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Annual Fodder and Silage Crops for Nebraska

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Sorgo grown in cultivated rows. Atlas (left) and Kansas Orange (right).

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The present shortage in the seed supply of all standard varieties of annual forage crops has created a special demand for information concerning their relative productivity and the possible use of substitute crops. This circular reports the yields secured from such crops at the Experiment Station, in an effort to help farmers reach a decision as to which crops should be grown this year for roughage, and which ones especially should have their seed supply increased for use in future years. Feed value and production costs as well as yields should be taken into consideration by the grower.

The standard annual fodder crops grown primarily for cured forage in Nebraska consist largely of several varieties of sorgo and millet, and Sudan grass. Although soy beans have not come into extensive use for hay, they command some interest. Oats make good hay but the yield is relatively small. Whereas corn has been the chief silage crop, tests during the last six years indicate that Atlas sorgo should be given preference wherever it will mature sufficiently.

CORN AND SORGHUM GROWN FOR FODDER OR SILAGE IN CULTIVATED ROWS

Atlas excels.—In a six-year test, 1928-34 (Table 1), Atlas sorgo has proved superior to other varieties of sorghum and to corn when grown in normal cultivated rows. Its yield of cured fodder was 5.54 tons per acre compared with 2.32 tons for corn. The corresponding silage yields calculated on the basis of 75 per cent moisture content were 18.84 tons for Atlas sorgo and 7.89 tons for corn. Atlas surpassed all other crops each year except Kansas Orange cane, which yielded more one year. The average yield of nearly 8 tons of corn silage per acre is about normal for this region. With respect to feeding value, the Animal Husbandry depart-

TABLE 1.—*Earliness, height, and yield in tons per acre of cured fodder (15 per cent moisture) and silage (75 per cent moisture) of five varieties of sorghum and corn when grown in cultivated rows* [1] *during six years, 1928-34.*

Crop	Date ripe	Height (in.)	Fodder							Silage
			1928	1929	1930	1931	1932	1934	Av.	
Black Amber sorgo	9/10	79	1.57	4.63	3.52	4.22	4.10	2.41	3.41	11.59
Kansas Orange sorgo	9/28	89	3.19	5.85	4.26	4.50	5.13	3.47	4.40	14.96
Atlas sorgo	10/3	88	3.40	7.58	6.95	4.57	8.13	2.62	5.54	18.84
Hegari	9/15	57	1.54	4.08	4.28	...	...	...	3.56 [2]	12.10 [2]
Pink kafir	9/20	72	2.28	4.19	5.27	4.12	5.12	1.57	3.76	12.78
Hogue corn	9/20	78	1.22	3.35	2.45	3.12	2.27	1.50	2.32	7.89

[1] In these tests the sorghum plants were spaced about 2 inches apart and the corn 14 inches apart within the row. The average planting date was June 1.

[2] Since Hegari was grown only during 1926-30, its average yield is calculated relative to that of Orange, Black Amber, and Pink kafir for that period.

ment of this station has fed Atlas sorgo silage to cattle during the last four years with the conclusion that, pound for pound, it is worth 90 per cent as much as corn silage. Other desirable characteristics are superior lodge resistance, leafiness, and value of the seed as a feed and market crop.

Atlas sorgo matures in about 130 days after planting, as compared with 120 days for east-central-Nebraska full-season corn, and is three weeks later than the well-known Black Amber cane. Because of its lateness, it can be depended upon to mature seed only in southeastern Nebraska although in some seasons it may ripen as far west as Custer county. Since it should be harvested for fodder or silage before fully ripe, its production for forage may extend over a much larger area. The western limit has not been well established.

Because of the shortage of Atlas sorgo seed as a result of the 1934 drouth, the seed supply should be greatly increased in 1935. Much of the seed sold in 1934 as Atlas was mislabeled and consisted of Hegari and other grain sorghum varieties. This also holds true for the current year. Unusual care must therefore be exercised in buying seed if true Atlas is desired. This problem would be simplified by the purchase and production of certified seed. Atlas sorgo has averaged an annual yield of 42 bushels of seed per acre when grown in cultivated rows during six years at Lincoln.

Hegari, a good substitute.—Hegari has yielded four tons more silage and a ton more cured fodder per acre than corn in a three-year test. It produces a good quality of palatable forage and is recommended under present conditions of very limited seed supply of the standard forage sorgo varieties, as a substitute for them. Hegari is grown extensively in the Southern Great Plains as a grain crop and the seed supply is ample and should be relatively low in price. Seed of this crop is being extensively advertised under the name of Early Atlas sorgo. One should not be misled by this, as it has no relationship whatever to the true Atlas variety.

