Seeding rate and variety effects on soft red winter wheat yield

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COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

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Ohio Corn&Wheat

Introduction

- Production of soft red winter wheat (SRWW) in Ohio has been steadily declining for nearly three decades. Producers cite lack of consistency in grain quality and yield as main factors in choosing whether or not to plant wheat.
- Current recommendations require counting tillers at Feekes GS 5 to estimate the yield potential of a given wheat stand in the spring. This is rarely practiced by producers, as it is time consuming.

Our objectives are to:

1. Examine the effect of seeding rate on grain yield

2. Evaluate new methods to assess spring stand and predict yield

Materials and Methods

3 Locations:

- Wood (seeding rate x variety)
- Crawford and Pickaway Counties (seeding rate only)

Seeding Rates: 0.75, 1.0, 1.5, 2.0, and 2.5 million seeds/acre

Varieties:

- Pioneer 25R40 (seeding sate only)
- Malabar (public), Cropland W210110R, Steyer Haubert, and Wellman W304 (Seeding rate x variety)

Row Spacing: Seven rows per plot at 7.5 inch spacing

Measurements:

- **Tiller Counts**: Feekes 1, 5, and 6 (3, 1-linear foot measurements per plot)
- **NDVI Readings**: Feekes 1, 5, and 6 (2 full-length plot readings)
- **Canopeo (percent canopy cover):** Feekes 5 and 6 (from approximately a 2 ft^2 area)
- **Head Counts**: Feekes 10.5 (3, 1-linear foot measurements per plot)
- **Grain Yield**: Standardizing moisture to 13.5%
- **Relative Yield:** Dividing each plot yield by site mean. (Crawford= 117.4 bu/acre, Pickaway=108.6 bu/acre)

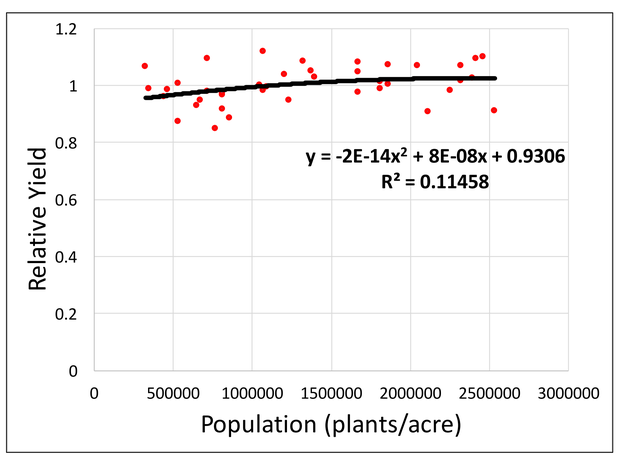

Figure 1. Polynomial regression of fall plant population and relative yield in Pickaway Co. and Crawford Co.

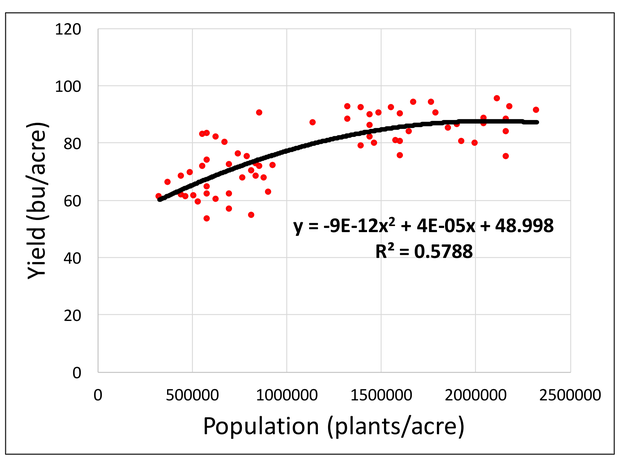

Figure 2. Polynomial regression of fall plant population and actual yield in Wood Co.

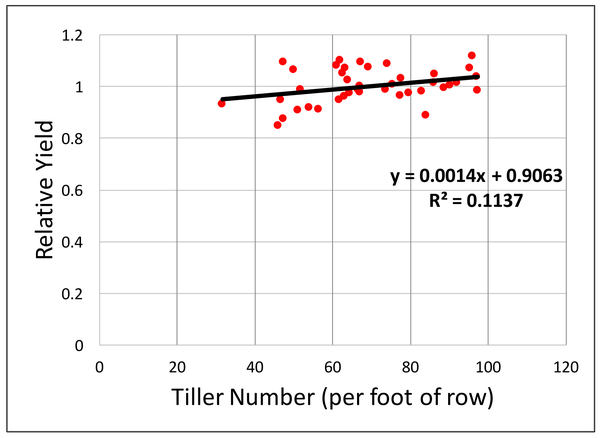

Figure 3. Linear regression of tiller counts taken at Feekes 5 and relative yield in Pickaway Co. and Crawford Co.

