc.com/server-java/Propub/esa/ec-v94n3.contents> [1] (scroll down to page 730 and click on the free pdf file).

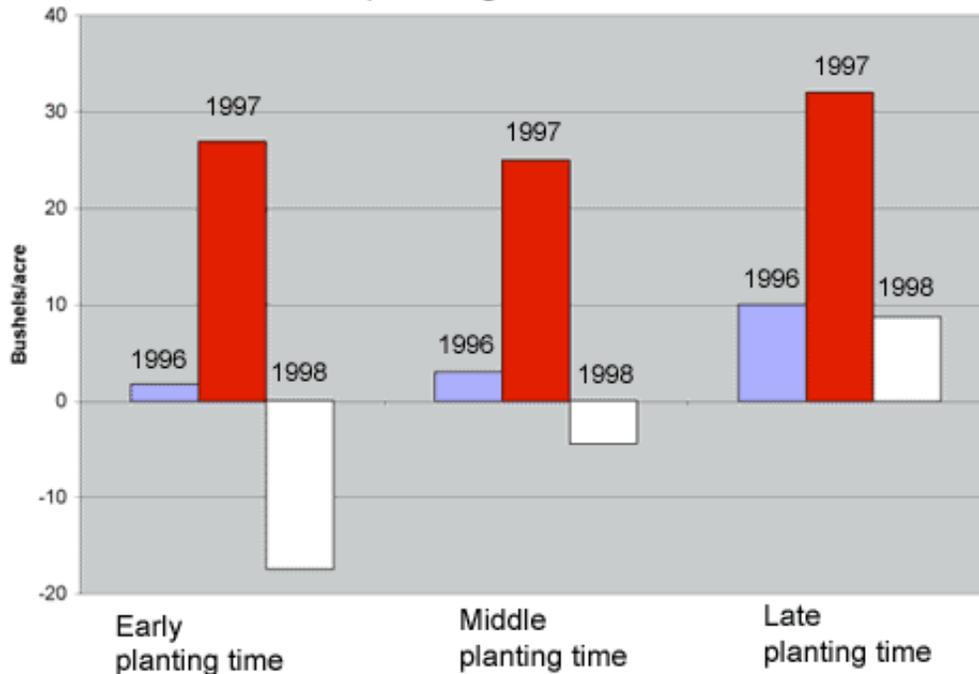
We did find that different planting times provided different economic benefits. Greater economic benefits were realized when Bt corn was planted late during in the planting sequence in central and southwestern Iowa. However, adjusting the planting dates of Bt and non-Bt corn provided inconsistent economic differences among planting dates in northern Iowa.

When we evaluated the actual profit or loss of each corn hybrid and planting date, we found three important results:

1. late planting always averaged the greatest economic profit or least economic loss based on location averages for each year among planting dates (except for one comparison);
2. overall late planting comparison between Bt and non-Bt corn resulted in the only economic advantage for Bt corn (\$8.13/acre); and
3. late planting of Bt corn was three times more likely to produce an economic gain than the early planting.

A summary of the yield differences between Bt and non-Bt hybrids across all three locations and years is shown in the figure.

Bt corn yields relative to non-Bt corn at three planting times



From one year to the next, changes will occur in corn borer population size, the dates the females are laying eggs, weather influences on larval survival, and growth and maturity of corn. Therefore, knowing exactly when Bt corn should be planted during the spring to gain the greatest economic benefit is impossible.

In summary, I am not recommending that Bt corn be planted "late" during any year. However, results from this study suggest that planting Bt corn late, or more specifically last, during the spring planting sequence provides the greatest opportunity for economic benefit. If a farmer plants a large number of corn acres or if delays in planting occur during the spring then our research suggests that the highest probability of gaining an economic return on the Bt technology will be when Bt corn is planted last with respect to the non-Bt hybrids.

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