## ***Forage Pest Update: Fall Armyworms and Bermudagrass Stem Maggots***

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### ***Fall Armyworms Arrive Early Despite Record Breaking Cold Temperatures***

After the record breaking cold February temperatures in Arkansas and points south, I never anticipated that fall armyworms would arrive this early. Fall armyworms don't overwinter in Arkansas but in south Texas (Fig.1). Fall armyworms tend to arrive early when mild winters are experienced – we have observed this multiple time. My assumption was that during mild winters, fall armyworms will overwinter further north than during colder winters. A mild winter would allow fall armyworms to start moving northward from areas closer to Arkansas than during cold winters. Obviously, my assumption/prediction was incorrect. So what happened? I don't know but assume that wind currents helped fall armyworm moths move northward at a faster rate. Here I go making assumptions again.

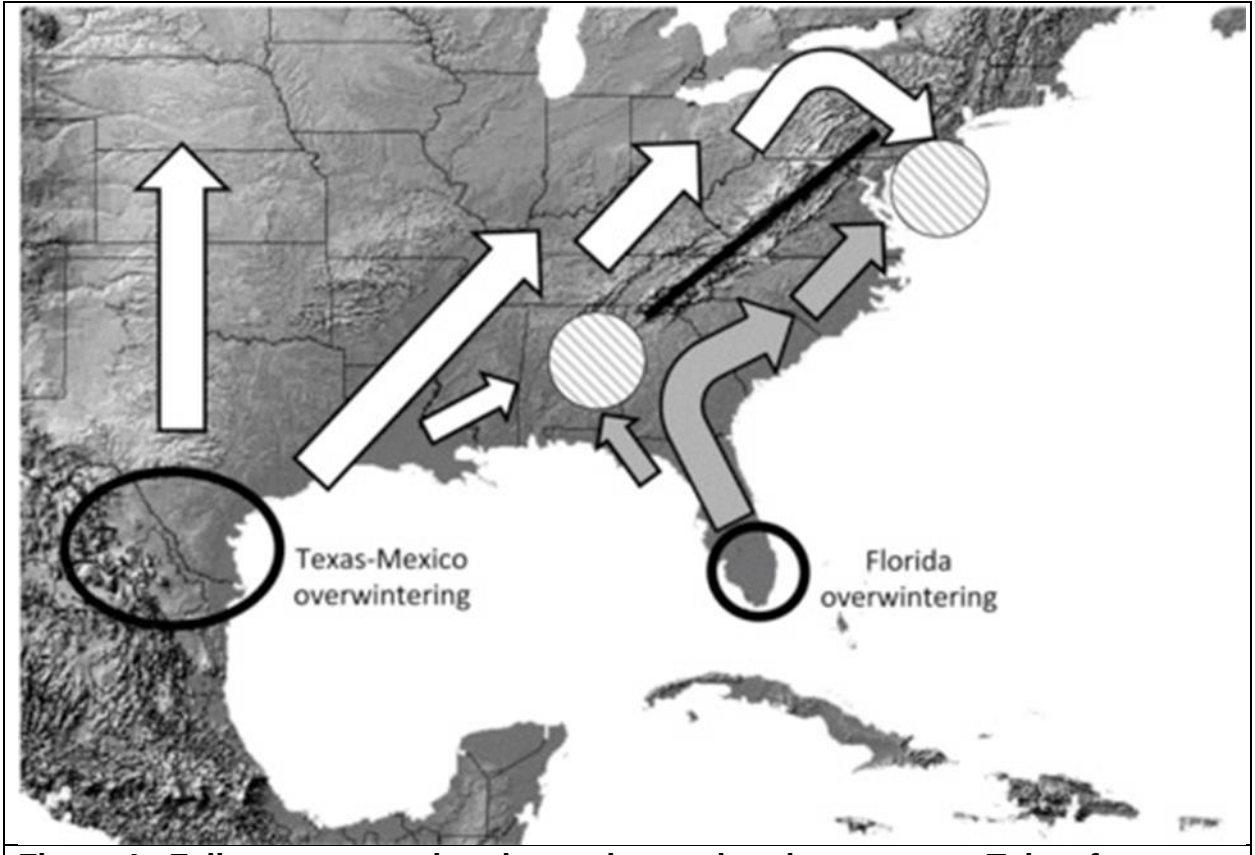


**Figure 1. Fall armyworm migration and overwintering patterns. Taken from Nagoshi et.al. 2012. Inferring the annual migration patterns of fall armyworm (Lepidoptera: Noctuidae) in the United States from mitochondrial haplotypes. Ecol. Evol. 2(7): 1458-1467.**

In early June we began getting reports of fall armyworms in corn in SW Arkansas. By mid-June, fall armyworms were at treatment level in south Arkansas. Now (late June) we are experiencing fall armyworms at treatment levels in some central Arkansas River Valley hayfields and sub-treatment level in others.

Diligence is critical in identifying and managing outbreaks before significant losses occur. Infestations are easily overlooked when the caterpillars are small and eating very little. Once they grow large and consume more grass, damage becomes apparent (Fig. 2). Now through fall, we should continue scouting pastures and hayfields.

**Figure 2. Fall Armyworms (*Spodoptera frugiperda*).**

Clues to fall armyworm infestations include: 1) field appears “frosted” 2) presence of birds in the field or 3) the odor of freshly grass. Armyworm outbreaks usually often occur in waves about 30 days apart. However, when mixed worm sizes occur (Fig.2), overlapping generation are present and new infestations occur more frequently than 30 days. When scouting, carefully examine grass blades, stems and organic debris at plant base for armyworms. It is best to take at least ten one-foot-square random samples (Fig. 3) across the pasture or hay meadow. Make note of the armyworm sizes as this will help make good management decisions.

