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Corn Pest Risk Survey Results

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CORN PEST RISK SURVEY RESULTS

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Economic Impact of Corn Pests

In 2009, South Dakota producers planted 5.00 million acres of corn and harvested 4.75 million acres. Corn-for-grain production totaled 706.7 million bushels, and silage production totaled 4.00 million tons. Corn acres accounted for 29% of total acres planted in South Dakota in 2009 (USDA-NASS 2010). A majority of corn production occurs east of the Missouri River in South Dakota. South Dakota is divided into nine agricultural statistical districts. Six of these areas are located in the eastern and central part of the state (primarily east of the Missouri River), where most of the intensive crop cultivation takes place. In 2009, 71% of corn acres planted in South Dakota used insect resistant biotech seed. That is 8% above the national average.

Mitchell (2007) estimated that loss from corn root worm (CRW) in the United States ranged from $0.5 to $1 billion a year. He also estimated that the control costs (soil insecticides, GMO seed, etc.) averaged about $170 million per year. In 2009, South Dakota ranked 6th in the nation for corn production. South Dakota produced about 5% of U.S. corn for grain in 2009. Thus, cost estimates for South Dakota due to CRW are $25 to 50 million in production loss and $8.5 million in control costs.

CRW is just one of a host of insect pests confronting South Dakota corn producers each year. To address this economic issue, South Dakota State University and USDA-Agricultural Research Service field office in Brookings, SD began a project to investigate the issue of corn pest risks in South Dakota. Below is the first year report on the field census component of the project.

Corn Pest Risk Project

The authors received a USDA-AFRI seed grant from the AFRI Plant Bio-Security Program (award # 2009-05007) for a two year study (2010-2011). The objective of the project is to develop a better understanding of the type of insects currently inhabiting South Dakota cornfields.

The project looks at insect pest that pose a danger to corn yield. Currently, we have an idea of the corn insects that growers face in our state, but their distribution and the severity of their infestations are poorly known. We completed our first summer field survey in 2010. The field survey team visited 19 South Dakota counties and collected samples from 28 farms.

The field survey team timed their farm visits to coincide with corn tasselling (late-July and early August; soon after plants have tasseled). Producers participating in the study pre-selected refuge cornfields for the survey team to sample, and 50 plants per field were examined for insects. Particular attention was paid to the number of corn rootworm adults (western, southern, and northern rootworms), corn earworm, European corn borer, western bean cutworm, and aphids (corn leaf aphid).

The project's short run objective is to develop a census of current insects inhabiting eastern South Dakota corn fields. The long run goal is to develop a

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two stage risk assessment tool that provides reliable forecasting capabilities for estimating the risk from a specific high consequence (economic damage to yield) insect becoming established in corn production areas in South Dakota at the county level. The risk assessment model will be based on: 1) county characteristics favorable to establishment of high consequence arthropods in a specific SD county; and 2) field sampling at the county level for targeted pests indentified as potential threats to South Dakota corn production. It is hoped that the data collected during the project will lead to the development of a prototype pest alert system at the county level that would enhance producers' ability to target corn pest management resources efficiently. The results of our first year census on corn insect populations for Eastern South Dakota are provided below.

Corn Pest Samples

This survey represents the first coordinated effort to sample South Dakota corn production for insect pests, which is critical information given the rapid development and marketing of novel tools for managing insect pests in corn (especially Bt hybrids, insecticidal seed treatments). We counted all insects found on refuge corn (no BT, no insecticidal seed treatment) on 28 farms in 19 counties located in East-River South Dakota. Fifty corn plants were sampled in each of the sites visited. Two sites were sampled in nine counties: Brown, Campbell, Codington, Deuel, Hand, Hanson, Hughes, Hutchinson and McPherson. One site was sampled in ten counties: Brookings, Douglas, Edmunds, Faulk, Hamlin, Jerauld, Lake, McCook, Minnehaha, and Yankton. (See Table 1.)

