

## 2010 IPM Survey Report on Insect Pests in North Dakota



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**Introduction:** The purpose of the IPM Survey is to detect the presence and population density of insect pests that are common in agricultural crops grown in North Dakota and to verify the absence of insects that might be of export concern. The following crops were surveyed: wheat, barley, canola, soybean, and sunflower. Survey scouts operated out of the Dickinson Research Extension Center, the North Central Research Extension Center (Minot), the Carrington Research Extension Center, the Langdon Research Extension Center, and the Fargo Agricultural Experiment Station. Survey information is provided on a timely basis to North Dakota producers and others in agriculture to assist them with insect management decisions.

### Results:

Maps from the 2010 IPM Survey in North Dakota were uploaded weekly onto the NDSU IPM website at the following address: <http://www.ag.ndsu.nodak.edu/aginfo/ndipm/>

**Crops Surveyed:** Five crops were scouted for disease and insect occurrence: wheat, barley, soybean, sunflower and canola. NDSU IPM field scouts surveyed a total of 810 wheat fields, 59 barley fields, 197 soybean fields, 189 sunflower fields, and 56 canola fields. Numbers of fields surveyed were slightly lower than in 2009. In addition to fields surveyed, crop scouts also set out traps across the state for canola and sunflower insects, as well as collected soil samples from wheat fields for analysis of nematode content. ***This report provides information on the insect portion of the survey.***

### GRASSHOPPERS SURVEYED IN ALL CROPS

Scouts swept for grasshoppers using a 15-inch sweep net in field edges of surveyed crops. A total of 1,185 fields was surveyed in 52 counties of North Dakota. Grasshoppers were found in 83% of fields surveyed from early June through the end of survey (mid-August). The average number of grasshoppers per sweep was only 5 among the positive observations, with ranges from 1 to 73. Populations of grasshoppers were the highest in the southwest and central regions of North Dakota. Most fields were generally below recommended treatment levels throughout North Dakota (Figs. 1 & 2). This may have been due to the wet weather conditions in June that were not favorable for grasshopper emergence and development. As a result, grasshopper populations were not a major pest problem as forecasted in the more central Plains states, like Nebraska.

### WHEAT

A total of 810 wheat fields was surveyed in all 53 counties of North Dakota during 2010. The survey was initiated on June 1 and continued through August 12, 2010. Crops were surveyed from the 1-leaf stage through hard kernel (ripening) stage. Field scouts surveyed for insect pests of winter wheat, hard red spring wheat, and durum wheat.

**Small Grain Aphids:** Aphids were counted on 100 stems (20 stems at 5 locations within a field) and recorded as the percent infested stems. Aphids were found in only 14% of the fields

surveyed (Fig 3). The average percent infested stems was <2%, with ranges from 0 to 94%. Peak population densities occurred from mid- to late July. The treatment threshold is when 85% of stems have one or more aphids present prior to completion of heading. There was limited insecticide spraying for control of wheat aphids, and mainly in the east central region.

**Wheat stem maggot:** Wheat stem maggots (*Meromyza americana*) were sampled on 100 plants (20 plants at 5 locations) and incidence was recorded as the percent of plants with white heads. Wheat stem maggots were found in 19% of fields surveyed from heading to maturity in 2010. White heads were observed from late June through mid-August. The average percent of infested plants with white heads was 7% among the positive observations, with ranges from 1 to 36% (Fig. 4). The incidence of wheat stem maggot was similar to 2009 levels. Many North Dakota producers in the western region that suffered yield losses from wheat stem maggot in 2007 tank-mixed insecticides with late herbicide applications during 2010.

**Wheat stem sawfly:** Wheat stem sawfly (*Cephus cinctus*) has become a major insect pest of wheat in western North Dakota. We estimated that North Dakota wheat growers loss an estimated \$28-70 million in 2009 due to wheat stem sawfly. Crop scouts surveyed for wheat stem sawfly by sweeping wheat fields. Four sweeps at five different sites were used for a total of 20 sweeps per field. The average number of sawflies per 20 sweeps was 15 among the positive observations, with ranges from 1 to 166 (Fig. 5). Wheat stem sawfly was the highest in the southwest region of North Dakota.

**Cereal Leaf Beetle:** Cereal leaf beetle (*Oulema melanopus*) is an export concern for shipments of hay from North Dakota to California and is monitored for state regulatory purposes. No cereal leaf beetle was detected in any of the surveyed wheat fields in North Dakota in 2010.

## BARLEY

A total of 59 barley fields was surveyed in 29 counties in North Dakota during 2010. The survey was initiated on June 3 and continued through July 28, 2010. Crops were surveyed from the 1-leaf stage through hard kernel (ripening) stage.

**Small Grain Aphids:** Aphids were counted on 100 stems (20 stems at 5 locations) and recorded as the percent infested stems. Aphids were found in 15% of all fields surveyed and were observed during mid-June to mid-July (Fig 6). The average percent infested stems was 9%, with ranges between 2 and 38% among the positive observations. There was little insecticide spraying for control of aphids in barley in 2010.

**Barley thrips:** The number of barley thrips (*Limothrips denticornis*) inside leaf sheaths was counted from ten plants at 4 locations (a total of 40 plants per field) and the average number of thrips per stem was recorded. The average number of thrips per stem was 4, with ranges between 1 and 50 among the positive observations (Fig. 7). Population densities were highest in the central and northeastern regions of the state. An estimated 10% of barley fields required an insecticide treatment for barley thrips.

**Cereal Leaf Beetle:** Cereal leaf beetle (*Oulema melanopus*) is an export concern for shipments of hay from North Dakota to California and is monitored for state regulatory purposes. No cereal leaf beetle was detected in any of the surveyed barley fields in North Dakota in 2008.

