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Missouri Crop Performance

NON-CIRCULATING
1980



Sunflowers

UNIVERSITY OF
MISSOURI

JAN 19 '81

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MISSOURI CROP PERFORMANCE

1980

SUNFLOWER

Sunflower, a native of North America, has only recently become an important crop in the United States. In 1975, planted area in the U.S.A. first exceeded one million acres. Approximately 18,000 acres were planted in Missouri in 1979. Hybrid selection and management practices were based largely on information developed in other states. Sunflower was included in the University of Missouri performance testing program in 1980 to provide an improved basis for selection of hybrids and evaluation of yield potential. The work was supported in part by funds from the Missouri Seed Improvement Association and fees from companies submitting hybrids for evaluation. This first report of results is a contribution of the Department of Agronomy, University of Missouri Agricultural Experiment Station, which reports on Research Project 363.

The large number and diversity of origin of hybrids available makes selection of a superior one difficult. To select intelligently, a reliable, unbiased, up-to-date source of information which will permit valid comparisons among available hybrids is needed. The objective of the University of Missouri's performance testing program is to provide this information. The tests are conducted under as uniform conditions as possible and small plots are used to reduce the chance of soil and climatic variations occurring between one hybrid plot and another. Results obtained should aid the individual grower to judge the relative merits of many of the commercial sunflower hybrids available in Missouri today.

COMPARING HYBRIDS

The most productive sunflower cultivars available today are hybrids. In addition to high yield, advantages of hybrids over the open-pollinated varieties include greater uniformity and improved disease resistance.

The performance of a hybrid cannot be measured with absolute precision. Uncontrollable variability is involved in the determination of each yield average. This variability is often the result of soil disuniformity, but many other conditions may contribute to it. Because variability exists in all field experimentation, statistics are used as a tool to assist with making decisions. The statistical tool used in the analysis of trials reported here is the test of least significant difference (L.S.D.). The L.S.D. is quite simple to apply; when two entries are compared and the difference between them is greater than the L.S.D., the entries are judged to be significantly different. Differences smaller than L.S.D. may have occurred by chance and are judged to be nonsignificant.

Hybrid performance may seem inconsistent from location to location and from year to year because of differences in rainfall, temperature, soil fertility, diseases, insects, and other factors. To obtain an improved estimate of relative hybrid performance, results from more than one location should be considered. In this publication, an effort has been made to facilitate comparisons across locations.

Although yield usually receives first consideration, other agronomic characteristics may be equally important when selecting a sunflower hybrid. From a management standpoint, standability, resistance to pests, and maturity are among those hybrid characteristics which deserve careful consideration.

The Missouri Agricultural Experiment Station does not make specific recommendations for hybrids. It is suggested that the farmers growing a new hybrid for the first time consider the information contained in this report and then grow a small acreage to determine adaptability. This should be the practice for all new hybrids regardless of origin.

EXPERIMENTAL PROCEDURES

Sunflower performance trials were planted at four locations in 1980. They were the Greenley Memorial Center near Novelty in Knox County, the Agronomy Research Center near Columbia in Boone County, the Weldon Spring Extension Center near Weldon Spring in St. Charles County, and the Delta Center near Portageville in Pemiscot County. These locations are shown in Figure 1.

Entries. All producers of hybrid seed were eligible to enter hybrids in the 1980 evaluation plots. Participation was voluntary and no control was exercised by the program over which, or how many, hybrids were entered. However, to help finance the evaluation program, a fee of forty dollars per location was charged for each entry entered by the seed producer. A total of 27 sunflower hybrids were entered in the 1980 evaluation program.

Field Plot Design. All tests were arranged in randomized complete block designs with four replications. Plots were four rows wide and 24 feet long at all locations. The center two rows were harvested for yield.

