PLANTING DATE AND INSECTICIDE USAGE FOR PREVENTION OF BARLEY YELLOW DWARF IN KENTUCKY GROWN WINTER WHEAT (1999-2000)

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METHODS:

Clark wheat was planted using a no-till planter on 15 Oct, 29 Oct, or 12 Nov 1999 following a corn crop on the University of Kentucky Research and Education Center in Caldwell Co. KY. The 7' by 25' plots were arranged in a completely randomized design generated by Proc Plan (SAS 1998) with 4 replications.

Fertility was applied as 35 lbs of nitrogen on 29 Feb 00 (Feekes GS 3-4) and 70 lbs of nitrogen on 24 Mar 00 (Feekes GS 6). Harmony Extra ® herbicide was applied on 8 March 00 (Feekes GS 5) at a rate of 0.5 fl. oz. per acre. The fungicide Quadris ® was applied at a rate of 10.8 fl.oz /Ac on 05 Mar 00 (Feekes GS 10.5).

The insecticide treatments included three different application dates and an untreated control applied to all planting dates. Two treatments consisted of single applications of Warrior ® (lambda-cyhalothrin) at 3.2 fl. oz. per acre, made with a backpack sprayer in 26 gal of spray per acre, on 24 Nov 99 (Feekes GS 2-3) or 02 Mar 00 (Feekes GS 4). The third set of plots were treated on both dates. These were compared to an untreated control. Regular aphid counts were not made but plots were checked for aphids just before applications were made. Plots were harvested in June 1999 using a small plot combine. Harvested grain was weighed, and check for moisture content. Plot grain weights were corrected to a moisture standard of 13.5% and yields per acre were calculated based on a standard 60 lbs. per bushel. Yields were analyzed for differences using SAS, Proc GLM.

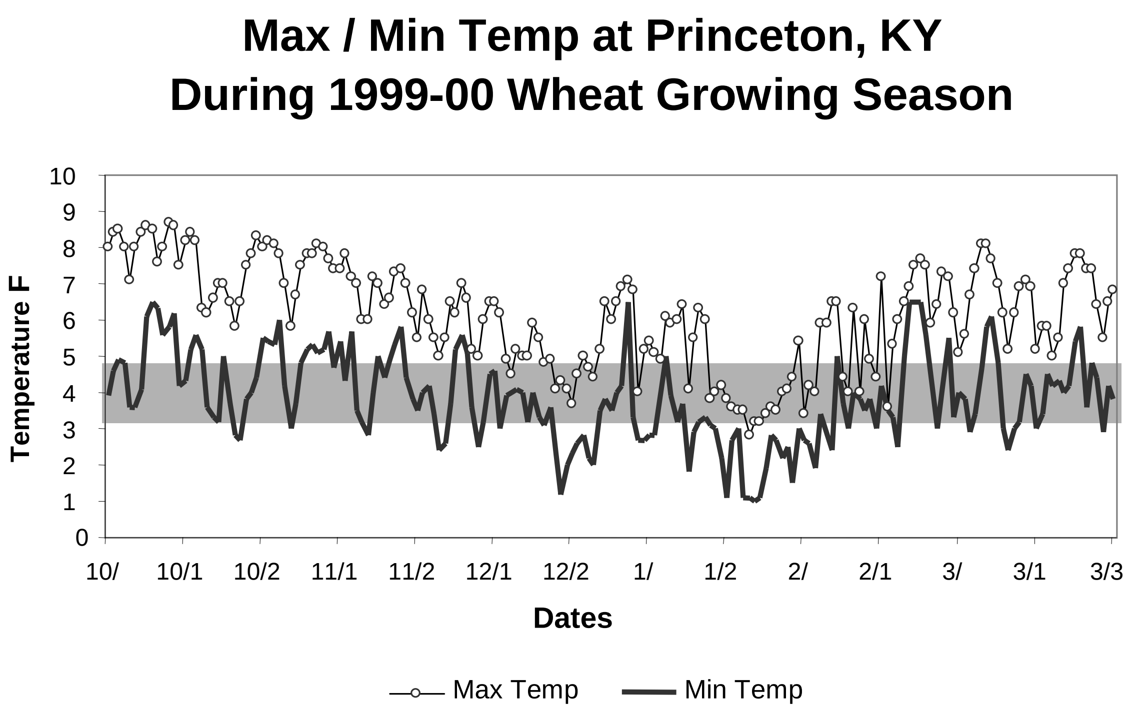
RESULTS AND DISCUSSION:

Originally the experiment was designed to have four planting dates. These dates would reflect planting early, on time and late. However, the severe drought of 1999 prevent the early planting.