## CANOLA PHEROMONE TRAP NETWORK

A total of 12 pheromone traps in 10 counties in the major canola growing areas of North Dakota were monitored for two Lepidopteran insect pests of canola: bertha armyworm (*Mamestra configurata*), and diamondback moth (*Plutella xylostella*). Pheromone traps were

monitored from mid-June to late July. The green bucket unitrap and winged sticky trap were used for bertha armyworm and diamondback moth, respectively. Trap data provide growers, agricultural consultants, agricultural field researchers, and county extension agents/specialists with an early risk warning system to determine when these insect pests are active and what their relative population levels are.

**Bertha Armyworm:** Populations of bertha armyworm were low and the peak flight occurred during early to mid-July. All of the trap sites had cumulative trap catches below 300 and were at “low” risk for larval infestation (Fig. 8). Overall, the 2010 trapping season was comparable to 2009 for bertha armyworm infestation risk. Cumulative trap catches in 2010 marks the seventh year in a row with low risk for bertha armyworm infestations. Canola fields did not require any insecticide treatments for control of bertha armyworm in 2010.

**Diamondback Moth:** Field scouting is recommended when more than 100 diamondback moths are captured per trap per week for several weeks prior to the susceptible crop stage (bloom to early pod development). Diamondback moth populations increased during early to mid-July, probably representing the second generation. However, the majority of the canola crop had flowered and injury from diamondback moth was minimal. Sites with the highest trap counts per trap season were in the east central region of North Dakota (Fig. 9). Fortunately, only a few canola fields (<10%) needed an insecticide application for control of diamondback moth in 2010.

#### **CANOLA SWATH SURVEY (post-harvest)**

A total of 56 canola fields was surveyed in 19 counties in North Dakota during 2010. The survey was initiated on July 30 and continued through August. Crops were surveyed at the swath (mature) stage.

**Flea Beetles:** Flea beetles (*Phyllotreta* species) were sampled using a 15-inch sweep net in freshly swathed canola fields. Four sweeps at five different sites were used for a total of 20 sweeps per field. Flea beetles were found in 80% of the fields surveyed. Peak population densities occurred in the north central and northwestern regions of North Dakota. The average number of flea beetles per 4 sweeps was 40 with ranges between 1 and 243 among the positives (Fig. 10). Large populations of flea beetles in late summer (swath canola) indicate large overwintering populations and potentially large populations the next spring. Therefore, the risk forecast for flea beetle infestation for spring 2010 is moderate. Use one of the commercially available insecticide seed treatments for canola is recommended.

#### **SOYBEANS**

A total of 197 soybean fields was surveyed in 31 counties in North Dakota during 2010. The survey was initiated on June 17 and continued through August 14, 2008. Crops were surveyed from cotyledon through R5 (beginning seed) crop stages.

**Soybean Aphid:** Soybean aphids (*Aphis glycines*) were counted on 4 plants from five sites for a total of 20 plants per field. If aphid population density exceeded 250 aphids per plant (economic threshold), aphid density was estimated. Aphids were found in 36% of all fields surveyed and were observed from June 24 to the end of survey period (August 11). The average percent of plants infested was 20%, with ranges between 1 and 100% among the positive observations (Fig. 11). The average number of soybean aphid per plant was 8, with ranges between 1 and 157 among the positive observations (Fig. 12). Soybean aphid as not a major insect pest problem in 2010 and these results are similar to populations levels in 2009. An estimated 10% of soybean fields required an insecticide treatment in the Red River Valley of North Dakota.

**Bean Leaf Beetle:** This was the first year the presence of bean leaf beetle (*Ceratoma trifurcata*) was recorded using a sweep net. Four sweeps at five different sites were used for a total of 20 sweeps per field. Bean leaf beetles were found in 13% of all fields surveyed and were observed during July. The overall population of bean leaf beetle was very low with a range of 1 to 4 adult beetles per 20 sweeps among the positives and was most common in the eastern half of North Dakota (Fig. 13).

## **SUNFLOWER**

A total of 189 sunflower fields was surveyed in 39 counties in North Dakota during 2010. The survey was initiated on June 18 and continued through August 12, 2010. Crops were surveyed from V2 through R5 (flowering) crop stages.

**Sunflower Beetle:** The numbers of adult and larval sunflower beetles (*Zygogramma exclamationis*) were counted on 10 plants from five sites for a total of 50 plants per field. Populations of sunflower beetles were very low. Adult and larvae were found in only one of the sunflower fields surveyed and only two adults per 50 plants and three larvae per 50 plants (Fig. 14 & 15, respectively). Overall populations of sunflower beetles continue to be low in most sunflower growing regions. One of the possible reasons for the decline of sunflower beetle populations could be the recent use of insecticide seed treatments in sunflowers, which control sunflower beetles and other early season insect pests.

**Regional Sunflower Insect Trapping Network for Banded Sunflower Moth and Sunflower Moth:** IPM scouts participated in a regional trapping network for three insect pests of sunflower: banded sunflower moth (*Cochylis hospes*), *Arthuri* sunflower moth (*Cochylis arthuri*) and sunflower moth (*Homoeosoma electellum*). About 40 pheromone trap sites were monitored weekly for banded sunflower moth and sunflower moth from June through August in Texas, Oklahoma, Kansas, Colorado, Nebraska, South Dakota, North Dakota, Minnesota and Manitoba, Canada. In North Dakota, trap catches for banded sunflower moth were high in most major sunflower growing areas (Fig. 16). *Arthuri* sunflower moth had lower trap catches than banded sunflower moth in most areas (Fig. 17). Trap catches for sunflower moth also were high in the southern states, such as Kansas (Fig. 18). Trap results were posted weekly on the NSA and NDSU Extension Entomology websites. Due to the high market price for sunflower and low economic threshold levels in 2010, most sunflower fields were treated with insecticides for control of the banded sunflower moth and other head-infesting insects in North Dakota.