Cultural Practices. The tests were planted and harvested with commercial equipment modified for small plot work. All hybrids were planted at the rate of 32 seeds per 25 feet in 30-inch rows. This gave a planted population of 22,300 seeds per acre. Fertilizer applied corresponded to that which would have been recommended for corn planted on the same land. Treflan was used for weed control. Additional cultivation and hand weeding was done as required. When needed, insecticide was applied, primarily to control sunflower moths. Planting and harvest dates are given in the heading of the data table presented for each location.

Data Recorded. Bloom date was recorded when 50% of the plants in a plot had open heads. The other agronomic characteristics were evaluated at harvest. Population was determined by counting all plants in the two harvest rows of each plot. Those plants inclined more than 30 degrees from vertical were counted as lodged. Yield was measured in number of pounds per acre at a moisture content of 13 percent. An electronic moisture tester was used for all moisture readings.

RESULTS

Eleven companies entered a total of 27 sunflower hybrids in the 1980 test. Names and addresses for the companies and the names of their entries are given in Table 6.

Test results varied markedly from location to location. Lowest average yields were recorded at Columbia (382 pounds/acre), followed by Novelty (723 pounds/acre), Portageville (1572 pounds/acre) and Weldon Spring (1866 pounds/acre). The major factors contributing to differences between locations included differences in amount and distribution of rainfall (see the following chart), soils, and pressure from pests, particularly the sunflower moth and birds.

Yield of individual hybrids ranged from 407 to 1133 pounds per acre at Novelty (Table 1), 254 to 602 pounds per acre at Columbia (Table 2), 1198 to 2267 pounds per acre at Weldon Spring (Table 3), and 1254 to 2272 pounds per acre at Portageville (Table 4). In each trial, the hybrids which did not differ statistically from the highest yielder at that location are denoted by an asterisk for easy identification. Increased confidence can be placed in results from more than one location since they represent results

from a larger sample of conditions. An estimate of potential performance across a series of environments can be obtained from Table 5, which summarizes 1980 results from all test locations.

Rainfall and Temperature

Location	Month	Rainfall			Temperature		
		in.	depart.	rainy days	°F	depart.	days 90°, or above
Novelty	May	1.5	-2.6	9	63.0	-0.1	0
	June	4.3	-0.7	3	70.8	-0.8	4
	July	3.1	-1.1	8	81.1	+5.1	23
	August	8.5	+4.9	14	77.1	+2.7	13
Columbia	May	3.4	-1.3	12	64.3	-0.1	0
	June	0.4	-4.2	1	75.2	+2.2	11
	July	1.4	-2.5	4	87.0	+9.6	28
	August	3.0	-0.2	4	81.7	+5.7	27
Weldon ^{1/} Spring	May	2.3	-1.9	8	63.8	-2.4	2
	June	1.8	-2.2	5	73.2	-1.8	9
	July	4.2	+0.1	5	81.6	+2.8	22
	August	2.2	-0.6	8	80.0	+2.7	22
Portage- ville	May	2.9	--	8	67.6	--	0
	June	1.9	--	8	77.3	--	17
	July	2.6	--	3	85.2	--	24
	August	1.4	--	5	82.2	--	26

^{1/}Records given for Weldon Spring are from St. Charles.

Plant population for sunflower should be between 15,000 and 25,000 plants per acre. Because sunflower is planted at a relatively low plant population, it is essential that seed with a high percentage of germination be used. Other factors being equal, preference should be given to hybrids which produce consistently high plant populations.

In the 1980 tests, populations were within the target range at Novelty and Columbia (no stand counts were made at Weldon Spring). The probable reason for low stands at Portageville is that the soil was dry at the time of planting. Due to the unusually dry conditions during the 1980 season, high populations of sunflower may have had an adverse affect on yield.

Date of 50 percent bloom was similar for all hybrids tested, suggesting that little differences for maturity exists under Missouri conditions. However, substantial differences in moisture content at harvest were found and these may reflect maturity differences not identified by recording flowering dates.

