Compliance or Complacency: Corn Producers and Bt Refuge

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Abstract
Tragic events or situations result in great loss and misfortune. The Tragedy of the Commons - by British writer, William Forster Lloyd, 1832, and cited later by Garrett Hardin, Science 1968 – illustrates this well. Lloyd asked, "Why are cattle on a common (publically-owned pasture) so puny and stunted? Why is the common so bare-worn, and cropped so differently from the adjoining (privately-owned) enclosures?"

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Compliance or Complacency: Corn Producers and Bt Refuge

By Roger Elmore, Department of Agronomy; Aaron Gassmann and Erin Hodgson, Department of Entomology

Tragic events or situations result in great loss and misfortune. The *Tragedy of the Commons* - by British writer, William Forster Lloyd, 1832, and cited later by Garrett Hardin, *Science 1968* – illustrates this well. Lloyd asked, “Why are cattle on a common (publicly-owned pasture) so puny and stunted? Why is the common so bare-worn, and cropped so differently from the adjoining (privately-owned) enclosures?”

Lloyd concluded that individual herdsmen guided by self-interest and personal gain, added more animals to their herds. Other herdsmen did the same, ultimately, ruining the common property. Hardin summarized this by writing, “Ruin is the destination toward which all men rush, each pursuing his own interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.”

A potential tragedy looms for U.S. corn producers: the loss or reduced efficiency of an important technology, Bt. According to USDA-NASS data, 71 percent of Iowa’s corn acres contain at least one Bt trait compared to 63 percent nationwide – see page 24 in the USDA report. Hybrids with stacked traits occupied 57 percent of Iowa’s corn acreage compared to 46 percent nationwide. This means hybrids on 9.7 million of Iowa’s 13.7 million acres carried at least one Bt trait (see figure).

While Bt traits protect yield they impose intense pressure on the target pest populations to develop resistance. Many scientists agree that refuges delay or prevent pests from developing Bt resistance.

**A grave assessment of compliance**

A *Center for Science in the Public Interest (C SPI) report* released last November summarized producer compliance for planting of refuges. Data were based on industry reports submitted to the Environmental Protection Agency. For Bt corn targeting European Corn Borer (ECB), compliance with refuge size requirements was greater than 90 percent from 2003 to 2005. A trend of decreasing compliance has since occurred, with compliance falling to 78 percent in 2008. Refuge distance compliance figures were slightly better with 88 percent compliance in both 2007 and 2008, but these were down from the 93 to 96 percent compliance from 2003 to 2006.

Compliance and trends for corn rootworm (RW) are more discouraging. Refuge size requirements for RW went from 89 percent in 2006 to 74 percent in 2008. Corn rootworm refuge distance compliance percentages fell from 82 percent to 63 percent in the same three years.

Stacked hybrid refuge compliance and trends were even more discouraging. Size compliance dropped from 78 percent in 2006 to 70 and 72 percent in 2007 and 2008. Compliance to the distance requirement fell from 92 percent in 2006 to 66 percent in both 2007 and 2008.
The CSPI used these data to estimate total compliance over all three categories ECB, RW, and stacked hybrids. The results averaged 73 percent compliance for distance and 74 percent for size. One out of four producers did not comply with the refuge requirements! According to the CSPI report, this amounts to 13.2 million acres in the U.S. that are not in compliance – that’s an area the size of Iowa’s corn crop. On the other hand three out of four producers do comply.

Transgenic hybrid adoption in Iowa, 2000-2009. Data adapted from USDA-NASS.

Why does refuge compliance matter?
Refuges delay pest resistance to Bt corn because susceptible pests emerging from the refuge mate with resistant pests from the Bt field. This dilutes the resistance genes and maintains susceptibility of pest populations to Bt corn. If refuges are too small or too far from Bt fields, a shortage of refuge insects to mate with insects from Bt fields will occur. When this happens, pests will quickly develop Bt resistance.

What’s at stake?
At least three issues come to mind:
• First, if compliance rates do not quickly improve, expect more demands for compliance, insistence to change the regulatory process, and/or steep penalties for noncompliance from groups like CSPI...and rightly so. Based on the CSPI report, 90 percent or greater compliance appears necessary.
• Second, refuge requirements form an integral part of insect resistance management programs. If some producers continue to ignore these requirements, insects may develop resistance to Bt corn sooner.
• Third, every business enterprise – including corn production – bears a social role and responsibility. Peter Drucker, a renowned writer and management consultant, warned that an enterprise, “...that fails to ‘think through its impacts and its responsibilities’ exposes itself to justified attack from social forces. Consumerism and environmentalism, he taught are not enemies to be vanquished, but symptoms of business’ failure to understand its broad social role.” (from Michael Hiltzik, Los Angeles Times, 31 Dec 2009). Some of us ignore our social role!

On the positive side, groups like the National Corn Growers Association place first priority on grower refuge compliance education programs. Certainly with the 2010 introduction of new combinations of transgenic traits, some refuge requirements indeed will change. However, producers planting current ECB, RW, and stacked hybrids must continue to follow the refuge requirements.
specific for those technologies. We thank the 3 of 4 who comply with refuge 
requirements.

Insects do not know property lines; our corn fields are the ‘commons.’ 
Consider the environment, consumers, your neighbors, your kids – or 
whoever farms after your time – when you decide whether to comply with 
scientifically-sound, government-mandated, socially-responsible, refuge 
requirements. Let’s do what we can to preserve this excellent technology!

This article first appeared in Wallace’s Farmer, February 2010. Roger Elmore 
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