EM 9000-E • December 2009

Wheat Head Armyworm True or False: A Tale from the Pacific Northwest

Silvia I. Rondon, Mary K. Corp, Diana Roberts, Keith S. Pike, Peter J. Landolt, and Dustin Keys

Armyworm caterpillars can be a troublesome pest in cereal grains grown in the Pacific Northwest states. These caterpillars, from the genus *Faronta,* have caused crop damage in Umatilla County, Oregon since 2007. In 2007 and 2008 the pest caused damage to crops in Lincoln County, Washington. Researchers also noted a 35% yield loss due to the insect in 2007 and 2008 in spring wheat trials conducted by Washington State University (WSU) near Davenport, Washington (Roberts 2008, 2009a, b). Bonneville County, Idaho reported damage from the pest in 2005 and 2006.

The insect involved may be the "true" wheat head armyworm (WHA), *Faronta diffusa* (*Lepidoptera*: *Noctuidae*), which is a pest of cereal grains throughout the Midwest and Great Plains, or it may be a close relative. Information about the insect in the Pacific Northwest is incomplete at this time.

The 'True' Wheat Head Armyworm

The genus *Faronta* consists of 13 species. True WHA larvae feed on wheat and various other grain and grass crops. The genus also includes *F. terrapictalis* (Buckett 1967, [1969]), which scientists at Oregon State University (OSU) referred to as "false" wheat head armyworm during the 2009 growing season. *Faronta terrapictalis* is native to the western United States. Its host range and pest status are not known (Michaud et al. 2007).

All *Faronta* larvae and moths look similar, which can cause confusion as to which species has been found feeding on wheat, grains or grass. OSU scientists have found moths of both *F. diffusa* and *F. terrapictalis* in wheat-growing areas of Oregon and Washington, but they are unsure which species may

Photo: Jean Paul Michaud. Courtesy of Kansas State University.

Figure 1. *Faronta* (armyworm) larvae can be troublesome in cereal grains grown in the Pacific Northwest states.

Silvia I. Rondon, assistant professor, Extension entomology specialist, Hermiston Agricultural Research and Extension Center, Oregon State University (OSU), Hermiston, Oregon. Mary K. Corp, associate professor, Alternative Cropping Systems, Umatilla County Extension, OSU, Pendleton, Oregon. Diana Roberts, Washington State University (WSU) Extension agronomist, Spokane Washington. Keith S. Pike, entomologist, WSU, Prosser, Washington. Peter J. Landolt, research leader, Yakima Agricultural Research Laboratory, USDA Agricultural Research Service, Wapato, Washington. Dustin Keys, research student, Eastern Oregon University, La Grande, Oregon.

Oregon State University | Extension Service

be responsible for larval damage to wheat. The next challenge, once researchers confirm the identification of the pest, is to determine appropriate control measures if needed.

Noctuidae comprise the largest family in the order *Lepidoptera*, which includes moths, skippers and butterflies. The family also includes numerous pest species such as loopers, cutworms, and armyworms (Mickel 1932). "True" and "false" WHA are typical representatives of the *Noctuidae* family. Both have straw colored forewings, which probably provide protection through camouflage against a background of dry grasses or wheat.

Although several species of *Faronta* can be found, the information presented here focuses on *F. diffusa* in the Midwest (only available literature). Currently, no comparable information is available on the biology of *F. terrapictalis*, or on the pest status and biology of *F. diffusa* for the Pacific Northwest.

Photo: Silvia I. Rondon, Oregon State University.

Figure 2. *F. terrapictalis* or 'false' wheat head armyworm adult. Note the dark hind wings.