Sunflower is a new crop in Missouri. These tests demonstrate a yield potential in excess of 2200 pounds per acre. The crop can be established earlier than corn because of its ability to germinate at a lower soil temperature. On the other hand, it is sufficiently short-season to be grown as a double crop after wheat. Stand establishment appears to be erratic under dry soil conditions and pests will require careful watching. Continued testing should provide a basis for making decisions relative to the place of sunflower on Missouri farms.



FIG. 1. TEST SITE LOCATIONS

TABLE 1. PERFORMANCE OF SUNFLOWER HYBRIDS EVALUATED NEAR NOVELTY ON THE GREENLEY MEMORIAL CENTER IN 1980.

PLANTED: 15 MAY 1980. HARVESTED; 11 SEPTEMBER 1980.

BRAND-HYBRID	POPU- LATION (PL/A)	50% BLOOM DATE	LOD- GING (%)	MOIS- TURE (%)	YIELD (LB / ACRE)
RANCHER BRAND 994	15246	7-17	24.9	12.6	1133**
DAHLGREN DO-843	15682	7-14	6.4	14.3	952*
IMPERIAL S-322	17424	7-15	19.8	12.9	944*
DAHLGREN DO-704	15333	7-15	36.4	10.3	938*
M-F-A SUN-GRO 380A	12545	7-17	12.6	13.7	868*
SIGCO 454	15420	7-16	26.2	15.7	841*
PACIFIC OILSEEDS S-304	15769	7-15	24.6	9.7	823*
SIGCO 894A	15856	7-14	40.3	10.0	820*
INTERSTATE SEED IS 7116	11935	7-15	18.3	12.2	812
PACIFIC OILSEEDS S-335	16030	7-17	14.5	11.1	805
IMPERIAL 672	14113	7-16	26.5	10.0	746
INTERSTATE SEED IS 897	15333	7-15	32.6	9.7	734
RBA 300G	12981	7-15	23.0	10.9	713
PACIFIC OILSEEDS S-311	17163	7-15	17.5	11.8	705
RBA 303	13852	7-14	29.9	10.8	695
IMPERIAL 891	14549	7-17	9.2	14.7	678
GOLDEN HARVEST GH 30	20125	7-15	15.2	15.0	665
PACIFIC OILSEEDS S-301A	16466	7-16	22.2	12.4	664
DAHLGREN DO-844	14113	7-13	25.1	14.6	645
MASTER FARMER 303	13329	7-14	28.5	11.5	639
SUNBRED BRAND 212	13939	7-14	18.2	16.3	637
PACIFIC OILSEEDS S-338	14462	7-16	10.4	12.4	595
INTERSTATE SEED IS 7115	15246	7-14	19.3	10.1	578
INTERSTATE SEED IS 7775	15769	7-15	17.4	11.2	536
MASTER FARMER 707	15682	7-14	10.8	11.4	481
M-F-A SUN-GRO 372A	17947	7-16	20.9	10.3	469
SUNBRED BRAND 265	18469	7-13	29.4	11.1	407
MEAN	15362	7-15	21.5	12.1	723
LSD .05					315

** HIGHEST YIELDING HYBRID IN THE TEST.

* HYBRID WHICH DID NOT YIELD SIGNIFICANTLY LESS THAN THE HIGHEST YIELDING HYBRID IN THE TEST.

TABLE 2. PERFORMANCE OF SUNFLOWER HYBRIDS EVALUATED NEAR COLUMBIA ON THE
 AGRONOMY RESEARCH CENTER IN 1980.
 PLANTED: 20 MAY 1980. HARVESTED: 11 SEPTEMBER 1980.

