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Summary

Results of variety trials indicate that excellent yields of sesame can be produced in the Mississippi Delta during most years. Outstanding yields of approximately 2500 pounds of seed per acre were produced in 20-inch rows at Stoneville in 1962.

The principal problem with sesame is that the present varieties cannot be satisfactorily harvested by mechanical methods in this area of high rainfall and humidity. Dehiscent sesame, which must be cut and shocked before threshing, will not dry properly under the humid conditions that usually exist. Indehiscent sesame has not been accepted, since producers are not willing to devote the necessary time and care required to combine the crop.

At present, sesame should be recommended only to interested farmers who understand the production problems and will take the care and have the patience to do a good job of harvesting the crop. It is believed that easily harvested varieties will be developed in the future. If so, sesame could become a promising new oilseed crop for the Mississippi Delta and surrounding area.

SESAME PRODUCTION IN THE MISSISSIPPI DELTA

By THOMAS W. CULP[1]

Although sesame has never been grown as a commercial crop in Mississippi, variety trials have been conducted at various times since 1952. In general, yields of varieties and promising selections have been most satisfactory. In some cases, outstanding yields have been produced.

Regional sesame yield tests were conducted on the Experiment Station at State College, Mississippi, by J. F. O'Kelly and G. D. Green from 1956 through 1960. The average yield of all varieties and selections was 830 pounds of seed per acre. The highest yield in these tests, 1526 pounds of seed per acre, was obtained with the variety Margo in 1956.

Similar yield tests were conducted at The South Mississippi Branch Station, Poplarville, Mississippi, by T. E. Ashley and W. W. Kilby from 1957 through 1959. Diseases of sesame were a greater problem at this location and yields were less than those obtained at State College.

In 1959, it was reported[2] that the average yield of all varieties grown in comparable variety trials at the Delta Branch Experiment Station, Stoneville, Mississippi, from 1952 through 1958 was 1049 pounds of seed per acre. The highest yield in these tests, 2071 pounds of seed per acre, was obtained with the variety, Llano in 1957. High yields of sesame and the stimulated interest of possible producers in this crop resulted in an expanded program of variety testing in the Mississippi Delta.

Regional Sesame Tests

Comparable regional sesame yield tests were conducted at Cleveland, Mississippi, in 1958 and 1959 and at Greenwood and Stoneville from 1958 through 1960. Oro and its sister selection, S.I. 58, produced the highest average yields in all tests, 1657 and 1684 pounds of seed per acre, respectively (Table 1). This variety or selection also produced the highest average yield at each location, and Oro produced the outstanding yield, 2043 pounds per acre, in the 1958 test at Cleveland. Calinda and Llano produced very good average yields, 1578 and 1458 pounds, respectively.

Blanco, Margo, S.I. 74, and Dulce produced average yields of only 1049 to 1182 pounds. These low yields were attributed to loss of growing points (cause unknown) and premature senescence of many plants at Greenwood and Stoneville in 1958 and 1959. The average yield of these varieties and selections at Greenwood and Stoneville during this period was only 816 pounds of seed per acre.

The selections S.I. 109 and 125 had the highest average yields, 1445 and 1336 pounds of seed per acre, among the indehiscent entries in these tests. Rio, one of the first released indehiscent varieties, made the third highest average yield, 1252 pounds. These data indicate a possible improvement in yield of S.I. 109 and 125 over Rio. The other indehiscent entries in these tests produced average yields of 973 to 1202 pounds of seed per acre. The low yields of these varieties and selections can be attributed partly to loss of growing points of plants at Greenwood and Stoneville in 1958 and 1959.

Average yields of all dehiscent varieties and selections at Cleveland, Greenwood, and Stoneville, Mississippi, were 1515, 1252, and 1283 pounds of seed per acre, respectively. At all locations it was 1350 pounds per acre.

The average yields of all indehiscent varieties and selections grown at these

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[2]Thomas W. Culp and William J. Stone. Factors affecting sesame production in the Mississippi Delta. Mississippi Farm Research. Vol. 22, No. 10. October 1959.

