Bermudagrass Stem Maggot.

July 2019

Allen Knutson, Extension Entomologist, Texas A&M AgriLife Extension, Dallas.
Forrest Mitchell, Texas A&M AgriLife Research and Extension Center, Stephenville.
Vanessa Corriher-Olson, Extension Forage Specialist, Texas A&M AgriLife Extension, Overton.

The bermudagrass stem maggot (BSM) is a relatively new pest of bermudagrass grown for hay. The larva or maggot feeds in the top of the bermudagrass stem, causing the top 1-2 leaves to turn brown or white and the stem to stop growing. Infested fields are stunted, and yield is reduced. The BSM was first reported in Texas in 2013 in fields in south and east Texas and since then it has been found throughout Texas from Lubbock to El Paso. The bermudagrass stem maggot is native to south Asia and was first reported in the United States in Georgia in 2010. This pest only infests bermudagrass and stargrass.

The adult stage of the BSM is a small, yellow fly, which lays its eggs on the bermudagrass plant. Once the egg hatches, the maggot moves to the top node of the stem, burrows into the shoot and consumes the plant material within the stem. This stem damage results in the death of the top 1-2 leaves while the rest of the plant remains green. The damaged leaves can be easily pulled from the leaf sheath. As a result of the feeding damage, growth is stunted. Damage can appear similar to frost, drought stress, disease or herbicide injury due to the accumulation of dead top leaves. Cutting open the stem just below the dead leaves will reveal the tunnel created by the maggot and possibly the maggot. The full-grown maggot is yellowish and about 1/8 inch long. Once the maggot completes feeding, it drops to the ground and enters the pupa stage. The adult fly later emerges from the pupae. The life cycle from egg to adult fly requires about 3-4 weeks, and there are several generations a year.

Observations in Georgia suggest that damage is more common in finer-stemmed cultivars, such as Coastal, Alicia, Russell, and common Bermuda. Infestations in coarser-stemmed varieties such as Tifton 85 appear to be less common. The stem maggot is usually not a pest of grazed pastures because livestock consume the eggs and maggot with the grass, thus preventing an increase in the fly population. It is not a pest of managed bermudagrass turf as regular mowing kills the young larvae.

Management.

Forage breeders are investigating Bermudagrass hybrids that have genetic resistance to Bermudagrass stem maggot infestation. Until they are available, insecticides are the sole means of controlling Bermudagrass stem maggot. Insecticides applied to the foliage kill adult flies, thereby reducing egg deposition, and may kill young maggots before they tunnel into the stem. Currently, there are three insecticides specifically labeled for control of Bermudagrass stem maggot adults (Table 1). However, no insecticides labeled for pastures and hay will kill larvae inside the stem.

There are two options for using insecticides to manage Bermudagrass stem maggot 1) insecticide treatment only or 2) early harvest followed by an insecticide treatment.

1. Insecticide treatment only. Recent field research in Texas found that for each one percentage of stems damaged by Bermudagrass, there was a yield loss of 8.9 lbs. of grass per acre. This research was used to develop guidelines on when an insecticide should be applied based upon the cost of control and value of the hay (Table 2). To use these guidelines, it is necessary to estimate the percentage of grass stems with stem maggot damage in the field. This is done by cutting a handful of grass at the base of the stems and carefully examining 50 stems at random for stem maggot damage. Set aside the damaged stems and once 50 stems have been examined, calculate the percent of damaged stems in the sample of 50 stems. Repeat this at 5-10 locations throughout the field and calculate the average stem damage for the field.

Then determine the treatment threshold using Table 2. Across the top, select your cost of insecticide treatment (cost of application plus insecticide and adjuvants). On the left, select the value of the hay. Where this row and this column meet is the treatment threshold reported as percent of damaged stems. If the percent damaged stems in you field is greater than this value, an insecticide treatment would result in a positive economic return. If your field infestation is less than this value from the table, then the infestation is not economically important. However, the infestation may increase with time so sample again the following week.

