Fall Fertility Management for Ailing Kentucky Bluegrass Stands Prior to Direct Seeding to Oats (Valleyford)

Goal

To determine the optimal fall fertilizer regime for Kentucky bluegrass stands in order to get adequate test weight in the following oat crop.

These farmer cooperators have been very successful in taking out old Kentucky bluegrass stands by spraying them with glyphosate and direct seeding oats into them. Part of the reason for this is that oats produce a natural fungicide named *avenacin* that protects the crop from soil pathogens commonly found in perennial grass stands. However, these farmers have not always achieved an adequate test weight (36 lb/bu) grain buyers require on the oats.

It was possible that the fertility regime they used on their bluegrass was having a negative effect on the oats. Typically, the farmers apply 150 lb/A nitrogen to bluegrass fields every fall. These cooperators prefer to apply this regardless of the health of the stand so they can decide the following spring whether or not to spray it out. Research from Canada, however, indicated that the optimal level of nitrogen available to oats was 100 lb/A (Revised Nitrogen Recommendations for Oats in Manitoba; Manitoba Agriculture and Food). Either side of that level yields dropped off. Test weight response to nitrogen was not included in the Canadian study, but could follow a similar trend.

The farmer cooperators decided to test 3 rates of fall nitrogen on bluegrass, 50 lb/A, 100 lb/A, and 150 lb/A, to see which was optimal for the subsequent oat crop.

Methods

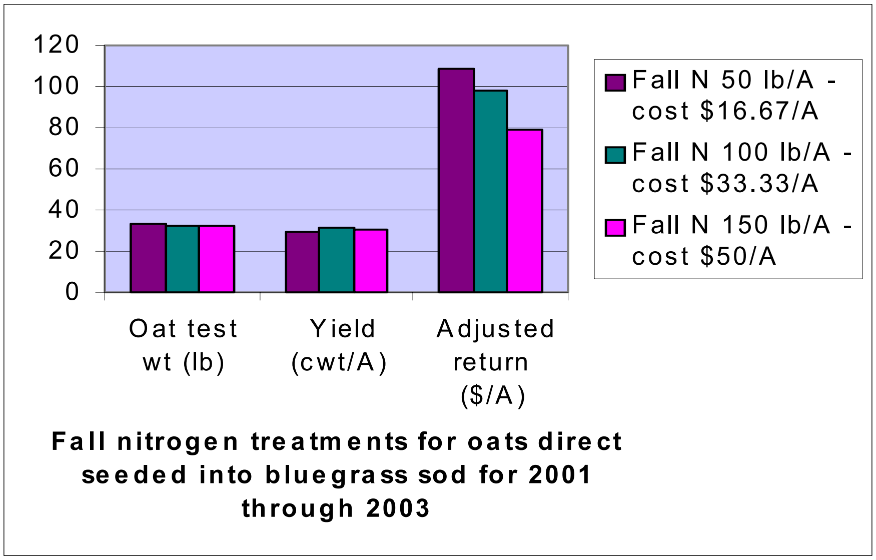
Each fall, the farmers selected a field they knew they would take out of bluegrass production the following spring. We laid out the plots with 4 replications each year. The farmers applied fall nitrogen to the plots as dry 30-0-0-6 (dry 29.5-5-0-3.5 in 2002) at 50 lb/A, 100 lb/A, and 150 lb/A. The first 2 years of the project that was the only fertilizer they used. However, as it was possible that the lack of starter fertilizer was a detriment to the oats, in 2003, they also applied 100 lb/A of 16-20 starter fertilizer at seeding.

The following spring, the farmers sprayed out the bluegrass, using glyphosate at a 48 oz/A rate and immediately seeded oats into the field. Each year they used the variety 'Waldern', which is a dual purpose grain and forage oat. In 2001, the bluegrass was 'Newport'; in 2002, it was the variety 'Goldrush'; and in 2003, it was 'Marquis'. They performed no tillage or residue management operations prior to seeding, although they had baled the bluegrass straw after harvest the previous year. They seeded the oats using a 30-ft wide Flexicoil 6000 drill with a Barton single disk opener with 7.5-in drill row spacing.

Results and Discussion

Figure 4 summarizes the 3-year results of this study for the parameters of primary interest. The full results are shown in Appendix Table 3. In 2001, due to a harvesting error, we only collected data from 1 replication of the treatments.

Figure 4. Effect of 3 levels of fall nitrogen application on Waldern spring oats direct seeded into Kentucky bluegrass stubble at Valleyford, WA, from 2001 to 2003.



Over the 3 years the oat test weight results were inconclusive as the 50 lb/A and 150 lb/A nitrogen treatments both tended to have higher test weight than did the 100 lb/A treatment. In 2001 and 2002, the test weights for all treatments in the test plots were much lower than desired, and were also lower than test weights collected from the rest of the field. In 2002, a very hot, dry spell in July may have contributed to this factor. However, the lack of starter fertilizer the first 2 years may also have contributed to depressed test weights. In 2003, the only season where starter fertilizer was applied, the test weight was 34.4 lb/bu for the 50 lb/A nitrogen treatment, 33.0 lb/bu for the 100 lb/A N, and 32.9 lb/bu for the 150 lb/A N treatment. These results showed the trends we expected, and the highest and lowest test weights were statistically different. However, none of the treatments achieved desired test weight (36 lb/bu), which was probably due partly to the lack of rain from early in May through harvest.

For oat yield, the 3-year data confirmed the Canadian study; the 100 lb/A nitrogen treatment tended to produce the highest yield, and yield tended to drop off with higher or lower nitrogen rates. However, differences were not statistically different so these trends would not necessarily hold every year.

Adjusted return was the gross economic return on a treatment less the cost of the fertility management treatment *only* (no seeding, herbicide, harvest costs). The costs for the treatments included all elements applied (not nitrogen only), but did not include application costs, which were the same across treatments. Treatment costs were: 50 lb/A N - $16.67, 100 lb/A N - $33.33, 150 lb/A N - $50.00, and starter fertilizer - $14/A. We used the target grain prices for oats of $1.40 per 32-lb bushel. However, this price does not accurately reflect market value of the crop, which was not marketable below 36 lb/bu.

The combined data showed that the adjusted return for the oats decreased significantly with each increase in fertilizer rate. From this it was evident that the growers' original decision-making process of applying 150 lb/A nitrogen in the fall was costing them a lot of money, not increasing yield, and possibly negatively impacting the oat test weight and marketability. This cost becomes more marked as fertilizer costs increase. In addition, the growers have to pay interest on their operating loan for those inputs for an extra 6 months. Consequently, they are revising their decision-making process around taking out bluegrass fields and try to make that decision in the fall.

Observations

The farmers have been able to amend the oat test weights to an acceptable level by cleaning the seed, which may remove awns from the grain so it packs tighter. Waldern oats is a combination grain/forage variety, which provides the growers with a dual market. They did find that high nitrogen applications tended to correlate with high nitrate levels in the straw. They had to blend it off in some years as nitrates can be toxic to cattle (ruminant livestock).