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## The monster in Iowa corn fields

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# The monster in Iowa corn fields

## **Abstract**

When growers plant continuous corn, corn rootworms become a severe pest problem. The planting of continuous corn suits rootworms because they lay eggs in the soil during late summer, those eggs hatch the following spring, and the subsequent larvae require corn roots to grow and develop into adults. Because corn rootworms required continuous corn, crop rotation has been, and for many areas continues to be, an effective management strategy.

## **Keywords**

Entomology

## **Disciplines**

Agricultural Science | Agriculture | Entomology



## Insects and Mites

# The monster in Iowa corn fields

by Jon J. Tollefson, Patricia L. Prasifka, and Benjamin C. Kaeb, Department of Entomology

When growers plant continuous corn, corn rootworms become a severe pest problem. The planting of continuous corn suits rootworms because they lay eggs in the soil during late summer, those eggs hatch the following spring, and the subsequent larvae require corn roots to grow and develop into adults. Because corn rootworms required continuous corn, crop rotation has been, and for many areas continues to be, an effective management strategy.

However, within the last 15 years, rootworms have adapted to crop rotation. By the late 1980s, a strain of the northern corn rootworm was selected for that had a two-year life cycle (extended diapause) and survived the annual rotation of corn with soybeans. In the mid-1990s, a variant of the western corn rootworm appeared in Illinois that laid its eggs in soybeans, and the larvae attacked the corn planted the following year.

With the increased production of biofuels, the demand for corn will increase, and the amount of continuous corn also will increase. These acres will be susceptible to the traditional corn rootworm, and the remaining rotated acres will be susceptible to the variants of the northern and western corn rootworm, creating the potential for a real monster lurking in all of our corn fields.

During summer 2006, a survey was conducted to determine:

- if northern corn rootworms were laying eggs in soybeans,
- the extent of rotation-resistant western corn rootworms in eastern Iowa, and
- how widespread extended diapause was in Iowa.

Nine locations were sampled for northern corn rootworm egg laying in soybeans (■ in Figure 1). At each location, emergence traps were placed in a corn field that had previously not been planted to corn for two or more years, reducing the possibility of infestations of extended-diapause northern corn rootworms. In a nearby soybean field (corn in 2005), Pherocon AM sticky traps were used to monitor adult activity, and soil samples were taken at three times to determine if eggs were being laid in the beans.

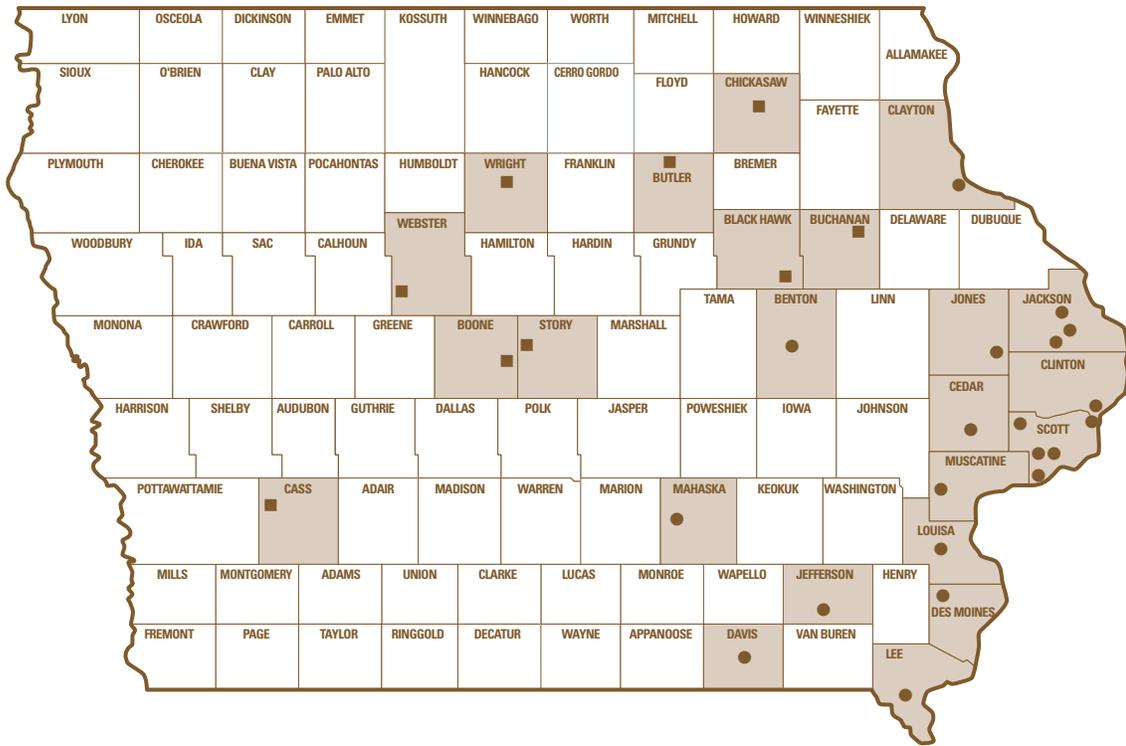
Rotation-resistant western corn rootworms and extended-diapause northern corn rootworms were monitored in 20 locations in eastern Iowa



