



## Rotated Corn Can Enhance Corn Yields with Less Inputs

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All growers recognize the benefits of an alfalfa/grass sod to the subsequent corn crop. Unfortunately, many growers have not recognized or fully exploited the rotational benefits of other crops, such as soybean, wheat, oats, etc. We conducted field-scale studies (~10 acres) in four counties to demonstrate to New York cash grain producers the benefits of soybean and wheat/clover to the subsequent corn crop. We compared yields of continuous corn (C-C-C) under conventional management (soil insecticide, broadcast herbicides, ~140 lbs N/acre) with corn yields in a soybean-corn (S-C) or soybean-wheat/clover-corn (S-W/CI-C) rotation with reduced inputs (banded herbicide plus cultivation, ~80-100 lbs N/acre).

Rotated compared with continuous corn yielded greater than continuous corn did at most sites in all years (Table 1). A significant rotation by site interaction existed each

year because rotations responded differently at each site. In Cayuga Co., the S-C rotation yielded 15, 22, and 19 bu/acre greater than the C-C-C rotation in the 3 years. In contrast, the S-W/CI-C rotation yielded greater than the C-C-C rotation only in 1995. In Seneca Co., the S-W/CI-C rotation yielded 25, 28, and 20 bu/acre greater than the C-C-C rotation in the 3 years. In Orleans Co., the S-C and S-W/CI-C rotations yielded greater than the C-C-C rotation in 2 of 3 years. In Yates Co., the S-C and S-W/CI-C rotations yielded greater than the C-C-C rotation in only 1 of the 3 years. Clearly, the rotation effect is real but not quite as consistent as expected because of the reduced inputs in the S-C and S-W/CI-C rotations.

For example, the PSNT values (Table 2) in the S-C rotation in 1994 were lower than expected (40 to 55 bu/acre soybean yields at the three sites in 1993). Consequently, our

80 lb N/acre application rate to rotated corn resulted in N deficiency and reduced yields at Orleans and Yates Co. in the high-yielding 1994 growing season. Research from the Midwest indicates that soybean N credits to the subsequent corn crop vary considerably from year to year so soil NO<sub>3</sub>-N concentrations should be monitored closely to avoid overfertilizing or underfertilizing corn following a soybean crop.

Production problems associated with the S-W/CI-C rotation included low corn plant populations under chisel tillage at Cayuga Co. in 1994 (data not shown), low PSNT values in 1996, and high weed densities at Orleans and Yates Co. in 1996 (Table 3). Research from Guelph, Ontario suggests that wheat (and perhaps clover) could have potential allelopathic effects of corn in reduced tillage systems, which would reduce corn stands and

Table 1. Corn grain yields under three crop rotations at four sites in 1994, 1995 and 1996.

Rotation	1994				1995				1996			
	Cayuga	Orleans	Seneca	Yates	Cayuga	Orleans	Seneca	Yates	Cayuga	Orleans	Seneca	Yates
	----- bu/acre -----											
C-C-C	154	142	112	156	148	110	87	125	130	113	101	116
S-C	169	140	127	137	170	118	103	153	149	119	116	121
S-W/CI-C	<u>157</u>	<u>163</u>	<u>137</u>	<u>161</u>	<u>164</u>	<u>123</u>	<u>115</u>	<u>152</u>	<u>129</u>	<u>110</u>	<u>121</u>	<u>115</u>
LSD 0.05	12	10	11	5	14	8	17	14	18	5	13	NS

(see CORN, page 7)

reduce yields. They advocate baling the wheat straw and killing the clover in late fall to minimize any potential risks. The high weed densities at two sites in 1996 in S-W/CI-C rotation indicate that rotating to a cool-season crop could actually increase rather than decrease weed competition in corn. Finally, the low PSNT values in the S-W/CI-C rotation in 1996 indicate

that clover N credits also vary greatly across years to the subsequent corn crop.

The S-C rotation vs. continuous corn increased corn yields in 9 of the 12 site-years, and the S-W/CI-C rotation increased corn yields in 6 of the 12 site years. Because of less inputs in rotated corn, S-C rotation vs. continuous corn was

more profitable in 11 of 12 site-years and the S-W/CI-C rotation was more profitable in 12 of 12 site-years (data not shown). We strongly advocate more rotated corn on cash grain operations. Rotated corn, however, requires closer management of the crop because of the real potential to decrease inputs while enhancing corn yields.

Table 2. Soil NO<sub>3</sub>-N concentrations of the presidedress nitrogen test (PSNT) under three crop rotations at four sites in 1994, 1995, and 1996.

Rotation	1994				1995				1996			
	Cayuga	Orleans	Seneca	Yates	Cayuga	Orleans	Seneca	Yates	Cayuga	Orleans	Seneca	Yates
	----- ppm -----											
C-C-C	8	10	6	7	14	10	10	11	7	0	9	4
S-C	16	9	10	8	19	19	14	17	11	2	11	8
S-W/CI-C	<u>15</u>	<u>11</u>	<u>19</u>	<u>29</u>	<u>25</u>	<u>24</u>	<u>21</u>	<u>21</u>	<u>11</u>	<u>1</u>	<u>12</u>	<u>2</u>
LSD 0.05	5	NS	NS	8	10	NS	NS	NS	NS	NS	NS	2

Table 3. Weed density in late June under three crop rotations at four sites in 1994, 1995, and 1996.

Rotation	1994				1995				1996			
	Cayuga	Orleans	Seneca	Yates	Cayuga	Orleans	Seneca	Yates	Cayuga	Orleans	Seneca	Yates
	----- weeds/m <sup>2</sup> -----											
C-C-C	2.1	-	2.3	0.7	0.9	1.6	0.3	1.6	2.0	1.7	0.3	1.0
S-C	1.9	-	1.0	2.0	2.0	2.8	0.3	1.8	1.4	1.6	0.2	2.7
S-W/CI-C	<u>1.9</u>	-	<u>1.5</u>	<u>2.7</u>	<u>1.6</u>	<u>1.3</u>	<u>0.2</u>	<u>0.9</u>	<u>1.5</u>	<u>6.4</u>	<u>0.7</u>	<u>10.0</u>
LSD 0.05	NS		NS	1.3	NS	NS	NS	NS	NS	2.2	NS	2.7