**Figure 3. Mixed sizes of fall armyworms (left) and fall armyworm sampling square (right).**

Insecticide application is recommended when an average of two or three fall armyworms per square foot occur within the field. Although we are working to develop a threshold using sweep nets, we need more data to develop the best correlation. If you are interesting in collecting data for this work, please let me know - I have the data sheets and extra sweep nets.

Per-acre insecticide cost will vary from as low as about $1.50 up to about $14.00. When calculating cost, always consider the cost per acre and not the cost per gallon of product. Consider residual activity of the product, especially if you are seeing multigenerational populations (all sizes of fall armyworm caterpillars) and heavy armyworm pressure. Pyrethroid insecticides such as Karate® (lambda-cyhalothrin), Mustang Max® (zeta-cypermethrin) and Baythroid XL (beta-cyfluthrin) have short-duration residual activity. In contrast, products such as Prevathon® (chlorantraniliprole), Besiege® (chlorantraniliprole and lambda-cyhalothrin) and Intrepid® (methoxyfenozide)) have longer-duration residual activity and can reduce the number of applications necessary to produce a hay crop. Efficacy evaluations in 2017 and 2018 demonstrated that a mixture of lambda-cyhalothrin and Dimilin® (diflubenzuron) would provide longer-duration residual activity at less than one-half the cost of the more expensive products. The rate we evaluated was 3.8 oz. lambda-cyhalothrin and 2.0 oz. Dimilin® per acre. Insecticides that will provide residual activity and have no grazing restriction and a limited pre-harvest interval for hay include: lambda-cy and Dimilin® tank mix, Intrepid® and generic methoxyfenozide, Besiege® and Prevathon®. Also remember, if the grass is ready, cutting for hay will avoid the need to make an insecticide application.

Hayfields can be dually infested with fall armyworms and bermudagrass stem maggots. And in some cases, the timing of an application for fall armyworms and bermudagrass stem maggots coincide. When this does occur, remember that bermudagrass stem maggot control is aimed at the egg laying adult flies which are treated with pyrethroids. Two fall armyworm treatment options that include a pyrethroid are the lambda-cyhalothrin/Dimilin® tank mix and Besiege.

