Producer Grant Final Report

Comparison of Weed control and Soil Erosion Control in 15"row corn vs.30"row corn

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The goal of this project was to build upon the research of the 1996 "Economic Comparison and weed control observation of 15" row corn vs. 30" row corn" and establish a better way of controlling weeds and soil erosion when growing corn for silage and grain. In doing this we looked at the possibility of reducing weed competition and weed seed viability by evaluating earlier crop canopy closure and controlling soil erosion more effectively by evaluating root mass and residue production.

I farm full-time with my father. We own 175 acres and grow corn, alfalfa, small grains, soybeans, and vegetables. We fatten 50 steers annually. We rely on cover crops and animal manures to provide most of our crops fertility needs. No-till planting, cover crops, and plant residues help control soil erosion on our rolling hillsides.

I was privileged to have some very fine cooperators who helped me on this project. Bob Anderson, Lancaster County Extension Agent helped take soil nitrate tests and yield checks. He also was involved in publicizing the field day. Greg Roth, State Corn Management Specialist, lended his expertise as an advisor and speaker at the field day. He also did the root biomass study. Joel Myers, State Agronomist for PA, also helped with data collection. His help in organizing the field day was very appreciated.

We used 2 fields for the project and planted 3 replicated strip trials (15" vs. 30" row corn) in each field. The fields were sprayed with a low rate of Roundup and Bicep before planting and a small area was sprayed at 2/3rds that rate. The corn was planted, but due to an unusually cool and wet spring the plant population was rather low. We then replanted both fields and sprayed 1/2pt. of Roundup to kill original corn plants. The canopy closure measurements were taken on June 27th, July 11th, and July 29th. We took root biomass samples on July 9th when the corn was 24" tall and again when the corn had reached maturity on August 7th.

Yield checks for both grain and silage were taken when the corn was ready to chop for silage. We harvested the 15"corn with a 30" head on a John Deere Chopper and it worked well. I intended to harvest the corn for grain but due to the local demand for silage I chose to put it in an agbag. The field that we used last year for the SARE project was observed for weed growth in both the 15" and 30" strips and for % residue on the surface in both treatments at planting time.

The root biomass data was nearly identical in the 2 treatments which surprised all those involved. More research on this will be necessary. Weed control was excellent, but since we had to spray Roundup to kill the first planted corn, it ruined our low rate plot and the ability to measure weed counts. The % surface residue levels were checked in last years SARE project. 15" rows had 85% ground cover while the 30" rows had 76% cover. We concluded that the increased residue cover will help in controlling soil erosion on slopes. Weed growth in the 2 treatments was identical. (The last 2 years I planted 15" corn I had noticed reduced weed pressure the following year in the 15" rows.) The 15" row corn out yielded the 30" rows by 12% in silage and also by 12% in grain. The silage yield was determined by harvesting 1/500th acre subplots from each plot. Grain yield was measured by multiplying the plant population by number of kernels per plant and dividing by 90,000(average number of kernels per bushel of corn). This was done because grain moisture was very high at the time of harvesting for silage.

Did the yield advantage make up for a few extra costs for the 15" corn? Seed costs were $5.00 an acre more and equipment would probably run about $10.00 an acre more. An increase of 2.4 tons of corn silage at $30/ton (local price), gives the 15" rows a $72.00 advantage. Subtract $15.00 in extra costs and that leaves us with a $57.00/acre profit. For grain an increased yield of 16.2 bu. @ $2.75/bu gives a $44.61 benefit. Take off the $15.00 and we have $29.61 profit. Keep in mind that there is an incremental increase in late season weed control and the extra residue after grain harvest can help control erosion on steep slopes. This also has benefits that I don't have a dollar value on, but none the less surely gives a long term positive effect. Based on this research and my experience in growing 15" corn our next planter will be capable of planting ultra narrow rows. I also think I can justify the extra expense of buying a 15" row kit to retrofit my corn head.

I've had a lot of interest from farmers wanting to know how this project has been working out. The annual field days we have here at our farm and my numerous speaking engagements have allowed me to share the results with others. I advise farmers to start with a field or two with the equipment they already have and go from there. I know of 2 other farmers in my area who are going to be planting corn in 15" rows next year.

Silage Yield and Root Mass Response of Corn to Narrow Rows

Conducted by: Steve Groff, Greg Roth, Joel Myers, Bob Anderson

Loccation: Holtwood, Lancaster County

Collaborators: PASA

Research Objective: To evaluate the influence of narrow row production on root biomass of corn, corn silage yield, and corn silage qulaity.

