

# Wisconsin On-Farm Testing Program

## Plant Density “Challenge”

### Key Contacts

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### Goal

To improve the reliability of crop management decisions.

### Objective

To determine optimum plant population recommendations for corn production using field-size plots and farm-scale machinery.

### Treatment selection

The experimental design should be a randomized complete block with at least two, preferably three and ideally four replications. The producer should alternate and randomly assign treatments to the plots. It is not important which treatment goes where, but it is important to **write down the order of the treatments in the replicate at the time of seeding**. The plots should be seeded wider than the combine width so you can cut a full combine width from the plot at harvest. Try to limit the number of plant density levels to the farmer’s and new technology practices.

Treatments	Plant density	Technology level
1.	25,000 plants/A	Farmer’s practice
2.	30,000 plants/A	↓
3.	35,000 plants/A	↓
4.	40,000 plants/A	New technology practice

Total number of plots = 4 plant densities x 3 reps = 12 plots

If there is interest in testing more treatment levels, please call and we can develop experiments on a case-by-case basis.

### Data Collection

Plant density at harvest, Plant lodging, Harvested plot length and width, Grain yield, Grain moisture

### Machinery and Equipment

All operations, including seeding and combining, will be done by each collaborating producer with the same equipment used on the rest of the farm.

### Trial Location on the Farm

The plots should be situated within a field that is also seeded to the crop. The replicates should be placed perpendicular to the natural variability in the field so the yields in the treatment plots will approximate the average yield of the field. Ideally, the treatments should uniformly include the natural variation that is found in the field, without any one treatment being favored or disfavored by some field condition.

The plots should not border a creek, fenceline, road, or edge of the field to avoid favoring or penalizing one treatment due to its position in the replicate. Nor should the plots run along the field contour, such that

treatments are on different positions along the slope of the field. In this situation, treatments on the lower slope positions would be favored by higher moisture levels. On the other hand, the plots should be less than a five minute walk from a road.

### Seeding the Hybrids

Use only “full season” hybrids in the trial. A “full season” hybrid is defined as a hybrid that uses the entire available growing season to reach physiological maturity before killing frost or cool temperatures end the growing season. The Wisconsin corn relative maturity belts in the figure depend upon well drained soils, fall tillage, planting by May 5, and average growing conditions.

### Plot Arrangements

The most reliable results are obtained from plots that are at least several feet wider than the combine width and about 1000 to 2500 feet long. This arrangement permits producers to combine full header widths per plot at the time of harvest.

### Soil Preparation, Fertilization, Weed and Pest Control

The on-farm test should be managed like the larger crop field surrounding it for all practices except seeding and harvesting of the different treatments.

### Harvest

Try to harvest more than 0.1 acre. The exact length and width of each plot must be measured and recorded by each producer or on-farm testing coordinator. The width reported will likely be the width of the combine. **Don't assume that the length of each plot is the same.** Slight differences in the rolling landscape or contour can result in 5 to 10 percent differences in the length of the plots, which will throw off yields. **So be sure to measure the length of each plot.**

Each treatment is cut separately and the combine is emptied into a weigh wagon. If a truck is used, the truck will go to the scales with each treatment for a separate weight. An alternative approach is to use bulk seed bags in a truck and unload the harvested plot into separate bulk bags and then weigh them individually at the elevator.

**For each treatment, a representative grain sample must be taken at harvest to determine grain quality (i.e. grain moisture and test weight).** To take a representative sample take 5 or 6 small samples to fill up the grain sample bag as the grain is being angled into the truck. Be sure to fill out the county, producer, and treatment on each of the grain sample bags.

### Signing Off

Return grain samples with yield results to the on-farm testing coordinator. Two signatures are required on the data sheets, one of which must be designated and approved.

