

THE SUNFLOWER: POTENTIAL CROP FOR IDLE LAND ^{1/}

By

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A large amount of land in Mississippi and the Southeast lies idle all or part of the year, producing nothing more than brush, sedgegrass, and briars. Much of this land is relatively infertile and tends to be droughty during the summer. If brought into stable crop production, the owners would need a short-seasoned crop that requires relatively low inputs of fertility, management, labor, and capital. Ideally, this crop should be able to withstand soil water shortages, insect and disease problems, and be adaptable to combining.

Sunflower (Helianthus annuus) (Figure 1) appears to meet some of these requirements. Sunflower grows rapidly, giving quick protection from erosion, and matures about three months after planting. They seldom require more than one cultivation. Furthermore, the sunflower's fertility requirements are moderate and it is notably drought resistant (Figure 2). Sunflowers are grown primarily for oils which are used in industrial and edible products. There are secondary uses as silage and confection. Most commercial scratch feeds for poultry and tame and wild birds contain about one percent of sunflower seed. We currently grow about 200,000 acres of sunflowers in the United States.

One disadvantage of the sunflower is its tendency to lodge after rainstorms because of its heavy seed-head, which droops over as the crop matures (Figure 3). Insects such as the sunflower head moth (Homoeosoma electellum Hulst) can cause great losses unless adequate control is applied at the proper time. Birds can also severely damage the crop. This damage can be lessened by selecting open fields away from woods and water and by early harvesting.

The purpose of this study was to evaluate the effect of row spacing and foliar sprays of the plant growth regulator, 2,3,5-triiodobenzoic acid

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(TIBA) on lodging of four high-oil types of sunflowers. We previously found that these practices significantly reduced plant height and lodging of soybeans.

Materials and Methods

During the summer of 1969, two experiments were conducted on Blackbelt soils near State College, Miss. Information on seed and dry matter yields, seed weight, stem diameter, and lodging was obtained from these experiments.

Experiment 1 - Row Spacing:

Two high-oil sunflower varieties, Peredovik and Armavirec, were planted in Marietta sandy loam in 12-, 24-, and 36-inch rows on May 15. Plants were thinned to a population of 35,000 per acre. Fertilizer and weed control practices consisted of 100-60-60 pounds of N-P₂O₅-K₂O and 1 pint per acre of Treflan^{4/} applied broadcast and disked in prior to planting. Seed were harvested on August 11, 95 days after planting.

Experiment 2 - Use of TIBA Plant Growth Regulator.

Pereodvik, NK HO 1, and VNIIMK varieties were planted in 30-inch rows in Catalpa clay loam of pH 6.5 on May 26. Fertilizer and herbicide treatments consisted of 100-100-150 pounds of N-P₂O₅-K₂O and 1 pint of Treflan per acre applied broadcast and disked in prior to planting. Plants were thinned to 30,000 per acre. TIBA was applied as a foliar spray using a 3-gallon hand sprayer. The spray solution was applied at the rate of 0.9 ounce of active TIBA in 50 gallons of water per acre. One-fifth of the active ingredient was applied on June 26 and four-fifths on July 1. A surfactant specifically prepared for use with TIBA was used in the solution. The herbicide gave excellent weed control so cultivation was not necessary.

Results and Discussion

All four varieties produced good yields of seed even though the crop received only 6 inches of rainfall between planting and harvesting (Tables 1, 2, and 3). The rainfall was evenly distributed in light showers except for one 2.4-inch rain during the fruiting period. Row spacing treatments caused no significant differences in seed yield (Table 2), but head size increased with each increase in row width (Figure 4). Even though yields were the same from all row spacings, planting in wider rows (36 to 40 inches) is probably more desirable because the stem diameter is larger and the plants are less prone to lodging. Seed were larger in wider row plantings, but differences in seed size between the two varieties were not significant.

Foliar applications of TIBA had no measurable or visible effects on the growth or dry matter of sunflowers (Table 3). The variety VNIIMK produced the highest seed yield, 2110 pounds per acre, which may be a reflection of the reduced lodging noted in this variety. Dry matter yields (exclusive of seed) averaged about 1.2 tons per acre. Sunflower seed accounted for about 40 percent of the weight of the aboveground portions of the plants. There was no damage from insects or diseases.

^{4/} Trade names are included for the benefit of the reader and do not infer any endorsement or preferential treatment of the product listed.

Conclusions

Sunflowers are a potential crop for some of the idle land in Mississippi. Experiments conducted near State College, Miss. during 1969 suggest that the high-oil varieties tested will produce good yields of seed with limited rainfall. Row spacings of 24 to 36 inches are more desirable than narrow rows. Foliar applications of the growth regulator TIBA, did not produce visible effects on the growth of sunflowers.

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Table 1 - Rainfall at site of sunflower experiment, Agronomy South Farm, State College, Mississippi, 1969.

<u>Date</u>	<u>Rainfall</u> (inches)
Experiment 1 planted May 15	
Experiment 2 planted May 26	
June 2	0.4
10	.2
19	.8
21	.4
July 8	.2
11	.3
18	.3
21	.4
22	2.4
23	.4
26	.1
27	.1
Aug. 10	.05
17 (crop mature)	—
Total	6.0

Table 2 - Influence of row spacing on yield, weight of seed, and stem diameter of two varieties of sunflower.

