

American Crystal Official Trial Program

The official (coded) trials run by ACSC (American Crystal) were run prior to 1982 to supply information to growers to assist in selecting varieties. Starting in 1982, an approval system was implemented which utilized data from the official trials to select varieties which met specific requirements. The growers continue to receive data from these official trials to assist in selecting varieties.

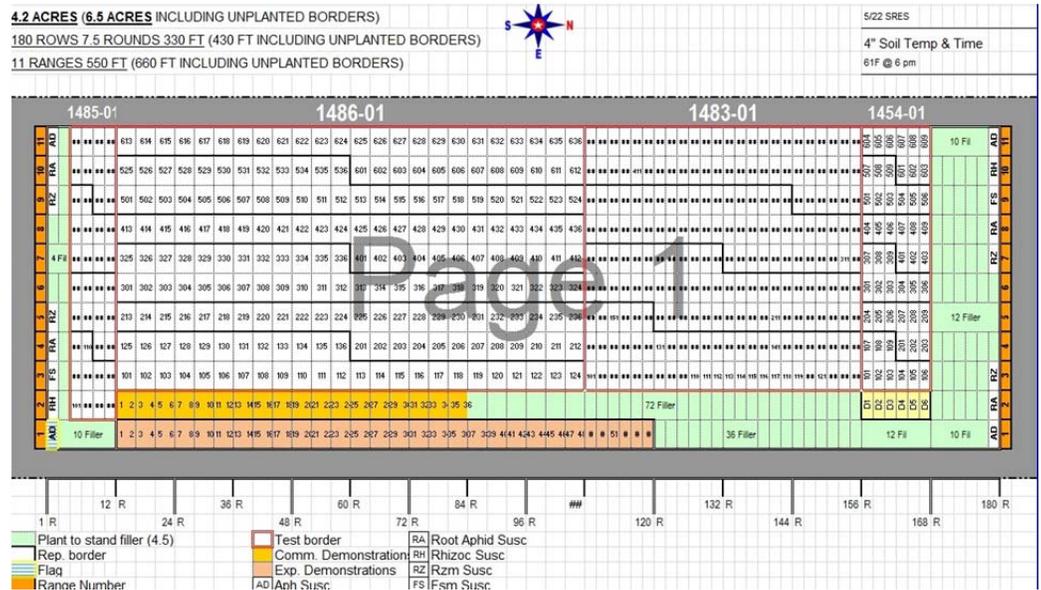


Varieties Entered into Official Trials

Seed companies are invited to enter varieties into the Official Trial each year. The trials consist of commercial trials (commercial seed evaluated), experimental trials (new varieties) which can be used toward gaining full approval, specialty yield trials (varieties with *Aphanomyces* disease resistance) and numerous disease nurseries. Yield trials are planted at about 13 sites and about 7 disease nurseries are managed.

Field Map

Each trial site (an individual grower's field containing the official trials) has all of the plots (50 feet by 2 or 4 rows) diagramed onto a field map. Each grid on the map represents an individual plot. Each map is used to facilitate planting, note taking and harvest operations. Each location is typically 5 to 15 acres in size.



Coding Varieties to Assure Non-Biased Results

A coding agent (university representative) places seed of each variety into a bag labeled with a consecutive code number for planting into yield trials and disease nurseries. ACSC does not know the names of the varieties associated with the seed in each bag labeled with a number only. A separate sample is placed into a bag with the variety name for use in demonstration plots which are identified with variety names for viewing by seed companies and growers.

Seed Preparation

While most seed received for testing is treated with Tachigaren and an insecticide, sometimes small samples of seed to be used for disease checks and indicators needs to be treated. A small Hege treater is used for this work.



Preparing Seed for Each Plot

After creating a randomization (which plots will contain specific varieties), seed for each plot is placed into a packet. A uniform number of seeds is placed in each packet. Seed for one variety is placed into all corresponding packets for all replications and locations. The process then continues with the next variety.

