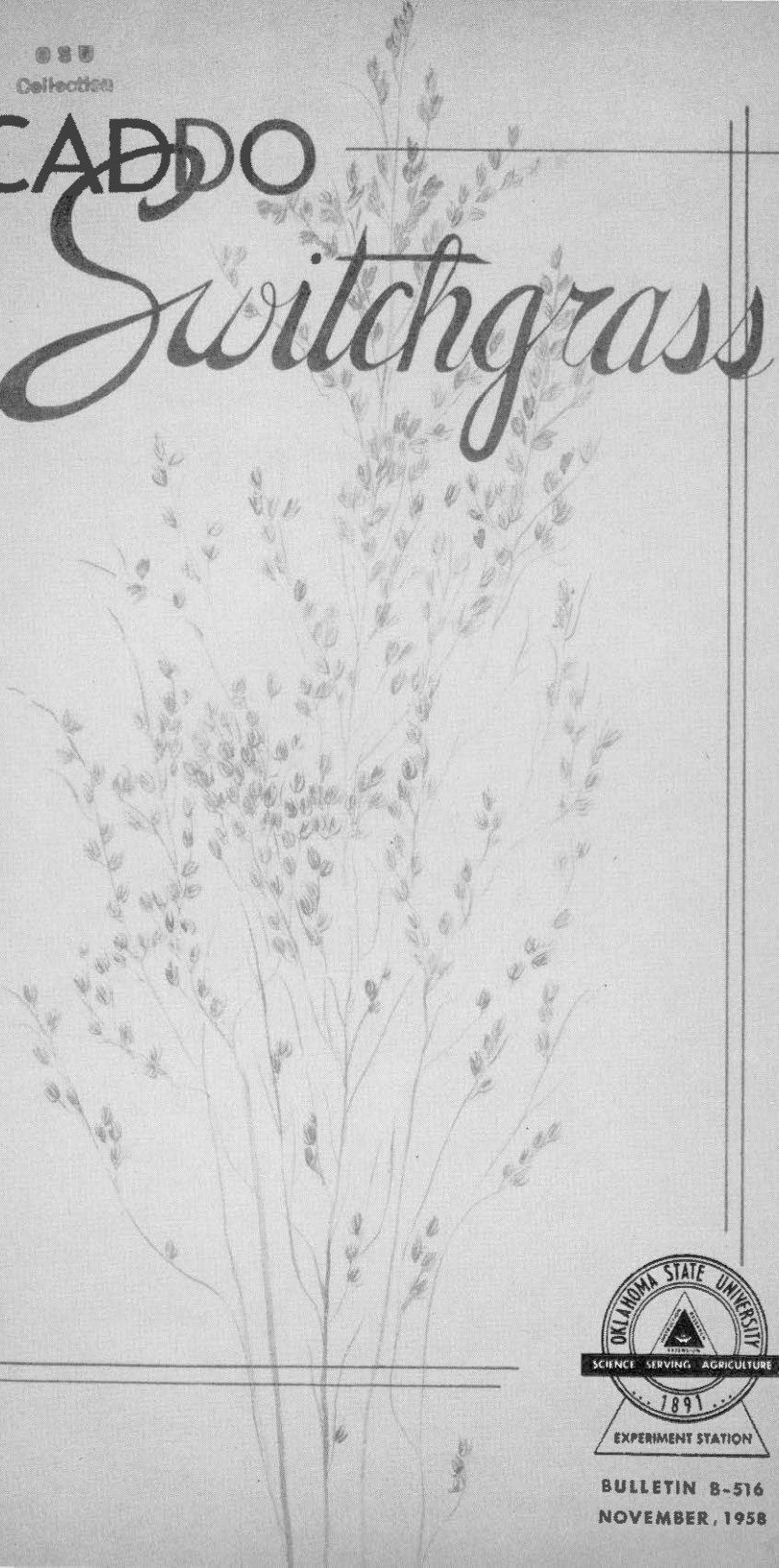
CADDO Switchgrass



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CADDO SWITCHGRASS[1]

