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EXTENSION

Hessian fly variety resistance and situation in Georgia winter wheat in 2023

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The Hessian fly, *Mayetiola destructor*, can cause severe damage to wheat production throughout the southern United States. In spring of 2023, we had a serious outbreak of Hessian fly in wheat across the southern United States and Coastal Plain region of Georgia. Infestations varied but it has been over a decade since the last outbreak of this pest in winter wheat in Georgia. Wheat is the primary host of the Hessian fly, but it also can attack triticale, barley, and rye. The Hessian fly does not attack oats and ryegrass. The only important non-crop host in Georgia is little barley.

Adult Hessian flies are small black flies about the size of a mosquito. Adults live about two days and females lay about 200 eggs in the grooves of the upper side of the wheat leaves. The eggs are orange-red, 1/32 inch long and hatch in 3 to 5 days. Young reddish larvae move along a leaf groove to the leaf sheath and then move between the leaf sheath and stem where they feed on the stem above the leaf base. Maggots become white after molting and appear greenish white when fully grown. Once larvae move to the stem base, they are protected from weather extremes and foliar-applied insecticides. Maggots suck sap and stunt tillers presumably by injecting a toxin into the plant. Infested jointed stems are shortened and weakened at the joint where feeding occurs. Grain filling of infested stems is reduced and damaged stems may lodge before harvest. Usually, three generations occur in the Piedmont region and four generations occur in the Coastal Plain region of Georgia. The fall and winter generations stunt and kill seedling plants and vegetative tillers. The spring generation infests jointed stems during head emergence and grain filling. Yield losses usually occur when fall tiller infestations exceed 8% of tillers and when spring stem infestations exceed 15% of stems.

First row, left to right: Hessian fly adult, eggs on upper leaf, larvae (white maggots) and puparia ('flaxseed') on a stem, larvae and puparium at based of a plant. Second row: Seedling damage in the fall, Resistant variety on left and susceptible variety on right with severe spring damage. Photos: Roger Ratcliffe and Scott Bauer, USDA-ARS; Dominic Reisig, NC State University; David Buntin, UGA.

The Hessian fly is a cool season insect and is dormant over the summer in wheat stubble as a puparium, which is sometimes called a 'flaxseed'. Adults begin to emerge in early September as soil temperatures decline. Since wheat is not yet planted, the first generation develops in volunteer small grains and little barley. Thus, reduced tillage, lack of crop rotation (wheat after wheat), and lack of volunteer wheat control in summer crops enhance problems with Hessian fly in autumn. Burning wheat stubble alone does not control over summering puparia but will make disk tillage more effective at burying puparia before fall emergence.

Planting a Hessian fly-resistant variety is the most effective way to control Hessian fly.

The following table is the list of wheat and triticale varieties recommended by the UGA Small Grains Commodity Team for production in Georgia for 2023-2024 season. The letter after the variety name indicates adaptation as S = statewide, P = piedmont region and C = coastal plain region. I have highlighted varieties based on the level of resistance to Hessian fly as yellow indicates good resistance, blue indicates fair resistance, and white or no highlighting are susceptible to the Hessian fly. Ratings are based on several years of data where generally good is 0 - 10% infested plants, fair is 11 -20% infested plants, and poor is greater than 20% infested plants.

All varieties in the Georgia state wheat variety trials are evaluated for Hessian fly resistance each year. A complete list is in Table 3 at the end of this document and in the 2022-2023 Small Grain Performance Tests Bulletin at https://swvt.uga.edu/ (click on the Winter Grains and Forages, 2023 report, pages 22-23).

