2016 Sunflower Seeding Rate Trial

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Background

One limitation to sunflower production in Aroostook County Maine is its short growing season. Cool soil temperatures and spring rains can delay planting and increase the likelihood of harvesting in the typical rainy period of mid to late October.

Despite production challenges, some farms are growing sunflowers for niche markets and are looking for ways to increase yields by improving production practices. Lodging prior to harvest can be a major constraint in attaining satisfactory yields. In the 2015 growing season lodging due to stalk rot caused by *Sclerotinia sclerotium* (white mold) and the weight of water saturated heads was estimated at 35-40% in a growers' field.

Methods and Materials

A 7.6 acre trial was hosted by Corey Farms in Monticello, Maine in 2016 to determine if increasing planting density could be an effective method of reducing sunflower head diameter to decrease lodging and lead to higher yields. The experiment was a non-replicated strip trial using 3 target stand populations of 21,000, 25,000, and 28,000 plants per acre. The previous crop was potato. The soil type was comprised of Mapleton shaly silt loam, Conant silt loam, and Caribou gravelly loam. The seedbed was prepared with a field cultivator just prior to planting. The variety of sunflower was Mycogen 8N668S (Table 1) with a relative maturity of 73 days was planted on May 23, 2016 using a Great Plains 1300 drill at 12 inch row spacing. Ammonium nitrate (30-0-06) was applied at planting at a rate of 133 pounds per acre (40 pounds of nitrogen and 7.98 pounds of potash). Herbicide treatment was Spartan 4F (sulfentrazone) applied at a rate of 6 fluid ounces per acre pre-emergence on May 26, 2016 (Table 2).

Variety	Mycogen 8N668S
Relative Maturity	73 Days to Flowering
Phys. Maturity	100
Architecture	Short stature
Seed Size	#4
Seed Count	9375 Seeds per Pound (225,000 seeds/24 lb bag)
Germination %	90%
Seed Treatment	Maxim 4FS, Apron XL, Dynasty 100 FS, Cruiser 5 FS

Table 1. Varietal characteristics

Plant stand characteristics measured throughout the growing season were; date of emergence, flowering progression, physiological maturity, plant height, and head diameter. Lodging was estimated at harvest.

Sunflowers were harvested on October 12, 2016 with a John Deere 9650 rotary combine fitted with a flex head grain platform. Yield and moisture content were measured using the software and equipment present in the combine. Yields were taken from the center 100 feet (4 passes) of each strip. No statistical analysis was performed on the data collected from this project.

Planting Date	23-May-16			
Harvest Date	12-Oct-16			
Days in Field	143			
Fertility	133 lbs 30-0-06 at planting (40#N 8#K ₂ 0)			
Herbicide	Spartan 4F at 6 oz per acre on 26-May-16 - pre-emerge			
Row Spacing	12 inches			
Planting Equipment	Great Plains 1300 drill - pull type-double disk openers-press wheel			

Table 2. Sunflower production information

Results

The 2016 growing season provided favorable growing conditions for sunflowers in Monticello, Maine. Table 3 shows average and 2016 temperatures and precipitation. Temperatures throughout the season were slightly warmer than normal. Rainfall totals were slightly less than average with the exception of August which received 2.52 inches over the 30 year average. September and October received 2.41 and 1.22 inches less than normal respectively.

Monticello, ME	May	June	July	August	Sept	Oct
Average Temperature (°F)	53.1	59.9	66.6	65.2	57.4	46.3
Departure from Normal	2	-0.3	0.9	1.4	2.3	2.9
Rainfall (In)	2.66	2.66	3.62	6.2	0.99	2.44
Departure from Normal	-0.64	-0.99	-0.04	2.52	-2.41	-1.22

Table 3. Weather Data, Houlton, ME, 2016.

2016 and Historical averages (1981-2010) NOAA from Houlton, ME.

