

Agronomy 212 – Crop Growth, Productivity, and Management

Cropping Systems

Two Outcomes

Crop Rotation Benefit

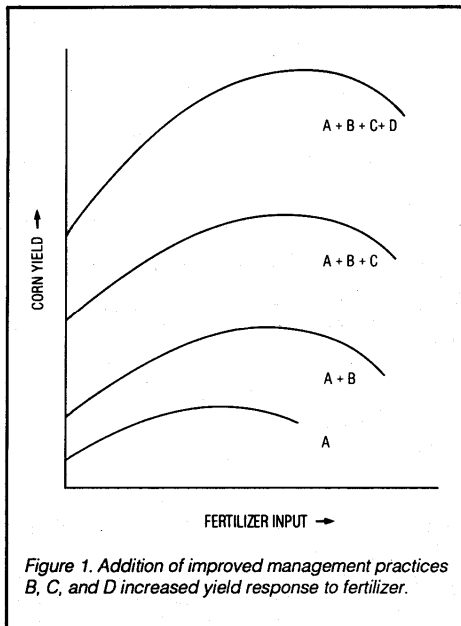
State	Site-years	Rotation Benefit	
		Corn	Soybean
Illinois	17		--
Indiana	20		
Iowa	8		
Minnesota	20		
New York	12		--
Wisconsin	9		

Years of continuous cropping following 5 years of the other crop	Corn Yield (Bu/Acre)	Soybean Yield (Bu/Acre)
1		
2		
3		
4		
5		
Continuous Corn-soybean rotation		

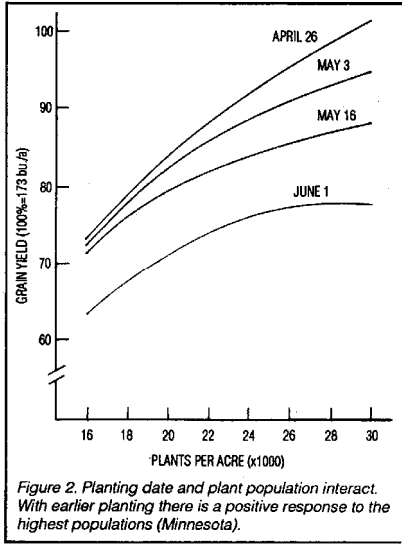
Are More Crops Needed?

Systems for Optimum Corn Yield

Interactions



Planting Date and Plant Population



Planting Date and Nutrient Level

Nitrogen and Plant Population, Nutrient Level and Hybrid

Table 1. Nitrogen and Plant Population Interact to Increase Corn Yields (Florida).

Plants/a.	Yield when N applied is—		
	80 lb.	160 lb.	240 lb.
	bu/a.		
12,000	118	138	155
24,000	151	178	202
36,000	164	210	231

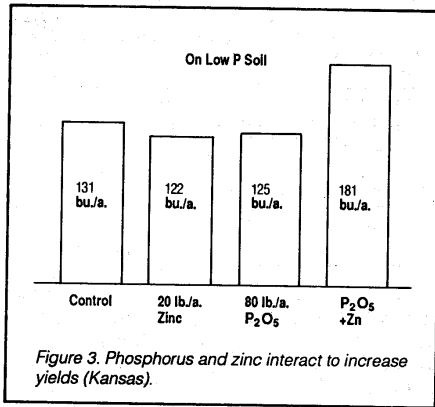
Table 2. Corn Hybrids Vary in Response to Nitrogen (Colorado).

Nitrogen applied	Yield	
	Hybrid A	Hybrid B
	bu/a.	
150	222	226
225	219	261
Difference	-3	+35

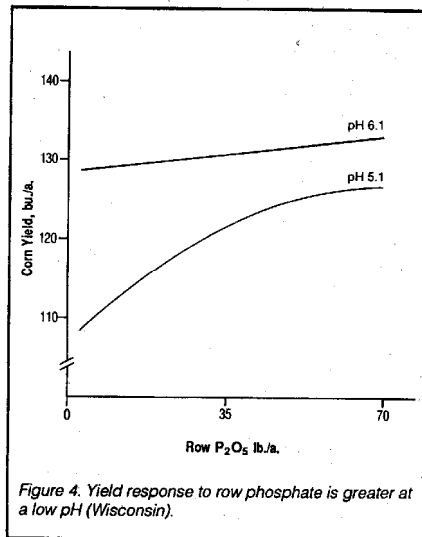
Table 3. Some Corn Hybrids Give Larger Responses to Higher Fertility (New Jersey).

N + P ₂ O ₅ + K ₂ O applied	Yield	
	Hybrid A	Hybrid B
	bu/a.	
Medium, 250+125+125	199	218
Very high, 500+300+300	227	312
Difference	+28	+94

Phosphorus and Zinc



Phosphorus and pH



Nutrients and Rainfall

Table 4. Corn Gives Larger Responses to Potassium in Dry Years Than in Good Rainfall Ones (Ohio).

Annual K ₂ O applied lb./a.	Yield	
	Good year	Stress year
0	163	81
50	163	113
100	167	121
200	163	129
Difference	+0	+48

Conservation Tillage

Table 5. No-till Corn Requires Higher Levels of Soil Potassium (Wisconsin).

Soil test K level	Yield		
	No-till	Plowed	Difference
lb/a.		bu/a.	
134	107	136	29
223	128	149	21
312	144	157	13
400	157	163	6

Table 6. Higher Corn Yields Are Accompanied by Increased Amounts of Residue (New Jersey).

N + P ₂ O ₅ + K ₂ O applied	Irrigated*	Residue Yield returned	
		bu/a.	ton/a.
lb/a.			
Medium, 250+125+125	No	127	5.0
Medium, 250+125+125	Yes	214	5.9
Very high, 500+300+300	Yes	299	7.5

*During growing season, rainfall 14.2 inches, irrigation 12.3 inches.

Table 7. Greater Amounts of Surface Residue Reduce Soil Erosion Regardless of Reduced-Tillage System. (Indiana).

Tillage system	Soil loss compared to moldboard plowing when surface residue after planting is—	
	1000-2000 lb/a.	Over 6000 lb/a.
	pct. of moldboard plow	
Chisel	89% soil loss	20% soil loss
No-till	17% soil loss	8% soil loss

Water Quality and Production Efficiency

Creating an Optimum Yield System

Precision Agriculture