Recommended Small Grain Varieties for Winter 2023-2024

Wheat	Harvey's AP 1983 (S)	AgriMAXX 516 (P)	Ogletree Johnson (S)[2]
	AGS 2021 (S)	Dyna-Gro 9002 (P)	Local Seeds *LW2026 (C)
	AGS 2024 (S)[2,]	*Dyna-Gro 9701 (P)[2]	Pioneer brand 26R45 (P)
	AGS 3015 (S)	Dyna-Gro 9811 (P)	Southern Harvest 9310 (C)
	AGS 3022 (S)	Dyna-Gro 9120 (P)	UniSouth USG 3329 (P)[2]
	AGS 3026 (S)	Dyna-Gro 9172 (P)	UniSouth USG 3352 (P)
	AGS 3040 (S)	Dyna-Gro Blanton (S)	UniSouth USG 3472 (P)
	AGS 4023 (S)	Dyna-Gro Plantation (S)	UniSouth USG 3640 (S)
	AGS 4043 (S)	Dyna-Gro Riverland(C)	UniSouth USG 3752 (S)
	AgriMAXX AM 481 (C)	*Dyna-Gro Rutledge (C)	Progeny #BULLET (P)
	AgriMAXX 513 (P)	Stratton *Go Wheat 2032 (S)[2]	Progeny #TURBO (P)
Triticale	Trical 342 (S)	TriCal 1143 (C)[2]	

1. P = Piedmont; C = Coastal Plain; S = Statewide.
2. Consider using a labeled fungicide; highly susceptible to powdery mildew, leaf rust, stripe rust,or crown rust.

* To be dropped from list for 2024-25.

Yellow highlighted indicates good Hessian fly resistance, 2022-2023 ratings.

Blue highlighted indicates fair Hessian fly resistance, 2022-2023 ratings

White indicates poor or no Hessian fly resistance

For susceptible varieties, systemic neonicotinoid seed treatments when applied at a high rate will help to control fall infestations but will not prevent Hessian fly infestation in winter or spring. Seed treatments are not needed on resistance varieties for Hessian fly control. The next table lists rates for each seed treatment.

Insecticide	Brands	Aphid rate (fl. oz. per 100 lb of seed)	Hessian fly rate (fl. oz per 100 lb of seed	REI (hours) / PHI (days)
imidacloprid	Guacho 600, Attendant 600, Axcess, Enhance AW, others	0.8 fl. oz.	1.6 to 2.4 fl. oz.	12 hr / 45 days
thiamethoxam	Cruiser 5FS	1.0 fl. oz.	1.33 fl. oz.	12 hr / 45 days
clothianidin	NipsIt Inside, Poncho	0.75 fl. oz.	1.79 fl. oz.	12 hr / not listed

The aphid rate is the standard low-rate treatment. It may suppress light to moderate Hessian fly infestations, but the Hessian fly rate is recommended for expected large infestations. These seed treatments often come as a premix of the aphid rate and with fungicides. Additional insecticide may need to be added to achieve the higher rate. Insecticide seed treatments also will help to control aphids and barley yellow dwarf infection in the autumn. In February through mid-March, a foliar application of lambda cyhalothrin also may suppress fall or spring infestations but effective control is difficult. This application must be applied while adults are active and eggs are being laid, so sampling of eggs on leaves is needed for proper timing.