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### Grasshoppers Season Final, 2010

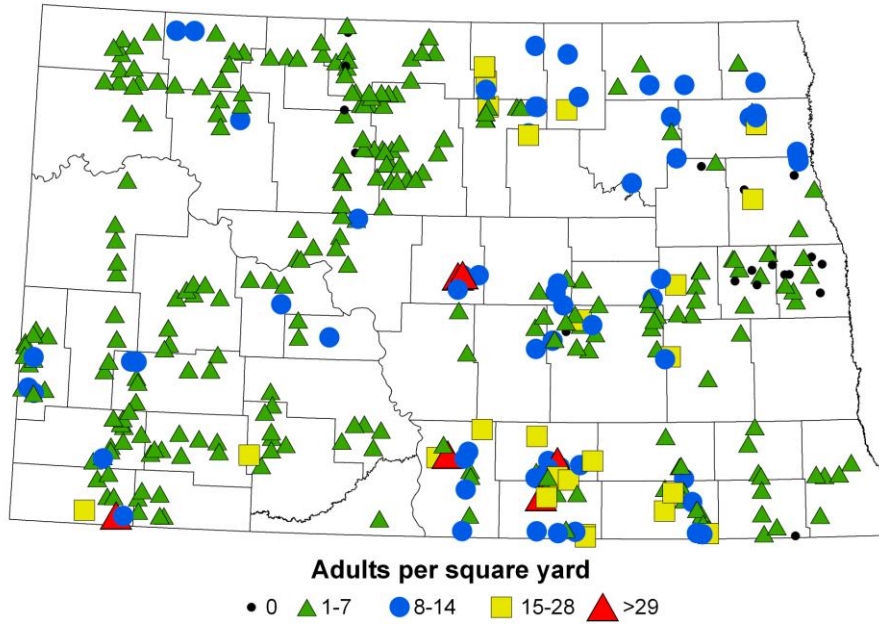


Figure 1. Adult Grasshoppers.

### Grasshoppers Season Final, 2010

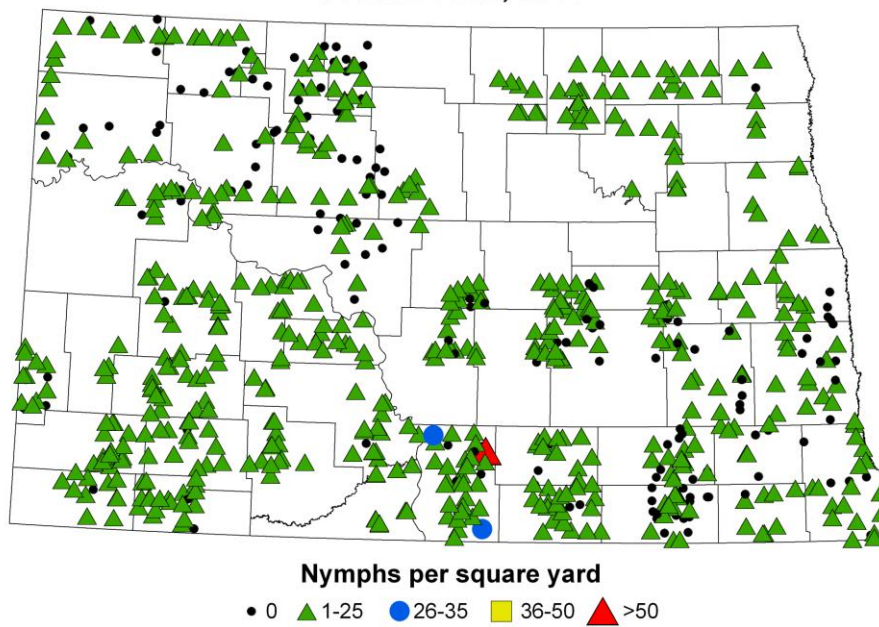
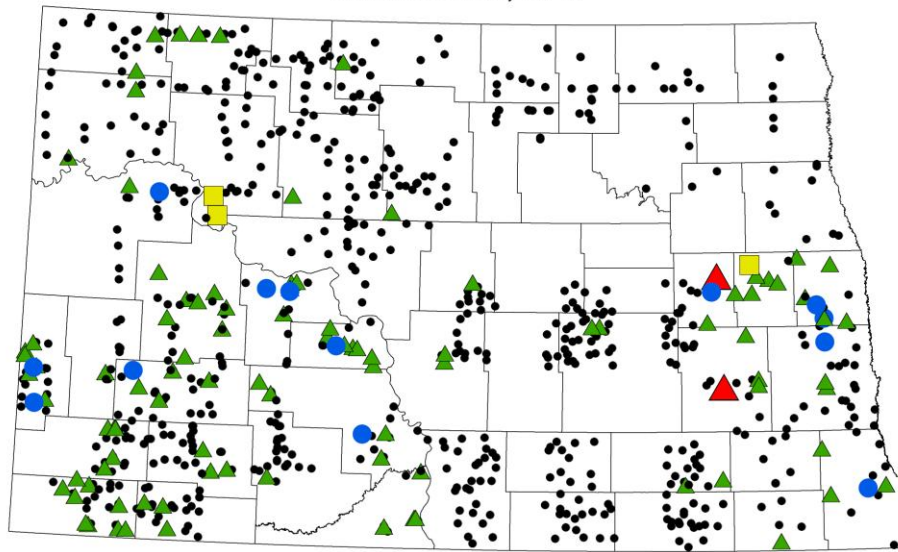


Figure 2. Grasshopper Nymphs.

