NORTH CAROLINA
MEASURED CROP PERFORMANCE
CORN and CORN SILAGE
2015

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Official Variety Testing Program

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INTRODUCTION

In 2015, North Carolina growers planted 830,000 acres of corn for grain production across the state, and 50,000 acres of corn for silage. Silage is an important part of the beef and dairy cattle industry in North Carolina, particularly in the Piedmont and Mountain regions.

The performance of various corn hybrids in different areas of the state depends on their adaptation to the environmental conditions within the area. With the large number of commercially available and prospective hybrids of corn, it becomes difficult for growers to select a superior hybrid suited for their particular area of the state and their individual farming operations. To make this decision, the growers need up-to-date, unbiased, reliable information. The Official Variety Testing Program at North Carolina State University seeks to provide that information through this report.

This report provides information for corn production as both grain and silage. It contains information on experimental procedure, trial locations, current season weather and performance results, as well as, performance for the previous two years when possible. Corn trials are conducted at eight locations across the Tidewater, Coastal Plain and Piedmont regions of North Carolina. Silage is conducted at one location in the Piedmont.

Growers are cautioned against selecting hybrids based on an individual location in any one year. True hybrid performance may have been influenced by the weather or pest conditions experienced at any one location or any one growing season. Therefore, performance results are reported on a statewide and regional basis.

EXPERIMENTAL PROCEDURE

Entries: Any public or private individual or firm is welcome to submit entries to the Official Variety Testing Program. In early January of each year, trial instructions and applications for the upcoming season are distributed to all previous participants and to those who make inquiry; they are also available on our website: www.ncovt.com. Entries are planted in separate tests for early (105 - 109 day), medium (110 – 115 day) and late (> 115 day) maturing hybrids based on the relative maturity specified on the application form by the sponsoring agency. It is important to remember that hybrids are categorized based on relative maturity, hence some hybrids may actually fit into either of two maturity groups. An entry fee

is charged for all private entries. The OVT program reserves the right to include additional entries for which additional information is desired.

During the 2015 growing season, 8 early, 45 medium and 30 late maturing hybrids were evaluated in the North Carolina corn grain trials. The silage trial evaluated 34 hybrids. Applicants provided seed to conduct the statewide trials. Entries were requested to have the fungicidal and insecticidal seed treatments of choice.

Locations: Corn trials were planted at eight locations across the state. Early, medium and late maturity trials were conducted at all locations. One trial was conducted for silage on an upland soil in Rowan County, in the Piedmont of North Carolina. Table 2 lists the cultural practices used and Table 3 lists the soil test results.

Three trials were located in the Tidewater region – Washington, Pasquotank and Beaufort Counties – on organic soil. Three trials were conducted in the Coastal Plain – Columbus, Robeson and Duplin Counties. Two trials were conducted in the Piedmont – Rowan and Union Counties. Within each region, performance trials were conducted on both North Carolina Department of Agriculture Research Stations, as well as private farms. A list of our cooperators and their locations are listed on this website. The Official Variety Testing Program recognizes and appreciates the cooperative spirit and civic-minded service rendered by the growers who have furnished, cultivated and managed the land for these trials.

Field Plot Design: A unique randomized, complete block design, with four or five replications per entry, was used at each location. Plots were planted as 28 feet long, and end trimmed approximately 4 weeks after emergence, to establish a uniform plot length of 22 feet. Each harvest plot consisted of two rows 22 feet long with a 30 inch row width. Plots were contiguous across the field, thereby reducing border effect. The two rows were harvested for yield.

Crop Management: Cultural practices, such as seedbed preparation, planting date, fertilization and topdressing were in accord with good farming practices and were uniform for all entries in a given trial (Table 2). Prior to planting each trial, soil samples were collected from the field and submitted to NCDA Agronomic Services Division for soil chemical analysis. Fertilizer and lime applications were made according to NCDA soil test recommendations. In

2015, all hybrids were planted at the same population per location, regardless of maturity group. Corn trials in the Tidewater region were planted at 32,000 plants per acre (ppa), while Coastal Plain and Piedmont locations were planted at 28,000 ppa. Corn silage was planted at 34,000 ppa.

SEASONAL CONDITIONS

The 2015 growing season began with on-time plantings for the OVT program (Table 2). . All locations experienced normal temperatures throughout the growing season. Rainfall patterns varied across the regions. All locations experienced average or below average rainfall throughout the growing season except at the Piedmont location (Rowan). This location experienced extreme drought conditions for the months of June, July and August.

Late maturity corn in Washington County was omitted from the dataset due to extreme variability, hence a lack in confidence of measuring true hybrid performance.

Corn harvest was on time at all locations. Silage dried down faster than anticipated, due to several weeks of dry weather.

DATA AND RESULTS

Plant and Ear height: For corn, ear height was determined by measuring the distance from the ground to the node where the ear attaches to the stalk. For silage, height of fully matured plants was measured from ground level to the flag leaf node. All values are reported as statewide averages.

