WHEAT SEEDING RATE STUDY

Jim Herbek, John James, and Dottie Call
Department of Agronomy

OBJECTIVE:

Evaluate the effect of different seeding rates and established stand on the yield potential of wheat.

METHODS:

The experiment was established at the UKREC Center in the Fall of 1999. The wheat variety, Pioneer 2552, was planted on October 20, 1999 with a Lilliston 9670 no-till drill (7-inch row spacing) in a conventionally tilled (chisel plow, 2 diskings, roterra) seedbed. All treatments received the following: Harmony Extra herbicide (0.5 oz/A) on 3-14-00; Warrior insecticide (3 oz/A) on 11-22-99 and 12-20-99; and Quadris fungicide (10.6 oz/A) on 5-5-00. Fertilizer (65 lbs. of 0-46-0 per acre and 50 lbs. of 0-0-60 per acre) was applied to the study area on 10-18-99. A total of 100 lbs. of N/acre as ammonium nitrate was applied in the spring in a split application (40 lbs. on 2-16-00 and 60 lbs on 3-23-00).

Seven wheat seeding rate treatment/goals were compared: 10, 15, 20, 25, 30, 35 and 40 seeds/ft^2. The drill was calibrated for each seeding rate treatment to insure seeding rate accuracy and to establish drill settings that would deliver the amount of seed needed in close proximity to the seeding rate treatment goals. Seeding rates were adjusted for germination so that wheat plant establishment would be numerically close to the seeding rate treatment goals. Wheat data was collected on: fall stand counts (11-9-99), spring head counts (6-7-00), lodging (6-21-00), and yield (6-22-00).

RESULTS:

The wheat seeding rate study results are shown in Table 1. Excellent stand establishment was achieved at all seeding rates. The % stand achieved (Column 3), based on the actual number of seeds drilled (Column 1) and fall plant stands achieved (Column 2), was over 80% for all seeding rate treatments which is considered good. The lowest seeding rate treatment (10 seeds/ft^2) achieved the highest % stand (>90%) and the highest seeding rate treatments (40 and 35 seeds/ft^2) achieved the lowest % stand. The actual plant stands achieved (Column 2) were numerically very close to the seeding rate treatment goals and is attributed to the adjustment of seeding rates for germination (Column 1) and also good planting conditions at seeding.

Total wheat head numbers (Column 4) were greater at the higher seeding rates (30-40 seeds/ft^2). The two lowest seeding rates had 5-7 fewer heads/ft^2 than the higher seeding rates. However, for the 2000 growing season and this variety, a total of ~ 50 heads/ft^2 was apparently sufficient to achieve a high yield. Normally, a goal of >60 heads/ft^2 is considered to be needed for optimum yield potential. At the lower seeding rates, the wheat plant compensated for the thinner stands by developing more tillers and heads per plant (Column 5). Wheat heads per plant were calculated from heads/ft2 (Column 4) and plants/ft^2 (Column 2) within each seeding rate treatment.

No lodging occurred with any of the seeding rates; not even at the highest seeding rates. The variety used, Pioneer 2552, has good standability.

Excellent wheat yields were achieved at all seeding rates (Column 7). There was no significant difference in yield among the seven seeding rates. The results were somewhat surprising since it was expected the lowest seeding rates would likely result in a yield reduction. However, it was apparent that more head bearing tillers were produced per plant to compensate for the thinner plant stands. It is also plausible that the lower seeding rates, despite having fewer heads/ft^2, compensated with greater seed size and/or greater seed numbers per head. These yield results are very similar to a wheat seeding rate study (15-45 seeds/ft^2) conducted in 1999 (See University of Ky Wheat Science Research Report 1998-99).

CONCLUSIONS:

The low seeding rate/final stands (10-20/ft^2) produced yields equal to higher seeding rate/final stands (25-40/ft^2). This does not imply that these low wheat seeding rates should be utilized and that similar results would be obtained. This year's results are with only one variety from one location. Other factors need to be considered. The variety used in this study (Pioneer 2552) has good tillering capacity. Other varieties with less tillering capacity may not perform as well at low seeding rates. Also, the 1999-2000 growing season was excellent for fall growth and tiller development, winter survival, and spring growth. Whereas, adverse growing seasons would hinder plant growth and development and thinner stands would not perform as well.

TABLE 1. EFFECT OF SEEDING RATE ON WHEAT STAND, HEAD NUMBER, LODGING AND GRAIN YIELD

Seeding Rate Goal (Seeds/ft^2)	(1) Actual Seeds Drilled (#/ft^2)*	(2) Fall Plant Stand (#/ft^2)	(3) % Stand Achieved	(4) Head Counts (#/ft^2)	(5) Heads Per Plant	(6) Lodging (%)	(7) Grain Yield (Bu/Ac)
10	10.9	10.0 g	92	48.8 d	4.9	0	110.2 a
15	18.2	16.0 f	88	50.7 d	3.2	0	110.5 a
20	22.6	19.9 e	88	55.4 c	2.8	0	110.9 a
25	27.8	24.7 d	89	56.3 bc	2.3	0	111.2 a
30	34.0	29.4 c	87	57.7 ab	2.0	0	112.2 a
35	41.7	34.4 b	83	58.4 ab	1.7	0	111.3 a
40	45.7	38.1 a	83	58.7 a	1.5	0	112.0 a

*Adjusted for 85% germination.
Means in a column followed by the same letter are not significantly different at the 10% level.