Hessian Fly and Aphid Management in Wheat in Georgia

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HESSIAN FLY

The Hessian fly has been a major factor limiting in wheat production in Georgia in the past. Severe outbreaks in the late 1980s were caused by widespread continuous planting of susceptible wheat varieties. Widespread use of resistant varieties and lower acreage have limited Hessian fly losses in recent years. However, the potential for Hessian fly damage is greater this year because of the expected increase in wheat acreage coupled with shortage of seed which may increase the planting of susceptible varieties.

The adult is small, long-legged, black gnat-like insect about the size of a mosquito. Adults live about two days and females lay eggs in the grooves of the upper side of the wheat leaves. Eggs are orange-red, 1/32 inch long and hatch in several days. Larvae initially are orange-red but become white with a greenish center. Young larvae move along a leaf groove to the leaf sheath and then move between the leaf sheath and stem where they begin to feed on the stem above the leaf base. Larvae are below ground in seedling plants but are usually just about joints (nodes) in elongated stems. Feeding by a single larva will stunt and eventually kill vegetative stage tillers. In headed stems larval feeding weakens the stems thereby reducing grain fill and increasing stalk breakage. Larvae molt into a puparia before emerging as an adult. The entire life cycle requires about 6 weeks at 70ºF. Once larvae move to the stem base, they are protected from weather extremes and insecticides.

Hessian fly is a cool-season insect and over-summers on the soil surface as a dormant puparia in previous year's wheat stubble. Adults emerge about September 1st. In northern Georgia there are usually three generations per year, two in the fall and one in spring (March through early May). In southern Georgia, there are usually four generations, the same three generations as in northern Georgia plus a winter generation in January and February. Wheat is the primary host of the Hessian fly, but the insect also will infest triticale and barley. Hessian fly does not attack oats and rarely infests rye. Little barley is the only important non-crop host in Georgia.

Management for Hessian fly

Integrated Management. For the most effective control, a combination of tactics should be used. Rotation, tillage, planting during the recommended planting time combined with recommendations listed for volunteer control and cover crops, combined with resistant varieties will provide the most effective level of Hessian fly control.

Rotation. Try to avoid planting wheat in previous year's wheat stubble (fields). Continuous planting of wheat in the same field can greatly increase Hessian fly numbers.

Forage, Cover Crops and Volunteer Wheat. The first generation of Hessian fly develops in volunteer wheat, wheat planted in early as a cover crop, or in wheat planted for dove hunting and wildlife plots. Control volunteer wheat in summer crops. Use rye instead of wheat as a cover crop. Plant non-host crops such as rye, oats or ryegrass for grazing.

Tillage. Bury wheat stubble! Conventional tillage that buries wheat stubble effectively kills over-summering puparia. Plowing is most effective while disking is only partly effective. No-tillage or strip-tillage that leaves wheat stubble on the soil surface greatly enhances Hessian fly problems. Burning wheat stubble after harvest generally does not kill puparia; burning must be combined with disking to bury the puparia.

Delayed Planting. In the northern U.S., Hessian fly only has a fall and a spring generation and delaying planting until after the first hard freeze can reduce fall infestations. This time is called the 'fly-free' planting date. In northern Georgia, planting after October 30th reduces the risk of fall infestations, however planting after early November also reduces the yield potential of wheat. In southern Georgia, the fly-free date approach is not effective. Therefore planting during the recommended time in November for agronomic reasons should be practiced.

Resistant Varieties. Planting a Hessian fly-resistant variety is the most effective way to control Hessian fly. Currently resistance in Georgia is based on a single gene source (H7H8) although a newer more effective gene (H13) is available in a few varieties such as AGS 2010. The following table lists resistant and susceptible varieties for fall 2007. Varieties indicated as 'fair' have some tolerance to Hessian fly that most likely will not hold up under severe infestation. Also it is not unusual for resistant varieties to have a low level of fly infestation especially from the spring generation.

Winter wheat varieties that are susceptible and resistant to Hessian fly in Georgia, 2007.

Susceptible varieties	**Resistant varieties**
AGS 2031, 2050 **Fleming** **Coker 9511, 9553, 9700(fair)** **AgriPro Panola** **Pioneer 2684, 26R12, 26R15, 26R22, 26R24, 26R87** **Roberts** **SS 520, 524, 535, 560, 8404** **USG 3295, 3477, 3910** **Vigoro V9510, V9412, Dominion, McIntosh, Tribute**	**AGS 2000, 2010*, 2020, 2485, 2060** **AgriPro Crawford, Magnolia** **Gore** **Pioneer 2580, 26R31, 26R38*,** **Pioneer 26R61*** **SS 8308(fair), 8641** **USG 3209(fair), 3592, 3665(fair)**

***** Good resistance to biotype L.

APHIDS

Aphids are small soft-bodied insects that can be found in wheat anytime during the growing season. The most common aphids found on wheat are the bird cherry-oat aphid, rice root aphid, greenbug, corn leaf aphid, and English grain aphid. The first four occur mostly in the fall and winter. Only the greenbug causes direct feeding damage that appears speckled brown and discolored with some leaf curling. The other aphids do not cause obvious feeding damage. Aphids also vector a viral disease named barley yellow dwarf (BYD). Wheat and barley can be severely damaged, but oats are most susceptible to this disease. Infection can occur from seedling emergence through heading, but yield loss is greatest when plants are infected as seedlings in the fall. Infections in Georgia are mostly associated with infestations of bird cherry-oat aphid. BYD occurs in most fields in most years throughout Georgia. Yield losses of 5-15% are common but losses can exceed 30% during epidemics.

