How Thick Should You Plant Your Corn Silage?

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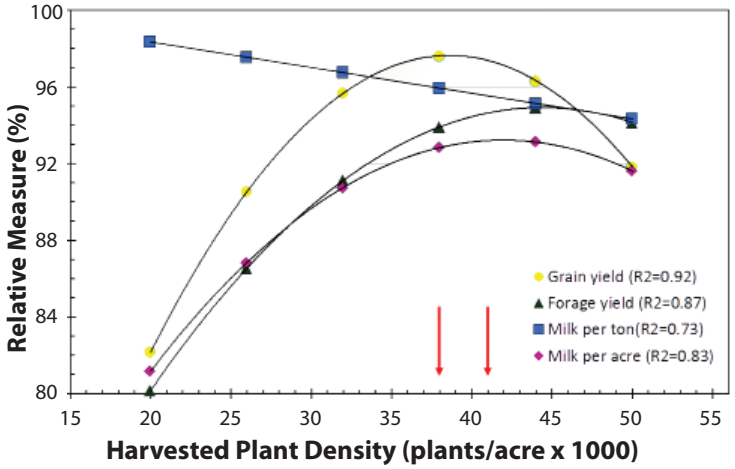
Numerous research reports comparing yield of old versus new corn hybrids indicate a greater tolerance of modern hybrids to higher plant densities through reduced bareness and lodging. USDA-NASS surveys indicate farmer seeding rates have been increasing over time. The availability of variable rate technology has many farmers adjusting corn seeding rates between and within fields, with the correct plant density likely varying across a field.

It seems clear the agronomic optimum plant density that maximizes corn grain and silage yield has been increasing over time. The economic optimum plant density is a function of corn yield and quality responses, seed cost, and grain or silage price. The economic plant density is lower than the agronomic optimum plant density that maximizes yield. The decisions growers face are, *"How thick should corn silage be planted?" "Does the agronomic optimum plant density differ between silage and grain fields?"*

To address these questions, plots were established at the UW-ARS at Arlington from 2000-2008. The plots were 8 rows wide by 25' long. Four rows were harvested for silage and the remaining 4 rows were harvested later for grain. The target plant densities varied by year and ranged from 14,000-56,000 plants/acre. Adapted, high-performing hybrids were selected using results from the UW Corn Trials and varied for relative maturity (full- and shorter-season). Milk per ton and milk per acre were estimated using Milk2006. The treatment (hybrid x plant density) mean that maximized forage yield, grain yield, milk per ton, and milk per acre within a year was set to 100%. The results in Figure 1 were summarized across all hybrids and the relationship between various measures and plant density was estimated using regression models at 20,000; 26,000; 32,000; 38,000; 44,000; and 50,000 plants/acre (Figure 1).

Figure 1. The relationship between harvested plant density and grain yield, forage yield, milk per ton and milk per acre during 2000-2008 (n= 447 plots) at Arlington, WI.



The agronomic optimum plant density that maximized grain yield was measured at 38,000 plants/acre. The relationship increased to a maximum and then decreased as plant density increased. In agronomic research, it is very difficult to measure grain yield differences less than 5%. So, grain yields within 5% of the maximum grain yield were measured at plant densities above 28,000 plants/acre.

Maximum forage yield was measured at 44,000 plants/acre and was within 5% of the maximum when plant densities were above 30,000 plants/acre. Forage quality as measured by milk/ton decreased linearly from a maximum at 20,000 plants/acre, but was within 5% of the maximum across the range of plant densities measured. Maximum milk/acre was measured at 41,000 plants/acre and was within 5% of the maximum at 28,000 plants/acre. These results are a good example of the trade-off that exists between forage yield and quality, i.e., the plant density that maximizes milk/acre is intermediate between plant densities that maximize forage yield and milk/ton.

Plant densities that maximize grain and forage yield are higher than currently recommended plant densities of 32,000-34,000 plants/acre. These results indicate the plant density that maximizes forage production is about 3,000 plants/acre higher than the plant density for maximizing grain yield, and so planters should be adjusted accordingly if the field will be harvested for corn silage. The economic optimum plant density is lower than the plant density required to maximize grain or forage yield. The economic optimum plant density is likely different between farms and fields within farms.

Adjusting plant density is probably one of the best ways to move off current yield levels. *So, how thick should corn silage be planted?* Begin by planting a field to what is considered the optimum plant density; at two or three places (rounds) in the field, increase the planting density by 10%. For example, if a producer currently plants at 30,000 plants/acre, they should do so for the majority of the field, but in two or three rounds the population should be increased to 33,000 plants/acre. The producer should measure yield at the end of the season and during the season to watch for "runt" plants, tillering, prolific versus ear bareness on plants, big versus small ears, ear tip "nose-back", and plant lodging, and then adjust the field accordingly the following year.