## Aphids in Wheat

Season Final, 2010



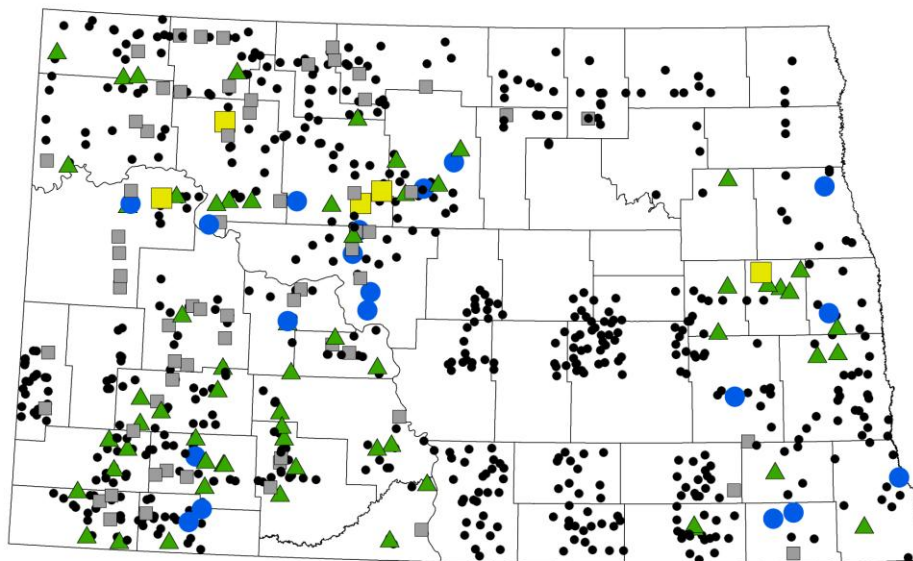
Percentage of Infested Stems

- 0
- ▲ 1-25
- 26-50
- 51-75
- ▲ 76-100

Figure 3. Small Grain Aphids in Wheat.

## Wheat Stem Maggot in Wheat

Season Final, 2010



Percentage of Infested Plants

- 0
- 1-5
- ▲ 6-10
- 11-20
- 21-50
- ▲ > 50

Figure 4. Wheat Stem Maggot in Wheat.

## Wheat Stem Sawfly

Season Final, 2010

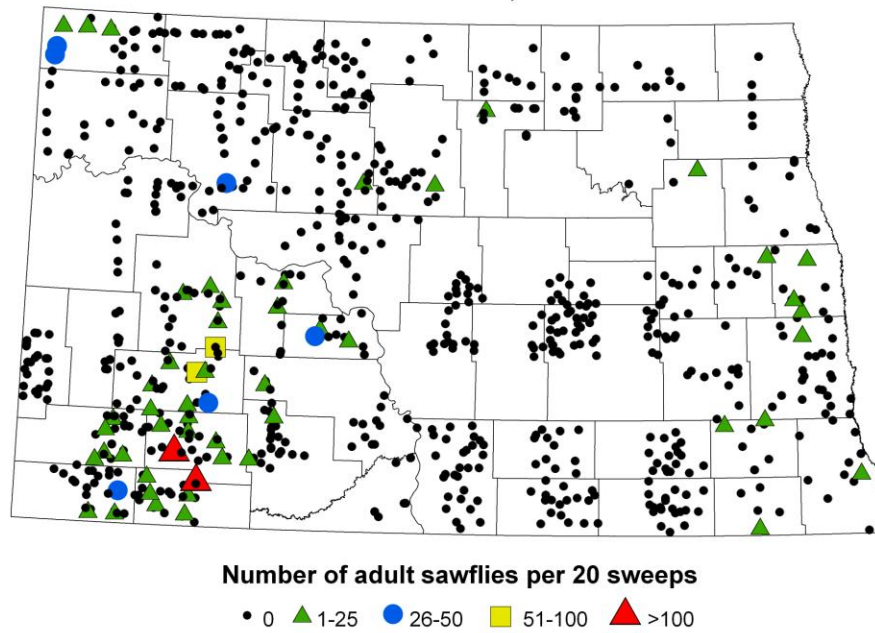


Figure 5. Wheat Stem Sawfly in Wheat.

## Aphids in Barley

Season Final, 2010

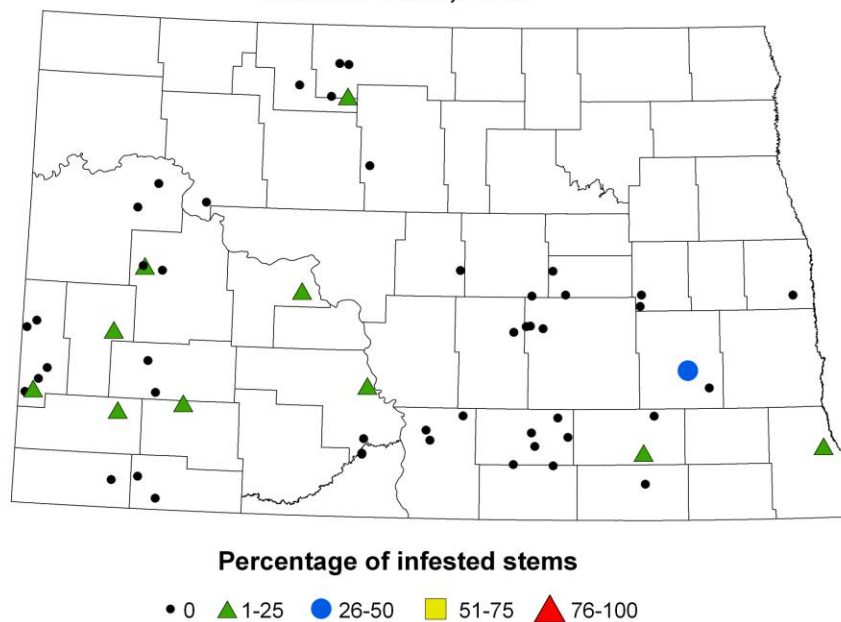


Figure 6. Small Grain Aphids in Barley.