Table 1.—Yield and other characteristics of comparable varieties and selections of sesame grown in regional tests at Cleveland, Mississippi, in 1958 and 1959, and at Greenwood, and Stoneville, Mississippi, from 1958 through 1960.

Variety or selection	S.I. No.	Yield in pounds of seed per acre				Threshing percentage	Percentage shattering
		Cleveland	Greenwood	Stoneville	Avg.		
Dehiscent (shattering) varieties and selections							
T53181-3-20-4-5-1-1-2[1]	58	1773	1510	1769	1684	—	—
Oro	61	1882	1382	1707	1657	—	—
Calinda	47	1587	1429	1718	1578	—	—
Llano[2]	8	1648	1212	1513	1458	—	—
Dulce	46	1601	1042	903	1182	—	—
T54137-2-2-B-1[1]	74	1050	1373	965	1129	—	—
Margo	39	1298	1051	856	1068	—	—
Blanco	3	1288	1023	837	1049	—	—
Indehiscent (non-shattering) varieties and selections							
T54118-5-1-2-1-2	109	1541	1304	1489	1445	63.1	8.4
T55388-B-7-2-5	125	1238	1332	1437	1336	74.2	10.4
Rio[2]	78	1160	1372	1224	1252	64.6	9.5
T53181-3-20-4-1-1-2	89	1094	1192	1319	1202	76.2	16.2
T55142-B-11-2-10[1]	128	1020	1214	1312	1182	83.7	31.0
T55433-B-1-1	139	1005	1394	968	1122	78.5	22.0
Delco[2]	77	1220	933	792	998	83.4	20.0
T55154-B-2-4[3]	117	1039	1149	730	973	83.4	31.7
Location average		1340	1248	1221	1270	—	—

[1]Not grown in 1958.
[2]Not grown in 1960.
[3]Grown only in 1959.

locations were 1165, 1242, and 1159 pounds, respectively. At all locations it was 1189 pounds of seed per acre.

The indehiscent selection S.I. 128 produced the highest yield, 1864 pounds, in the 1960 test at Stoneville. This yield is approximately 200 pounds less than the highest yield of the top-yielding dehiscent variety. The average yield of all indehiscent varieties and selections is 161 pounds less than the average yield of all dehiscent varieties and selections in these tests. Although dehiscent sesame generally yields more seed than indehiscent sesame, both types have produced excellent yields in the Mississippi Delta during most years.

The principal problem with this crop is that present varieties cannot be satisfactorily harvested by mechanical methods in this area of high rainfall and humidity. For this reason, yield testing was reduced and confined to the Delta Branch Station in 1961 and 1962.

Tests at Delta Station

Sesame yield tests on the Delta Branch Station in 1961 and 1962 were designed to compare yields of varieties and promising selections and to obtain additional information on the effects of row spacings on maximum yields and weed control. Two regional yield tests were grown each year in 1961 and 1962. One test was planted in 40-inch rows and the other in 20-inch rows.

Yields were very low in 1961 (Table 2). The average yield of all varieties and selections was only 711 pounds of seed per acre when grown in 40-inch rows and 829 pounds of seed per acre when grown in 20-inch rows. These low yields were obtained because Alternaria and Corynespora leaf and stem spot defoliated the plants and caused them to mature early in the season. This was the first time that these diseases caused appreciable damage to sesame. Generally, these diseases occur late in the season and act as beneficial agents by defoliating and drying the plants for harvest.

In 1961, Calinda produced the highest yields, 1162 and 1354 pounds of seed per acre, when planted in 40- and 20-inch rows, respectively. This yield was not sig-

nificantly greater than the highest yields of the indehiscent selection S.I. 151, which made 939 and 1267 pounds. Two sister selections, T55191-B-1-1-M1-2-B-B and T55-191-B-1-1M11BB, produced the highest yields, 2108 and 2026 pounds, respectively, when planted in 40-inch rows in 1962. There were no significant differences between the other dehiscent entries, which produced 1358 to 1676 pounds of seed per acre, except Calinda which produced the lowest yield of 1156 pounds.

