Title: Insecticide seed treatments compared to other management tactics for control of aphid vectors of Barley yellow dwarf virus: 2005-2006.

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Experimental Design[1, 2] **:** Split-Plot, with two planting dates, eight pesticide combinations, and four replications. All treatment were randomly assigned to identifying numbers, and experimental units using SAS Proc Plan.

Data Analysis: Analysis of Variance was conducted using SAS Proc GLM**.** Means separation was done using the Ryan-Einot-Gabriel-Welch test. SAS Inst. Inc., Cary, NC.

Experimental Unit: 7, 7" rows by 20' long.

Location: UK-REC, Princeton, (Caldwell Co.) KY.,

Wheat Variety = "Clark"

Seeding Rate: 40 seeds / ft^2

Tillage = No-Till, following corn, flail mowing of stalks

Planting

Equipment: Hege**,** No-till plot planter

Planting Dates:
1st Planting Friday Sep. 30, 05, 2nd Planting Friday Oct. 14, 05.

N_2 Fertility: 1st App.– 30lb 15 Feb 06, 2nd App. – 70lb 15 Mar 06

Herbicide: Harmony Extra 1.2 oz/A 15 Mar 06

Fungicide: Tilt 4oz/A 19 Apr 06

Insecticides:

Products / Rates: See "Pesticide Treatments" for products and rates.

Foliar applications:

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[1] Due to some seed based issues this experiment could not be planted as originally designed. It is therefore not possible to make all the comparisons and thus inferences that are desired.

[2] This experiment was specifically set up to have an earlier than recommended planting date. This is necessary to increase the chances of obtaining enough aphid (and thus BYD) pressure to test the various treatments. It is however an artificial situation which provides an aphid / BYDv "nursery". This nursery would then serve as a source of aphids / BYDv to infest / infect the second planting which would not be the case in a production field.

Equipment: $C0_2$ powered backpack sprayer, 8004 flat fan nozzles at 42 psi, providing 20 gpa.

Application Dates: Fall: 23 Nov. 05, Winter 14 Mar 06.

Seed treatments: All seed applied treatments made by product manufacturer or their designated applicator(s) at rates targeted for sale in Kentucky.

Pesticide Treatments:

1.) Dividend Extreme @ 2.0 fl. oz / 100 wt + Fall Warrior @ 3.5 fl. oz / Ac
2.) Dividend Extreme @ 2.0 fl. oz / 100 wt + Cruiser @ 1.0 fl. oz / 100 wt
3.) Raxal / Thiram @ 3.5 fl. oz / 100 wt + Fall Warrior @ 3.5 fl. oz / Ac
4.) Raxal / Thiram @ 3.5 fl. oz / 100 wt + Gaucho @ 1.0 oz. / 100 wt
5.) Dividend Extreme @ 2.0 fl. oz / 100 wt + Cruiser @ 1.0 fl. oz / 100 wt + Winter Warrior @ 3.5 fl. oz / Ac
6.) Raxal / Thiram @ 3.5 fl. oz / 100 wt + Gaucho @ 1.0 oz. / 100 wt + Winter Warrior @ 3.5 fl. oz / Ac
7.) Dividend Extreme @ 2.0 fl. oz / 100 wt
8.) Raxal / Thiram @ 3.5 fl. oz / 100 wt

Results

There were no differences between the two fungicide treatments. F (1, 13) =2.17; Pr>F = 0.1642. Their yields were statistically the same regardless of fungicide product, or planting date and there was no interaction between fungicide package and planting date.

Table 1. was not designed to illustrate differences between pesticides treatments. It solely illustrates the yield advantage in planting on or after the Hessian Fly free date (Oct. 15 for this location).

Table 1. Comparing Planting Dates: Yield (Bushels per acre) ± Standard Error for wheat plots treated with various insecticide applications on the UK-REC in Princeton, KY during the 2005-2006 season.