### Barley Thrips Season Final, 2010

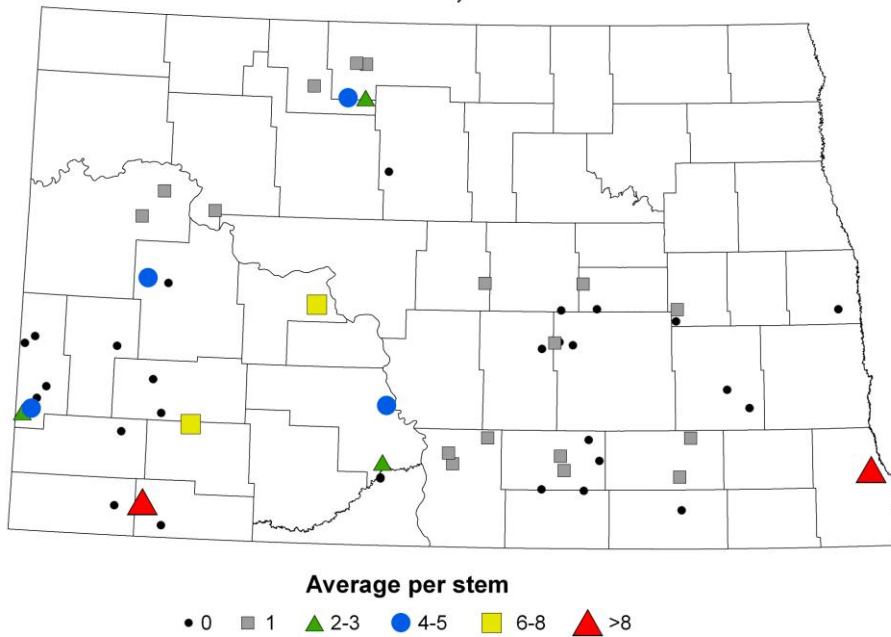


Figure 7. Barley Thrips in Barley.

### Bertha Armyworm Trap Catches Season Final, 2010

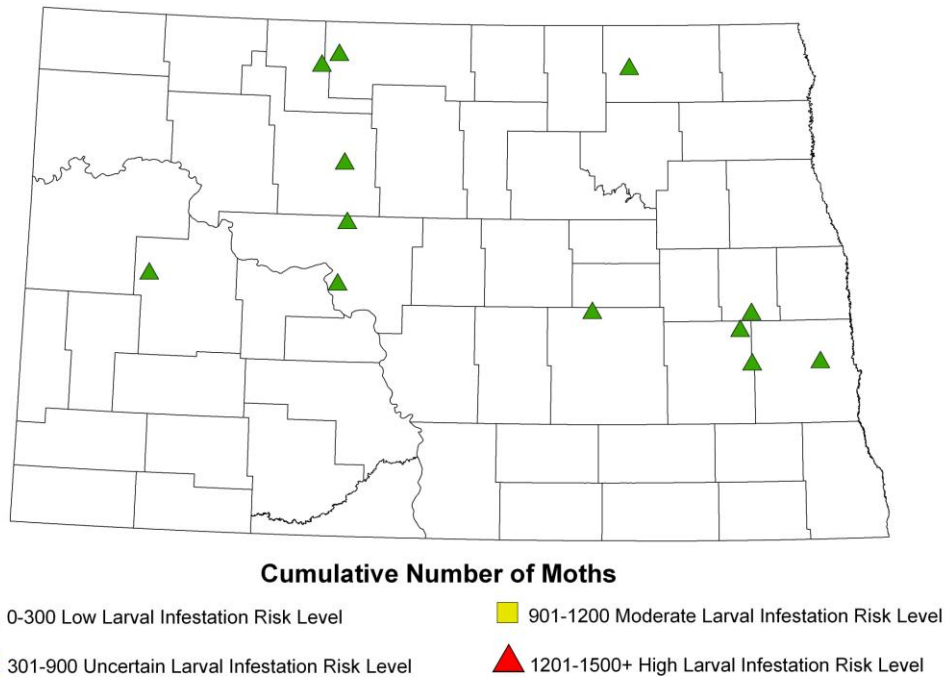
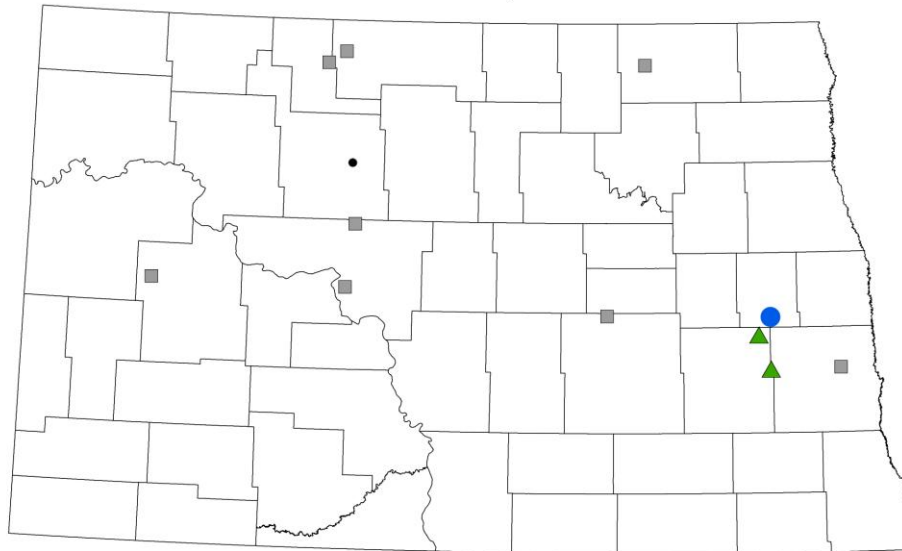


Figure 8. Bertha Armyworm in Canola.

