

CORONADO

OSU
Collection

SIDE-OATS GRAMA



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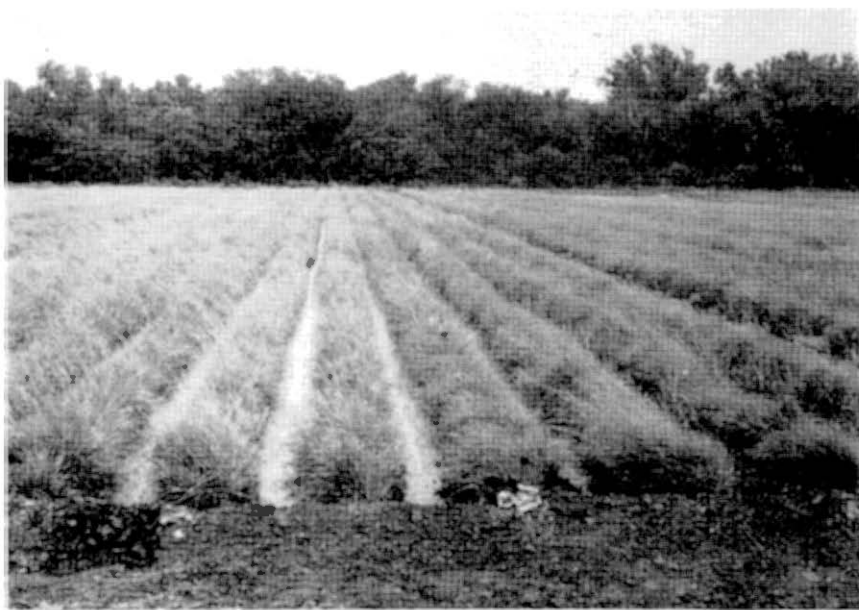
CORONADO SIDE-OATS GRAMA¹

By Jack R. Harlan and Robert M. Ahring²

Coronado is a new variety of side-oats grama developed for western Oklahoma and adjacent areas primarily to the south and west.

Orígin

The original source from which Coronado was developed was a collection made by Jack R. Harlan in 1946, in a small, dry wash 1.5 miles west of the town (Post Office) of Encinoso, New Mexico. The association was dominated by white oak but the location was very near the ecotone between oak and the midgrass association. The exact location is of some interest because the general area was revisited in 1949 when it became evident that this particular source had promise. Collections made within 200 yards of the original site proved to be of a different and less desirable type.



An irrigated field of foundation Coronado, Livestock Research Station, El Reno, Oklahoma.

¹ Contribution of Crops Research Division, Agricultural Research Service, U.S.D.A. and the Oklahoma Agricultural Experiment Station.

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The source was grown at the U. S. Field Station, Woodward, Oklahoma, in 1947 and immediately indicated promise because of its seedling vigor and total production. Some plants died the first two winters, however, and there was some concern over its winter hardiness. Since this time no evidence of winter injury has been observed. It is presumed that non-hardy types have now been eliminated.

Following the initial selection the source was increased for testing at Woodward and later at El Reno. It has been distributed rather widely for trial under the name Encinoso.

Characteristics

Coronado is an apomictic type of side-oats grama. It is rather robust, productive of both forage and seed, and extremely uniform. Spikes tend to be straw-colored at maturity and the tips of the inflorescences characteristically turn white as the spikes ripen. The seed is large; seed set under favorable conditions is good, and seedling vigor is excellent. Two crops of seed per year may be expected as in most apomictic varieties.

Production

Plot tests conducted during the last five years at Woodward, Perkins, and the Blackland Station, Temple, Texas, indicate Coronado produces somewhat more forage than Tucson and substantially more



A commercial field to Coronado, in Southwestern Oklahoma. Frequent examination of the seed field is necessary in order to select the best harvest date.

forage than El Reno and commercial sources. (Table I). Protein analyses of the forage from four different cuttings, over a three-year period at Woodward, indicate the protein content of Coronado is comparable to that of other available varieties. Table II.

Seeding Habits

Desirable seeding habits are especially important in native grasses, since they are wild plants, not adapted to conditions of domestication and notoriously difficult to handle from the seed point of view. Coronado was selected from many side-oats grama varieties primarily for its desirable seeding habits. Under favorable conditions seed set is unusually high permitting the marketing of seed with 80% or higher purity which is exceptional in this species. The seed is large compared to that of other varieties. Table III.

Seedling vigor is also very good, probably as a corollary to the seed size. Seedling growth in the green house was measured from both large and small seeds of the same varieties with the results given in Table IV. Green weight of seedlings was determined from cuts made at 4, 6 and 13 weeks following planting.

Note the uniform emergence and high seedling yield of Coronado when compared to the next best variety and to nursery bulk material.



A five-year old stand of Coronado at maturity.

It should be remembered that nursery bulk is far above average commercial material in most respects.

Although no stand count data were taken, it was observed on no less than five occasions in plot seedings that Coronado produced a better stand than all other varieties in the test. Counts were not taken because the near or complete failure of some varieties made the plots unusable. High seedling vigor and ability to produce stands is therefore an outstanding feature of the variety.