Planting date is the single most important management practice affecting aphid infestation and BYD infection in the fall. Early plantings generally have greater aphid numbers and greater BYD incidence than late plantings. Crop rotation and reduce tillage do not prevent aphid infestation. And varieties with resistance to aphids or BYD are not available.

INSECTICIDE MANAGEMENT FOR HESSIAN FLY AND APHIDS

Insecticides - Seed Treatments.

For Aphid control, systemic insecticide seed treatments, Gaucho 600 at 0.8 fl. oz/100 lb of seed or Cruiser 5FS at 1.0 fl. oz/100 lb of seed, can be effective in controlling aphids in the fall and thereby reducing BYD levels. These seed treatments are more effective in the northern half of the state. Seed treatments in the southern half of the state have been inconsistent in control and are not recommended for aphid control.

For Hessian fly control on susceptible varieties, systemic seed treatments can be effective in controlling Hessian fly in wheat seedling in the fall if applied at higher rate than the rate used for aphid control: Gaucho 600 at 1.2 to 1.6 fl. oz. / 100 lb of seed or Cruiser 5FS at 1.33 fl. oz. / 100 lb of seed. These treatments are fairly expensive and are best applied by a commercial seed treater. Commercial seed treaters have special slurry application equipment that ensures thorough coverage of the seed. Seed treatments will suppress fall infestations, but they will not prevent Hessian fly infestation in winter or spring.

Granular insecticides applied at planting, such as Di-Syston 15G, Thimet or Phorate 20G, are not longer labeled for use on wheat.

Insecticides - Foliar Insecticides.

Insecticides for Hessian fly control should only be considered for use on susceptible varieties. An application of a long-residual pyrethroid insecticide (Karate / Warrior and similar products) can suppress Hessian fly infestations IF it is applied while adults are laying eggs, eggs are present on leaves and before larvae become established in the stems. Studies in North Carolina have found that a timely application at 2-3 leaf stage

after emergence can significantly reduce fall infestations. However, studies in Georgia have found Warrior applied at 2-4 leaf stage is variable in efficacy. Nevertheless, this approach may be suitable for susceptible wheat varieties under intensive wheat management that includes routine scouting for insects. Leaves should be sampled for Hessian fly eggs while sampling for aphids. The approach is most appropriate for fields planted with a susceptible variety that has not been treated with a systemic seed treatment AND when wheat is planted early, wheat is planted in the same field or within a few hundred yards of previous year's wheat fields, and/or Hessian fly has caused losses on the farm or adjacent farm in previous years.

For later generations, inspect fields for puparia and target fields with high numbers of puparia for egg sampling. Sample these fields in January for the winter generation and late February early March for the spring generation. Treatment is justified if adults are laying eggs and a large number of eggs are found. However, proper timing of application is difficult for these generations. Other pyrethroid insecticides, Baythroid XL and Mustang MAX and similar products, also are labeled for use on wheat, but these insecticides have a shorter residual period and are not recommended for Hessian fly control.

Foliar insecticide treatments for aphid control: A well-timed insecticide application of a persistent pyrethroid insecticide such as lambda cyhalothrin (Warrior, Karate, Lambda, Silencer, others) can reduce the incidence of BYD and increase yields. Apply Karate at 1.3 to 1.9 fl. oz. per acre or Warrior and similar products at 2.6 to 3.8 fl. oz per acre. The lower rate can be used for aphids, but the higher rate should be used for aphid and Hessian fly control.
<u>In southern Georgia</u>, the best treatment time usually is at full-tiller stage before jointing in early to mid-February. Lambda cyhalothrin treatment at full tiller can be applied with top-dress nitrogen. But, fields should be scouted for aphids at 25 - 35 days after planting and during warm periods in January to determine if an insecticide application is needed.
<u>In northern Georgia</u>, the best time for treatment to prevent BYD infection usually is 25 - 35 days after planting (2-3 leaf stage). An application at full tiller also may be beneficial in some years.

To sample aphids, inspect plants in 12 inches of row in fall and 6 inches of row in winter at about 10 locations per field. Consider treatment at:
Seedlings (2-3 leaf stage): 1 bird cherry oat (reddish-brown) aphids per row foot.
Full tiller before jointing: 8 bird cherry oat aphids per row ft.

Recent high commodity prices may justify a preventive strategy of foliar insecticide sprays at 25 - 35 days after planting and at full-tiller stage to suppress aphids and BYD incidence.

Boot / Heading stage aphid control: English grain aphid is the main aphid present. It can reach large numbers on flag leaves and developing grain heads. BYD infection can still occur but is too late to cause yield loss. Damage from large infestations of this pest can result in reduced kernel size and low test weight grain. In most years, beneficial

insects such as lady beetles exert enough control over aphids after head emergence to prevent significant damage. For making control decisions, sample wheat in spring by inspecting 10 grain heads (+ flag leaf) per sample and counting all aphids on both the flag leaf and head. Sample at about 10 locations per field. Treat thresholds are:
Stem elongation to flag leaf emergence: 2-3 aphids per stem.
Head emergence to blooming: 5 aphids per stem.
Milk stage: 10 aphids per head.
Do not treat for aphids after early-dough stage (it is too late to prevent damage).

Lambda cyhalothrin can only be applied twice to a crop so use another product at heading such as Baythroid XL or Mustang MAX/Respect. These can be combined with a foliar fungicide application and also will control cereal leaf beetle if it is present.

ALWAYS FOLLOW ALL INSECTICIDE LABEL INSTRUCTIONS.