For additional information on armyworms see “Managing Armyworms in Pastures and Hayfields” and is available at: https://www.uaex.edu/publications/pdf/FSA-7083.pdf and the Insecticide Recommendations for Arkansas” at: https://www.uaex.edu/publications/mp-144.aspx.

***Bermudagrass Stem Maggots Have Arrived***

We are getting reports of bermudagrass stem maggots in multiple areas of the state. Reports are from south Arkansas, the Arkansas River Valley and even in NE Arkansas. In some cases, damage has been noted and insecticides applied. We need to encourage our hay producers to be diligent in scouting their Bermuda grass fields now so that control can be initiated at the optimal time. One major problem with bermudagrass stem maggot infestation is that they may go unnoticed until they cut and see a dramatic reduction in yield.

Damage caused by the bermudagrass stem maggot results from larval stages (maggots) feeding in the shoot causing the top two or three leaves to die (Fig. 1). Lower leaves remain alive and unaffected by the maggot’s feeding. Because of the death of the top couple of leaves, the plant (and field, if heavily infested) may exhibit a frosted appearance (Fig. 2.). The life cycle from egg to adult requires about three weeks The adult female fly will lay eggs on the bermudagrass stem near a node. The maggot will hatch from the egg, crawl up to toward the last plant node (where the leaf blade emerges from the stem) and burrow into the shoot and begin feeding. Usually by the time the top leaves have died, the maggots have exited the stem and pupated on the ground. With such as short generation period, multiple generations occur and populations tend to increase later in the season causing an accumulation of damage.

**Fig. 1. Typical damage caused by the bermudagrass stem maggot. Note the dead upper leaves.**

**Fig. 2. Bermudagrass stem maggot damage.**

The adult fly is small (~1/8 inch long) and yellow colored with four prominent black spots on the abdomen (Fig. 3). The maggot (larva) is also yellowish colored and about 1/8 inch in length when fully mature (Fig. 4).

**Fig. 3. Bermudagrass stem maggot adult. Note the four black spots on its abdomen.**

**Fig. 4. Bermudagrass stem maggot larvae.**

In general, this pest is less of a problem in coarse stemmed bermudagrass varieties (Tifton 85 and others) and bermudagrass that is grazed. In grazed pastures, cattle eat the fly eggs and maggots along with the grass, lessening population build up. Bermudagrass stem maggots may become an economic pest in finer stemmed varieties (common, Coastal, Alicia and others) that are baled for hay, especially later in the season after the population builds. In heavy infestations, regrowth after cutting can be slowed substantially. Bermudagrass stem maggot management demonstrations have shown as much as 50% yield loss in fine-stemmed varieties. Figure 5 shows a bermudagrass field with significant damage in untreated verses the pyrethroid treated area.

**Fig. 5. Pyrethroid treated verses non-treated areas of a bermudagrass field infested with bermudagrass stem maggots. Photo by Ben Thrash**.

Systemic insecticides and insect growth regulators labeled for use in bermudagrass forage are **not** effective in combatting bermudagrass stem maggot damage. Effective insecticide applications are aimed at killing the egg-laying adults. When applied from seven to ten days following harvest, a pyrethroid insecticide application will usually protect the crop until the next cutting. Timing of the pyrethroid application is critical for two reasons. First, the grass has resprouted and adults are emerging from larvae that pupated at the time of cutting and are ready to lay eggs. Second, pyrethroid applications made after the seven to ten day treatment window are less effective because some eggs have already been laid and the grass canopy may be too thick for the pyrethroid application to penetrate the area where adults rest. In many situations, early cutting is necessary to allow for a successful treatment to prevent significant yield loss in the next cutting. Pyrethroid insecticides such as lambda-cyhalothrin and others labeled for use in forage grass are the most cost-effective product choices.