The pests found in the various counties were categorized into caterpillar, aphids, and rootworms. The caterpillar pests were made up of western bean cutworm, European corn borer, and corn earworm. The corn rootworms included western, northern, and southern rootworms and aphids which were primarily corn aphids. These pests never exceeded economic thresholds at any of the sites. European corn borer was the most consistent pest found, but the maximum infestation level was 20% of the plants infested at a single site. A likely factor for this low level of pests may be the area-wide suppression of pests due to high adoption rates of genetically modified (GM) crops.

Beneficial Insects

We found a diverse community of beneficial insects (insect predators) at all of the sampled farms, including spiders, lacewings, pirate bugs, lady beetles, and syrphid flies. Densities ranged from 1-8 predators per plant. At 77,000 plants per hectare, this translates to up to 660,000 beneficial insects per hectare living just in the plant foliage. These predators are also working against pests, and they should be preserved and encouraged through farm management practices as a free source of pest management for producers in the South Dakota.

Summary

The goals of this project are twofold. First, we will complete a two year census of corn pest populations in South Dakota at the county level. Second, we will develop a methodology to predict corn pest infestation outbreaks in South Dakota at the county level.

The project is about to begin its second year. We will begin contacting South Dakota corn producers in late April to confirm their willingness to participate in the corn pest field census. The field survey work will sample corn refuge acres at the tasselling stage. At each field site, approximately 50 plants will be examined for the presence of corn pests. After the second year census data has been collected, we will begin the process of developing methods for developing a prototype prediction model.

The corn pest research team is still looking for additional corn producers who would be interested in participating in the field census this summer. Please contact Dr. Scott Fausti at 605-688-4868 for more information.

References:

Mitchell, Paul, (2007), Costs and Benefits of Controlling Corn Rootworm: The USA Experience (April 2007).

United States Department of Agriculture National Agriculture Statistics Service., South Dakota Agriculture 2010, various tables.

Table 1. Average Insect Counts by Sample Site.

Plant Site	County	Caterpillar Pests	Aphid Pests	Rootworm Pests	Beneficial Insects
		--- average per plant ---			
I	Hutchinson	0.02	1.29	1.21	1.55
II	Hutchinson	0.12	0.20	0.04	2.94
III	Douglas	0.08	0.78	0.02	4.26
IV	Deuel	0.00	0.40	0.06	1.04
V	Deuel	0.02	11.18	0.08	3.58
VI	Hamlin	0.04	7.51	0.04	4.08
VII	Codington	0.04	3.9	0.12	3.16
VIII	Codington	0.12	1.14	0.08	2.46
IX	Yankton	0.14	7.16	0.58	6.54
X	Hanson	0.02	0.20	0.02	5.70
XI	Hanson	0.10	0.54	1.36	3.66
XII	Jerauld	0.52	0.12	0.08	3.20
XIII	Hand	0.10	0.54	0.06	6.50
XIV	Hand	0.02	2.48	0.06	5.30
XV	Hughes	0.30	0.12	0.60	2.68
XVI	Hughes	0.18	0.22	0.20	5.44
XVII	Campbell	0.12	5.82	0.02	7.44
XVIII	Campbell	0.12	1.02	0.02	4.16
XIX	Edmunds	0.52	8.86	0.76	6.80
XX	McPherson	0.10	1.68	0.02	5.82
XXI	McPherson	0.51	2.63	0.04	5.45
XXII	Brown	0.06	52.45	0.06	4.42
XXIII	Brown	0.02	3.0	0.02	5.00
XXIV	Faulk	0.10	19.84	0.00	7.72
XXV	Minnehaha	0.66	29.28	0.30	4.32
XXVI	McCook	0.34	4.72	0.34	2.24
XXVII	Lake	0.04	7.54	0.00	3.32
XXXVIII	Brookings	0.14	0.00	0.16	2.56
Average across samples		0.16	6.20	0.22	4.25

- Densities range between 1-8 predators per plant.
- There are 31,000 plants per hectare, which translates to up to 267,000 beneficial insects per acre living in the plant foliage.

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