



## IS BT-RW CORN CHANGING THE RISK FROM CORN ROOTWORMS? A REQUEST FOR HELP

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Corn production, corn rootworms and their management have changed a lot over the last 5 years. Farmers now have much more invested in their crop, yields are higher, and more economic outcome is riding on corn rootworm management decisions. Corn rootworm emergence is just beginning. Getting a handle on the density of rootworm beetles in your fields, could help with management decisions.

The University of Minnesota would like your help with two projects (descriptions below):

1. **Conduct a corn rootworm survey, in conjunction with the MDA, to develop a more comprehensive risk picture;** and

One tool for gauging risk has been the annual survey of corn rootworms conducted by the MDA Plant Pest Survey Program. Unfortunately with survey

demands from soybean aphid and soybean rust increasing, the MDA has not been able to devote the same level of survey effort to corn rootworms as they did previously. The decline in corn rootworm survey effort comes at a crucial time as the risk of losses increases, extended diapause problems expand, and rapid

adoption of corn rootworm corn potentially subdues increasing corn rootworm population levels. In

addition, prolonged wet soil conditions could diminish corn rootworm populations in some areas.

2. **Examine the impacts (yield, lodging) of corn rootworms under current corn production situations.**

Just as the risk picture for corn rootworm is changing, so is the yield-loss picture from corn rootworms. Recent changes in corn production practices, such as earlier planting dates, higher plant populations, narrower rows, etc., favor corn rootworms and their damage. Transgenic corn resistant to corn rootworms (Bt-RW corn) protects root systems more completely than soil insecticides. Among the insecticide options, there's a trade-off between convenience and root protection. Root protection by insecticides and Bt-RW corn diminishes with higher corn rootworm populations. Unfortunately, interpreting the impacts of corn rootworms relies on yield loss data gathered 15-25 years ago with corn prices a fraction of today's prices. In addition, factors like increased harvesting time haven't even been considered in corn rootworm thresholds.

If you have a prospective cooperator in mind, consider participating in one of these two studies. Just let me know of your interest by responding to this email, faxing the [site registration form](#) to 612-625-5299 or leave a message on my lab phone at (612) 625-5299. If you have general questions about the study, call me at (612) 750-0993. Funding for these studies has been provided by the Minnesota Corn Research & Promotion Council and the MN Legislative Rapid Agricultural Response Fund.

**How will Bt-RW corn affect corn rootworm populations?** Preliminary data from last summer verifies



Your help is wanted with corn rootworm research.

that all three corn rootworm events in the market cannot be considered high-dose events. Against a mixed species population at Rosemount last summer, reduction in rootworm beetle emergence by Bt-RW corn averaged about 75% for northern corn rootworm and from 85-96% for western corn rootworms, compared to about 65% against both species by Force CS. Control is notably reduced compared to Bt-CB performance against European corn borer. While Bt-CB corn has substantially reduced the frequency and severity of corn borer infestations, it's too early to judge what level of suppression we'll see with corn rootworms. The potential exists for Bt-RW corn to alter the risk posed by corn rootworms, and coincidentally the yield benefits from Bt-RW traits. However, with reduced effectiveness against northern corn rootworms, I'm not willing to say Bt-RW corn will make corn rootworms a non-issue. Using transgenic corn with Bt-RW resistance offers growers a convenient management solution, but resistance by rootworms to this new technology is a real possibility.

Corn rootworms emergence is just beginning. Males are more common initially with the proportion of females increasing sharply after the first week. At first, beetles focus on mating and feeding. Females require about two weeks to produce their first batch of eggs and may lay several batches in the following weeks. Thus monitoring is typically delayed two weeks after emergence begins do survey efforts coincide with egg-laying populations in the field. This year many fields are tasseling later than normal, so monitoring corn rootworm beetles will be substantially delayed compared to last year.

## ***Project Descriptions***

### ***Project 1. Corn Rootworm Survey***

The Minnesota Department of Agriculture – Plant Pest Survey and University of Minnesota are seeking your help in scouting corn rootworm populations in one or more fields. Other survey demands (soybean rust and soybean aphid) have diluted MDA survey efforts for

corn rootworm. Typically this survey focused on non-transgenic corn in both continuous corn and rotated corn situations. The rapid adoption of Bt-RW has also complicated the survey process. Select field(s) of interest to you and the grower. If the grower plants Bt-RW corn, we'll need survey data from both the Bt-RW corn and the associated refuge, whether in the field or adjacent. Please do not select a grower planting 100% Bt-RW corn, or a field without an appropriate refuge. The field will need to be scouted two to three times in August, best dates will vary with corn rootworm emergence in your area and planting date.



*Corn rootworms can be a serious pest issue.*

### ***Project 2. Corn Rootworm Impacts and Management Benefits***

This study requires 2 key ingredients:

1. A cooperator with the logistical capability, interest and willingness to place strips in the field when it's next planted to corn.
2. An ag professional willing to monitor the field this year and help with data collection from the strips when the field is next planted to corn.

The study would begin with monitoring the corn rootworm population in a selected field(s) this summer. Choose a field of interest to you and the farmer. When corn is next grown in the field, the field would be planted to strips of at least two, preferably three, treatments: Bt-RW corn, a refuge (preferable the same genetic family) protected by insecticide or seed treatment, and if possible, an unprotected refuge. Data collected would include harvested stand, corn rootworm injury, lodging, harvesting time, and yield.

The study will compare captures on sticky traps (Pherocon AM unbaited sticky traps) with whole-plant counts and explore their relationship with subsequent root injury and loss. Previous research suggests that the root protection provided by corn rootworm management options declines with corn rootworm pressure. Seed treatments, liquid and granular

insecticides and transgenic rootworm corn will vary in their root protection and the resulting benefits (yield and harvesting logistics) as pressure increases.

Monitoring will involve four weekly field visits. At each visit, ca. 50 whole plant counts will be taken. The 12 sticky traps are installed at the first visit, changed weekly, and removed at the last visit. The project may require up to 2 hours per week per field.

***Why are we conducting this study?*** Research linking corn rootworm pressure, loss and the value of corn rootworm management is simply outdated, ca. 15-25 years old. Given the growing threat from corn rootworms, higher yield potentials, and new management options it's important to re-examine corn rootworm risk, the value of management tools, and our ability to predict when to use them. We hope the information from this study will help growers make better decisions about whether or not rootworm management is needed, target the use of transgenic rootworm corn, and plan how to manage refuge acres.