Background: Narrow rows have been shown to increase corn yields in some cases in previous studies. Another benefit of narrow rows could be to reduce the potential for soil erosion. One factor considered by NRCS in reucding erosion is the root biomass. In this study, root and above ground biomass were estimated in early and late summer. Silage yields were estimated in mid September.

Study Description: Corn ' Dekalb 618' was no-tilled into soybean stubble on May 23 at a plant population of 27,000 in both narrow and wide rows. Planting was done with a John Deere 7000 planter and the narrow rows were planted by doubling back over the plots. Plots were 10 feet wide and approximately 500 feet long. Each treatment was replicated six times. Root samples were obtained from 6, 8.5 sq ft quadrats in each treatment. Yield samples were obtained by hand harvesting samples from 1/500 acre subplots from each plot. Weed control was excellent in both treatments. Corn borer pressure was moderate. The fields were irrigated twice during July.

Results

Table 1. Mean root and stalk mass of corn planted in 15 in. and 30 in. row spacing.

Row Spacing	7/9 Root Wt.	7/9 Stalk Wt.	8/7 Root Wt.	8/7 Stalk Wt.
in.		lb/ac		
15	252	975	2670	8145
30	275	1143	3051	7812
Significance	NS	NS	NS	0.1

Table 2. Silage yield, plant population, and moisture of corn planted in 15 in. and 30 in. row spacing.

Row Spacing	Plant population	Yield (65%)	Moisture.
in.	plants/A	Tons/A	%
15	26329	21.9	65.5
30	27684	19.5	66.1
Significance	0.12	0.14	NS

Conclusions: We were unable to show any increased root mass in the narrow row treatments. Aboveground dry matter was increased with the 15 inch rows in the August sampling. The yield advantage to the narrow rows was 12% and was nearly significant at the 0.10 level (this means there would be a 90% probability this kind of difference would be not be due to chance). Plant populations were slightly lower in the narrow rows, probably due to the traffic over the rows when planting. This study showed: 1) doubling back can reduce stands, 2) yields can be increased with narrow rows in some cases, and 3) root biomass differences among the treatments were not eveident. It also reaffirmed that root biomass is difficult to assess accurately.

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Steve Gross
1997 Narrow Row Corn Project
Grain Yield Evaluation

Steve:

I have evaluated the grain yields on your two fields which were used to compare 15 inch to 30 inch corn rows. Because the corn was removed as silage before the grain was ready to remove as grain, I used the following method of determining they yields. Plant population times the number of kernels per plant divided by 90,000 (then average number of kernels per bushel of corn)

Field # 1

30 inch Rows

	Plant Population	Yield (Bu/A)
Rep. #1	26,136	125.32
Rep. #2	26,136	123.84
Rep. #3	27,434	138.06
Average	26,571	129.10

15 inch Rows

	Plant Population	Yield (Bu/A)
Rep. #1	32,234	151.32
Rep. #2	31,992	154.84
Rep. #3	29,512	142.84
Average	~~28,749~~ 31,246	149.67

Field # 1 showed an increase in yield of 20.57 bushels per acre with 15 inch rows or an 15.95 % increase in yield when comparing to 30 inch rows. Part of this increase may be due to increase of ~~8.2 %~~ more plants per acre in the narrower rows. ~~However each 1% increase in the number of plants resulted in almost a 2 % increase in the yield.~~ 17.6%

Field # 2

30 inch Rows

	Plant Population	Yield (Bu/A)
Rep. #1	25,700	137.92
Rep. #2	24,829	132.59
Rep. #3	27,443	136.65
Average	25,991	135.70

15 inch Rows

	Plant Population	Yield (Bu/A)
Rep. #1	26,136	143.04
Rep. #2	25,265	144.29
Rep. #3	30,492	155.34
Average	27,297	147.56

Field # 2 showed an increase in yield of 11.86 bushels per acre with 15 inch rows or an 8.72 % increase in yield when comparing to 30 inch rows. Part of this increase may be due to increase of 5.0 % more plants per acre in the narrower rows. The percentage increase was less in Field #2 than in Field #1 however it was still larger than the number of plants alone can account for.

Sincerely

Robert Anderson
Extension Agent - Agronomy

cc G. Roth, PSU