CROP INSIGHTS

PIONEER® BRAND · PRODUCTS

Corn Silage Production in Narrow Rows

by Steve Butzen, Agronomy Information Specialist

Summary

- Researchers and farmers in the Eastern U.S. are evaluating narrow row corn silage production.
- In a three-year New York study narrow rows resulted in silage yield increases of one ton/acre with no reduction in silage quality.
- In a two-year Pennsylvania study the silage yield response to narrow rows was 10%. Forage quality was generally unaffected by row spacing or population unless population exceeded 34,000 plants/acre in narrow rows.

After years of extensive study in replicated plots and field-sized trials, narrow row corn production is now being implemented by some grain producers in the Midwest. In the Eastern United States the narrow row width concept is being applied to corn silage production. Researchers and farmers in New York and Pennsylvania are trying to determine if narrow rows can increase corn silage yields while maintaining silage quality. This Crop Insights will report on the results of two narrow row silage studies, one in New York and one in Pennsylvania.

New York Study

Farmers in New York have shown considerable interest in narrow row silage production. Some dairy producers who have compared 30-inch vs. 15-inch rows report substantial silage yield increases (Deibel, 1997). Because on-farm observations suggest that narrow rows perform best at high populations on heavily manured fields, producers have planted their fields at 40,000 to 50,000 thousand plants/acre (Deibel, 1997). Unfortunately, there is little documented research to support these practices. A New York study reported nearly 30 years ago that narrow row spacing did not significantly increase silage yields and that hybrids responded in a similar way to row width (Ruger and Crowder, 1967). However, more current research results are needed.

A study was conducted in New York from 1994 to 1996 to examine corn silage yield and quality responses of eight corn hybrids at two row spacings and five harvest plant densities (Cox and Cherney, 1996). The objectives were three-fold:

- To evaluate corn silage yield and quality under 15- vs. 30-inch row spacing.
- To determine if row spacing by plant density interactions exist for corn silage yield and quality.
- To determine if row spacing by hybrid interactions exist for corn silage yield and quality.

Eight hybrids were over-planted and thinned to 5 densities, 18, 24, 30, 36 and 42 thousand plants/acre. Yields were determined by harvesting individual hybrids at the ½ milkline stage, which corresponded to

about 65% whole plant moisture. Other silage traits were determined from a sample of five plants from each plot. Grain and stover were separated and dried to determine whole plant moisture and grain content. Stover and grain were recombined and ground and wet chemstry was used to determine digestibility and crude protein. Three replications were evaluated at one location each year.

Table 1. Effect of row spacing on silage yield, 1994-1996.

Year	15-in. rows	30-in. rows	Difference	LSD*
	Tons/acre			
1994	27.6	25.9	1.7	0.8
1995	22.3	21.9	--	NS
1996	25.2	23.7	1.5	0.7
Average	24.9	23.9	1.0	0.5

** Least Significant Difference - .05 probability level.*

Narrow rows outyielded wide rows by about 1.5 tons/acre in 1994 and 1996 but were not significantly higher yielding in 1995. When averaged over three years, narrow rows outyielded wide rows by 1.0 tons/acre or 4.2%. Hybrids responded in a similar way to row width changes, suggesting that none of the hybrids tested had an adaptive advantage to narrow rows. Because the 4.2% yield increase does not offset the capital costs for the purchase of a narrow row planter and narrow row corn chopper, the authors are not recommending that farmers adapt narrow row corn silage production.

Maximum yields were obtained at about 36,000 plants/acre in 1994, 30,000 plants/acre in 1995 and 42,000 plants/acre in 1996. Population responses were similar across row widths. When averaged across years and hybrids maximum silage yields occurred at harvest densities of about 36,000 plants/acre under both row spacings.

Row spacing did not affect any measured silage quality trait but silage quality decreased somewhat as plant densities increased. According to the authors, the silage yield increase that resulted from increasing population from 30,000 to 36,000 plants/acre was probably not sufficient to offset the decrease in silage quality that also occurred when plant density increased.