## Diamondback Moth Trap Catches

Season Final, 2010



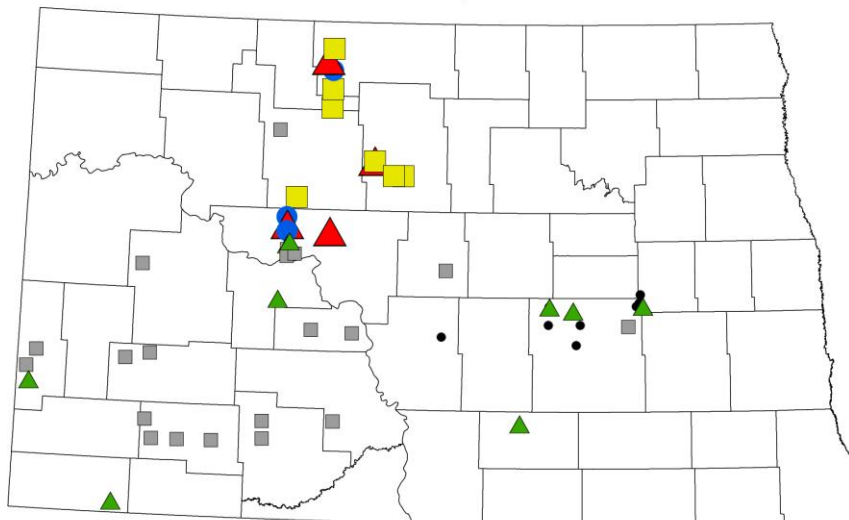
Average Number of Moths per Trap per Week

- 0
- 1-100
- ▲ 101-200
- 201-300
- 301-400
- ▲ > 400

Figure 9. Diamondback Moth in Canola.

## Flea Beetles in Canola (late summer)

Season Final, 2010



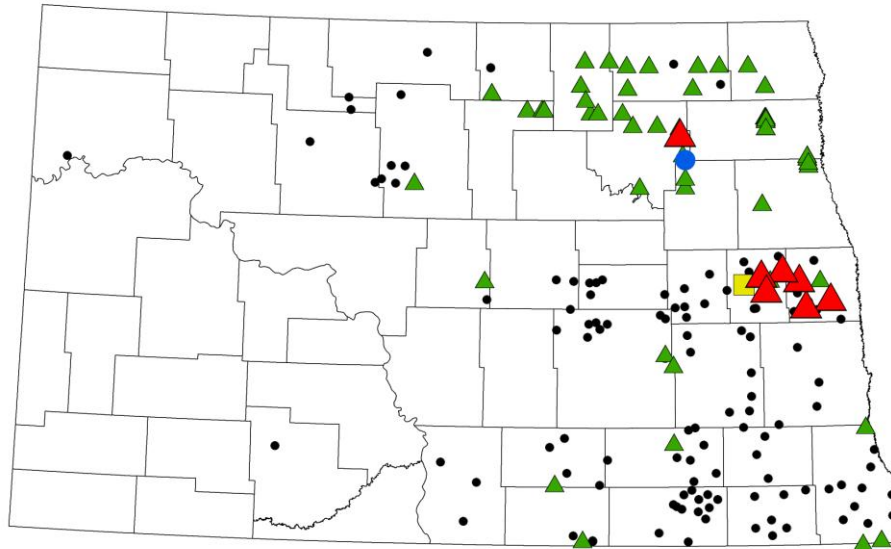
Average number of Flea Beetles per 4 sweeps

- 0
- 1-10
- ▲ 11-25
- 26-50
- 51-100
- ▲ >100

Figure 10. Flea Beetles in Swathed Canola.

## Soybean Aphids

Season Final, 2010



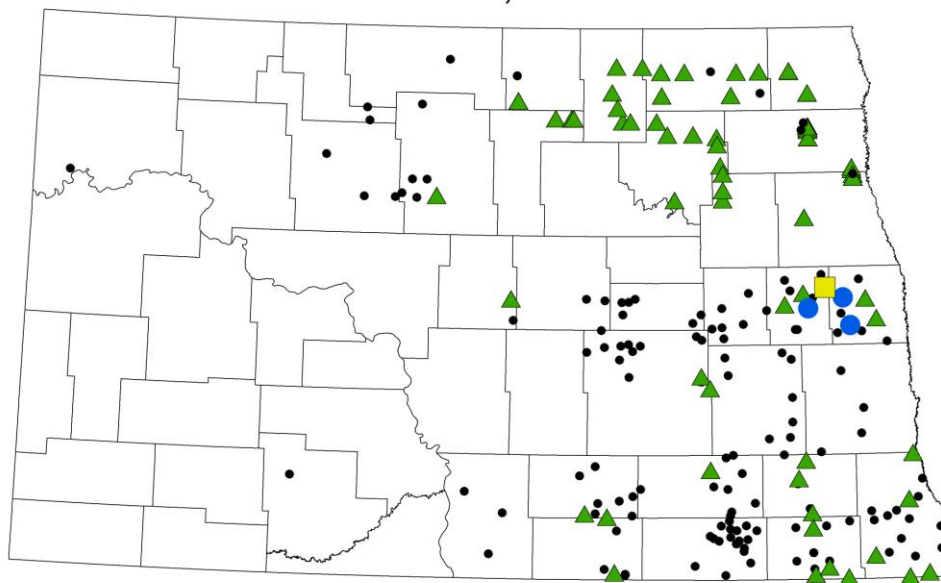
Percentage of plants infested with more than one aphid

• 0 ▲ 1-25 ● 26-50 ■ 51-75 ▲ 76-100

Figure 11. Incidence of Soybean Aphids.