As an example, if your cost of insecticide treatment is $12 per acre and the hay value is $140 per ton, then the treatment threshold from Table 2 is 16% of the stems with stem damage. If your field samples averaged 16% or more damage, then the potential loss from stem maggot damage is greater than the cost of control, $12.00/acre, and an insecticide treatment should be considered. If the field is near harvest, an early harvest, rather than insecticide treatment, is also an option. If your field averaged less than 16% in this example, then an insecticide treatment would not be justified. Sample again in a week.

2. Early harvest followed by an insecticide treatment. Recommendations developed in Georgia and Alabama suggest that if damage is found, proceed to harvest the crop as soon as weather conditions allow. This action is necessary if the field is heavily damaged as the damaged stems shade the lower nodes and prevent the growth of new shoots. The stunted field essentially stops growing and forage accumulation ceases. Thus, even treating with an insecticide may not be sufficient to allow the crop to begin growing again. By cutting and removing the damaged crop, sunlight can reach the lower nodes and stimulate regrowth.

Maggots feeding in the stem will die once the crop is cut and dried for harvest. However, flies will emerge from pupae in the soil and re-infest the field. To protect the regrowth from infestation, apply a pyrethroid insecticide about 7 days after cutting to kill adult flies. If the infestation is extensive, a second application 5-7 days later should be considered.

Table 1. Insecticides labeled for control of Bermudagrass stem aggot. Follow label directions.

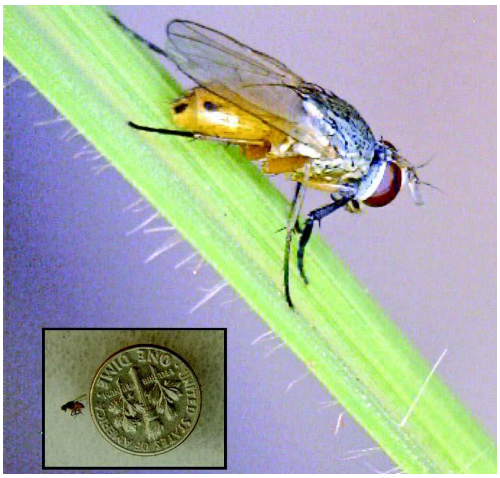
Active Ingredient	Insecticide	Pre-grazing interval in days	Pre-harvest interval for hay
gamma-cyhalothrin	Declare	0	7 days
chlorantraniliprole + lambda-cyhalothrin	Besiege	0	7
zeta-cypermethrin	Mustang Max	0	0

Treatment with these insecticides will only kill adults and not larvae feeding inside the stem.

Table 2. Treatment thresholds for Bermudagrass stem maggot as percent of injured stems for different hay values and costs of insecticide application.

Value of Hay $ per pound ($ per ton)	Cost of control, $ per acre				
	$10.00	$12.00	$14.00	$16.00	$18.00
$0.09 ($ 180)	10	12	14	16	18
$0.07 ($ 140)	14	16	18	22	24
$0.05 ($ 100)	18	22	26	29	33
$0.03 ($ 60)	29	34	40	46	51

Note: The treatment thresholds shown here are calculated at 0.8 X economic injury levels as reported in A. Knutson and F. Mitchell, 2019. Economic injury levels for Bermudagrass stem maggot. J. Economic Entomology. This reduction allows for the time needed to apply the insecticide to prevent an increasing infestation from reaching the economic injury level and also accounts for those infested stems in which the damage is not yet evident.



Top left: Top two leaves killed as a result of Bermudagrass stem maggot feeding inside the stem below. Top right: Bermudagrass stem maggot larva. Bottom: Adult fly.

Acknowledgments. Images reproduced from the publication “Biology and Management of Bermudagrass Stem Maggot” 2013 Alabama Cooperative Extension System. ANR-1462.