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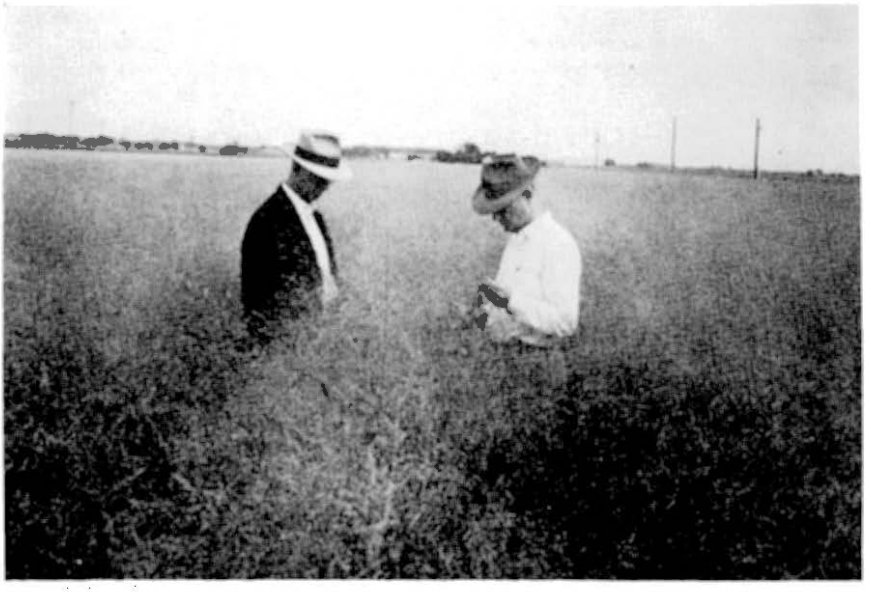
Caddo switchgrass is a new variety developed for Oklahoma and adjoining portions of the Southern Great Plains.

Characteristics

Caddo is a tall, robust upland switchgrass generally characteristic of central Oklahoma. It is leafy and productive, has considerable rust resistance, is rather uniform when seeded in rows for seed production and gives a heavy yield of seed under favorable conditions. The forage yield under irrigation is good for a native grass, and it recovers exceptionally well after mowing. There are no special features which distinguish it positively from other varieties, but it tends to be greener and contains less red pigment in stems and heads than many other varieties.



A commercial seed production field of Caddo Switchgrass in Southwestern Oklohoma.

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Origin

Caddo switchgrass was developed by mass selection over a period of several years. The general procedure was to assemble source collections from various parts of the Southern Great Plains with emphasis on central Oklahoma sources. These materials were grown in space planted nurseries and the most undesirable types removed from the cross-breeding population. The process was repeated using the most promising lines, and seed from selected plants was then used to seed rows in a nursery located on block 4200 of the Agronomy farm. Five of these rows were selected for uniformity and superior production, and seed from the five rows was bulked to form a strain tested under the number 4200.

Materials were assembled in part by the late Hi W. Staten, some of the selections were made by W. C. Elder and the final selection and bulking was done by Roy A. Chessmore. Some additional refinement was done before final increase by Jack R. Harlan.

Testing

The testing and evaluation of native grasses presents several problems not usually encountered in other crops. Adequately comparable stands of all varieties in a test are especially difficult to obtain and are

Caddo being laid in a swath for seed harvest. This method permits a high recovery of seed and eliminates the drying problem often encountered in direct combining.

almost impossible to obtain during drouth years. A suitable check is also difficult to obtain. No commercial source has an identity that can be repeated, therefore commercial materials now used generally make unsatisfactory checks.

In evaluating Caddo, the best selected material from the Woodward breeding program was used (the W_2 variety). The Blackwell variety selected in Kansas is now widely used in that state, and although it is highly susceptible to rust and not very well adapted to most of Oklahoma, it was included in some of the comparisons.