BRAND-HYBRID	POPU- LATION (PL/A)	50% BLOOM DATE	LOD- GING (%)	MOIS- TURE (%)	YIELD (LB / ACRE)
SUNBRED BRAND 212	23277	7-13	2.9	19.6	602**
INTERSTATE SEED IS 7116	17696	7-16	0.8	19.0	506*
PACIFIC OILSEEDS S-301A	21916	7-16	1.4	22.3	502*
INTERSTATE SEED IS 7775	22325	7-15	1.9	20.8	465*
RANCHER BRAND 994	19053	7-15	3.1	19.9	449*
GOLDEN HARVEST GH 30	23277	7-15	0.7	21.1	423*
M-F-A SUN-GRO 380A	22188	7-17	0.6	24.5	422*
RDA 300G	23686	7-12	5.1	19.0	420*
PACIFIC OILSEEDS S-338	17696	7-12	0.0	19.7	414*
SUNBRED BRAND 265	22052	7-13	1.8	20.1	412*
INTERSTATE SEED IS 7115	22369	7-11	0.7	24.6	400
IMPERIAL 891	17969	7-15	5.0	21.8	393
MASTER FARMER 303	19466	7-14	2.7	19.0	389
DAHLGREN DO-704	22188	7-12	5.8	20.7	384
IMPERIAL 672	22052	7-14	0.7	21.0	379
SIGCO 454	20963	7-14	2.0	21.9	363
PACIFIC OILSEEDS S-311	21236	7-15	1.2	19.7	363
IMPERIAL S-322	23005	7-16	1.7	24.6	336
MASTER FARMER 707	22461	7-12	7.1	20.9	320
DAHLGREN DO-843	20555	7-12	4.6	21.4	319
PACIFIC OILSEEDS S-304	23686	7-13	3.6	20.2	315
INTERSTATE SEED IS 897	21508	7-15	1.1	21.1	304
PACIFIC OILSEEDS S-335	20827	7-19	0.0	27.4	303
DAHLGREN DO-844	19330	7-12	5.2	20.8	297
RBA 303	18921	7-14	0.7	21.2	294
M-F-A SUN-GRO 372A	23005	7-17	0.0	22.0	292
SIGCO 894A	21508	7-15	1.3	24.3	254
MEAN	21286	7-14	2.3	21.4	382
LSD .05					195

** HIGHEST YIELDING HYBRID IN THE TEST.

* HYBRID WHICH DID NOT YIELD SIGNIFICANTLY LESS THAN THE HIGHEST
 YIELDING HYBRID IN THE TEST.

TABLE 3. PERFORMANCE OF SUNFLOWER HYBRIDS EVALUATED NEAR WELDON SPRING
ON THE WELDON SPRING EXTENTION CENTER IN 1980.
PLANTED: 18 JUNE 1980. HARVESTED: 6 OCTOBER 1980.

BRAND-HYBRID	50% MATURITY DATE	LOD- GING (%)	MOIS- TURE (%)	YIELD (LB/ ACRE)
DAHLGREN DO-844	9-29	59.8	8.6	2267**
DAHLGREN DO-843	9-29	52.3	8.7	2248*
DAHLGREN DO-704	9-22	45.8	8.7	2149*
INTERSTATE SEED IS 7115	9-29	46.5	8.9	2119*
INTERSTATE SEED IS 7116	9-29	38.3	8.9	2109*
M-F-A SUN-GRO 380A	9-22	9.8	9.3	2040*
RBA 300G	9-29	51.3	8.5	1990*
INTERSTATE SEED IS 7775	9-29	29.8	8.7	1971*
GOLDEN HARVEST GH 30	9-29	29.0	9.0	1970*
SUNBRED BRAND 212	10-06	52.5	9.1	1951*
MASTER FARMER 303	9-22	36.5	8.6	1911*
IMPERIAL S-322	9-22	35.8	9.0	1871*
RBA 303	9-29	61.0	8.6	1862*
SIGCO 454	9-29	41.3	8.7	1852*
SUNBRED BRAND 265	9-29	58.0	8.6	1851*
IMPERIAL 891	9-29	36.0	9.1	1842*
PACIFIC OILSEEDS S-304	9-29	38.0	8.4	1812*
INTERSTATE SEED IS 897	9-29	46.3	8.7	1733
MASTER FARMER 707	9-22	53.5	8.5	1733
SIGCO 894A	9-29	51.5	8.7	1683
IMPERIAL 672	9-29	57.5	8.8	1634
M-F-A SUN-GRO 372A	9-22	22.8	8.8	1595
PACIFIC OILSEEDS S-311	9-29	72.3	9.1	1545
RANCHER BRAND 994	9-22	69.0	8.4	1198
MEAN	9-27	45.6	8.8	1872
LSD .05				527

