

PLANTING DATE AND FOLIAR AND SEED APPLIED INSECTICIDE TREATMENTS FOR CONTROL OF APHID VECTORS OF BARLEY YELLOW DWARF VIRUS: 2006-2007

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Standard Practices:

Experimental Design¹ : Split-Plot, with two planting dates, twenty four pesticide combinations, and three replications. All treatment were randomly experimental units using SAS Proc Plan.

Data Analysis: Analysis of Variance (ANOVA) 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/ft²

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

Planting Equipment: Hege, No-till plot planter

N₂ Fertility: 1st - 22 Feb 07, 40 lbs; 2nd App. - 22 Mar 07, 70 lbs

Herbicide: Harmone Extra @ ½ oz/A. on 09 Nov 06 & 16 Mar 07

Foliar Fungicide: Tilt @ 4 oz/A. on 23 Apr 07.

Harvest:

Equipment: Wintersteiger plot combine

Harvest Date: 18 June 07.

Experimental Treatments:

Planting Dates: 1st Planting, Tue. Oct 3, 2006 2nd Planting Mon Oct. 23, 2006.

¹ 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.

Pesticides Treatments/Rates:

Seed Treatments: Plots were planted with seed treated with the following pesticides and rates. All seed applied treatments were made by product manufacturer or their designated applicator(s) at rates targeted for sale in Kentucky. Cruiser and Gaucho did not occur in the test without their associated fungicide.

No Insecticide

Raxal/Thiram @ 3.5 oz. per 100wt.

Dividend Extream @ 2.0 oz. per 100wt.

Raxal/Thiram + Gaucho @ 3.5 oz. + 1.0 oz. per 100wt.

Dividend Extream + Cruiser @ 2.0 oz. + 1.0 oz. per 100wt.

Foliar Treatments: Foliar treatments were made using a CO₂ powered backpack sprayer, delivering 20 GPA, at 45 PSI, through 8003 nozzles. Plots may have received: No application, a “Fall” application, a “Winter” application or a “Fall” and “Winter” application. “Fall” applications were applied thirty days after wheat emergence. For the first planting that was 08 Nov. 06; for the second planting; 09 Dec 06. The “Winter” application was made on 08 Mar 07. All foliar insecticide applications consisted of : Warrior @ 3.5 fl. oz. per acre.

Results:

There is little doubt that planting date had a significant affect on the yield and test weight in the 2006-2007 season (Table 1). Analysis clearly shows that the second planting date resulted in greater yield and

test weight. There were no interactions with other treatments.

This is the normal occurrence, with planting after 15 Oct. generally having the advantage. This advantage is often due to reduced exposure to the cereal aphid complex and thus the yellow dwarf viruses, and possibly reduced Hessian fly infestation (though Hessian fly is poorly understood in Kentucky). Conversely, in this season a major portion of the advantage is likely to be the result of differential damage suffered from a severe frost that occurred during April 6-9, 2007 (See Wheat Science News Vol. 11, No. 2 & other reports in this document). The week before the frost, plots planted on the 2nd planting date were significantly shorter than were those of the 1st planting date. After the frost, plots planted on the 2nd planting date were visually less damaged and appeared to recover more quickly and more completely. Certainly some of the difference may be due to BYD, but it is very difficult to estimate just how much.

In Kentucky, systemic insecticide seed treatments are only sold in combination with seed applied fungicides. In order to understand whether or not the insecticides are having any affect on yield and test weight, one must first separate the affects that may be due to the associated fungicide. Therefore the associated fungicides were tested separately. Table 2 indicates average yields and test weights for plot treated with seed applied fungicides compared to an untreated control. Analysis indicates that these fungicides did not produce any significant difference in yield or test weight compared to one another or the untreated control.

The affect of the systemic insecticide seed applied treatments is less straight forward.

Analysis indicates that the insecticides did not have an effect on yield (Table 3). Cruiser and Gaucho both produced greater yields than did the untreated, but the two products were not different from each other. ANOVA also, indicated significance among test weights. On the other hand, the difference could not be illustrated using a mean separation test. This indicates a very weak relationship to treatment. Because there were no significant interactions, it is not possible to separate the differences that may be due to planting date. Arithmetically, however most of the differences occurred in the first planting date, which is expected. In the second planting date difference between the untreated and the two insecticides was very small, though significant by definition. I have considerable doubt that these are real.