Seed Production

A number of seed production studies have been conducted on Coronado under irrigation and on dryland at El Reno. Results of the several studies are presented in Tables V through X and the production and chemical evaluation of the stover in Tables XI and XII.

It seems evident from these rather extensive studies on the effect of fertility level on seed production that Coronado side-oats grama, on this soil, gives only occasional and modest responses to soil amendments. Apparently Brewer clay loam, on which the tests were conducted, can supply Coronado with about as much mineral nutrition as the variety can use, although occasional responses were obtained.



A supply of exceptionally high quality certified seed of Coronado. This was raised in Southwestern Oklahoma under irrigation.

Inconclusive evidence shown in Table X suggests that, in general, nitrogen amendments may increase seed slightly under irrigation and could possibly decrease it somewhat under dryland. More study is needed on this point.

The protein content of Coronado stover following seed harvest suggests that this would make very satisfactory roughage. The first crop under irrigation is always higher than the second crop, and dryland stover is higher in protein than irrigated stover.

Superior Qualities

Coronado is considered superior to other available varieties in the following characteristics, approximately in order of superiority:

1. Seed size
2. Seedling vigor
3. Seed production
4. Forage production
5. Coronado is superior to Tucson in resistance to cold especially in the seedling stage. For this reason it can be used in areas where Tucson is not satisfactory.
6. Coronado is superior to El Reno in all qualities measured, while El Reno in turn is somewhat superior to commercial sources in several respects.

Recommended Area of Use

At the present time, the area recommended is the western half of Oklahoma, the Texas Panhandle and areas immediately adjacent thereto.

Table I.—Forage Yields of Coronado Side-Oats Grama in Pounds Per Acre.

Perkins Test (Oven dry basis)						
	1952	1953	1954	1955	Avg.	
Coronado	2674	3869	----	2033	2859	
Tucson	2147	3595	----	2124	2633	
El Reno	2330	3552	----	1593	2492	
Commercial	1354	2750	----	1606	1903	
Woodward Test (Air dry basis)						
	1952	1953	1954	1955	1956	Avg.
Coronado	1634	1192	662	----	1481	1242
Tucson	1361	1128	563	----	697	937
El Reno	1089	840	245	----	755	732
Woodward Test 2 (Air dry basis)						
	1951	1952	1953		Avg.	
Tucson	1299	633	806		912	
El Reno	1013	558	536		702	
Commercial	1046	496	602		715	
Blackland Station, Temple, Texas						
(Oven dry basis)						
	1952	1953	1954	Avg.		
Coronado	870	2865	1740	1825		
Tucson	705	2630	1735	1690		
El Reno	735	2490	1430	1550		

Table II.—Percentage Crude Protein in Dry Matter.

	2nd cut 1952	1st cut 1953	2nd cut 1953	1st cut 1954	Average
Coronado	9.27	11.10	9.02	5.70	8.77
Tucson	9.79	11.32	8.92	6.27	9.08
El Reno	7.07	10.61	9.58	6.19	8.36

Table III.—Percent of 500-gram Seed Sample of Size Indicated.

Screen Size	Coronado	Hope	Nursery Bulk
6/28	4.0	0.0	5.6
6/30	15.0	3.4	3.6
6/32	63.8	34.8	21.2
6/34	4.4	17.6	12.4
6/36	7.0	33.2	34.4
6/38	1.8	4.6	5.6
Below 6/38	4.0	6.6	1.7

Table IV.—Seedling Growth Measured from Both Large and Small Seeds of the Same Varieties.

	Seed size	Weight 100 seeds in gr.	Days to murgence	Total green weight per 100 seedlings in Gr. (3 cuts)
Coronado	6/28	.099	9.0	31.03
	6/38	.052	9.4	19.95
Hope	6/28	.092	8.5	16.12
	6/38	.053	13.0	14.08
Bulk	6/28	.097	12.9	17.23
	6/38	.054	13.6	14.90

Table V.—Effect of Soil Amendments on Seed Production under Irrigation at El Reno.

		0-0-0	Per Crop 60-0-0	Per Crop 180-0-0	Per Crop 60-180-0
2nd crop	1954	55	49	71	52
1st crop	1955	331	408	269	385
2nd crop	1955	247	225	258	247
Total	1955	579	633	527	632

Table VI.—Residual Effects of Fertilizer. The indicated amounts of fertilizer were applied on each crop in 1956 and no fertilizer in 1957.

		0-0-0	30-0-0	90-0-0	90-90-0
1st crop	1956	445	446	470	487
2nd crop	1956	387	548	374	478
Total	1956	832	994	844	965
1st crop	1957	345	508	544	508
2nd crop	1957	218	272	357	309
Total	1957	563	780	881	817

Table VII.—Residual Effects of Fertilizer. The indicated amounts of fertilizer were applied in the spring of 1956 and no fertilizer thereafter.

