

# Potential Strategies for Increasing Sunflower Productivity

## Objective

Evaluate sunflower performance among tillage systems, with emphasis on strip till, and with Headline (pryaclostrobin) fungicide.

## Materials and Methods

The field experiments were conducted on a Heimdahl loam soil with 6.7 to 6.9 pH and 2.9 to 3.2 percent organic matter at the NDSU Carrington Research Extension Center. Experimental design was a randomized complete block with three (fungicide) or four (tillage) replicates.

### Tillage

The trial was conducted on ground with wheat as the previous crop. Plot size was 10 by 30 ft. Conventional-till plots were tilled on September 29, 2005 and October 16, 2006 using a roto-tiller at a 2- to 4-inch depth. Strip-till treatments were applied using a Yetter strip-till unit with 30-inch row spacing at a 2- to 5-inch tillage depth that established a berm 10- to 12-inches wide (Figures 1, 2 and 3). The fall strip-till treatment was made on October 13, 2005 and October 16, 2006, and spring strip-till treatment on April 19, 2006 and April 23, 2007. Mycogen NuSun '8N429CL' oil sunflower was planted on May 15, 2006 and '8N386CL' was planted on May 21, 2007 with a John Deere Max-Emerge II row crop planter in 30-inch rows. Conventional-till plots were cultivated between crop rows on June 21, 2006 and June 22, 2007. The trial was harvested on October 16, 2006 and November 19, 2007.

### Fungicide

Mycogen '8N429CL' was planted in 30-inch rows on June 10, 2005 and May 31, 2006, and '8N386CL' was planted on May 21, 2007 in 30-inch rows. Headline treatments were applied to 10 by 30 ft plots with a CO<sub>2</sub> pressurized hand-held plot sprayer at 17 gal/A and 30 to 35 psi through TJ-60 or flat-fan 8002 nozzles. Harvest dates were October 26, 2005; October 16, 2006; and November 19, 2007.

## Results and Discussion

### Tillage

Days from planting to plant emergence and flowering were delayed one day with no-till compared to other tillage systems in 2006, but plant development time was similar among tillage treatments in 2007 (Tables 1 and 2). Sunflower stand, seed yield, test weight and seed oil were similar among tillage systems.

**Table 1. Sunflower performance with tillage systems, Carrington, 2006.**

Treatment	Plant emergence	Plant stand	R5.1		Seed yield	Test weight	Seed oil
	Jday	plt/A	Jday	Jday			
conventional till	146	10292	205	251	1160	24.2	38.3
no-till	147	10624	206	252	1338	24.1	39.0
strip till - fall	146	10624	205	249	1134	24.7	39.4
strip till - spring	146	12616	205	251	1379	24.6	39.5
mean	146	11039	205	251	1253	24.4	39.0
CV (%)	0.2	21.1	0.1	0.5	11.3	4.8	3.5
LSD (0.05)	1	NS	1	NS	NS	NS	NS

**Table 2. Sunflower performance with tillage systems, Carrington, 2007.**

Tillage treatment	Plant emergence	Plant stand	R5.1		Seed yield	Test weight	Seed oil
	Jday	plt/A	Jday	Jday			
conventional	156	16601	215	267	1040	30.3	39.8
no-till	155	20747	214	267	956	30.4	40.8
strip till - fall	156	17651	214	267	1086	30.0	40.0
strip till - spring	156	18261	214	267	942	29.9	39.8
mean	156	18315	214	267	1006	30.2	40.1
CV (%)	0.3	22.8	0.3	0.0	12.1	1.2	2.4
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS

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Figure 1. Yetter strip-till unit used in trial.



Figure 2. Tillage plots established in the fall: left= conventional till, center=no-till, and right=strip till.



Figure 3. Strip-till sunflower.

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## Results and Discussion (continued)

### Fungicide

In 2005, sunflower rust was absent from the trial when visually evaluated August 5 and 18, and September 2 (data not shown). Sunflower maturity tended to be delayed with Headline compared to the untreated check. Seed yield, test weight and oil content were similar among treatments (Table 3). In 2006, sunflower rust was not detected in trial until September 14, with severity at 0.1 percent across treatments (data not shown). Sunflower maturity tended to be delayed with Headline compared to the untreated check (Table 4). Seed yield and quality were similar among treatments. In 2007, sunflower rust was present on August 31 and September 25, but severity was very low at 0 to 0.1 percent across treatments (data not shown). Sunflower development, seed yield and oil were similar among treatments (Table 5). Test weight with the early Headline treatment was greater than the untreated check.

**Table 3. Sunflower response to Headline, Carrington, 2005.**

No.	Name	Treatment <sup>1</sup>		R9	Seed yield	Test weight	Seed oil
		Rate	Unit				
1	Headline	3	fl oz/a	273	1488	28.8	41.7
	NIS	0.25	%v/v				
2	Headline	6	fl oz/a	273	1413	29.2	42.1
	NIS	0.25	%v/v				
3	Headline	9	fl oz/a	273	1652	28.6	41.7
	NIS	0.25	%v/v				
4	Untreated check	x	x	272	1575	28.9	42.2
Mean				273	1532	28.9	42.0
CV (%)				0.4	9.9	1.0	1.7
LSD (P=.05)				NS	NS	NS	NS

<sup>1</sup>Treatments applied at R1 stage. NIS=Induce.

**Table 4. Sunflower response to Headline, Carrington, 2006.**

No.	Name	Treatment			First flower	R9	Seed yield	Test weight	Seed oil
		Rate	Unit	Stage					
1	Headline	3	fl oz/a	R2	217	259	1183	26.2	38.2
	NIS <sup>1</sup>	0.25	%v/v						
2	Headline	6	fl oz/a	R2	217	259	1320	25.9	38.3
	NIS	0.25	%v/v						
3	Headline	6	fl oz/a	R3	217	259	1361	25.6	37.4
	NIS	0.25	%v/v						
4	Untreated check	x	x	x	217	258	1353	26.2	38.1
Mean					217	259	1304	26.0	38.0
CV (%)					0.4	0.2	13.3	4.0	2.0
LSD (P=.05)					NS	NS	NS	NS	NS

<sup>1</sup>NIS=Induce.

**Table 5. Sunflower response to Headline, Carrington, 2007.**

No.	Name	Treatment			First flower	R9	Seed yield	Test weight	Seed oil
		Rate	Unit	Stage					
1	Headline	6	fl oz/a	V4	214	266	1023	28.7	40.8
	NIS <sup>1</sup>	0.25	%v/v						
2	Headline	6	fl oz/a	R2	215	266	972	28.2	40.0
	NIS	0.25	%v/v						
3	Headline	6	fl oz/a	R4	214	267	927	27.7	40.7
	NIS	0.25	%v/v						
4	Untreated check	x	x	x	214	266	882	28.1	41.2
Mean					214	266	951	28.2	40.7
CV (%)					0.1	0.2	20.6	0.9	2.4
LSD (P=.05)					NS	NS	NS	0.5	NS

<sup>1</sup>NIS=Induce.