OPTIMUM PLANT POPULATION OF SUPERSWEET CORN

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Objective

Few studies have been done to determine the range of ideal plant populations for supersweet corn. Ideal plant populations to maximize grain yield of field corn and useable ear yield of sweet corn are well established based on production area, cultivar maturity, soil, and fertility status. For sweet corn ideal plant populations are lower than for field corn because ear quality is a primary consideration. Ideal plant population for the normal sweet corn cultivar Golden Jubilee grown in the Treasure Valley of eastern Oregon and southwestern Idaho is thought to be 25,000 plants per acre.

Materials and Methods

The field, planting date, and cultural practices were identical to those already described above in "Seed class and seed density of supersweet corn." Abbott and Cobb 7710 supersweet corn seed treated with Thiram-Benomyl-Apron was planted in four row plots twenty-five feet long. Seed was planted at 30, 40, 50, 60, and 70 thousand plants per acre and thinned to final plant stands of 15, 20, 25, 30, and 35 thousand plants per acre. When plants were thinned, plants were not selected for removal based on size or vigor. Each population treatment was replicated five times in a randomized complete block design with five replicates.

Before harvest the middle 17 feet of the center two rows of each plot was flagged and the number of plants in the harvest area was counted to determine the final plant population. Ears from the plants in the interior part of the plot were harvested, weighed, and counted.

A twenty ear subsample from each plot was husked. Ear length, ear diameter at the base, and ear diameter six inches from the base were measured and averaged for each plot. Ears were evaluated for kernel row number, maturity, and cobs graded as A, B, and C according to processing standards. Population treatment effects on all parameters was based on regression using the actual plant population in each harvest area.

Results and Discussion

Supersweet corn yields increased with plant population to a maximum of 9.97 tons/acre at 24900 plants per acre according to the relationship in Figure 1 as follows:

$$Y = -2.09+7.71\ X\ 10^{-4}P - 1.55\ X\ 10^{-8}P^2 \qquad R^2=.84$$

Where Y = yield in tons per acre
P = plant population in plants per acre.

In 1990 the maximum yield was 7.43 tons/acre at 23200 plants/acre.

The number of marketable ears also increased and then decreased with plant population with a maximum at 31200 plants per acre (Figure 2). In 1990 the number of marketable ears increased to 28000 plants per acre. There is a clear trade- off of total cob yield and yield of marketable cobs. The number of marketable ears peaks at a higher population than total cob yield.

On the other hand, ear quality measurements showed declines with increasing plant population. Average ear length declined with population dipping below eight inches at 32300 plants per acre (Figure 3). Basal-end ear diameter and ear diameter at six inches also decreased with increasing plant population (Figure 4). Average ear weight declined with increasing plant population (Figure 5). Ear maturity, kernel row number and the proportion of the different ear grades were unaffected by plant population.

As indicated by this and last years' results, there are clear trade-offs of number of marketable ears per acre and ear quality. Populations targeted well below the population resulting in maximal number of marketable ears (31200 plants per acre) are desirable to assure market quality of the ears. Abbott and Cobb, the supplier of 7710, recommends a population of 22,000 to 24,000 per acre for this variety. This research indicates an optimal plant population of 23200 to 24900 for supersweet corn yields in the Treasure valley. Given the sensitivity of supersweet stands to planting conditions and the year to year variation in seed vigor, a target seeding rate considerably above 25,000 seed per acre may be advisable to obtain a final plant stand of 23000 to 25000 plants per acre.

