North Dakota Sunflower Insect Pest Survey, 2006-2008

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Abstract

The major insect pest species that cause economic losses to sunflower producers in North Dakota are banded sunflower moth (Cochylis hospes Walsingham), red sunflower seed weevil (Smicronyx fulvus Le Conte), and sunflower midge (Contarinia schulzi Gagné). New emerging insect pests include lygus bugs (Lygus spp.), sunflower bud moth (Suleima helianthana (Riley)), longhorned beetle (Dectes texanus LeConte), and sunflower seed maggot (Neotephritis finalis (Loew)). Sunflower moth (Homoeosoma electellum (Hulst)) occasionally migrates into the northern Great Plains production region and can cause severe yield losses. Results of the 2006, 2007 and 2008 sunflower insect pest surveys are reported for banded sunflower moth, red sunflower seed weevil, sunflower midge and longhorned beetle in North Dakota.

Introduction

North Dakota leads the United States in sunflower production, producing approximately one half of the nation’s total sunflower crop annually. In 2008, 960,000 acres were planted in North Dakota and produced 1,329,000,000 lbs of oilseed (Fig. 1) and 181,500,000 lbs of non-oilseed sunflower (Fig. 2), worth an estimated total of $307 million (North Dakota Agricultural Statistics, 2009). Each year, the National Sunflower Association (NSA) supports a sunflower crop survey prior to harvest in the southern and northern Great Plains. Data is collected on agronomic practices and pest problems, including weeds, diseases and insects. Information collected during the survey provides yield forecast estimates, pest forecasts for the following year, and shows trends in pest problems from year to year. This information also helps the NSA focus their funding on important research and extension efforts. Methods for the insect pest portion of the survey and results for major insect pests are presented for North Dakota for the years 2006-2008.

Figure 1. Oil sunflower production, 2008.  Figure 2. Non-oil sunflower production, 2008.
Insect Survey Methods

In North Dakota, 84, 82, and 77 fields were surveyed in 2006, 2007, and 2008, respectively. Fields were selected at random in the major sunflower production counties. Date, field number and GPS coordinates were recorded for each field. All insect counts were conducted in the interior of the field about 25 m from the field edge. For banded sunflower moth and red sunflower seed weevil, a random sample of 100 seeds from five heads was collected for damage assessment from each field. Seed damage for each of these insects was examined in the laboratory and percent damaged seed for each insect determined. For sunflower midge, 10 heads were examined in the field and rated using the Bracken rating scale of 0 to 5, with 0 having no damage and 5 having damage so severe that the head does not open (Bracken 1991). For longhorned beetle, five stalks were split in the field and the number of stems with larvae was recorded.

Results

Banded Sunflower Moth

Banded sunflower moth (Appendix A, Figs. 1-2) is the most widespread and damaging sunflower insect pest in North Dakota. Larvae consume developing florets and seeds, and one larva can consume the contents of several seeds. Damaged seeds typically blow out the back of the combine during harvest. From 2006-2008, banded sunflower moth was most damaging in 2006 (Fig. 3), with four fields having 11-25% damaged seed, one field with 26-50% damaged seed, two fields with 51-75% damaged seed and two fields with 76-100% damaged seed. In 2007 (Fig. 4) damage was less severe, with all fields having < 10% damaged seed. Damage in 2008 (Fig. 5) was also less severe than in 2006, with most fields having < 10% damaged seed, three fields with 11-25% damaged seed and one field with 26-50% damaged seed. The lower percentage of damaged seeds in 2007 and 2008 was probably due to scouting and well-timed insecticide sprays, since many producers suffered yield losses in 2006.

![Figure 3. Banded sunflower moth percent seed damage, 2006.](image-url)
Red Sunflower Seed Weevil

Red sunflower seed weevil (Appendix A, Figs. 3-4) causes economic loss from larval feeding on developing and mature kernels. Larvae typically consume only a portion of the kernel. Partially consumed kernels may also have lower oil content than kernels that have not been fed upon. If seed weevils have not dropped out of the seed prior to harvest, active larvae can still be present in storage bins, which can cause heating problems in stored grain. From 2006-2008, red sunflower seed weevil was most damaging in 2006 (Fig. 6), with seven fields having 26-50% damaged seed and nine fields with 11-25% damaged seed. In 2007 (Fig. 7), damage was moderate with eight fields having 11-25% damaged seed and one field with 51-75% damage seed. Damage in 2008 (Fig. 8) was least severe for the three-year period, with only one field having 11-25% damaged seed.
Figure 6. Red sunflower seed weevil percent seed damage, 2006.

Figure 7. Red sunflower seed weevil percent seed damage, 2007.

Figure 8. Red sunflower seed weevil percent seed damage, 2008.
Sunflower Midge

Females lay eggs on developing buds, either in the center of the bud or beneath the bracts. Larvae feed on tissue beneath the bracts and in the developing receptacle (Appendix A, Fig. 5). Damage from light infestations is evident by bract scarring only, and little or no economic loss may occur. With more severe infestations, head cupping (Appendix A, Figure 6) and dead central areas occur, resulting in loss of seed development. Damage is typically restricted to field margins in lightly infested fields, although field-wide damage and significant yield loss can occur in heavily infested fields. In recent years, midge activity has been limited to a few “hot-spots” within the state. In 2006 (Fig. 9), three fields sustained heavy midge damage and one field had such severe damage that many heads did not open. In 2007 (Fig. 10), one field sustained heavy damage and one field had extreme damage. In 2008 (Fig. 11), three fields had heavy damage and one field had extreme damage.

Figure 9. Sunflower midge damage, 2006.

Figure 10. Sunflower midge damage, 2007.
Longhorned Beetle

The longhorned beetle, *Dectes texanus* LeConte (Appendix A, Figs. 7-8), is also known as the sunflower stalk girdler because mature larvae girdle the stem near the base of the plant. Damage is caused by weakening of the stalk, which can cause lodging. In North Dakota, this pest causes significant damage only in the south-central portion of the state. In 2006 (Fig. 12), two fields had 51-75% infested stalks and three fields had 76-100% infested stalks. In 2007 (Fig. 13), six fields had 76-100% infested stalks. In 2008 (Fig. 14), one field had 26-50% infested stalks and two fields had 76-100% infested stalks.
Figure 13. Longhorned beetle percent infested stalks, 2007.

Figure 14. Longhorned beetle percent infested stalks, 2008.

Literature Cited


North Dakota Agricultural Statistics No. 78, June 2009.

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Appendix A. Images of insects and damage.

Figure 1. Adult banded sunflower moth.  

Figure 2. Banded sunflower moth larvae and damaged seeds.

Figure 3. Adult red sunflower seed weevil.  

Figure 4. Red sunflower seed weevil larva in kernel.
Figure 5. Sunflower midge larvae and bract damage.

Figure 6. Severe head cupping caused by sunflower midge.

Figure 7. Adult longhorned beetle.

Figure 8. Longhorned beetle larva boring in stalk.