## Soybean Aphids

Season Final, 2010



Average Number of Aphids per plant

• 0 ▲ 1-40 ● 41-150 ■ 151-250 ▲ > 250

Figure 12. Average number of Soybean Aphids per plant.

## Soybean: Bean Leaf Beetle

Season Final, 2010

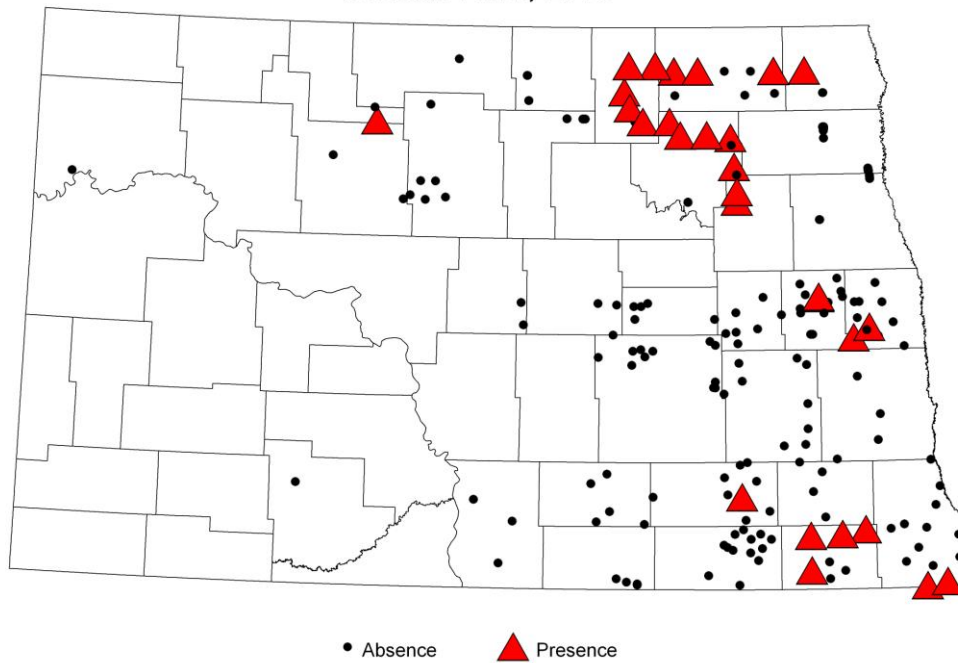


Figure 13. Bean Leaf Beetle in Soybean.

## Sunflower Beetle Average Number of Adults per Plant

Season Final, 2010

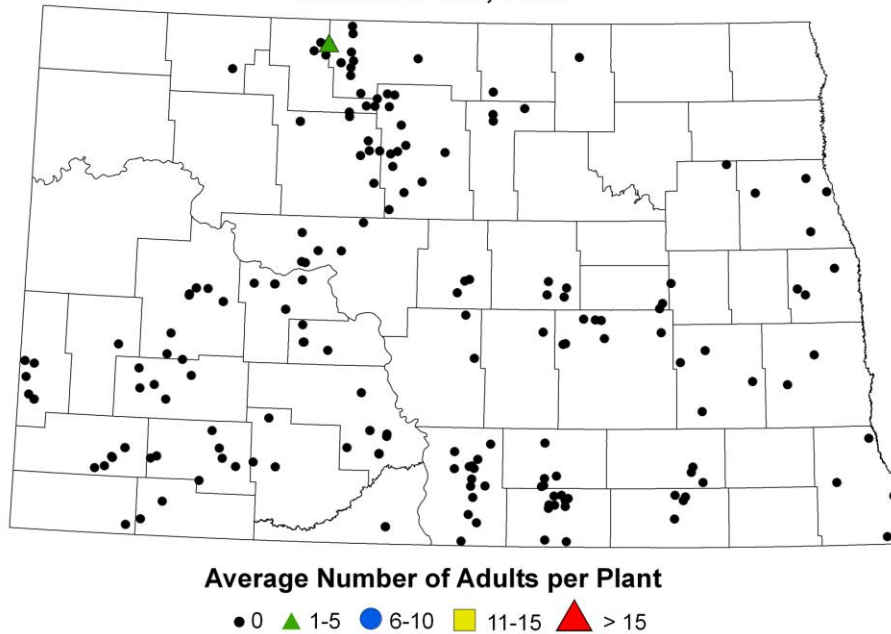


Figure 14. Adult Sunflower Beetles.

## Sunflower Beetle Average Number of Larvae per Plant Season Final, 2010

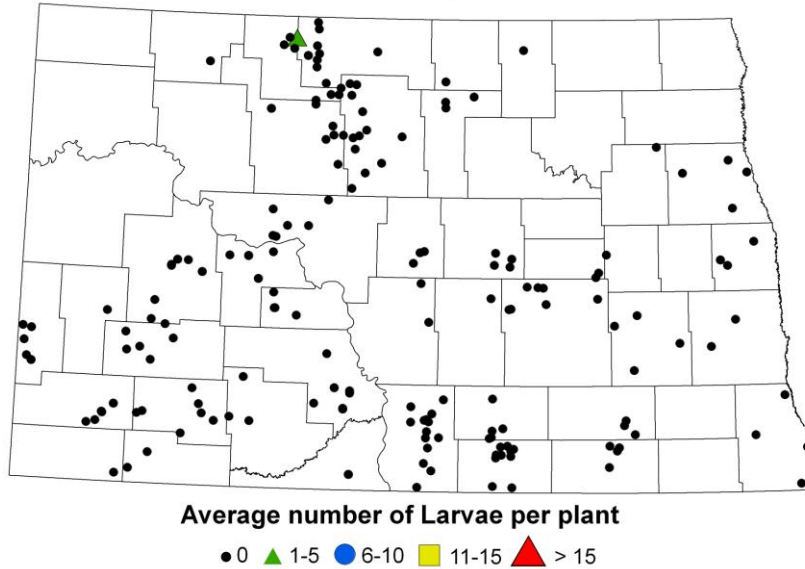


Figure 15 Sunflower Beetle Larvae.