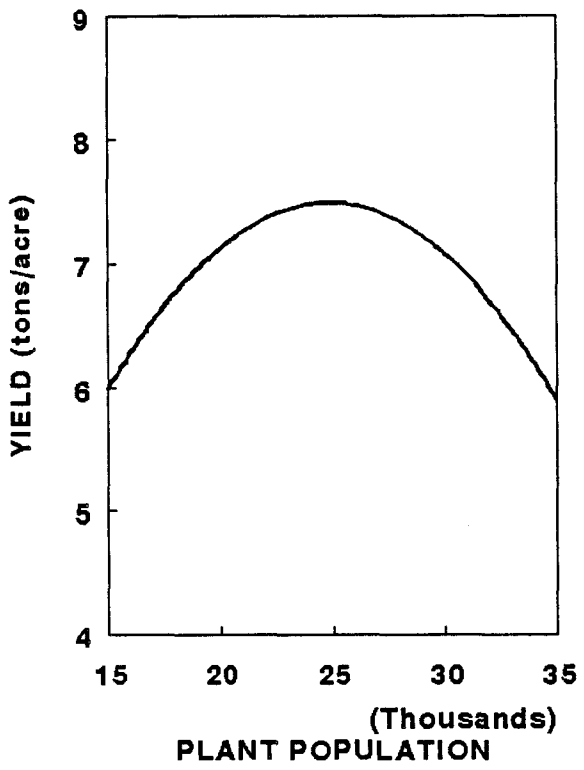

Figure 1. Primary ear yield of Abbott and Cobb 7710 supersweet corn in response to increasing plant population, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

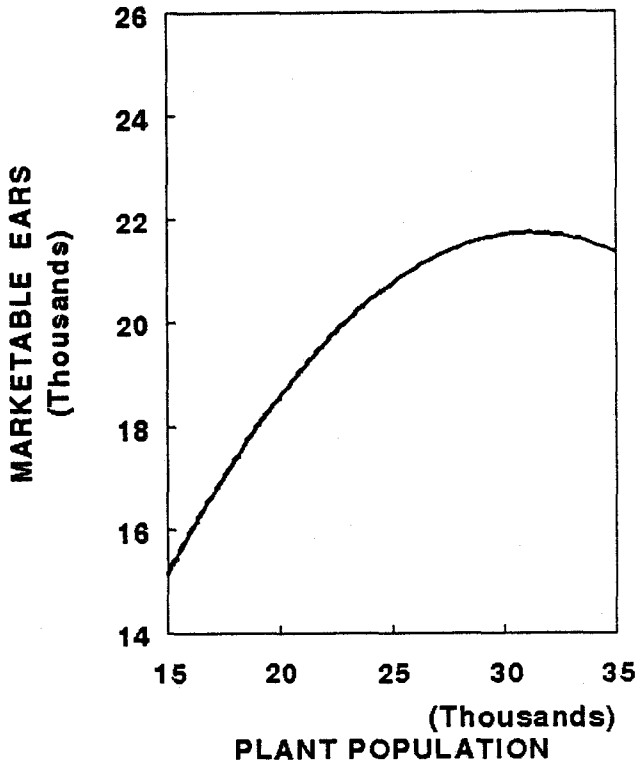

Figure 2. Marketable ears of Abbott and Cobb 7710 supersweet corn in response to increasing plant population, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

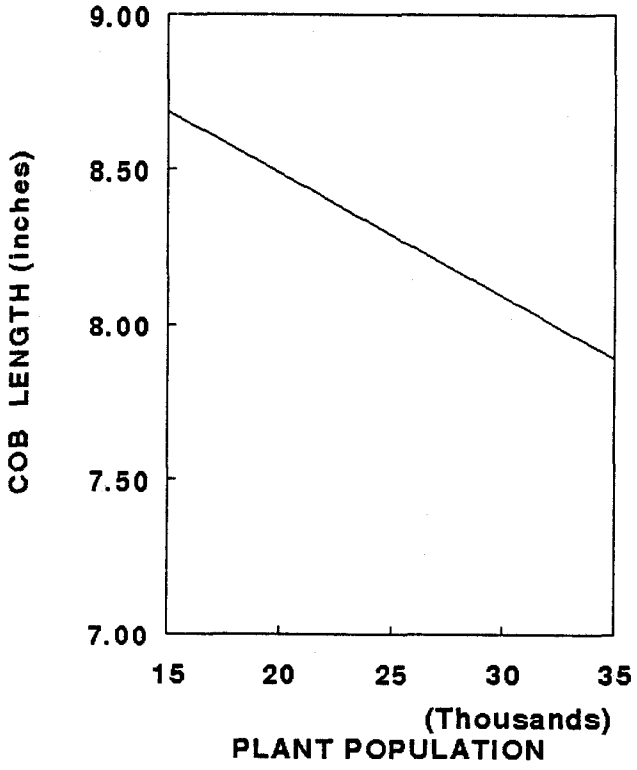

Figure 3. Cob length in inches decreased with plant population, r^2 =.73. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