		0-0-0	60-0-0	180-0-0	180-180-0
1st crop	1956	485	481	578	495
2nd crop	1956	260	299	322	352
Total	1956	745	780	902	847
1st crop	1957	526	544	472	417
2nd crop	1957	363	381	381	436
Total	1957	889	925	853	853

Table VIII.—A Comparison in 1957 Between Fertilizing the Second Crop Only and Fertilizing Both Crops.

	Lbs. Yield Per Acre
First Crop—No amendments	590
Second Crop—50 lbs. N applied	318
Total	908
First Crop—50 lbs. N. applied	726
Second Crop—50 lbs. N. applied	454
Total	1180

Table IX.—Seed Production in Pounds per Acre of Coronado Side-Oats Grama Under Irrigation and Dryland.

Treatments	Irrigated				Dryland			
	2nd crop 1956	1st crop 1957	2nd crop 1957	Total 1957	Total for 3 crops	1956*	1957	Total for 2 years
0-0-0	436	336	354	688	1116	----	93	93
0-100-0	516	322	414	735	1176	----	113	113
0-0-100	529	314	346	660	1264	----	123	123
0-100-100	396	175	395	570	966	----	85	85
100-0-0	559	409	406	815	1374	----	99	99
100-100-0	584	479	363	841	1340	----	55	55
100-0-100	684	295	371	766	1525	----	90	90
100-100-100	547	582**	419	1000	1547	----	59	59
200-0-0	653	508	429	935	1588	----	81	81
200-100-0	540	346	404	749	1506	----	127	127
200-0-100	476	576	391	966	1225	----	93	93
200-100-100	638	592**	385	977	1615	----	74	74

* No seed produced under dryland in 1956.

**Significantly higher than check at the 5% level.

Table X.—Production of Caryopses of Coronado Side-Oats grama Expressed as Percentage of Total Seed Weight, 1957.

Treatment	Irrigated	Treatment	Dryland
200-100-100	23.5	0-100-0	11.9
200-0-100	19.9	200-100-0	7.6
100-0-0	19.6	0-0-0	6.9
100-100-100	19.0	0-100-100	6.7
100-0-100	18.1	200-0-100	6.2
0-100-0	17.8	200-0-0	5.7
0-0-100	17.4	200-100-100	5.3
100-100-0	16.8	100-0-0	4.6
0-100-100	16.3	0-0-100	4.3
200-0-0	16.1	100-0-100	4.2
200-100-0	15.1	100-100-0	3.8
0-0-0	13.0	100-100-100	3.8

Figures covered by the same line are not significantly different from each other.

Table XI.—Stover Production in Pounds Dry Matter per Acre of Coronado Side-oats Grama Under Irrigation and Dryland.

Treatment			Irrigated		Total for 3 crops	Dryland		
	2nd crop 1956	1st crop 1957	2nd crop 1956	Total 1957		1956	1957	Total for 2 years
0-0-0	2521	2219	2069	4288	6809	1430	844	2274
0-100-0	2598	3061	2253	5314	6787	1311	927	2238
0-0-100	2580	2137	2061	4189	7894	1332	808	2140
0-100-100	2386	1921	1972	3894	6280	1222	702	1924
100-0-0	2925	3758	2541	6299	9224	1322	1013	2335
100-100-0	2896	3281	2480	5762	8629	1208	752	1957
100-0-100	2823	3025	2708	5733	8585	1081	1020	2101
100-100-100	2768	3100	2468	5568	8336	1503	578	2081
200-0-0	3055	3180	2333	5512	8567	1201	476	1677
200-100-0	2779	2818	2081	4899	9202	1482	779	2261
200-0-100	2633	3180	3242	6423	7532	1269	644	1913
200-100-100	3091	3434	2737	6171	9262	1124	403	1527
C. V. in percent	13.3	30.0	22.0	21.0				

Table XII.—Evaluation of Coronado Side-oats Grama Stover Produced Under Irrigation and Dryland.

AVERAGE PERCENT PHOSPHORUS								
		with K	without K	with P	without P	100 lbs. N	200 lbs. N	No N
Irrigated:								
1st crop	1957	.231	.239	.233	.234	.232	.214	.256
2nd crop	1957	.150	.155	.158	.147	.131	.124	.308
Dryland:	1957	.332	.315	.328	.319	.329	.335	.308
AVERAGE PERCENT CALCIUM								
Irrigated:								
1st crop	1957	.302	.332	.301	.309	.350	.327	.273
2nd crop	1957	.284	.299	.290	.293	.297	.264	.341
Dryland:	1957	.363	.307	.320	.350	.348	.372	.293
AVERAGE PERCENT PROTEIN								
Irrigated:								
2nd crop	1956	5.25	5.38	5.56	5.07	5.75	5.87	4.33
1st crop	1957	8.98	8.88	8.62	9.25	9.68	10.06	7.06
2nd crop	1957	6.16	5.92	6.07	6.00	6.44	6.60	5.07
Dryland:	1956	8.75	8.99	8.98	8.76	8.44	9.48	8.69
	1957	10.07	10.36	10.27	10.17	10.62	10.00	10.03