SORGO, SUDAN GRASS, AND MILLET DRILLED FOR CURED FORAGE

Throughout a 14-year period, four varieties of sorgo or cane have been compared for yield of cured forage with Sudan grass and two standard varieties of millet. In this test (Table 2) the three kinds of crop have been sown with a grain drill at the respective rates of 95, 25, and 32 pounds of seed per acre. The Kansas Orange and Honey sorgo, with respective acre yields of 4.8 and 5 tons, averaged about two weeks later ripening than Black Amber which yielded 4.2 tons. Early Sumac sorgo was intermediate in time of maturity and yielded 4.6 tons per acre. It is apparent that the large, late-ripening varieties yield most in southeastern Nebraska where the growing season is relatively long. Northward and westward within the state the intermediate and early varieties become more dependable.

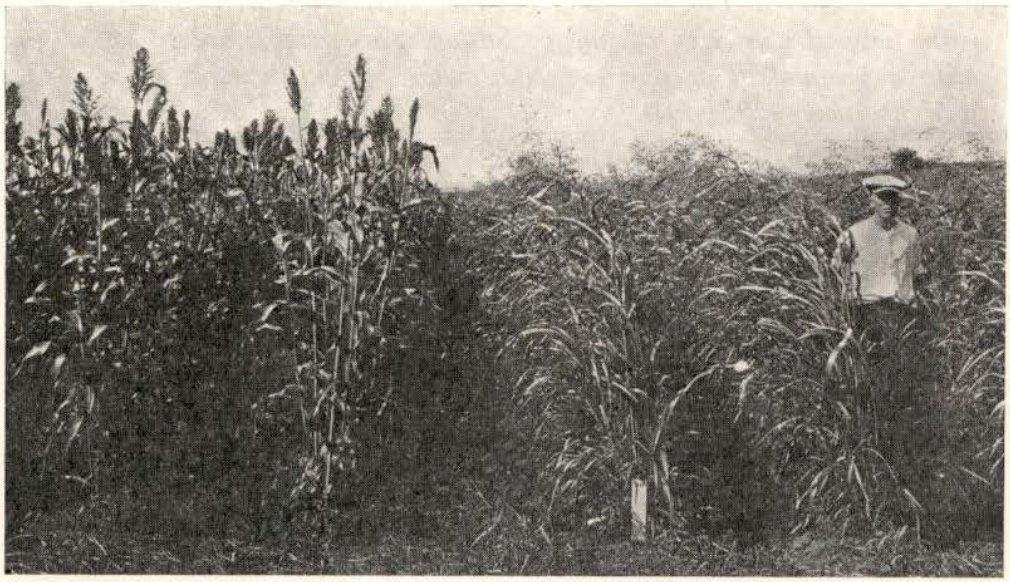

FIG. 1.—Black Amber sorgo (left) and Sudan grass (right) planted in 42-inch rows for forage.

Sudan grass yielded 3 tons per acre, or only 71 per cent as much as Black Amber sorgo. Its greatest value lies in use as a temporary pasture crop, since it can be pastured by livestock with little danger of prussic acid poisoning.

FIG. 2.—Black Amber sorgo (left) and Sudan grass (right) drilled for forage.

TABLE 2.—*Yields in tons per acre (15 per cent moisture) of cured forage from several varieties of sorgo, Sudan grass, and millet when sown with a grain drill at the respective rates of 95, 25, and 32 pounds of seed per acre—1921-34.*

Year	Sorgo				Sudan	Millet	
	Black Amber	Early Sumac	Kansas Orange	Honey		Common	German
1921	4.05	5.94	5.26	5.65	3.29	4.31	4.43
1922	4.67	4.05	4.53	5.19	2.77	4.26	4.25
1923	5.69	6.30	5.28	5.69	4.01	2.45	2.23
1924	4.19	4.31	4.25	4.24	2.93	3.00	2.97
1925	2.68	4.63	4.50	5.47	3.12	1.92	2.20
1926	3.56	2.94	3.15	2.89	0.76	1.39	1.11
1927	3.79	3.81	4.18	4.49	2.93	3.13	3.26
1928	3.45	5.28	5.57	5.23	3.09	3.21	4.85
1929	4.41	5.46	5.28	5.83	2.49	2.38	4.77
1930	3.74	4.89	5.34	5.43	3.43	2.73	3.44
1931	4.41	4.24	4.65	4.41	3.41	2.44	4.01
1932	7.22	4.35	6.21	6.06	4.31	5.32	5.22
1933	4.74	5.63	6.33	6.09	3.70	2.91	1.99
1934	2.70	2.63	2.46	2.84	1.93	0.00	0.00
Average	4.24	4.60	4.79	4.97	3.01	2.82	3.20
Relative	100	108	113	117	71	67	75

In comparison, alfalfa has averaged 3.35 tons per acre or 79 per cent as much as Black Amber sorgo during this 14-year period.

German millet, with an average yield of 3.2 tons per acre, proved slightly superior in yield to the Common variety but yielded only 75 per cent as much as Black Amber. On the same farm, though grown in different fields, Kherson oats has averaged 1.2 tons of cured forage per acre during the same 14 years. This is 29 per cent of the yield of Black Amber cane.