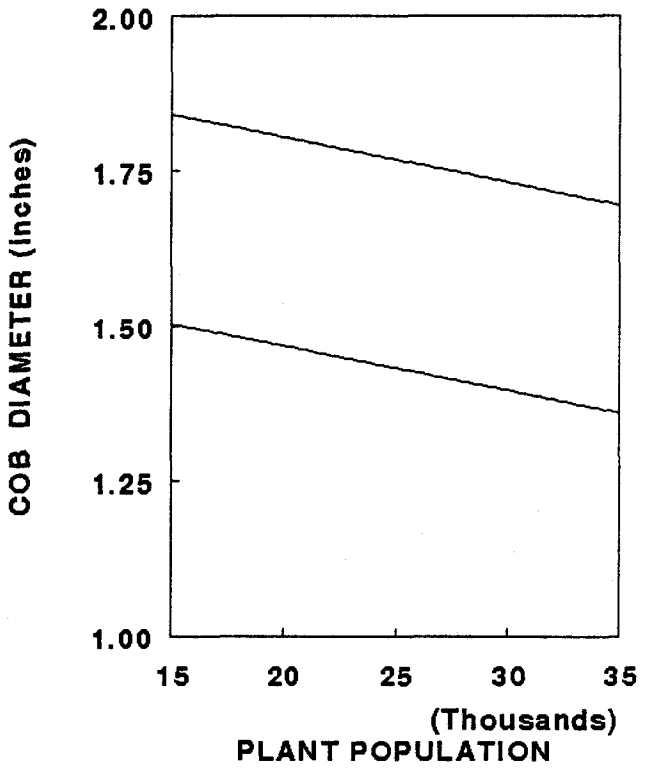

Figure 4. Both cob diameter at the base (upper line), r^2 =.43, and cob diameter at 6 inches (lower line), r^2=.45, decreased with plant population. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

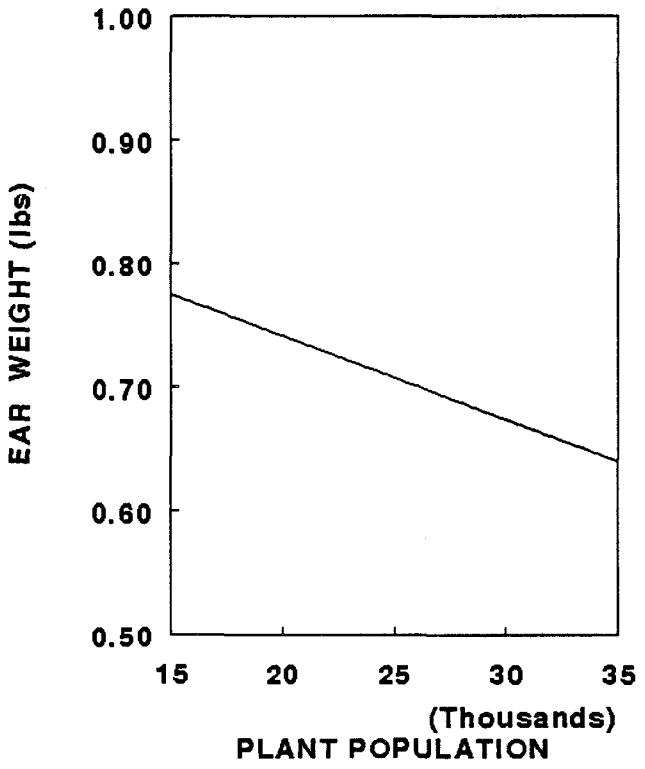

Figure 5. Ear weight decreased in response to increasing plant population, r^2 = .26. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.