Performance

Most of the pertinent, available data are presented in Tables I and II. Tests in which Caddo and the W_2 variety were seeded side by side have been made in Texas, Beckham, Woodward, Grady, Carter-Payne, McClain, Nowata, Okmulgee and LeFlore counties. In all cases the Caddo variety was clearly superior in seedling vigor, total growth and recovery after clipping. In most of these tests either stands were not adequate or comparable on all replications or observation plots only were intended and yields were not obtained. Yield data from a set of

Picking up Caddo out of the swath for threshing with a combine.

plots at Woodward are given in Table I and confirm these general observations. It should be noted that on both the Woodward dryland plots and the El Reno irrigated plots the advantage of Caddo is primarily in aftermath growth, i.e. in the second cutting. This also confirms results of the observation plots.

Protein analyses of the forage indicate no difference between Caddo and W_2 (Table I). The remarkably high forage yields obtained in 1955 under irrigation have never been repeated. This appears to be a characteristic of second-year stands and has been observed in some commercial seed fields and in a dryland test at Perkins in 1957 when moisture relations were good. In older stands, forage production under irrigation is more in line with that reported in Table V.

Results of a spaced nursery study are given in Table II. The figures suggest that plants of Caddo produce more and are more uniform than the other varieties. The data indicate no statistical differences at the 5% level, but the calculated odds are 12 to 1 that these conclusions are correct. Data from Renner, Texas, comparing Blackwell with the the 5% level, but the calculated odd are 12 to 1 that these conclusions Common check, W_2, confirm the fact that Blackwell is not well adapted very far south. Table III.

Seed Production

Detailed studies on the effect of fertility level on seed production were conducted for two years at the El Reno station under both irrigated and dryland conditions. Seed yields by treatment are given in Table IV, stover yields in Table V and the protein content of the stover in Table VI.

It is apparent that on a fertile soil, such as the Brewer clay loam on which these tests were conducted, only very small responses, if any, can be expected to soil amendments. It is possible that on older stands responses may be obtained. Earlier work at the Woodward station[1] showed that switchgrass responds readily to nitrogen amendments when grown on a leached sandy soil.

The protein content of the dryland stover is significantly higher than that under irrigation, Table VI. It may or may not be significant that the protein content of both dryland and irrigated stover was slightly lower in the wet year of 1957 than in the dry year of 1956, but such a trend is usually expected.

[1] Harlan, Jack R. and W. R. Kneebone. Effect of various methods and rates of nitrogen application on seed yield of switchgrass (*Panicum virgatum*, L.) Agron. Jour. 45 (8):385-386, 1953.

Superior Qualities

In both observation and yield plot tests it has been established that Caddo is superior to other available materials in the following respects, listed in approximate order of superiority.

1. Superior recovery after clipping.
2. Superior forage production.
3. Superior seed production.
4. Greater uniformity.
5. Caddo has greater rust resistance than Blackwell.
6. Caddo is better adapted to Oklahoma in general than Blackwell and considerably better adapted to central Oklahoma than W_2.

Recommended Area of Use

Throughout the state of Oklahoma wherever switchgrass should be used.

Table I. Comparison of Caddo Switchgrass with the W_2 Variety as Check.

Woodward Dryland Plots	1952 2 cuts lbs./Acre	1953 2 cuts lbs./Acre	1954 1 cut lbs./Acre	3-Yr. Ave. lbs./Acre
Caddo	3902	1563	1134	2200
W_2	2541	1261	1153	1651

Woodward Dryland Plots—Percent Crude Protein

	1952 2nd cut	1953 1st cut	1953 2nd cut	1954 1st cut	Average
Caddo	9.12	11.84	9.25	6.28	9.12
W_2	9.96	11.71	9.45	5.66	9.20