** HIGHEST YIELDING HYBRID IN THE TEST.

* HYBRID WHICH DID NOT YIELD SIGNIFICANTLY LESS THAN THE HIGHEST
YIELDING HYBRID IN THE TEST.

TABLE 4. PERFORMANCE OF SUNFLOWER HYBRIDS EVALUATED NEAR PORTAGEVILLE
ON THE DELTA RESEARCH CENTER IN 1980.
PLANTED: 3 JUNE 1980. HARVESTED: 3 SEPTEMBER 1980.

BRAND-HYBRID	POPU- LATION (PL/A)	50% BLOOM DATE	LOD- GING (%)	MOIS- TURE (%)	YIELD (LB / ACRE)
PACIFIC OILSEEDS S-338	9359	7-24	1.4	16.9	2272**
SUNBRED BRAND 265	9909	7-23	1.4	18.8	2012*
DAHLGREN DO-843	9978	7-23	5.5	14.7	1887*
MASTER FARMER 707	11905	7-24	1.6	12.8	1845*
M-F-A SUN-GRO 380A	9015	7-28	0.0	14.1	1830
SUNBRED BRAND 212	9496	7-25	2.8	17.7	1817
IMPERIAL S-322	10598	7-25	2.2	13.5	1768
DAHLGREN DO-844	9290	7-24	5.9	17.2	1719
GOLDEN HARVEST GH 30	8464	7-27	2.5	15.2	1633
PACIFIC OILSEEDS S-301A	9496	7-26	1.8	14.8	1609
PACIFIC OILSEEDS S-335	9084	7-28	1.4	15.6	1564
INTERSTATE SEED IS 7115	10391	7-24	3.7	14.4	1517
PACIFIC OILSEEDS S-311	9152	7-25	3.9	14.0	1510
RBA 303	9496	7-24	1.6	13.4	1491
INTERSTATE SEED IS 7775	9978	7-26	3.4	19.9	1486
IMPERIAL 891	8258	7-27	1.7	12.5	1478
SIGCO 894A	11423	7-25	3.2	12.0	1456
INTERSTATE SEED IS 897	9084	7-25	1.8	14.3	1449
M-F-A SUN-GRO 372A	10116	7-28	2.1	13.9	1421
RANCHER BRAND 994	9341	7-26	3.3	11.3	1365
PACIFIC OILSEEDS S-304	10804	7-24	5.0	13.6	1359
SIGCO 454	10391	7-26	2.7	15.8	1352
IMPERIAL 672	9841	7-26	2.1	15.1	1346
RBA 300G	9565	7-24	6.0	12.3	1335
MASTER FARMER 303	10047	7-25	4.3	11.0	1335
DAHLGREN DO-704	10391	7-24	18.5	12.8	1330
INTERSTATE SEED IS 7116	8671	7-25	3.9	12.7	1254
MEAN	9779	7-25	2.8	14.5	1572
LSD .05					427

** HIGHEST YIELDING HYBRID IN THE TEST.

* HYBRID WHICH DID NOT YIELD SIGNIFICANTLY LESS THAN THE HIGHEST YIELDING HYBRID IN THE TEST.

TABLE 5. SUMMARY OF FOUR SUNFLOWER LOCATIONS IN MISSOURI DURING 1980 AT NOVELTY, COLUMBIA, WELDON SPRING, AND PORTAGEVILLE.