In the test planted in 20-inch rows in 1962, S.I. 155 produced the highest yield of 2572 pounds of seed per acre. This yield was not significantly different from yields of 7 other dehiscent varieties and selections which produced from 2038 to 2522 pounds. Only Calinda and S.I. 156 had lower yields of 1967 and 1665 pounds, respectively, in this test.

S.I. 128 produced the highest yield, 1225 pounds, among the indehiscent entries grown in 40-inch rows in 1962. This yield was not significantly different from that of the other indehiscent varieties and selections, which ranged from 901 to 1154 pounds. The indehiscent selections S.I. 160 and 161 produced the highest yields among indehiscent entries of 2075 and 1970 pounds respectively, when grown in 20-inch rows in 1962. These yields were not significantly different from that of the highest yielding dehiscent variety grown in this test. Only selection S.I. 159 produced a lower yield than the other indehiscent selections, 1389 pounds of seed per acre.

Table 2.—Yield and other characteristics of comparable varieties and selections of the regional sesame yield tests grown in 20- and 40-inch rows at Stoneville, Mississippi, in 1961 and 1962.

Variety or selection	SI No.	Yield in pounds of seed per acre: 40-inch rows 1961	40-inch rows 1962	40-inch rows Avg.	20-inch rows 1961	20-inch rows 1962	20-inch rows Avg	Threshing percentage 1961	Percentage shattering 1961
Dehiscent (shattering) varieties and selections									
Calinda	47	1162*	1156	1159	1354*	1967	1660		
Margo	39	679	1565	1122	706	2247*	1477		
T53181-3-20-4-5-1-1-2	58	735	1464	1100	988	2023*	1506		
Oro	61	788	1406	1097	974	2038*	1506		
T56065-B-3-2-1	153	530	1451	990	924	2318*	1621		
T57109-B-3-3	154	915			876				
T54137-2-2-B-1	74	572			362				
T57109-B-3-3-3	155		1676			2572*			
T58061-B-1-1	157		1522			2388*			
T58128-B-5-4	156		1358			1665			
T55191-B-1-1-M1-2-B-B			2108*			2271*			
T55191-B-1-1-M1-1-B-B			2026*			2522*			
Indehiscent (non-shattering) varieties and selections									
T56117-B-31-3-33-1	151	939*	978	958	1267*	1838	1552	88.2	5.2
T55142-B-11-2-10	128	486	1225	856	771	1687	1229	86.2	7.5
T55433-B-1-1	139	348	962	655	685	1532	1108	83.4	7.5
T56117-B-31-3-7-1	149	759			707			88.6	3.8
T56031-B-2-7	144	755			806			89.8	5.0
T56117-B-31-1-7-3	150	698			647			89.6	10.0
T56026-B-3-9-4	152	581			534			92.4	5.5
T56564-B-B-1-2	162		1154[1]			1698			
T58399-B-2-1	160		1124			2075*			
T58382-B-5-1	159		1119			1389			
T58542-B-2-B-1	161		1058			1970*			
T56026-B-3-4-1-1	158		901			1764			
Average yield		711	1347	992	829	1998	1457		
L.S.D. (5% level)		225	334		280	603			
Coefficient of variation, %		22.2	17.4		23.7	21.2			

[1]Missing plot calculated by appropriate statistical method.
*Indicates not significantly different from highest yielding variety in test.

In 1961 and 1962, the highest yielding dehiscent varieties and selections continued to out-produce the highest yielding indehiscent varieties and selections in most cases. In all cases, the average yields of dehiscent entries were greater than that of indehiscent entries by 109 to 508 pounds of seed per acre. These data suggest that it should be possible to continue to improve the yields of indehiscent varieties and selections through plant breeding.

Narrow Rows Control Weeds

Production of sesame in narrow rows may be an excellent method of reducing late weeds and increasing yields. Although yields were poor because of dry weather and diseases in 1961, the varieties and selections grown in 20-inch rows produced an average of 119 pounds of seed per acre more than the same varieties and selections grown in 40-inch rows. In these tests 9 of the 14 entries produced greater yields, which ranged from 27 to 394 pounds when grown in 20-inch rows. Since this was an unusually dry fall and Alternaria and Corynespora leaf and stem spot diseases caused early maturity of all varieties, it was expected that plants growing in 40-inch rows would show a yield advantage over those in 20-inch rows. Surprisingly, this was not the case and apparently sesame will produce just as well in 20-inch rows even when conditions are not ideal for maximum growth.