El Reno Irrigated Plots

	1954 Seed Yields lbs./Acre	1955 July Forage Yields lbs./Acre	1955 October Forage Yields lbs./Acre	1955 Total Forage Yields lbs./Acre
Caddo	630	12,705	10,400	23,105
W_2	580	12,487	5,200	17,687

Table II. Comparison of Caddo Switchgrass with Blackwell and Blackwell with W_2. Pounds green weight per plant 30-50 plants

Woodward Nursery Test	1954 West Nursery	1954 East Nursery	1955 Nursery	Totals
Caddo	1.55	2.99	.65	5.19
W_2	1.42	2.93	.47	4.82
Blakwell	1.56	2.60	.60	4.36
Woodward Nursery Test—Coefficients of variation for individual plants; 30-50 plants				**Average**
Caddo	37.9	41.5	36.6	38.7
W_2	38.6	56.3	47.6	47.5
Blackwell	37.7	45.2	46.0	43.0
Common	54.9	44.9	68.9	56.2

Table III. Tons of Oven Dry Forage Per Acre on Four Replications at Renner, Texas.

Row Test, Renner, Texas	1953	1954	1955	Average
W_2	3.71	3.25	2.66	3.20
Blackwell	1.09	2.82	2.51	2.14

Table IV. Seed Production of Caddo Switchgrass Under Irrigation and Dryland. Expressed as the Average in Pounds per Acre of Four Replications of Twelve Treatments.

Treatment	Irrigated 1956	Irrigated 1957	Dryland 1956	Dryland 1957
0-0-0	384	582	---	207
0-100-0	376	631	---	288
0-0-100	452	638	---	127
0-100-100	451	535	---	192
100-0-0	454	694	---	232
100-100-0	555	633	---	158
100-0-100	374	592	---	175
100-100-100	481	575	---	168
200-0-0	380	558	---	133
200-100-0	315	614	---	110
200-0-100	452	655	---	154
200-100-100	381	694	---	128
C. V. in %	23.8	19.0	---	44.0

No significant differences due to fertilizer treatments. No seed was produced under dryland in 1956.

Table V. Stover Production of Caddo Switchgrass Under Irrigation and Dryland. Expressed as the Average in Pounds of Dry Matter per Acre of Four Replications of Twelve Treatments.

Treatment	Irrigated		Dryland	
	1956	1957	1956	1957
0-0-0	8149	6991	3846	5755
0-100-0	8493	6881	4911	6003
0-0-100	8703	7555	5449	5577
0-100-100	8569	7114	4557	5787
100-0-0	7317	7187	4207	5642
100-100-0	8783	7069	4734	6258
100-0-100	8581	7639	4087	6457
100-100-100	8297	6989	3525	5671
200-0-0	8742	7218	4900	6591
200-100-0	9409	7180	4786	6638
200-0-100	8198	7038	4598	5982
200-100-100	8807	7885	3941	5793
C. V. in %	14.0	10.3	27.0	13.0

No significant differences due to fertilizer treatments.

Table VI. Protein Content of Caddo Switchgrass Stover Under Irrigation and Dryland Expressed in Percent of Dry Matter for Twelve Treatments.

Treatment	Irrigation		Dryland	
	1956	1957	1956	1957
0-0-0	5.69	3.17	7.25	5.20
0-100-0	4.06	3.76	5.37	5.47
0-0-100	4.19	3.46	4.13	5.14
0-100-100	3.63	3.57	6.56	5.27
100-0-0	3.94	4.05	7 00	5.33
100-100-0	4.00	3.68	6.00	6.09
100-0-100	4.50	3.94	6.00	6.09
100-100-100	3.84	4.80	6.25	5.67
200-0-	3.94	3.48	6.94	5.77
200-100-0	3.81	4.27	6.87	6.05
200-0-100	5.25	5.04	4.44	5.39
200-100-100	4.69	4.88	6.13	6.45
Average	4.29	4.01	6.08	5.66

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