BRAND-HYBRID	NOVEL- TY	COLUM- BIA	WELDON SPRING	PORTAGE- VILLE	MEAN
DAHLGREN DO-843	952*	319	2248*	1887*	1352**
M-F-A SUN-GRO 380A	868*	422*	2040*	1830	1290*
SUNBRED BRAND 212	637	602**	1951*	1817	1252*
DAHLGREN DO-844	645	297	2267**	1719	1232*
IMPERIAL S-322	944*	336	1871*	1768	1230*
DAHLGREN DO-704	938*	384	2149*	1330	1200*
GOLDEN HARVEST GH 30	665	423*	1970*	1633	1173*
SUNBRED BRAND 265	407	412*	1851*	2012*	1171*
INTERSTATE SEED IS 7116	812	506*	2109*	1254	1170*
INTERSTATE SEED IS 7115	578	400	2119*	1517	1154
RBA 300G	713	420*	1990*	1335	1115
INTERSTATE SEED IS 7775	536	465*	1971*	1486	1115
SIGCO 454	841*	363	1852*	1352	1102
IMPERIAL 891	678	393	1842*	1478	1098
MASTER FARMER 707	481	320	1733	1845*	1095
PACIFIC OILSEEDS S-338	595	414*	--	2272**	1094#
RBA 303	695	294	1862*	1491	1086
PACIFIC OILSEEDS S-304	823*	315	1812*	1359	1077
MASTER FARMER 303	639	389	1911*	1335	1069
INTERSTATE SEED IS 897	734	304	1733	1449	1055
SIGCO 894A	820*	254	1683	1456	1053
RANCHER BRAND 994	1133**	449*	1198	1365	1036
PACIFIC OILSEEDS S-311	705	363	1545	1510	1031
IMPERIAL 672	746	379	1634	1346	1026
M-F-A SUN-GRO 372A	469	292	1595	1421	944
PACIFIC OILSEEDS S-301A	664	502*	--	1609	925#
PACIFIC OILSEEDS S-335	805	303	--	1564	890#
MEAN	723	382	1872	1572	1112
LSD .05					191

** HIGHEST YIELDING HYBRID IN THE TEST.

* HYBRID WHICH DID NOT YIELD SIGNIFICANTLY LESS THAN THE HIGHEST YIELDING HYBRID IN THE TEST.

HYBRID MEAN CONTAINS ONLY THREE LOCATIONS.

-- DATA MISSING.

TABLE 6. SOURCE OF COMMERCIAL SUNFLOWER SEED ENTERED IN THE 1980 MISSOURI YIELD TRIALS.

BRAND	HYBRID	COMPANY ADDRESS
DAHLGREN	D0-843, D0-704, D0-844	DAHLGREN & CO., 1220 SUNFLOWER, CROOKSTON, MN 56716
GOLDEN HARVEST	GH 30	COLUMBIANA SEED CO., ELDRED, IL 62027
IMPERIAL	891, 672, S-322	RED RIVER COMMODITIES, INC., BOX 3022, FARGO, ND 58108
INTERSTATE	7115, 7116, 7775, 897	INTERSTATE SEED CO., P.O. 470, FARGO, ND 58107
MASTER FARMER	707, 303	FARMER SEED, INC., BOX 10, CARROLLTON, IL 62016
MFA	SUN-GRO372A, SUN-GRO380A	MFA SEED OPERATIONS, 201 S. 7TH ST., COLUMBIA, MO 65201
PACIFIC OILSEED	S-338, S-311, S-335, S-304, S-301A	PACIFIC OILSEEDS INC. BOX 1008, WOODLAND, CA 95695
RANCHER BRAND	994	BARZEN OF MPLS, 455 HARRISONSTONE, MINNEAPOLIS, MN 55440
RBA	300G, 303	RBA SEEDS, OLIVIA, MN 56277
SIGCO	454, 894A	SIGCO RESEARCH, BOX 150, BRECKENRIDGE, MN 56520
SUNBRED BRAND	212, 265	NORTHRUP KING CO. , P.O. BOX 959 MINNEAPOLIS, MN 55440

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