TABLE 3

Griffin and Plains Georgia: Hessian Fly Susceptibility, 2022-2023

Company or Brand Name	Variety	OVT Grain Test* Plains non-fungicide Visual plot rating		Non-Replicated nurseries Plains		Griffin	
				Infest. stems	HF/Stem	Infest. stems	HF/Stem
		1-5 scale	T-group	%	count	%	count
Commercial Varieties							
AgriMAXX	AM481	1.00	L	20.0	0.30	5.0	0.20
AgriMAXX	AM513	.	.	40.0	1.15	0.0	0.00
AgriMAXX	AM535	.	.	20.0	0.85	10.0	0.80
AgriMAXX	AM516	.	.	10.0	0.10	15.0	0.15
Dyna-Gro	9290	4.50	ABC	0.0	0.00	35.0	2.05
Dyna-Gro	Blanton	1.50	JKL	15.0	0.20	5.0	0.15
Dyna-Gro	Plantation	1.50	JKL	9.1	0.09	0.0	0.00
Dyna-Gro	Riverland	3.75	CDE	50.0	1.00	5.0	0.20
Dyna-Gro	WX23777	1.50	JKL	40.0	1.05	0.0	0.00
Dyna-Gro	WX23444	.	.	0.0	0.00	14.3	0.21
Dyna-Gro	9002	.	.	15.0	0.40	11.8	0.29
Dyna-Gro	9701	.	.	65.0	1.10	5.0	0.05
Dyna-Gro	9811	.		10.0	0.10	10.0	0.10
Dyna-Gro	9481	.	.	15.0	0.15	0.0	0.00
Dyna-Gro	9290	.	.	0.0	0.00	35.0	2.05
Dyna-Gro	9172	.	.	0.0	0.00	15.0	0.15
GSDC	GA Gore	3.25	EFG	65.0	1.65	0.0	0.00
Harvey's	AP 1983	1.00	L	5.0	0.05	5.0	0.05
Mixon Seed	AGS 2021	3.50	DEF	57.1	2.07	15.0	0.35
Mixon Seed	AGS 2024	1.00	L	50.0	1.25	0.0	0.00
Mixon Seed	AGS 3015	2.00	HIJK	35.0	0.65	0.0	0.00
Mixon Seed	AGS 3022	1.75	IJKL	20.0	0.35	5.0	0.20
Mixon Seed	AGS 3026	1.75	IJKL	60.0	1.30	5.0	0.05
Mixon Seed	AGS 3040	1.25	KL	10.0	0.10	5.0	0.10
Mixon Seed	AGS 4023	1.50	JKL	5.0	0.05	0.0	0.00
Mixon Seed	AGS 4043	1.00	L	10.0	0.15	0.0	0.00
NCCIA	Appalachian White	4.00	BCDE	65.0	1.20	0.0	0.00
NCCIA	Hilliard	1.25	KL	25.0	0.60	30.0	0.70
NCCIA	NuEast (hard red)	1.00	L	0.0	0.00	5.0	0.40
Ogletree	Johnson	.	.	0.0	0.00	0.0	0.00
Pioneer	26R45	1.75	IJKL	10.0	0.15	5.0	0.10
Pioneer	26R59	4.50	ABC	20.0	0.20	6.3	0.06
Pioneer	26R94	2.25	GHI	50.0	1.45	0.0	0.00
Progeny	#BINGO	5.00	A	35.0	1.20	15.0	0.20
Progeny	#BUSTER	2.50	GHI	5.0	0.15	5.0	0.05
Progeny	#CHAD	3.75	CDE	45.0	1.15	10.0	0.10
Progeny	#TURBO	1.75	IJKL	10.0	0.10	20.0	0.20
Southern Harvest	SH5550	1.00	L	15.0	0.30	0.0	0.00
Southern Harvest	SH7222	2.75	FGH	35.0	0.85	0.0	0.00
Stratton Seed	GoWheat 2032	1.75	IJKL	20.0	0.25	5.0	0.10
Stratton Seed	GoWheat 6000	4.50	ABC	80.0	1.40	20.0	0.35
Stratton Seed	GoWheat LA754	4.00	BCD	45.0	0.55	5.0	0.05
UniSouth	USG 3640	1.50	JKL	35.0	0.35	0.0	0.00
UniSouth	USG 3752	1.00	L	25.0	0.30	0.0	0.00
UniSouth	USG3352	.	.	75.0	2.20	0.0	0.00
UniSouth	USG3472	.	.	0.0	0.00	0.0	0.00
UniSouth	USG3783	.	.	45.0	1.50	0.0	0.00

*entries with dots were in the Hfly nursery but not in the OVT yield trial.

1 = no damage 5 = severe damage; SEM=0.3484, F = 9.67, P < 0.0001

2 Unreplicated Hessian fly nursery dissection of 20 stem sample.