Efficacy of seed treatments for Hessian fly (Mayetiola destructor) control in winter wheat for the Tidewater region of North Carolina.

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Early season efficacy and yield differences in seed treatments were observed in 2009-2010 and not in 2010-2011. Both the 2009-2010 and 2010-2011 wheat growing seasons offered very high early season insect pressure. The data show that the use of an insecticide seed treatment may be effective in some instances, but not in all cases. In 2009-2010, significant differences in early season control were noticed in treatments containing thiamethoxam and imidacloprid as indicated by larva1 and pupa1 counts taken on 17 November 2009 and 17 February 2010, respectively (Table 1). Final yield corresponded to the early season efficacy in all treatments containing thiamethoxam and imidacloprid. No differences in number of pupae were noticed in treatments containing a low rate of clothianidin and treatments containing fungicides alone. Significant differences in early season control were also noticed in treatments containing imidacloprid and clothianidin as indicated by larval and pupal counts taken on 17 November 2009 and 17 February 2010, respectively (Table 2). Final yield paralleled with early season efficacy in all treatments containing imidacloprid and clothianidin. The foliar treatment with lambda-cyhalthrin alone yielded similarly to seed treatments containing imidacloprid and clothianidin. The treatment combination containing clothianidin and foliar applied clothianidin also yielded similarly to treatments containing clothianidin alone. The foliar treatment containing clothianidin alone had significantly reduced yield relative to all seed treatments containing 0.047 lb ai/cwt or higher of imidacloprid or clothianidin. In 2010-2011, no differences were observed in either early season control or in final yield, between untreated controls and seed treatments containing clothianidin, thiamethoxam, and imidacloprid (Tables 3 and 4).

Table 1. Mean number of Hessian fly larvae, infested plants and bushel yields in a field trial to evaluate the efficacy of insecticide seed treatments, 2009-2010, 3B Farms Beaufort County, NC.

Product	Rate (lb ai/cwt)	Hessian fly larvae per plant[1] Nov 17	Percent infested plants Nov 17	Hessian fly pupae per plant[1] Feb 17	Percent infested plants Feb 17	Bushels per acre Jun 9
difenoconazole + mefenoxam[2]	0.015	1.25 ab	45	1.50 ab	40	33.15 c
prothioconazole + tebuconazole + metalaxyl[3]	0.008	1.35 a	55	1.85 a	50	33.86 bc
difenoconazole + mefenoxam thiamethoxam[4]	0.015 0.029	1.55 a	45	0.45 c	20	39.20 ab
difenoconazole + mefenoxam thiamethoxam	0.015 0.052	0.3 bc	15	0.60 bc	25	42.58 a
tebuconazole + metalaxyl + imidacloprid[5]	0.035	0.20 c	10	0.50 bc	40	39.10 a-c
prothioconazole + tebuconazole + metalaxyl + clothianidin[6]	0.013	0.9 a-c	40	0.55 bc	30	33.08 c
LSD		0.98	NS	1.02	NS	5.85

Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).
[1]Based on sampling five plants per plot.
[2]Formulated as Dividend Extreme 0.96SS and contains 0.77 lb/gal difenoconazole and 0.19 lb/gal mefanoxam.
[3]Formulated as Proceed MD 0.21FS and contains 0.128 lb/gal prothioconazole, 0.025 lb/gal tebuconazole and 0.052 lb/gal metalaxyl.
[4]Formulated as Cruiser 5FS and contains 5 lb/gal thiamethoxam.
[5]Formulated as Gaucho XT 1.29F and contains 0.056 lb/gal tebuconazole, 0.075 lb/gal metalaxyl and 1.16 lb/gal imidacloprid.
[6]Formulated as Proceed MDW 0.33FS and contains 0.128 lb/gal prothioconazole, 0.026 lb/gal tebuconazole, 0.051 lb/gal metalaxyl, and 0.128 lb/gal clothianidin.

Table 2. Mean number of Hessian fly larvae, pupae, eggs, infested plants and bushel yields in a field trial to evaluate the efficacy of insecticide seed treatments, 2009-2010, 3B Farms Beaufort County, NC. Foliar treatments were applied on March 25, 2010.

Trt	Product	Rate	Hessian fly larvae per plant[1] Nov 17	Percent infested plants Nov 17	Bushels per acre Jun 9
1	Untreated	---	1.90 b	80 a	26.85 c
2	metalaxyl + metconazole[4]	---	3.65 a	70 a	25.33 c
3	metalaxyl + metconazole imidacloprid[5]	--- 0.047 lb ai/cwt	0.00 c	0 b	41.00 a
4	metalaxyl + metconazole imidacloprid	--- 0.094 lb ai/cwt	0.00 c	0 b	40.00 a
5	metalaxyl + metconazole clothianidin[6]	--- 0.029 lb ai/cwt	0.00 c	0 b	35.03 ab
6	metalaxyl + metconazole clothianidin	--- 0.047 lb ai/cwt	0.00 c	0 b	35.83 ab
7	metalaxyl + metconazole clothianidin	--- 0.059 lb ai/cwt	0.00 c	0 b	36.50 a
8	metalaxyl + metconazole clothianidin	--- 0.094 lb ai/cwt	0.00 c	0 b	41.03 a
9	metalaxyl + metconazole clothianidin clothianidin[7]	--- 0.059 lb ai/cwt 0.099 lb ai/A	0.00 c	0 b	38.83 a
10	metalaxyl + metconazole clothianidin	--- 0.099 lb ai/A	3.50 a	80 a	29.35 bc
11	metalaxyl + metconazole lambda-cyhalothrin[8]	--- 0.030 lb ai/A	3.20 a	85 a	36.03 ab
	LSD		0.93	0.98	6.85

Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

[1]*Based on sampling five plants per plot.*

[2]*Based on two 1-ft samples per plot.*

[3]*Based on sampling five tillers per plot.*

[4]*Formulated as V-10305 and contains metalaxyl and metconazole. Formulation is confidential.*

[5]*Formulated as Gaucho 600 5FS and contains 5 lb/gal imidacloprid.*

[6]*Formulated as NipsIt INSIDE 5FS and contains 5 lb/gal clothianidin.*

[7]*Formulated as Belay 2.13SC and contains 2.13 lb/gal clothianidin.*

[8]*Formulated as Warrior Z 1CS and contains 1 lb/gal lambda-cyhalothrin.*

Table 3. Mean number of Hessian fly larvae, pupae, eggs, and infested plants in a field trial to evaluate the efficacy of insecticide seed treatments, 2010-2011, 3B Farms Beaufort County, NC.

Trt	Product	Rate (lb ai/cwt)	Larvae per plant[1] Dec 9	Percent infested plants Dec 9	Percent infested plants Mar 17	Tillers per row foot May 6	Bushels per acre Jun 7
1	Untreated	---	2.00	75.0	80.0	12.19	50.05
2	metconazole + metalaxyl[3] clothianidin[4]	1.0 oz/cwt 0.019	1.55	65.0	55.0	14.71	57.78
3	metconazole + metalaxyl clothianidin	1.5 oz/cwt 0.029	1.65	60.0	25.0	14.78	63.83
4	metconazole + metalaxyl clothianidin	1.0 oz/cwt 0.039	2.35	90.0	65.0	13.33	59.95
5	metconazole + metalaxyl clothianidin	1.0 oz/cwt 0.069	1.70	55.0	40.0	15.32	58.95
6	metconazole + metalaxyl + clothianidin[5]	0.014	2.65	75.0	50.0	14.93	52.13
7	metconazole + metalaxyl + clothianidin	0.022	2.50	75.0	55.0	14.71	56.15
8	difenoconazole + mefanoxam[6] thiamethoxam[7]	0.015 0.029	2.00	80.0	60.0	15.16	57.40
9	prothioconazole + tebuconazole + metalaxyl[8] clothianidin[9]	0.008 0.029	2.20	70.0	55.0	14.63	55.85
10	ipconazole + metalaxyl + imidacloprid[10]	0.054	2.00	50.0	30.0	14.25	58.25
	LSD		NS	NS	NS	NS	NS

Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

[1]Based on sampling five plants per plot.

[3]Formulated as NispIt SUITE CCVR-MM (NipsIt SUITE Cereals Commercial Variable Rate) and contains metconazole and metalaxyl. Formulation is confidential.

[4]Formulated as NipsIt SUITE CCVR-C (NipsIt SUITE Cereals Commercial Variable Rate) and contains 5 lb/ gal clothianidin.

[5]Formulated as NipsIt SUITE C OF (NipsIt SUITE Cereals On-Farm) and contains 0.038 lb/gal metconazole, 0.077 lb/gal metalaxyl, and 0.256 lb/gal clothianidin.

[6]Formulated as Dividend Extreme 0.96SS and contains 0.77 lb/gal difenoconazole and 0.19 lb/gal mefanoxam.

[7]Formulated as Cruiser 5FS and contains 5 lb/gal thiamethoxam.

[8]Formulated as Proceed Concentrate 1.03FS and contains 0.643 lb/gal prothioconazole, 0.129 lb/gal tebuconazole and 0.257 lb/gal metalaxyl.

[9]Formulated as Poncho 600 5FS and contains 5 lb/gal clothianidin.

[10]Formulated as Rancona Crest 1.38FS and contains 0.0384 lb/gal ipconazole, 0.0513 lb/gal metalaxyl, and 1.286 lb/gal imidacloprid.

Table 4. Mean number of Hessian fly larvae, pupae, eggs, and infested plants in a field trial to evaluate the efficacy of insecticide seed treatments, 2010-2011, 3B Farms Beaufort County, NC. Experimental compounds omitted.

Trt	Product	Rate (lb ai/cwt)	Larvae per plant[1] Dec 9	Percent infested plants Dec 9	Tillers per row foot May 6	Bushels per acre Jun 7
1	prothiconazole + tebuconazole + metalaxyl[3]	0.008	2.50	80.0	13.87	48.78
2	prothioconazole + tebuconazole + metalaxyl imidacloprid[4]	0.008 0.031	1.35	55.0	12.50	51.90
3	prothioconazole + tebuconazole + metalaxyl clothianidin[5]	0.008 0.031	1.80	60.0	14.63	54.13
4	prothioconazole + tebuconazole + metalaxyl clothianidin[5]	0.008 0.061	1.35	55.0	14.02	56.85
5	prothioconazole + tebuconazole + metalaxyl imidacloprid clothianidin	0.008 0.031 0.031	1.20	45.0	14.93	57.78
6	tebuconazole + metalaxyl + imidacloprid[6]	0.034	1.80	61.0	14.71	53.65
	LSD		NS	NS	NS	NS

Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).
[1]Based on sampling five plants per plot.
[2]Based on sampling five tillers per plot.
[3]Formulated as Proceed Concentrate 1.03FS and contains 0.643 lb/gal prothioconazole, 0.129 lb/gal tebuconazole and 0.257 lb/gal metalaxyl.
[4]Formulated as Gaucho 600 5FS and contains 5 lb/gal imidacloprid.
[5]Formulated as Poncho 600 5FS and contains 5 lb/gal clothianidin
[6]Formulated as Gaucho XT 1.29F and contains 0.056 lb/gal tebuconazole, 0.075 lb/gal metalaxyl and 1.16 lb/gal imidacloprid.