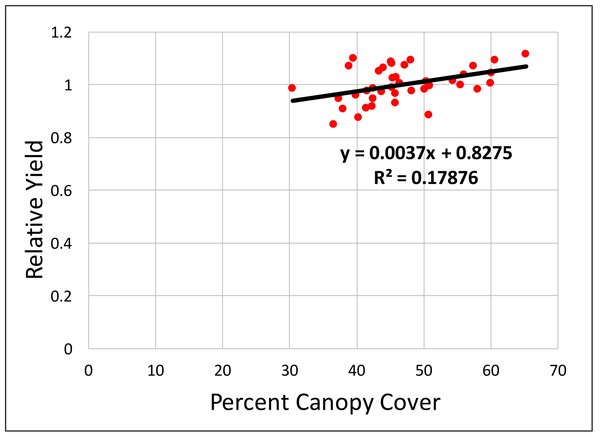

Figure 4. Linear regression of percent canopy cover at Feekes 5 and relative yield in Pickaway Co. and Crawford Co.

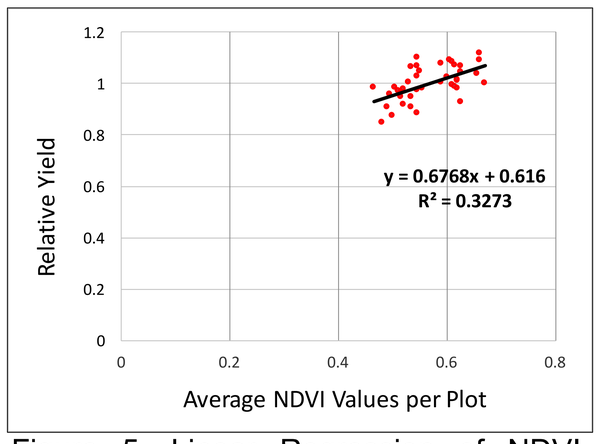

Figure 5. Linear Regression of NDVI values at Feekes 5 and relative yield in Pickaway Co. and Crawford Co.

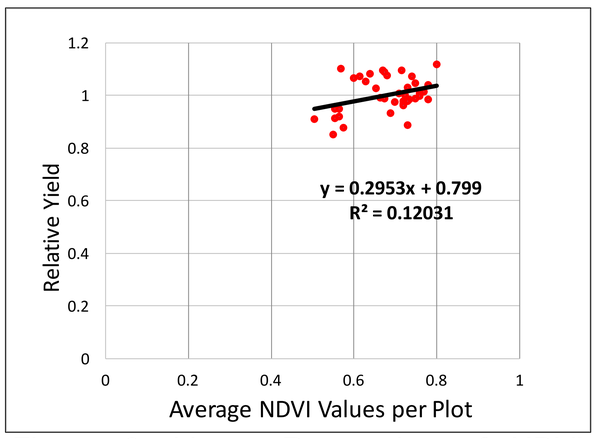

Figure 6. Linear Regression of NDVI values at Feekes 6 and relative yield in Pickaway Co. and Crawford Co.

Results and Conclusions

Seeding Rate: Under optimal growing conditions, such as those at the Pickaway and Crawford locations, SRWW yields did not differ significantly among seeding rates of 1.0, 1.5, 2.0, and 2.5 million seeds/acre. Under poor growing conditions (such as Wood Co. where soil was dry at planting), a population of at least 2.0 million seeds/acre was required to maximize yield. There was no seeding rate x variety interaction for yield at Wood Co.

New Methods of Evaluating Spring Stand: Tiller counts performed at Feekes growth stage 5 is the standard method of evaluating wheat stand and was used as a benchmark for comparison.

- **Feekes 5 NDVI:** Fit yield data approximately 3 times better than the standard method of stand evaluation. This is a promising method.
- **Canopeo at F5:** While not as strongly correlated as NDVI at Feekes 5, this is still a feasible method with the benefit of being readily available and free.
- **Feekes 6 NDVI:** NDVI readings at this stage are nearly equivalent in predictive ability as tiller counts at Feekes 5. However, vital information needs to be gathered prior to this time, as nitrogen should have been applied prior to this stage. A poor NDVI reading at F5 would be able to prevent expensive N inputs for a crop that will not produce economically acceptable returns.

0.75 mil seeds/acre at Pickaway Co.

Avg Trt Yield: 100.9 bu/acre

2.5 mil seeds/acre at Pickaway Co.

Avg Trt Yield: 112.1 bu/acre

Acknowledgements

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