A comparison with alfalfa may be of interest. As an average for the 14-year period, established alfalfa meadows on the Experiment Station farm yielded 21 per cent less cured forage of equal moisture content than Black Amber cane. It must be borne in mind, however, that alfalfa has about six times the protein content of these other non-leguminous forage crops.

SOY BEANS FOR FORAGE

The soy bean, an annual legume, produces very palatable hay with high protein content when properly cured. The most productive variety, the Illini, yielded about 80 per cent as much cured forage as alfalfa and 45 per cent as much as Black Amber sorgo (Tables 2 and 3) on the Experiment Station farm during the three-year period, 1930-32. In this test, the soy beans were grown in cultivated rows spaced 36 inches apart. The Manchu variety yielded only slightly less than the Illini. Of the varieties commercially available, these two may be regarded as superior for hay production. They ripen seed about the same time as east-central Nebraska corn.

In the year 1932, the Manchu soy bean was tested for forage in both cultivated rows and in close drills sown with a grain drill. The yields

FIG. 3.—Soy beans in cultivated rows.

were nearly alike. Drilling requires about 85 pounds of medium-sized seed per acre compared with 35 pounds in rows. Soy beans are commonly much more subject to weed competition when drilled than when grown in cultivated rows. Much may be done toward weed control by working the soil just before planting, followed several times by a harrow or rotary hoe while the beans are small. The questions of seed cost, labor, soil erosion, and weeds should be considered in any decision on the manner of planting. Small fields of soy beans are often destroyed by rabbits.

TABLE 3.—*Comparative annual and average yields in tons per acre (15 per cent moisture) of six varieties of soy beans grown in cultivated rows spaced three feet apart—1930-32.*

Year	Aksarben	Illini	Ito San	Manchu [1]	Midwest	Virginia
1930	1.75	2.18	1.48	2.03	2.14	1.82
1931	2.20	2.39	1.73	2.00	1.81	1.92
1932	2.66	2.40	1.69	2.56	1.94	2.12
Average	2.20	2.32	1.63	2.20	1.96	1.95

[1] In 1932, the Manchu was also tested by close drilling with a grain drill and yielded 2.40 tons, compared with 2.56 tons in cultivated rows.

MANNER OF PLANTING FODDER CROPS

Drilling, broadcasting, and cultivated rows are used in the growing of sorghum and Sudan grass for forage. The highest yields were obtained from drilling in an eight-year test with Black Amber sorgo and Sudan grass at the Experiment Station (Table 4). In the case of the sorgo,

broadcasting yielded 85 per cent and cultivated rows 66 per cent as much as drilling. With Sudan grass, the broadcasting yielded 92 per cent and the cultivated rows 81 per cent as much cured forage as drilling.

TABLE 4.—*Comparative forage yields from Black Amber sorgo and Sudan grass when planted by various methods—eight-year average.*

Crop and method of planting	Amount of seed planted per acre	Plant height	Yield per acre of forage with 15% moisture content	
	Pounds	*Inches*	*Tons*	*Relative*
Black Amber sorgo				
Drilled	93	66	5.19	100
Broadcast	93	72	4.42	85
Cultivated rows	6	93	3.42	66
Sudan grass				
Drilled	31	74	3.42	100
Broadcast	31	74	3.15	92
Cultivated rows	4	83	2.77	81

When drilled at a rather heavy rate per acre as in this experiment, namely 93 pounds of sorgo and 31 pounds of Sudan grass, the stems are fine and there is relatively little waste when fed to livestock as cured fodder. A disadvantage of drilling or broadcasting is the higher seed cost. This is partially offset by the extra labor cost of cultivated rows. In these row-tests 6 pounds of sorgo seed and 4 pounds of Sudan grass were planted per acre. While these cultivated rows were sown at the customary rate used for seed production, maximum yields of forage may be expected from planting about double this amount of seed in eastern Nebraska.

The time of planting and approximate amount of seed per acre recommended for the various crops when grown for forage may be summarized as follows for eastern Nebraska.

Crop	Time of planting	Lbs. seed per acre, drilled	Lbs. seed per acre, in rows
Sorgo	May 20 to June 10	90	12-18
Sudan	May 20 to June 10	25	8
Millet	May 20 to June 20	30	..
Oats	March 20 to April 5	64	
Soy beans	May 20 to June 10	85	35

It is generally recognized that the amount of seed should be reduced somewhat westward within the state to offset the lower rainfall. For seed production of the full-season crops the earlier planting is most likely to result in full maturity.

In the yield tests reported in this bulletin, triplicate plats of 1/40 acre were commonly used. The yields of cultivated plats were obtained from the interior rows. Special precautions have been taken to assure comparable stands each year.

[10M]