

CROPPING SYSTEMS RESEARCH

This trial is designed to include a comparison of several crop rotation sequences as follows:

Treatment 1: Compares a two year rotation of wheat and corn with a two year fallow-wheat rotation. Early corn varieties for grain production will be used in this comparison.

Treatment 2: Compares a two year rotation of wheat and sunflowers with a two year fallow-wheat rotation.

Treatment 3: Records production in a four year cropping sequence of sunflower on wheat stubble, barley on sunflower stubble, fallow on barley stubble and wheat on fallow.

Treatment 4: Compares wheat on fallow, wheat on continuous cropping and wheat on no-till recrop.

In 1983 fertilizer was applied on all recrop, corn and sunflowers at the rate of 80 lbs. N, 30 lbs. P₂O₅ and no K₂O. All wheat on fallow received 40 lbs. N, 30 lbs. P₂O₅ and no K₂O. All land to be fallowed was not fertilized. In 1984 fertilizer was applied on all corn, sunflower and small grain recrop at the rate of 60 lbs. N, 30 lbs. P, and no K₂O. All wheat on fallow received 30 lbs. N, 30 lbs. P and no K₂O. Land to be fallowed was not fertilized. In 1985 and 1986 60 lbs. of N and 30 lbs. of P were applied to all corn, sunflower, and small grain recrop. Fallow land was treated with 30 lbs. of N and 30 lbs. of P.

In both 1983 and 1984 weed control was accomplished with: Alachlor at 2 lbs. per acre and Dicamba at 0.25 lbs. per acre in a tank mix on corn; Trifluralin at 0.5 lbs. per acre preplant incorporated on sunflower; and, Diclofop at 0.75 lbs. per acre and Bromoxynil at 0.25 lbs. per acre in a tank mix on small grain. In 1985 and 1986, wheat and barley were sprayed with a tank mix of Hoelon at 2 pints per acre plus Buctril at 1 pint per acre. Weeds in sunflowers were controlled with 0.5 lbs. per acre Trifluralin preplant incorporated.

Varieties used in the 1983 cropping systems trial were: Alex wheat, Morex barley, Keltgen 582 corn and Interstate 777S sunflower. In 1984 Alex wheat and Morex barley were used, along with Jacques JX21 corn and Interstate 7111 sunflower. Stoa wheat, Bowman barley, Jacques JX21 corn, and Interstate 7111 sunflower were seeded in 1985. Stoa wheat, Bowman barley, and Interstate 7111 sunflower were again used in 1986 along with Dahlgren DC408 corn.

Tillage on fallow to prepare a seedbed was with a spring tine cultivator and harrow. Continuous crop stubble, sunflower stubble, and corn stubble land were double disked in preparation for seeding, as was all wheat stubble planted to corn or sunflowers. Excellent yields recorded for all crops in all rotation systems were the result of a combination of high fertility, ample reserve soil water, adequate seasonal precipitation, reasonably good growing conditions and satisfactory cropping management in 1983. Because of considerable drier growing conditions in 1984, yields were reduced with small grains showing the most reduction on all treatments. May 1985 rainfall was well above average. Cool temperatures in June slowed development of row crops but promoted excellent growth of small grains.

The excellent yields for all crops in 1986 was the result of above average precipitation and satisfactory growing conditions during most of the growing season. One period of dry weather extending from May 25 through June 25 resulted in soil water stress under recrop.

High temperatures had a major effect on crops in 1987. From April through June the number of wheat growing degree days—the sum of daily degrees above 32—ranged from 500 to 700 more than normal across the state. This means that by July 1 the growing season for perennial plants and early-seeded crops was 14 to 17 days more advanced than usual. Above normal heat combined with a dry spell in April and May to reduce crop yield.

In 1988, tillage and seeding procedures, fertilizer application and weed control were the same as was used in previous years.

Severe drought prevailed throughout the growing season of 1988.

Total precipitation for the twelve month period, September, 1987 through August, 1988 was 8.63 inches as compared to the 94 year average of 15.89 inches.

Low rainfall throughout the entire growing season was coupled with temperatures that were far above average. The month of June was the most devastating in terms of adverse weather with average temperatures 14°F higher than the 94 year norm, and with precipitation 2 inches below average. Evaporation for June, July and August was 34.9 inches compared to the norm of 21.3 inches. High temperature, low precipitation and excessive wind combined to create the worst growing conditions experienced in this region for the past fifty years.

Data from the cropping systems trial for the years 1983 through 1988 are summarized in Table 42.

Table 42. Cropping Systems Trial 1983-1988

Crop and Rotation:	Yield							6 Yr. Avg.	% of Fallow
	1983	1984	1985	1986	1987	1988			
Wheat yields on:									
Fallow	47.1	34.5	36.7	57.8	20.7	9.4		34.4	100
Continuous re-crop	38.5	27.2	20.6	36.1	9.3	0.0		22.0	64
No-till continuous	39.0	20.4	14.8	22.9	4.8	0.0		17.0	49
Sunflower stubble	46.1	21.4	16.9	39.5	6.5	0.0		21.7	63
Corn stubble	47.2	32.2	29.6	45.4	16.6	0.0		28.5	83
Barley yields on:									
Sunflower stubble	64.8	36.3	31.5	43.6	26.8	0.0		33.7	
Corn yields on:									
Wheat stubble									
Grain (bushels/acre)	72.6	72.4	56.5	57.2	82.4	11.2		58.7	
Silage (ton/acre)	10.3	8.9	12.6	9.7	12.7	4.5		9.8	
Sunflower on:									
Wheat stubble (lbs./acre)	1784	1664	1224	2423	1182	0.0		1380	