Identification, Life Cycle, and Behavior

The WHA has four life stages: egg, larva, pupa, and adult. Larvae go through five instars (Peairs 2006). The larvae vary in color but have been noted as gray, cream, or green with distinct yellow, white, and brown strips along the length of the body (figure 1). The adult moth is yellow-brown with a brown stripe running down the length of each of the forewings (figure 2). The wingspan measures 1.2 to 1.5 inches (Michaud et al. 2007). During the winter months, the larvae pupate in the soil. When spring arrives, moths emerge. Within a few days, the moths lay eggs on wheat or barley crops (Peairs 2006). Larvae that develop from eggs feed on wheat as early as late May, with increasing numbers into mid-June (Michaud et al. 2007). This late-spring timing coincides with wheat flag leaf development. Larvae feed on wheat heads, primarily at night, when ambient temperatures are cooler. They migrate toward the base of stalks during hot days. Larvae and moths typically are active only at night (Michaud et al. 2007; Royer 2007).

The first generation of larvae, which emerges in mid- to late- spring, is the generation that tends to cause undetected but significant damage to wheat crops. This generation pupates in mid-summer as the wheat heads ripen to maturity, leaving damaged wheat kernels as remnants of their presence. The second generation of moths usually lays its eggs on warm seasonal grasses in the fall, after wheat has been harvested (Royer 2007). In Oregon and Washington, a trapping program showed two flights of moths in 2009, with moth numbers in the second flight substantially lower than in the first.

Distribution

The WHA is found throughout the United States and Canada, but is more common in high-producing wheat areas including Kansas, Nebraska, Oklahoma, and Colorado (Michaud et al. 2007). When WHA first entered Oregon and Washington is unclear. Adult moths confirmed to be *F. diffusa* were captured in sex-attractant traps in a 2009 study (Roberts 2009a,b). In that study, *F. diffusa* and *F. terrapictalis* were consistently found in Oregon and Washington. However, 2009 trapping data from eastern Washington into Umatilla County, Oregon do not identify which species was likely to have caused reported crop damage. The two species are morphologically similar, except that *F. terrapictalis* has somewhat darker forewings and substantially darker hind wings (figure 2).

Feeding

WHA larvae may feed on all parts of grass and cereal crops, but seem to prefer the heads of these crops. Damage takes the form of a small hole bored into the base of the floret. It may look very similar to damage caused by weevils in stored grain. The pests are more likely to be found along field margins.

The preferred crop is yet to be determined. Many believe this species of armyworm only has an affinity towards wheat, but some entomologists suggest Timothy grass (*Phleum pratense*) is the preferred crop. When larvae feed on wheat, they tend to eat

the wheat heads at night and early in the morning. They usually hang upside down from the slender bristles or "awns" and hollow out the kernels.

Control

Infrequently, WHA can cause economic harm to cash crops. The problem usually goes unnoticed until the crop is harvested and damaged kernels are found. Scouting for the pest is unlikely to be justified unless it is part of an integrated management program or if infestations have occurred previously in an area. At present, control measures based on research are limited (see *Chemical Controls*), and scientifically tested economic thresholds for treatment are not available. Researchers at OSU and WSU do not routinely recommend growers spray at the first sign of the insect.

Sampling and trapping are two practices that may be helpful if a monitoring program to scout for WHA is desired.

Sampling

Sampling for WHA larvae and moths may be done with a sweep net (figure 3). Infestations are usually limited to field margins, so this would be the first place to check. Scouts should also sweep deep into each field to get a representative sample. Stay consistent with the number of sweeps where field sampling is to be done. Identification of WHA is difficult, but OSU Extension and WSU Extension can assist with identification, at least to the genus level.

Photo: Silvia I. Rondon, Oregon State University.

Figure 3. Sampling for wheat head armyworm larvae and moths using a sweep net.

Trapping

Trapping is another way to monitor for WHA (figures 4a and 4b). A sex-attractant may be used to lure moths to the trap (Showler 2005). Traps should be left in or adjacent to the the field throughout the crop season, from late April to mid-summer,

Photo: Mary K. Corp, Oregon State University.

Photo: Mary K. Corp, Oregon State University.

Figure 4. Pheromone traps used to sample for wheat head armyworm.

and should be checked at least once per week. OSU experts recommend changing the pheromone lures and insecticidal strips in the traps every four weeks.

Chemical Control

While no insecticides are specifically labeled for control of WHA in the Pacific Northwest, studies suggest pyrethroids may work well. They should be used with restraint since they affect natural enemies. For best results, spray early in the morning or late in the evening, while the pest is exposed and feeding. If the field is sprayed during the day the treatment is likely to be less effective.