<u>Sunflower</u> <u>Variety</u>	<u>Row spacing, inches</u>			<u>Average</u>
	12	24	36	
	<u>Yield of seed^{1/}, lbs./A.</u>			
Peredovik	2378	1969	2170	2225 a ^{2/}
Armavirec	<u>1527</u>	<u>1822</u>	<u>1630</u>	1660 b
Average	1953 a	1895 a	1900 a	
	<u>Ounces of seed/head</u>			
Peredovik	.78	1.07	1.29	1.04 a
Armavirec	<u>.72</u>	<u>1.02</u>	<u>1.12</u>	.95 a
Average	.75 c	1.04 b	1.20 a	
	<u>Wt. in ounces of 1000 seed</u>			
Peredovik	2.0	2.3	2.4	2.2 a
Armavirec	<u>2.2</u>	<u>2.5</u>	<u>2.6</u>	2.4 a
Average	2.1 b	2.4 ab	2.5 a	
	<u>Stem diameter, inches</u>			
Peredovik	.7	.9	1.1	.9 a
Armavirec	<u>.7</u>	<u>1.0</u>	<u>1.1</u>	.9 a
Average	.7 b	.9 ab	1.1 a	

^{1/} Expressed as containing 10% moisture.

^{2/} Means followed by a different letter are significantly different at the .05 probability level.

Table 3 - Influence of a foliar spray of TIBA on seed yield, stover yield, height, and lodging at harvest of three varieties of sunflowers.

<u>Sunflower Variety</u>	<u>TIBA treatment, ounces/A</u>		<u>Average</u>
	0	0.9 oz.	
<u>Yield ^{1/} of seed, lbs./A</u>			
NK HO 1	2066	1945	2006 a ^{2/}
Peredovik	2023	1906	1964 a
VNIIMK	<u>2120</u>	<u>2100</u>	2110 a
Average	2070 a	1984 a	
<u>Yield ^{3/} of leaves + stalks, lbs./A</u>			
NK HO 1	2442	2605	2524 a
Peredovik	2354	2255	2304 a
VNIIMK	<u>2333</u>	<u>2323</u>	2328
Average	2376 a	2394 a	
<u>Plant height, inches</u>			
NK HO 1	55	54	54 a
Peredovik	57	56	56 a
VNIIMK	<u>57</u>	<u>55</u>	56 a
Average	56 a	55 a	
<u>% Plants Lodged</u>			
NK HO 1	38	37	37 b
Peredovik	31	32	32 ab
VNIIMK	<u>31</u>	<u>29</u>	30 a
Average	34 a	33 a	

^{1/} Expressed as containing 10% moisture.

^{2/} Means followed by a different letter are significantly different at the .05 probability level.

^{3/} Oven-dry basis.

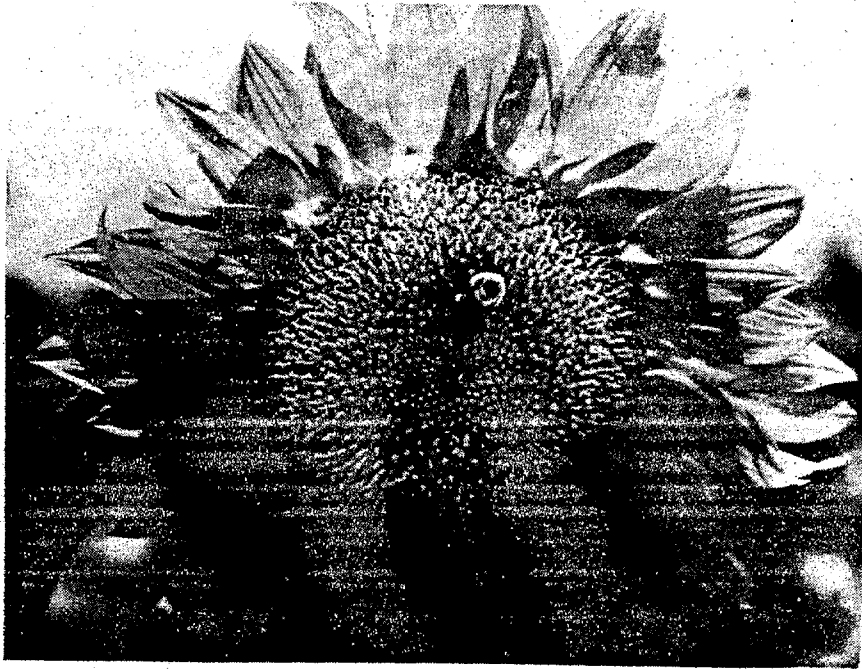


Figure 1 - Russian-bred sunflowers high in oil content are grown from Texas throughout the Southeast. Note bee is attracted by sunflower.



Figure 2 - Soil moisture was extremely low at this date when plants were 20 inches tall. Note the crack in the Blackbelt soil midway between and parallel to rows 30 inches apart.



Figure 3 - This picture was taken looking down the row. Lodging is so severe that rows are not discernible. Heads droop to the east.

ROW SPACING IN

12 24 36

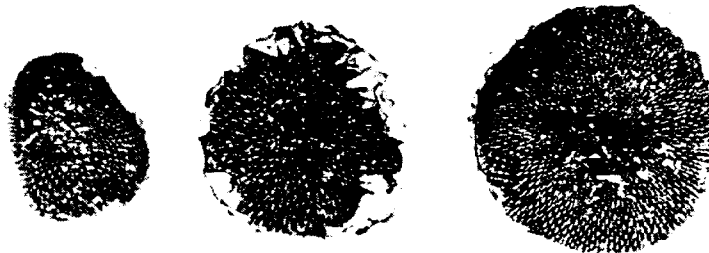


Figure 4 - Head size ranged from 4 to 10 inches as row width was increased from 12 to 36 inches.