Varieties and selections grown in 20-inch rows in 1962 produced an average of 651 pounds of seed per acre more than the same varieties and selections grown in 40-inch rows. In these tests all entries produced greater yields, which ranged from 163 to 951 pounds of seed per acre, when grown in 20-inch rows. Since outstanding yields of sesame were produced and late-season weeds were easier to control in 20-inch rows, this would be a recommended method of producing this crop, if suitable equipment for cultivation is available on the farm and if sesame could be mechanically harvested satisfactorily in this area.

Harvesting is Problem

High yields obtained in variety trials since 1952 indicate that excellent sesame can be produced in the Mississippi Delta and surrounding area during most years. Harvesting by mechanical methods has proved to be the limiting factor in the production of the crop. Dehiscent sesame, which must be cut and shocked for harvesting, will not dry properly under the humid conditions that usually exist. Indehiscent sesame has not been accepted, since producers are not willing to devote the necessary time and care required to thresh the crop. If an easy method of harvesting or an easily harvested variety can be developed, sesame could become a promising new crop in this area.

Dehiscent sesame possessing strong placenta attachments, which might retain the seed until it could be combined from standing plants in the field, offers promise in the development of easily harvested varieties. Most of the present lines which possess strong placenta attachments are too late for production in this area, and they also dehisce from the apex to the base of the capsules. These lines hold most of their seed for a short time after maturity and then gradually lose them from weathering while the plants continue to dry. Crosses have been made in an attempt to obtain dehiscent plants possessing strong placenta attachments of seed that are borne in capsules which dehisce primarily at the apex and are borne in an upright position on the plants. The F_2 populations of these crosses were planted in 1963; therefore, it is too early to predict the outcome of these studies.

Indehiscent sesame possessing very long papershell capsules, which do not lose seed by partial dehiscence, offers promise in the development of easily harvested varieties. To date, most of the work in the development of easily harvested varieties

has been conducted with this type material.

Progress on Varieties

Much progress in the development of easily harvested varieties has been accomplished, as indicated by the threshing percentages of indehiscent varieties grown from 1958 through 1961. (Threshing percentages are calculated as the percentage seed obtained from the first of 5 runs through an experimental Vogel-type thresher). Rio, released in 1955 as one of the first indehiscent varieties, had a threshing percentage of 64.6% (Table 1). The first papershell variety, Delco, (released in 1957, had a threshing percentage of 83.4% and S.I. 128 had the highest, 83.7%; in these tests. In the test grown in 1961 (Table 2), S.I. 128 had a percentage of 86.2%; however, 5 of the 6 other indehiscent entries possessed higher threshing percentages than this selection. S.I. 152 produced the highest, 92.4%. The percentage shattering or loss of seed from partial dehiscence of Rio was 9.5%. Delco lost 20% of its seed while S.I. 128 lost 31% during the period from 1958 to 1960. In 1961,S.I. 128 lost 7.5% of its seed. Five of the 6 other indehiscent selections lost less or no more seed than this selection.

These data indicate that much progress in the development of easily harvested indehiscent varieties has been made since the first indehiscent variety was released in 1955. However, it is expected that future progress will be much slower.

The process of transferring strong placenta attachments to indehiscent lines which possess long papershell capsules and partially dehisce but are very easy to thresh, offers promise in the development of varieties easy to harvest. Crosses to effect this transfer have been made. The F_2 seed of these crosses was planted in 1963; therefore, it is too early to determine whether the strong placenta attachments will retain the seed in the indehiscent capsules which partially dehisce. If so, it should be possible to develop an easily harvested variety from this material.

It is hoped that one of these methods of breeding will produce a variety of sesame that is easy to harvest and adapted to production in this area. If this can be accomplished sesame could become a promising oilseed crop for the Mississippi Delta and surrounding area.

Sesame growing in the Mississippi Delta. Research indicates good yields can be produced most years but harvesting is a problem.