Demonstration packets are also prepared for the official trial sites.



Sorting Packets by Plot Order

After all varieties are packeted, the packets are placed into plot planting order.



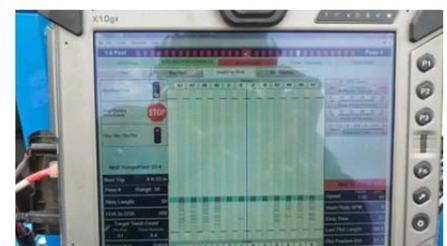
Rodding of Packets for Planting

All packets for a specific location are placed into planting order (including demonstration and filler material) onto tables. The packets are then placed on metal rods to keep the packets in proper order during transport and planting in the field.



Planting

Two specialized 12 row vacuum planters are used to plant the official trials. The newest tractor used for plot planting uses GPS to guide steering. Three technicians handle two seed dispersing units each (one unit plants 2 rows). Each seed packet plants two 50 feet long rows. The field map is referenced during the planting process to ensure all plots are planted in the correct order.



Emergence Counts

About 20 days following emergence, emergence counts are taken on the trials.



Demonstration Plots

Demonstration plots (from separate seed samples) are available for viewing at some sites. These plots may be labeled with a stake or metal sign identified with the variety name.



Measuring Row Length

Prior to harvest, each row is measured for total length. Gaps over 60 inches are measured. Footage is adjusted for gaps exceeding 60 inches.



Defoliation

Plots are defoliated using a six-row defoliator. Following defoliation, the area is walked and dislodged beets are returned to their position.



Harvest

Modified four-row harvesters are used to harvest plots. Staff members check for beets missed by the harvester.

Each harvester has a cleaning system to aid in soil removal. Harvesters, as well as other machinery, are equipped with safety shielding to minimize exposure to moving parts.



Sample Bags

One 25 lb. quality sample, 10 to 20 beets, is taken from each plot and placed into a tare bag for processing at the Moorhead Technical Services Quality Lab facility. The remaining beets from each plot are weighed and then hauled to the sugar factory for producing sugar.



Unloading Harvester

Bulk beets are transferred to the truck on the left for transport to sugar factory. The tare bags are transferred to the truck on the right for sugar and quality analysis at ACSC Technical Services.



Tare Lab Unloading Area

Tare bags are unloaded and placed on a conveyor to initiate quality analysis.



In Scale

Beets are weighed (prior to washing) and the sample ID bar code is scanned into the quality lab data collection system.



Topping and Transfer Station

Soil and green material are removed prior to sample collection. The out scale records the clean weight for each sample to allow calculation of tare percent.



Quality Lab

Each sample is analyzed for sugar and impurity components on equipment similar to the East Grand Forks grower quality lab. The Technical Service's quality lab is smaller than the EGF lab.



Disease Nurseries

Aphanomyces, Cercospora, Fusarium and Rhizoctonia nurseries in the RRV are part of the Official Trial program. Aphanomyces and Fusarium nurseries are grown in fields with naturally occurring levels of disease inoculum. The Cercospora and Rhizoctonia nurseries are infected with inoculum to enhance uniform inoculation.

Rhizoctonia Inoculum

Rhizoctonia fungus is grown on barley kernels under high humidity at 80F for about 3 weeks and then ground into a coarse powder.



Rhizoctonia inoculum evaluation

The inoculum is evaluated by treating seedlings in a growth chamber for about three weeks and then plants are checked to ensure the inoculum will be effective under field conditions.

The ground barley is sprinkled on the leaves and crowns of the beets around the 8 leaf stage. Irrigation promotes the fungus growth and plant infection.



Approval Calculations

Following yield trial and disease nursery data collection, statistical analysis, identification of varieties and combining of data across multiple years, calculations determining approval status of currently approved and experimental varieties are performed.

The list of approved varieties is provided to all growers and cooperating seed companies. Disease ratings and agronomic performance for varieties are also provided to growers and seed companies.