

INTERCROPPING CORN WITH SOYBEAN: 1982 RESULTS

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Investigations into intercropping corn with soybean continued in 1982 and again in 1983. We see the practice of intercropping corn with soybean for silage as a method of increasing home-grown protein production while maintaining an acceptable level of dry matter production.

In 1982 Cornell 281 corn and Williams soybean in monocultures were compared to two intercrop planting patterns where 50% of the corn rows were replaced by soybean rows. The same intercrop planting pattern as in 1981, where alternate rows of corn were replaced by two soybean rows, and a planting pattern where every third and fourth row of corn was replaced with two soybean rows, were used. These are illustrated in Fig. 1, which also shows the way corn density varied in monoculture and intercrop corn rows. Densities of corn in monoculture were equivalent to 26,000, 38,000 and 50,000 plants per acre. Soybean density was the same as in 1981 at 160,000 plants per acre in monoculture, or 18 seeds per row, 36 per double row.

Planting Pattern	Density			SOYBEAN	
	CORN				
	Low	Med	High		
	— plants/m of row —				
S - S	<u> </u>	-	-	-	18
C - C	<u>FFFFF</u>	5.9	8.6	11.2	-
CC - SS	<u>FF </u>	5.9	8.6	11.2	18
C - S	<u>F F F</u>	5.9	8.6	11.2	18

Fig. 1. 1982 planting patterns and plant densities of intercropped corn and soybean.

Silage yields are shown in Table 1, and showed similar responses to 1981 except yields of monoculture corn and intercrops were lower than the previous year. The lower yields were probably related to the heavy rainfall early in the 1982 growing season. This, we think, resulted in the marked response to nitrogen fertilizer in an adjacent corn fertility study where the previous two years none had been found. The intercropping study only received a modest amount of nitrogen

(120-130 lb per acre) while yields of corn in the fertility study were still increasing at over 200 lbs per acre nitrogen. Even though yields were lower than in 1981 the density trends with corn and the intercrops were similar. The corn-corn-soybean-soybean intercrop was included because this arrangement would be easier for farmers to plant and differentially fertilize with nitrogen than the corn-soybean intercrop, and the contribution of soybean in the 1981 corn-corn-soybean intercrop was below optimum levels. Intercrop yields in 1982 were below corn monocrop yield but increasing corn density in the intercrop improved the situation.

Table 1. 1982 silage yields of intercropped corn and soybean.

Corn Density	Planting Pattern			
	S - S	C - C	CC - SS	C - S
	———— t/ha (70% moisture) ————			
-	25.4	-	-	-
Low	-	54.8	40.4	47.1
Medium	-	56.4	46.3	48.4
High	-	56.6	48.6	52.5

Significant trends: Density linear**, density x pattern**

Significant comparisons: Monoculture vs. intercropping**
CC - SS vs. C - S**

Soybean contribution to silage yields (Table 2) were higher in 1982 than in 1981 and although protein contents have not yet been determined they should be comparable or higher than in 1981. Increasing corn density decreased soybean contribution, a similar trend as in 1981.

Table 2. 1982 contribution of soybean to silage (percent soybean).

Corn Density	Planting Pattern			
	S - S	C - C	CC - SS	C - S
	———— % soybean ————			
-	100	-	-	-
Low	-	-	31.1	28.7
Medium	-	-	26.0	22.3
High	-	-	21.7	19.6

Significant trends: Density linear**

Significant comparisons: Monoculture vs. intercropping**
CC - SS vs. C - S**

Row equivalent yields of corn and soybean are shown in Table 3. This comparison of corn rows in intercropping with corn rows in monoculture shows the yield advantage intercropping affords corn plants compared to corn plants at the same row density in monoculture. Most advantage was seen when corn rows were bordered both sides by soybean rows. For soybean the yields of the double rows bordered both sides by corn were generally lower than the pattern where they were bordered by both corn and soybean rows. The increased yield of corn rows in intercropping produced a similar trend of increased ear contribution to corn yield as in 1981. Thus improved quality from increased protein from soybean and from the contribution of corn ears can be expected in intercropping.

Table 3. Row equivalent yields of corn and soybean, a comparison of intercropped rows with monocropped rows.

Corn Density	Planting Pattern			
	S - S	C - C	CC - SS	C - S
g/m ²				
<u>CORN:</u>				
Low	-	1645	1673	2014
Medium	-	1693	2054	2256
High	-	1666	2276	2530
<u>SOYBEAN:</u>				
-	761.9	-	-	-
Low	-	-	752.4	813.1
Medium	-	-	725.1	647.2
High	-	-	635.3	618.0

Significant trends: Corn density linear**, density x pattern**
Soybean density linear**, density x pattern**

Significant comparisons: Corn monoculture vs. intercropping**
CC-SS vs. C-S**

We can recommend intercropping to farmers who are in the situation of corn silage surplus, are in the position to make slight machinery modifications and at the same time have a deficit in home-grown protein. In 1983 we are attempting to make this practice even more attractive by differentially fertilizing with nitrogen the corn and the soybean. There are possible savings in nitrogen fertilizer cost of 40-50% if soybean yields can be maintained only by symbiotically fixed nitrogen from the atmosphere.