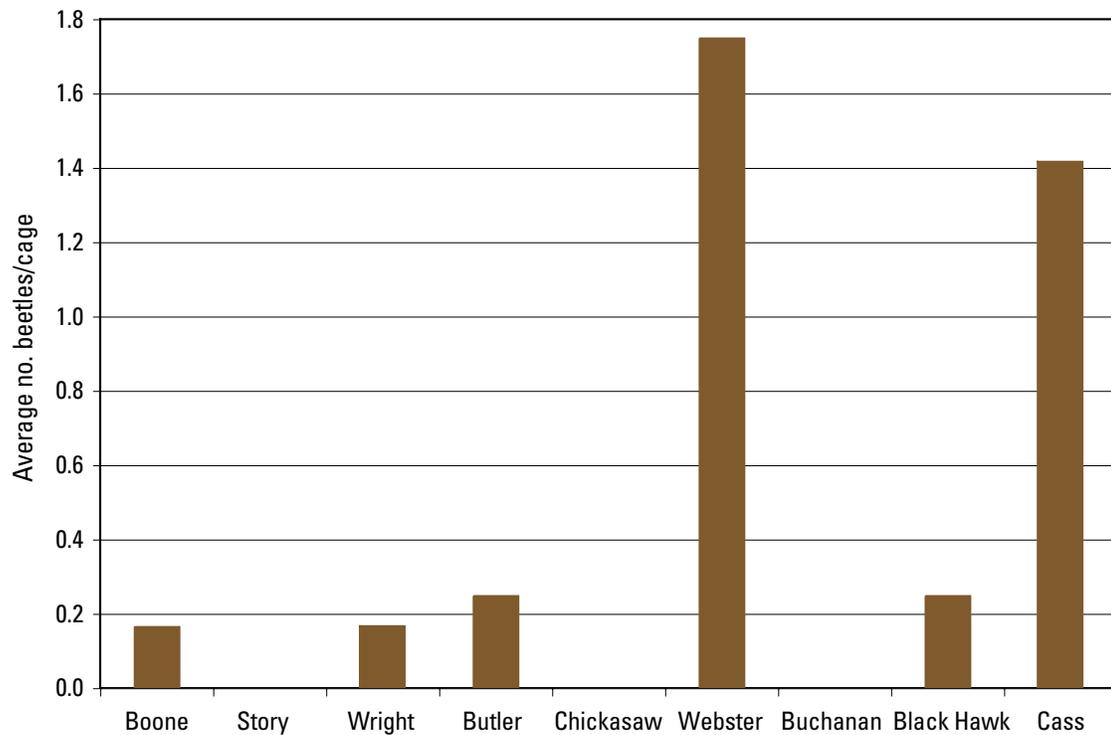
Adult northern corn rootworms feeding on corn silks. (Marlin E. Rice)

(● in Figure 1). At each location, emergence cages were placed in the corn fields that had been annually rotated with soybeans. Yellow sticky traps were placed in an adjacent soybean field to detect the presence of adults that may be laying eggs in the beans.