Actual plant populations and seeding rates after calibration differed slightly from the target and were 28,336 (3.73 lbs/acre), 25,829 (3.4 lbs/acre), and 20,663 (2.72 lbs/acre). Seeds were drilled in 12 inch rows at a depth of 1.5 inches on May 23. Soil temperature was approximately 50°F. Seedbed was prepared just prior to planting. Soil surface was dry with adequate moisture at seeding depth. A pre emergence application of Spartan 4F (sulfentrazone) was made on May 26. Emergence for all treatments was May 31.

Terminal buds were visible (R1 stage) in all treatments on July 20 (54 DAP). Plant heights averaged 21.4 inches in the 28,000 treatment, 20.7 inches in the 25,000 treatment, and 19.6 inches in the 21,000 treatment. Plants from all treatments had an average of 16 leaves.

Flowering began on August 5 (73 DAP). On August 8, 20% of flowers were visible, 85% on August 13, and 100% on August 19.

Plant heights and head diameters were measured on September 26. All treatments were at R8 growth stage (back of head yellow but bracts are green). Height and head diameter measurements were taken from 15 plants from each treatment and averaged. Table 4 shows the comparisons between treatments.

Treatment	Ave. Height (in)	Ave. Head Dia (in)		
28,000	45	6.9		
25,000	53	8.8		
21,000	57	9.3		

Table 4. Average plant height and headdiameter at R8

Sunflowers were harvested on October 12. Combine settings were adjusted while harvesting field edges and borders. Adjustments were made to reduce dockage entering the grain tank as well as reduce hulling of seeds. Satisfactory results were obtained by using the settings in Table 5.

Cylinder RPM	Fan RPM	Upper Sieve (cm)	Lower Sieve (cm)	Concave (cm)
250	715	12	7	42

Table 5. Internal combine settings

Harvest moisture was similar for all treatments and ranged from 20.6% to 22.3%. Yields at harvest moisture were 52 bushels/acre in the 28,000 treatment, 55 bushels/acre in the 25,000 treatment, and 49 bushels/acre in the 21,000 treatment. Bushel weight for oilseed sunflower is 25 pounds (USDA/GIPSA) and safe storage moisture is 9%. Harvest yields and yields corrected to 9% moisture are include as Table 6.

Treatment	Harvest MC%	Yield @ Harvest Moisture	Yield @ 9% MC	Yield @ 9% (bu/a)
28,000	20.6	1300	1134.3	45.4
25,000	22.3	1375	1174.0	47.0
21,000	20.6	1225	1068.8	42.8

Table 6. Sunflower yields at harvest and corrected to 9% moisture

Lodging was not severe in any of the treatments regardless of plant population or head diameter. The wet weather in August during flowering was conducive for white mold infection. While the disease was present, damage was spotty throughout the field and did not cause significant losses. September and October were dry, receiving only 3.43 inches of rain, 3.63 inches *below* average. Sunflower heads, regardless of diameter, were not saturated with water and did not lodge to any great extent.

Discussion

Yield of sunflowers in 2016 were an improvement from past years. The dry growing season, selection of a short statured hybrid, and low incidence of lodging were helpful in attaining higher yields. There is likely more yield potential of sunflowers in Maine. Learning from observations noted throughout the 2016 growing season may be helpful in improving yield and financial return.

- Seed placement was erratic. Target plant populations were achieved however the distance between seeds in row was not consistent. The shape of the seed and metering mechanism of the drill caused the seed to bridge resulting in long gaps between seeds alternating with dropping several seeds at once (Appendix A, pictures 1 and 2).
- Sunflowers are sensitive to seed placed fertilizer. Recommended practices are to broadcast or band fertilizer so that is does not directly contact the seed. Banding with a grain drill is not possible without modification. Broadcasting will require and additional field pass and could lead to higher weed densities due to the distribution of fertilizer but would reduce seedling damage due to fertilizer burn (Appendix A, pictures 3 and 4).
- Thorough herbicide coverage is essential early in the season. Sunflower canopies are slow to develop and are not competitive with weeds (Appendix A, pictures 5 and 6).



Appendix A







Photo 3

Photo 4



Photo 5

Photo 6

