Evaluation of Sesame Cultivars for Grain Production in Southern Oklahoma

THE SAMUEL ROBERTS NOBLE FOUNDATION

by Jagadeesh Mosali and Jim Johnson

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Introduction

Crop producers are looking for alternative crops like sesame (*Sesamum indicum* L.) that can be used in a wheat rotation. Sesame is one of the most ancient oilseed crops. Sesame oil is used as a cooking medium in certain parts of the world and is also used in various culinary preparations. Sesame seed contains 50 percent oil and 25 percent protein. Sesame cake is a rich source of protein, carbohydrates and minerals, and can serve as a nutritious feed for dairy cattle. Sesame is drought tolerant, and sets seeds and yields relatively well under high temperature and low rainfall conditions. Sesame plants are also expected to improve water percolation in the soil because of their deep, penetrating root system.

Until recently, sesame was harvested manually due to its high seed-shattering potential. Due to recently developed non-dehiscent sesame cultivars by SESACO that have the capability of opening at the tip of the pods for drying, but retaining the seeds until harvest, harvesting the plants mechanically using a combine has become possible on a commercial scale. Oklahoma and Texas have a climate suitable for sesame growth during the summer, and producers can utilize this crop as an alternative in their production system. Currently, there are no data available in this region regarding the production potential of this crop, making informed management recommendations difficult. The variety testing is intended to furnish producers with supplemental information to aid decision-making and idea formation. The information coming from the variety testing program should be a valuable tool when used with similar information from other sources.

Materials and Methods

The sesame variety trials were conducted at the Noble Foundation Headquarters Farm, Ardmore (Wilson silt loam); Red River Demonstration and Research Farm, Burneyville (Minco fine sandy loam); Dupy Farm, Gene Autry (Dale silt loam); and on a producer's field near Walters, Okla. (Foard silt loam). Previous crops were wheat at Ardmore and Walters, sorghum at Dupy and rye at Burneyville. The experimental design was a randomized complete block with four replications. The experimental unit was a 5-foot by 20-foot plot of a single variety. The trial consisted of seven entries of sesame that were evaluated during the 2010 growing season.

The entries were seeded into a clean-tilled seedbed on June 21, 2010, at Ardmore and Burneyville, and on June 22, 2010, at Dupy in 30-inch rows at 3/4-inch depth. At Walters, sesame was planted on June 23, 2010, into no-till ground in 15-inch rows at 3/4-inch depth. The seeding rate was adjusted so that all varieties had 30 seeds per foot of row regardless of row spacing. Each entry was planted with a HEGE 500 research plot drill. Fertilization consisted of a preplant application of nitrogen (N) which resulted in 60 pounds N/acre, including residual nitrogen. Soil tests showed all other nutrients to be adequate at all locations.

The entire plot was harvested with a HEGE 140 grain combine after frost. Plots were harvested on Dec. 1, 2010, at Walters, Dec. 2, 2010, at Burneyville and Dec. 3, 2010, at Ardmore. Seed was then dried for 10 days and cleaned to remove trash. The Dupy site was planted, but not harvested due to stand loss caused by flooding rain after planting.

Data were analyzed with the general linear models procedure in SAS (Statistical Analysis Software, Cary, N.C.), and means were separated by the least significant difference (LSD) method ($P \leq 0.05$).

Results and Discussion

Average growing conditions at Ardmore, Burneyville and Walters are reported in Tables 1, 2 and 3. Total rainfall during the growing season was lower than the 30-year average at all three locations. The months of July and September had more rainfall than the 30-year average, whereas the rainfall was less than the 30-year average in August and October. The dry period in August, particularly during pod formation, might have had an effect on crop yield. Grain yields among the varieties ranged from 657 to 954 lbs/ac at Ardmore, 384 to 1,028 lbs/ac at Burneyville and 162 to 439 lbs/ac at Walters.

S-70 (a dwarf variety) was the lowest yielding variety at all three locations and especially much lower in the sandy loam soils at Burneyville. S-26 and S-32 with fungicide produced consistently higher yields at all three locations. Varieties S-28 and S-30 produced higher yields in two of three locations. Variety EXP3 produced higher yields both at Ardmore and Burneyville, but performed poorly in the no-till scenario and drier environment at Walters. Using fungicide has resulted in variety S-32 having significantly higher yields in one location out of three.

Based on one year yield data and an average contract price of 30 cents per pound, and depending on the location and variety, a producer can sell the crop in the range of $48.60 to $308.40. Since the potential input costs are minimal, there is a good opportunity for the bulk of the gross to be profit.

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Table 1. Average 2010 monthly high and low temperatures (°F) and precipitation (inches) for the Noble Foundation Headquarters Farm, Ardmore, Okla.

	Temperature		Precipitation	
Month	Avg. High	Avg. Low	Total	30-yr Avg.
June	93	73	2.34	4.26
July	91	74	4.52	2.48
Aug	97	74	1.16	2.51
Sept	86	67	6.13	4.17
Oct	78	50	2.33	4.43
Nov	66	43	1.81	2.70
June-Nov	–	–	18.29	20.55

Table 2. Average 2010 monthly high and low temperatures (°F) and precipitation (inches) for the Red River Research and Demonstration Farm, Burneyville, Okla.

	Temperature		Precipitation	
Month	Avg. High	Avg. Low	Total	30-yr Avg.
June	97	71	2.16	4.23
July	92	73	5.09	2.18
Aug	99	72	1.00	2.70
Sept	87	65	6.82	4.00
Oct	79	47	2.90	4.39
Nov	67	41	1.37	2.73
June-Nov	–	–	19.34	20.23

Table 3. Average 2010 monthly high and low temperatures (°F) and precipitation (inches) for the Kinder Farm, Walters, Okla.

	Temperature		Precipitation	
Month	Avg. High	Avg. Low	Total	30-yr Avg.
June	94	71	3.06	4.00
July	94	73	3.00	2.14
Aug	100	73	1.11	2.32
Sept	88	66	5.04	3.82
Oct	80	48	2.40	3.45
Nov	67	39	0.24	2.11
June-Nov	–	–	14.85	17.84

Table 4. Grain yield in pounds per acre of commercial and advanced experimental lines of sesame at the Noble Foundation Headquarters Farm, Ardmore; Red River Demonstration and Research Farm, Burneyville; and Kinder Farm, Walters, Okla.

Variety	Ardmore	Burneyville	Walters	Variety mean across locations
S-26	920 ab*	952 ab	439 a	770
S-28	832 b	941 ab	365 abc	713
S-30	886 ab	798 ab	208 bcd	631
S-32	922 ab	753 b	337 abc	671
EXP3**	810 b	1,004 ab	162 d	659
S-70	657 c	384 c	196 cd	412
S-32 with Fungicide	954 a	1,028 a	369 ab	783
LSD	115	234	161	
Location mean	854	837	297	

*Means followed by the same letter are not significantly different at the 0.05 probability level
** Experimental variety