In order to reduce variability in the experiment, fertility, herbicides, and fungicide were applied regardless of need and at high rates. Reducing variation, as much a possible, increases one's ability to explain differences or lack thereof, on the experimental variables, in this case planting date and insecticide timing. They are not however, necessarily economically appropriate treatments and are not intended as production recommendations.

In general, the fall of 1999 and winter of 1999-2000 were very mild (See Figure 1.) Just as a rule of thumb, I have divided the temperature graph into three regions. The gray bar represents the temperature span of 32^{o} F to 48^{o} F. At these temperatures aphids will not be killed by cold, but will also not be able to do much more than survive. At temperatures above this band the aphids will be able to function, that is to reproduce and to spread. At temperatures below this bar they will tend to die, especially with prolonged exposure. It was not until mid to late December that temperatures decreased to the point of inhibiting aphid reproduction and movement. Additionally, only twice once in late December 1999 and again in late Jan 2000 were temperatures low enough to likely produce significant aphid mortality. In fact in early January 2000, temperatures reached the 70^{o} F mark! This type of weather allows "overwinter" survival of the aphid vectors and relatively speaking increased time during which reproduction and spread can occur.

Figure 1



Because insecticide sprays did not produce proportional results across all planting dates we will need to look at the results of each planting date. Economic comparisons are done based on $2.50/Bu. wheat, with the Fall, Winter, and combined sprays costing $11.00, $6.00 and $17.00 respectively (See Johnson and Townsend 1999).

12 Nov 99 Planting– This is the latest planting date and is probably not a practical alternative in most years, but it does serve to illustrate several points. Fall spray did not produce a different yield from the non-sprayed. This is to be expected because this planting date was barely emerged at the time of the spray. The Fall+Winter and the Winter sprays were also not different from one another, again because the Fall spray was ineffective with any protection coming from the Winter spray. The Fall+Winter and Winter sprays were, however, better than the non-sprayed indicating that even at this late planting date, in this year, aphids/BYDV was active (Figure 2.) .

Looking at the cost/benefits of the insecticides, clearly the fall spray would have cost the producer $11.00 as no increase in yield was produced. The Winter and fall+Winter treatments would have produced profits of $21.75 and $10.75 because of a yield increase of 11.1 bu/ac. The reduced figure for the Fall+Winter spray results because there was actually no protection provide by the Fall spray. It appears that when planting this late, even in a late fall, the Fall Spray in not needed.

30 Oct 00 Planting– Once again at this date, the fall spray was not effective. The yields of the Fall treatment and the non-treated were not statistically different. Though this is the middle planting date for this warm year, it is still quite a late planting date. One can see that the delay in this planting from the 12 Nov 99 planting increased the non-treated treatment yields by 12.4 bu/ac.

As with the last planting date, the Fall treatment was ineffective. Use of this application would have cost the producer the $11.00 application cost. Also, the Winter and Fall+Winter treatments are better than the non-treated, but though they may appear so, are not different from each other. So once again, the Winter treatment would have produced a $35.50 profit while the Winter+Fall treatment would have provided a $24.50 response. Again, because the Fall application did not produce a response over the non-sprayed but does represent a cost if used. Once again it appears that when planting this late, even in a warm fall, the Fall Spray in not needed.

15 Oct 99 Planting– At this planting date (which is at about the right time for this location) all treatments produced an increase in yield when compared to the untreated check (Figure 2.). The Fall-only treatment produced a 21.6 bu/ac increase over the untreated plots. The Winter-only treatment was a bit better producing a 30.4 bu/ac increase over the non-treated check. When the two treatments are combined, the yield increases another 4.8 bu/acre. This last difference is not statistically significant. However, in both the first two plantings, this order of increase is maintained. At these rates the return on spray costs would be $ 33.40, $70.00 and $73.00 for the Fall-only, Winter-only and Fall+Winter sprays, respectively. However, there is probably no real statistical difference between the latter two. Certainly, if other farm management duties required making a choice, in this case it would clearly be the Winter-only spray.

It is unfortunate that we were unable to get in the earliest (01 Oct. 99) planting date. Would the results have been much like the 15 Oct 99 planting but with bigger differences? Would the non-sprayed control have produced even lower yields because the aphids/virus had more warm days to spread and reproduce? Would the Fall and Winter sprays have produced about the same protection or would they have been too late in this warm season?

Without question in very warm fall and winter weather on intensively managed wheat, insecticide application can provide significant returns. Remember, however, these results are dependent upon warm weather. The absence of this weather will very likely reduce or negate the returns.

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Figure 2