The affect of foliar applications is shown in Table 4. There was no significant affect on test weight, but some affects are seen in yield. All the foliar applications are significantly different from the untreated. The mean separation does not send a much more clear signal. The “Fall + Winter” is better than the “Fall” along but not better than the “Winter” alone. Additionally, the “Winter” alone is not different from the “Fall”. As with the seed applied insecticides there were no significant interactions with planting date. Again, arithmetically, most of the differences occurred in the first planting date, which is expected. In the second planting date difference between the untreated and the foliar insecticides was very small, though significant by definition. I have considerable doubt that these differences are real.

Summary Interpretation:

Certainly in the 2006-2007 season, planting date was the most important factor affecting

yield and test weight in this experiment. Though there are likely differences due to aphids and associated BYD, they are far overshadowed by the planting date – frost interaction. Insecticides probably did provide some differences particularly in the first planting, but it is highly unlikely that they made much, if any, difference in the second planting.

References Cited:

Wheat Science News. Vol. 11 No. 2. Apr. 2007.

<http://www.ca.uky.edu/ukrec/newsltrs/News07freeze.pdf>

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Table 1. Effect of planting date on yield and test weight of wheat plots on the UK-REC 2006-2007.			
Planting Date	n	Yield ± S.E	Test Weight ± S.E
03 Oct 2006	71	52.0 ± 1.2 b	60.6 ± 0.2 b
23 Oct 2006	72	79.6 ± 1.3 a	61.2 ± 0.2 a
ANOVA		F(1,119)=270.62, Pr>F= <.0001	F(1,119)= 9.31, Pr>F= 0.0028

Means in the same column, follow by the same letter are not significantly different using the Ryan-Einot-Gabriel-Welch mean separation test at p=0.05 level of significance.

Table 2. Effect of seed applied fungicide on yield and test weight of wheat plots on the UK-REC 2006-2007.			
Fungicide	N	Yield ± S.E (Bu / Ac)	Test Weight ± S.E.
None	48	63.3 ± 2.4	60.7 ± 0.2
Dividend Extreme	24	65.1 ± 3.7	60.4 ± 0.4
Raxal / Thiram	23	64.9 ± 3.5	60.6 ± 0.3
ANOVA;		F(2,89)= 0.29, Pr>F = 0.7526	

Table 3. Effect of seed applied systemic insecticides on yield and test weight of wheat plots on the UK-REC 2006-2007.			
Insecticide + (fungicide)	n	Yield ± S.E (Bu / Ac)	Test Weight ± S.E
None + (none)	95	64.1 ± 1.7 b	60.6 ± 0.2
Curiser + (dividend extream)	24	68.9 ± 3.4 a	61.1 ± 0.2
Gaicho + (raxal & thiram)	24	69.8 ± 3.7 a	61.2 ± 0.2
ANOVA		F(2,119)= 6.87, Pr>F= 0.0015	F(2,119)= 3.24, Pr>F= 0.0428

Means in the same column, follow by the same letter are not significantly different using the Ryan-Einot-Gabriel-Welch mean separation test at p=0.05 level of significance.

Table 4. Effect of foliar applied insecticide at various timings on the yield and test weight of wheat plots on the UK-REC 2006-2007.			
Application Timing	n	Yield ± S.E (Bu / Ac)	Test Weight ± S.E
None	35	57.4 ± 2.9 c	60.9 ± 0.3
Fall	36	65.1 ± 2.8 b	60.4 ± 0.2
Fall + Winter	36	72.4 ± 2.5a	61.0 ± 0.2
Winter	36	68.5 ± 2.8 a b	60.8 ± 0.2
ANOVA		F=(3,119) 15.34, Pr>F= <0.0001	F(3,119)= 0.38, Pr>F= 0.07646

Means in the same column, follow by the same letter are not significantly different using the Ryan-Einot-Gabriel-Welch mean separation test at p=0.05 level of significance.