Grain Yield: Yield is reported as a mean value. Harvest values were adjusted to 15.5% moisture, and are reported as bushels per acre, based on 56 pounds per bushel. Therefore, reported yields indicate relative performance and may differ from on-farm yields.

Yield is reported as a mean value on statewide basis by averaging data across all applicable environments within the state. These data are available for multiple year and current year.

Silage Yield: At harvest, silage was weighed at field moisture. Sub-samples were collected at harvest and oven-dried at 140 °F to measure percent moisture and dry matter at harvest. These values were used to calculate dry matter yield (tons per acre) and silage yield which is reported at 65% moisture . Additionally, all yield values reflect an 18.2% yield reduction to account for

border effects that have been determined in our field trials. Therefore, reported yields indicate relative performance and may differ from on-farm yields. Multiple year performance for silage corn is reported for hybrids entered for two and three years in the North Carolina Official Variety Trials.

MILK2006: Silage samples were sent to Dairy One Forage Testing Laboratory to analyze forage quality using near infrared reflectance (NIR) spectroscopy. Many characteristics were analyzed using the NIR 48-hr NDFD incubation period. Several of these: dry matter, crude protein, neutral detergent fiber, neutral detergent fiber digestibility (NDFD), starch, ash and fat were used to calculate milk production using the MILK2006 equation developed at the University of Wisconsin (Shaver, 2006). These values are a useful tool to assess relative milk production of hybrids. Milk production is reported as pounds per acre and pounds per ton dry matter. Hybrids are ranked based on milk production per acre. (Table 21).

COMPARING HYBRIDS

Performance of a hybrid cannot be determined with absolute precision. Even though the tests are conducted in a uniform manner, uncontrollable variability exists among experimental plots due to environmental differences in soil, fertility, moisture, insects, diseases, and other sources of variation. Because this variability exists, statistics are used as a tool to examine differences among hybrids. A statistical method of spatial analysis has been used to allow for similarities between neighboring plots based on their location in the field in order to adjust for the unknown environmental variation (Brownie et al., 1993). The particular spatial model allows for correlations that decrease exponentially as distance between plots increases in both row and column directions.

Coefficient of variation (**CV**) is a relative assessment of trial variability. It measures experimental error caused by variation in management practices and immeasurable factors in the environment as a percent of mean yield for the trial. To summarize values of CV for multiple environments, the average of the values for individual sites (**avg CV**) is reported.

Lower values generally indicate trials with less unexplained variation, hence, more reliable trials (though high mean yields also tend to produce lower CVs).

Standard error of the mean (**SEM**) is listed as a general indicator of precision since it measures how well a true hybrid mean was estimated. For individual trials, SEM varies across hybrids (due to accounting for spatial variation within the site) and is summarized by reporting the average SEM (avg SEM). On average, this indicates how well hybrid means were measured across all replications within the trial. Where multiple trials were combined for regional and statewide data, **SEM** is reported. For combined datasets, the hybrid mean is an average over environments and replications within environments, weighted by precision associated with each environment. The SEM for averages over environments is the same for each hybrid and mainly reflects differences in performance of hybrids across environments. Thus, lower values of SEM tend to indicate greater consistency in hybrid rankings across environments.

All reported trials meet an established criterion for precision by having an average value of the standard error of a difference between hybrid means (avg SEDiff) below a threshold value. Avg SEDiff is calculated as the square root of the average variance of a difference between two hybrid means. Threshold SEDiff values are based on OVT data from 1990 - 2013, and are calculated as the value twice as large as that predicted from the historical data following Bowman and Rawlings (1995).

In assessing hybrid performance, the largest yield difference between two hybrids which can reasonably be attributed to chance variation, is listed at the bottom of each table as the least significant difference **(LSD)**. Where multiple trials were combined for regional and statewide data, LSD accounts for variation across all environments. However, for individual trials, this is reported as the average LSD (**avg LSD**), and represents the difference of hybrids within a trial. Hybrids whose yields differ by less than the average LSD are not statistically different. Those hybrids that are not different from the highest observed yield are denoted in the tables with an asterisk (*); the highest yielding hybrid is denoted by a double asterisk (**). The LSD for comparisons among hybrid means is applied at the 10% level, which indicates 90% confidence that yield differences are not due to chance variation. The degrees of freedom associated with the LSD (**df LSD**) are also reported in the tables.

Hybrid performance may appear inconsistent among environments within an area or among years at a particular location. Year-to-year variation in weather and pest pressure is sufficiently large enough to make predictions of hybrid performance based on single-year data less reliable than predictions using multiple-year data. Research has shown that multiple-year means across environments provide the best prediction of hybrid performance. Thus it is important to examine results from more than one location and more than one year to obtain a more accurate picture of relative hybrid performance.

New hybrids are being introduced each year and these hybrids are potentially higher yielding or pest resistant than the current hybrids. It is suggested that growers plant new hybrids on a small number of acres to determine if it is adapted to their farm. Other agronomic characteristics may be as equally important as yield. Yield information presented in this report should be used in junction with other available information and personal experience when selecting hybrids.