Any registered contact insecticide should be effective against the pest. However, pesticide trials have not been conducted specifically for control of WHA. While armyworms are listed on the labels of a number of chemicals, no currently available commercial insecticide specifically lists WHA.

Two chemicals that may be of some help against the pest are Warrior with Zeon Technology, from Syngenta, and Mustang Max EC, from FMC. Warrior has a warning safety label, a re-entry interval of 24 hours, and a preharvest interval (PHI) of 30 days. This may pose a problem for growers if it is applied close to harvest, in winter wheat especially. Mustang Max has a caution label, a re-entry interval of 12-hours, and a PHI of 14 days. The law requires applicators to **always read and follow all pesticide label recommendations when using chemical products.**

Biological Control

A report from WSU indicates caterpillars thought to be WHA were parasitized by an unidentified wasp. In other areas, it has been suggested that *Glyptopanteles militaris*, a parasitoid wasp, may prey on the WHA. Ground beetles, lady beetles, and lacewings probably also prey on WHA larvae.

References

Michaud, J.P., P.E. Sloderbeck, and R.J. Whitworth. 2007. *Wheat Insect Management*. Manhattan, KS: Kansas State University Research and Extension.

Mickel, C.E. 1932. Armyworms in Southern Minnesota. *Journal of Economic Entomology* 25(6): 1123-1128.

Peairs, F.B. 2006. Crops: Caterpillars in Small Grains. Insect Series 5.577. Fort Collins, CO: Colorado State University Cooperative Extension.

Roberts, D. 2008. Alleged wheat head armyworm marching again. Pullman, WA: Washington State University Extension.

Roberts, D. 2009a. Wheat head armyworm update June 22, 2009. Pullman, WA: Washington State University Extension.

Roberts, D. 2009b. Wheat head armyworm update July 1, 2009. Pullman, WA: Washington State University Extension.

Royer, T. 2007. Armyworms and wheat head armyworms: how to tell the difference. *Oklahoma State University Plant Disease and Insect Advisory* 6(15).

Showler, A.T., E. Salgado, I. Fraser, and D.C. Robacker. 2005. Effect of aging on pheromone emission from a commercial beet armyworm (Lepidoptera: *Noctuidae*) lure and trap efficiency. *Journal of Economic Entomology* 98(2): 373-377.

For More Information

Baily, D.L., and H.L. Chada. 1968. Effects of natural (sorghum) and artificial (wheat germ) diets on developments of the corn earworm, fall armyworm, and southwestern corn borer. *Journal of Economic Entomology* 61(1): 257-260(4).

Sheppard, C.A., and R.A. Weinzierl. 2002. Entomological lucubrations: the 19th century spirited conflict concerning the natural history of the armyworm, *Pseudaletia unipuncta* (Haworth) (Lepidoptera: Noctuidae). *American Entomologist* 48(2): 108-117.

Tindall, K.V., M.W. Siebert, B.R. Leonard, J. All, and F.J. Haile. 2009. Efficacy of Cry1Ac:Cry1F proteins in cotton leaf tissue against fall armyworm, beet armyworm, and soybean looper (Lepidoptera: Noctuidae). *Journal of Economic Entomology* 102(4): 1497-1505.

Underhill, E.W., M.D. Chisholm, and W. Steck. 1977. Olefinic aldehydes as constituents of sex attractants for noctuid moths. *Environmental Entomology* 6(2): 333-337.

Watts, J.C., and A.C. Bellotti. 1967. Some new and little-known insects of economic importance on range grasses. *Journal of Economic Entomology* 60(4): 961-963.

© 2009 Oregon State University. This publication was produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U.S. Department of Agriculture, and Oregon counties. Oregon State University Extension Service offers educational programs, activities, and materials without discrimination based on age, color, disability, gender identity or expression, marital status, national origin, race, religion, sex, sexual orientation, or veteran's status. Oregon State University Extension Service is an Equal Opportunity Employer.

Published December 2009.