	1st Planting 30 Sep. 05		**2nd Planting 14 Oct. 05**		**DIFF (BU)**
Pesticide Treatments	**n**	**MEAN ± SE**	**n**	**MEAN ± SE**	
(1) Div. Ext. + Fall Warrior	3	63.9 ± 4.69	4	76.6 ± 4.37	12.7
(2) Div. Ext. + Cruiser	3	77.8 ± 1.01	4	83.2 ± 8.19	5.4
(3) Raxal/ Thiram + Fall Warrior	3	69.6 ± 1.35	4	75.1 ± 3.37	5.5
(4) Raxal/ Thiram + Gaucho	3	67.8 ± 1.33	4	69.5 ± 4.16	1.7
(5) Div. Ext. + Cruiser + Winter Warrior	3	80.0 ± 6.14	4	84.8 ± 4.04	4.8
(6) Raxal/ Thiram + Gaucho + Winter Warrior	3	86.5 ± 2.12	4	84.7 ± 3.89	-1.8
(7) Dividend Extreme	3	56.8 ± 3.66	4	68.2 ± 5.69	12.2
(8) Raxal / Thiram	5	57.6 ± 2.35	5	57.1 ± 2.76	-0.1
				Mean Difference =	**4.55**

There was a significant difference in yields with respect to planting date. F (1, 48) = 5.11; Pr>F = 0.0290 (Table 1.). Six of the eight pesticide treatments resulted in greater yields in the second planting date. On average the second planting date yield advantage was at least 4.55 bushels. The differences between yields by planting date might have been larger had the second planning date been physically separate from the first planting date. (See footnote 2).

Comparing among various insecticide treatments is less obvious (Table 2.). Because all possible treatments are not represented in this study (See Footnote 1), direct comparisons between some treatments are not possible. Nevertheless, there were definitely differences among pesticide treatments, F(7, 48) = 11.32; Pr>F < 0.0001. We can see three general groupings in the data. Treatments 2, 5 & 6 are at the top, with treatments 1, 3 & 4 in the middle and treatments 7 & 8 yielding the least in both planting dates. This makes some sense. Neither of the least yielding treatments (7 & 8) was treated with any type of insecticide, and the fungicide treatments would not be expected to provide yield protection from BYD. The greatest yielding treatments (6 & 5) had a seed applied systemic insecticide and a winter applied foliar insecticide, while treatment 2 had a seed applied systemic insecticide. In this year the Fall only applications do not appear to have provided the level of protection obtained by the combination of seed applied + winter foliar application.

Table 2. Comparing Pesticide Treatments. Yield (Bushels per acre) ± Standard Error for wheat plots treated with various insecticide applications on the UK-REC in Princeton, KY during the 2005-2006 season.

1st Planting - 30 Sep. 05			**2nd Planting – 14 Oct. 05**		
TRT	n		**TRT**	**n**	
6	3	86.5 ± 2.12 a	5	4	84.8 ± 4.04 a
5	3	80.0 ± 6.14 a	6	4	84.7 ± 3.89 a
2	3	77.8 ± 1.01 abc	2	4	83.2 ± 8.19 a
3	3	69.6 ± 1.35 bcd	1	4	76.6 ± 4.37 ab
4	3	67.8 ± 1.33 bcd	3	4	75.1 ± 3.37 ab
1	3	63.9 ± 4.69 cd	4	4	69.5 ± 4.16 ab
8	5	57.6 ± 2.35 d	7	4	68.2 ± 5.69 ab
7	3	56.8 ± 3.66 d	8	5	57.1 ± 2.76 b

Values within a column preceded by the same letter are not significantly different using the Ryan-Einot-Gabriel-Welch mean separation test at the p =.05 level.

In this particular location in this year, BYD was a significant factoring reducing wheat yields. While all insecticide applications appear to have provided some protection, only the two treatments (5 & 6) containing a seed applied insecticide + winter foliar insecticide consistently provide statistically significant greater yields than the insecticide free controls. The two seed applied insecticide + winter foliar insecticide combinations were not significantly different from one another.

Summery Interpretation

1. Barley yellow dwarf was evident in these plots and certainly produced yield reducing pressure in the 2005-06 production season.
2. There were no differences between the two fungicide treatments.
3. There was a significant difference in yields with respect to planting date.
4. The fungicide only treatments consistently yielded less than did any of the treatments that included an insecticide.
5. There were statistically significant differences among insecticide treatments.
6. The treatments containing a systemic seed applied insecticide, as a group, yielded greater than did other insecticide treatments and those treatments which did not include an insecticide.
7. The two seed applied insecticide + winter foliar insecticide combinations were not significantly different from one another.
8. All treatments containing an insecticide(s) consistently produced greater numerical yields than did treatments without insecticides, though the yields could not always be separated statically.

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