Prof. Swallers inspects some large-seeded sunflowers.

Performance of Large-Seeded Sunflowers at Three Plant Spacings

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Acreage of large-seeded sunflowers grown in North Dakota and Minnesota has increased five-fold since 1966. Of about 200,000 acres grown in 1972, it was estimated that one-third of the production was sold for bird feed. The remainder was used in the confectionery market as dehulled nutmeats or salted-in-the-shell seed (personal communication, D. W. Cobia, Department of Agricultural Economics, North Dakota State University).

Because of the importance of obtaining high-quality seed, particularly for the confectionery market, industry often sets minimum standards in contracts with growers for characters such as seed size and test weight. Failure to meet these standards may result in price discounts or refusal on the part of the contractor to accept the crop. Crop management practices, including planting rate and resultant plant spacing within the row, are important factors in influencing seed size and test weight. Wide plant spacings are known to produce larger seeds, but many growers believe that by increasing plant spacing they sacrifice yield and test weight. In this study we report on the relative performance of large-seeded sunflowers grown at three plant spacings at Fargo, North Dakota, in 1971 and 1972.

Methods

Two sunflower varieties, Mingren and Commander, were planted in replicated field plots in rows spaced 36 inches apart. The plants within the row were thinned to spacings of 6, 12, and 18 inches between plants, which represented populations of about 29,000, 14,500, and 9,700 plants per acre, respectively. The land had been cropped the previous year to spring wheat. No fertilizer was applied since soil fertility was considered relatively high. Weeds were controlled by Trifluralin and cultivation. Soil moisture was considered adequate in both years.

Results and Discussion

The effects of the different plant spacings on the performance of the two varieties were similar

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Table 1. Agronomic data for two large-seeded sunflower varieties from plants spaced 6, 12 and 18 inches apart in 36-inch rows at Fargo in 1971 and 1972.

Plant spacing, inches	Variety	50% flower, days	Height, inches	% lodging	Seed yield, lb/a	Test weight, lb/bu	Seed size, % over 20/64
6	Mingren	69	66	73	1546	21.2	50.2
	Commander	71	67	73	1686	22.6	30.1
	Avg.	70	67	73	1616	21.9	40.2
12	Mingren	68	62	60	1598	20.3	77.7
	Commander	68	63	52	1471	22.7	42.6
	Avg.	68	63	56	1535	21.5	60.1
18	Mingren	67	61	47	1700	20.1	87.4
	Commander	67	62	43	1692	21.5	69.9
	Avg.	67	61	45	1696	20.8	78.6

for 1971 and 1972. These effects, averaged over the two years, are shown in Table 1. Seed yields at the three spacings were not significantly different. However, as plant spacing decreased from 18 to 6 inches between plants, flowering was delayed by three days, plant height increased by 6 inches, and per cent lodging increased by 28 percentage points. Test weight of the seed was about one pound per bushel greater, but seed size dropped from nearly 80 per cent to 40 per cent over a 20/64 screen. Corresponding measurements at the 12-inch spacing were intermediate to those obtained from 6- and 18-inch spacings.

For the grower who is paid premium prices for a high percentage of large seeds, the wide spacing appears most desirable. Seed yields were comparable to those at narrower spacings, and in addition to the advantage of larger seeds, the plants were shorter and lodged less.

On the other hand, if the grower has a contract without a size consideration, but his crop is subject to dockage for low test weight, then narrower spacings appear more desirable. Narrower spacings also produce plants with smaller heads (5.5, 6.2 and 7.1 inches for 6-, 12- and 18-inch spacings in 1972, respectively), which presumably dry faster and are ready for combining before those in wide spacings. In view of increased lodging, small seed size and lack of increased yields at the 6-inch spacing, an intermediate plant spacing (about 15-18,000 plants per acre) would seem appropriate for most conditions.

The nonsignificant yield differences obtained from the three plant spacings agree with results obtained for Mingren grown at populations of 10,000-40,000 plants per acre at Crookston, Minnesota, in 1968-1969 (1). They do not agree with results for bird feed and confectionery varieties grown at several locations in Minnesota (3) and in Canada (2), which showed a yield advantage of 6-inch over wider plant spacings. This suggests that moisture, temperature, fertility levels, and other variable environmental factors influence sunflower seed yields, and that optimum plant spacings will differ for various years and locations.

The two varieties, Mingren and Commander, were similar in flowering, height, lodging and seed yield at all spacings. Seed of Mingren was larger, but of a lower test weight, than that of Commander. Based on these results, Mingren appears a better choice for the grower desiring a high percentage of large seeds, whereas Commander would be more suited where a high test weight is desirable.

Summary

Plant spacings of 6, 12 or 18 inches between plants within 36-inch rows had no significant effect on the yield of large-seeded sunflower varieties Mingren and Commander grown at Fargo in 1971 and 1972. As plant spacing decreased (plant population increased), flowering was delayed, plants were taller and more lodged, heads were smaller, and seeds were smaller and had higher test weight.

References

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