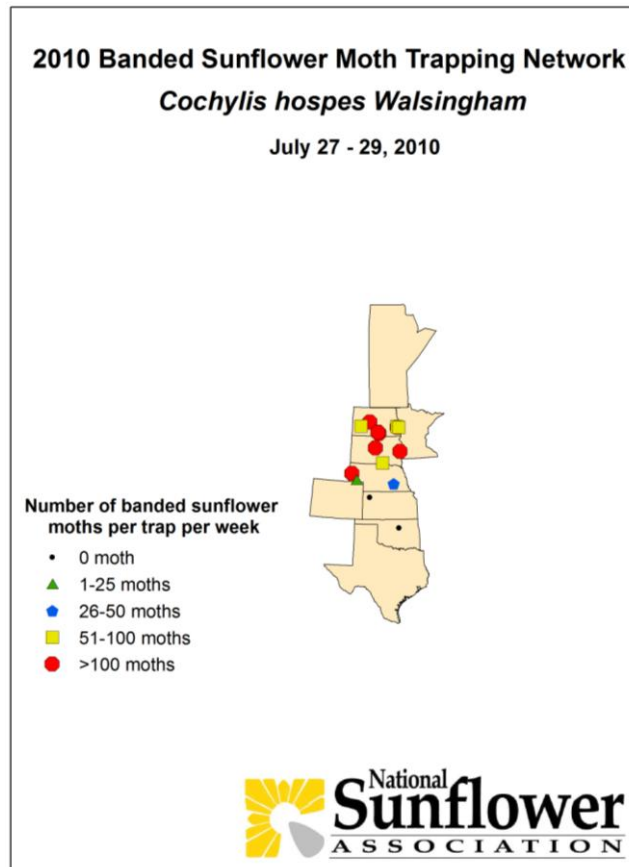


Figure 16. Adult Banded Sunflower Moth Trap Catches in Regional Trap Network.

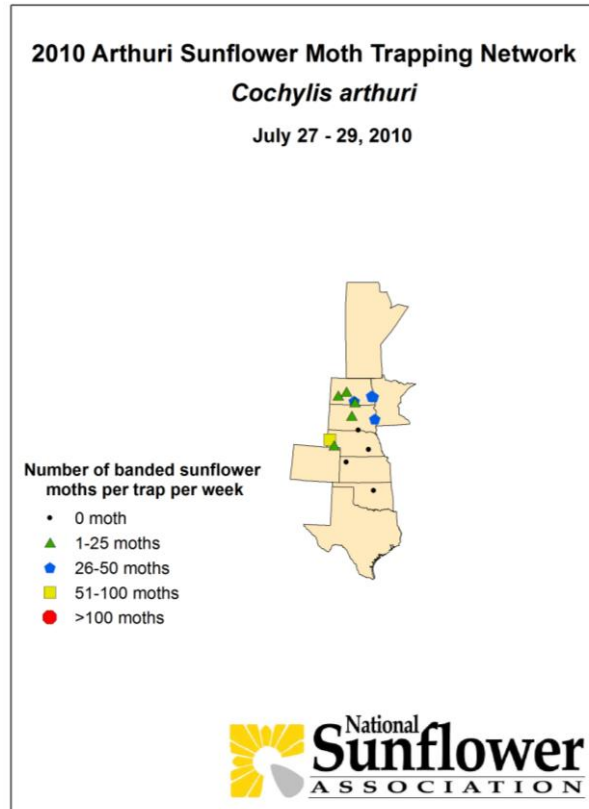


Figure 17. Adult *Arthuri* Sunflower Moth Trap Catches in Regional Trap Network.

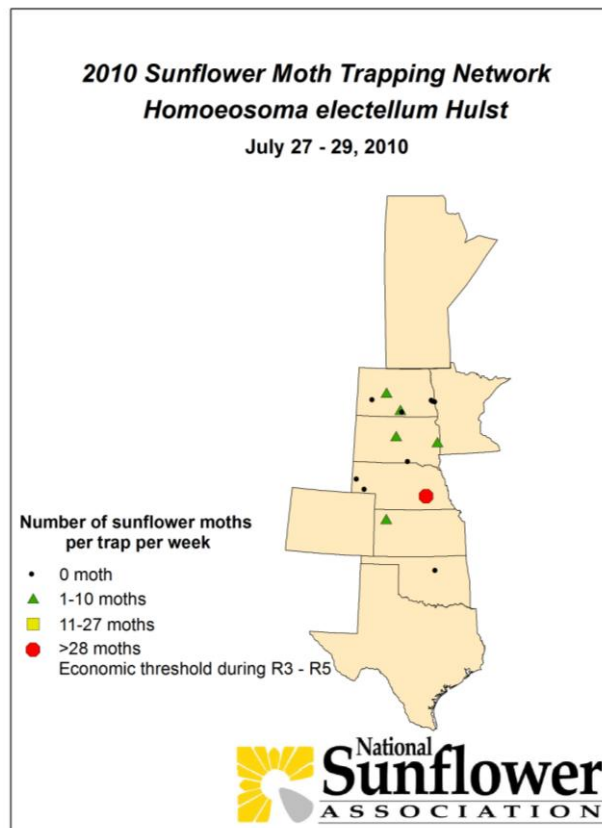


Figure 18. Adult Sunflower Moth Trap Catches in Regional Trap Network.