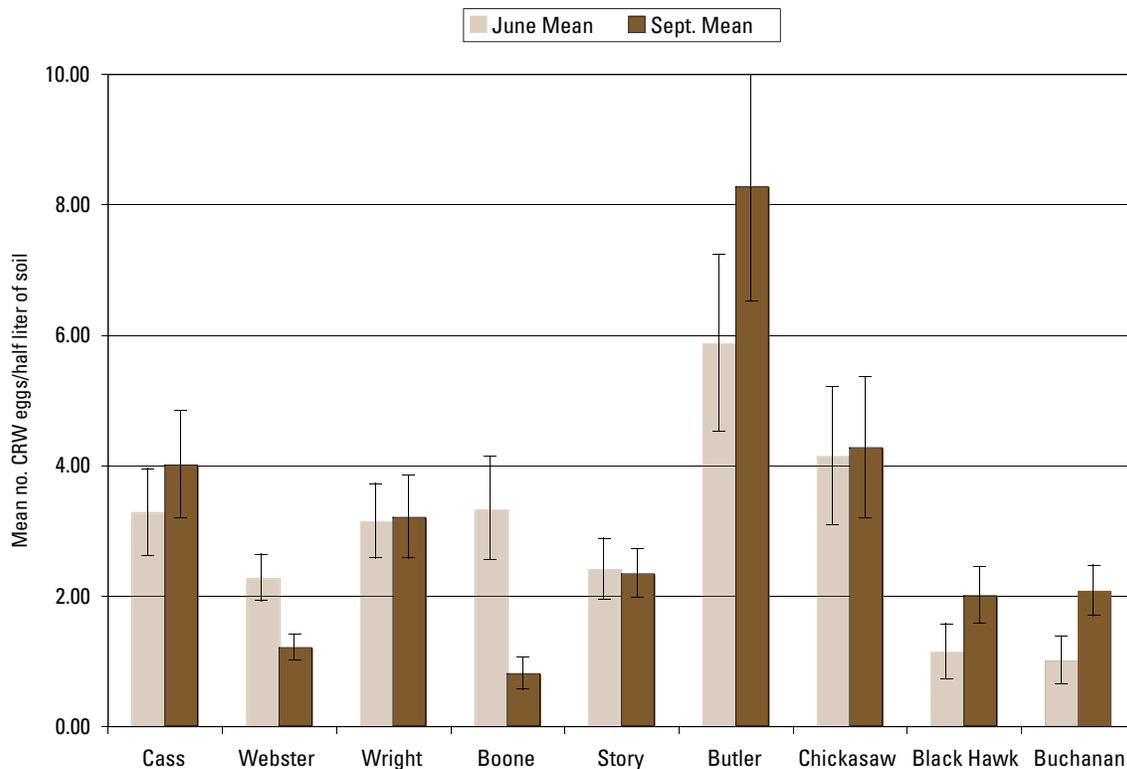
Northern corn rootworm adults emerged from six of the nine fields that had been rotated away from corn for prolonged periods (Figure 2). However, emergence was very low in all but two fields. In these fields, it is possible that some of the beetles emerging were extended-diapause northern corn rootworms with a three-year life cycle or the result of edge effects because the field was small ( $\approx 1$  acre). In the four northeastern-most fields, there were more northern corn rootworm eggs in the soybean fields in the fall than there had been in June. These results indicate there is a possibility that northern corn rootworms are laying eggs in soybeans but at very low levels (1–2 eggs per half liter of soil, Figure 3). Both northern and western corn rootworm adults were trapped in soybeans, but the numbers were far below the threshold indicating that the following year's corn should be treated.



**Figure 1. Field locations: ● = fields where both a corn and soybean field were monitored for rotation-resistant western corn rootworms and extended-diapause northern corn rootworms, ■ = fields where northern corn rootworm activity in soybeans following prolonged rotations away from corn were monitored.**



**Figure 2. Mean number of northern corn rootworm adults emerging per cage from nine corn fields previously in extended, non-corn rotations.**



**Figure 3. Comparison of June and September soil samples (±SE).**

At the 20 eastern Iowa locations, adult northern corn rootworms emerged from corn at all locations and westerns emerged at 19 of the 20 locations. The only location from which westerns did not emerge was the more westerly Mahaska County location. The sticky traps in soybeans caught adult northern and western corn rootworms in all fields, and economic numbers of western corn rootworms (4–6 beetles/trap/day) were found in Scott and Clinton counties.

What can be done about the monster in the corn field? Whether a field is in continuous corn or in an annual rotation with soybeans, it can be monitored with Pherocon AM sticky traps and the following year's corn protected if economic numbers (6 beetles/trap/day) are captured over the four weeks of peak adult activity (late July to mid-August). This threshold has been calculated by Illinois for the western corn rootworm, but it should conservatively be able to be applied to the

northern corn rootworm and mixed populations of the two. There is no way to predict infestations of extended-diapause northern corn rootworm in corn rotated annually with soybeans. If corn following beans has lodged in the past, it is probably appropriate to apply rootworm protection to the corn.

To learn more about monitoring variant corn rootworms with Pherocon AM sticky traps, see the University of Illinois protocol at [www.ipm.uiuc.edu/fieldcrops/insects/western\\_corn\\_rootworm](http://www.ipm.uiuc.edu/fieldcrops/insects/western_corn_rootworm).

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