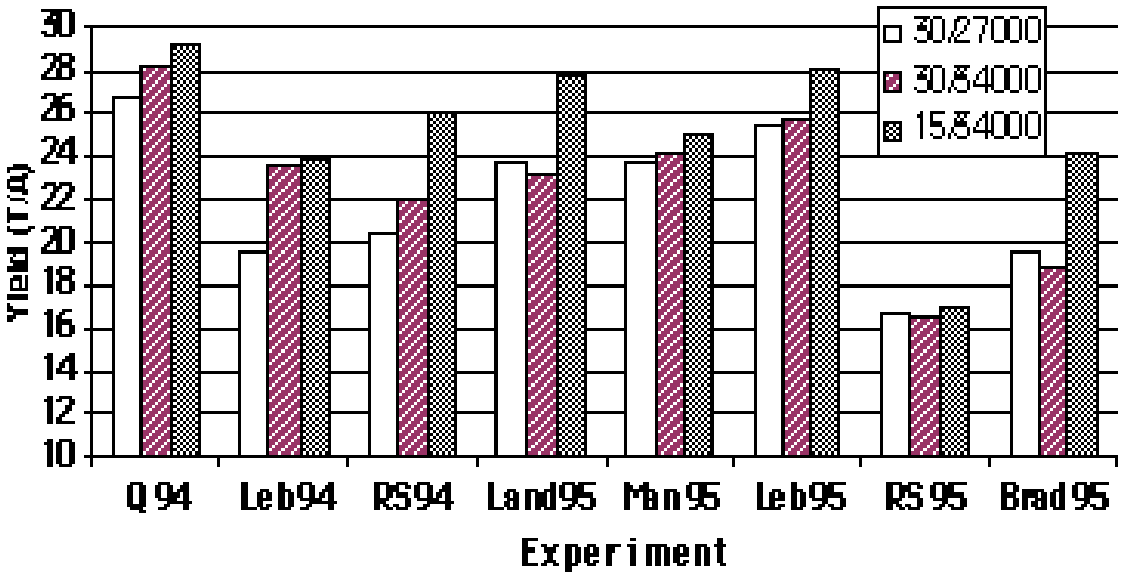
Pennsylvania Study

In 1994 and 1995, eight on-farm field studies were established to evaluate the silage yield response to narrow rows and plant population. The experiments were overplanted and not thinned. Three treatments were applied:

- 30-inch rows, 27,000 plants/acre (normal population)
- 30-inch rows, 34,000 plants/acre (high population)
- 15-inch rows, 34,000 plants/acre (high population)

Results by location are shown in Fig. 1 below:

Fig. 1. Response of silage yield (tons/acre) to row width and population, by environment.



In four of the eight growing environments the narrow row high population treatment was significantly higher yielding than the normal row width and population. Averaged over the eight locations, the silage yield response to narrow rows was approximately 10%. There was some tendency for larger yield responses in short season environments. The silage yield response to plant population in 30-inch rows was significant at only one of eight sites.

Forage quality was generally not affected by row spacing or population except in two cases where final stands exceeded 34,000 plants/acre. In these two narrow row treatments silage energy levels were reduced by 5 to 10%.

Are Narrow Rows Practical in Pennsylvania?

"Based on our experience narrow rows may offer yield advantages of up to 10% for silage, although this response seems to vary among seasons and locations," explains Greg Roth, Extension Specialist at Penn State University. "There are other advantages for narrow rows, including weed control, soil erosion reduction, the opportunity to use one planter for corn and soybeans and increased nutrient uptake associated with narrow rows," he continues. "The potential of narrow rows for individual producers will depend on individual economic decisions and the adaptability to the farming operation," Roth concludes.

Fig. 2. 15- vs. 30-inch corn plots. From *Evaluation of Narrow Row Corn for Grain and Silage Production in Pennsylvania,* Greg W. Roth.

References

Cox, W.J. and D.J.R. Cherney. 1996. Row spacing, hybrid and plant density effects on corn silage yield and quality. A final research application summary prepared for the Pioneer Crop Management Research Awards Program.

Deibel, J. 1997. Producing corn in narrow rows. Proc. Silage: Field to Feedstuff. P. 37-46. NRAES 99. Cornell Cooperative Ext. Serv., Cornell Univ., Ithaca, NY.

Roth, G.W. Evaluation of narrow row corn for grain and silage production in Pennsylvania. From the Penn State University College of Ag Sciences website. URL = http://www.cas.psu.edu/docs/CASDEPT/Agronomy/Extension/Gleanings/Gleanings96.html

Rutger, J.N., and L.V. Crowder. 1967. Effect of population and row width on corn silage yields. Agron. J. 59:475-476.