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J. G. Ross

S. S. Bullis

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SOUTH DAKOTA STATE COLLEGE

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Oahe Intermediate Wheatgrass

Oahe (Oh-wah-hee) is a new intermediate wheatgrass variety bred and released by the South Dakota Agricultural Experiment Station. It is noted for high seed yield.

Inherent faulty seed production of present varieties has resulted in high seed cost and consequently a smaller acreage than the merits of intermediate wheatgrass would call for. It is recognized as a valuable hay and pasture grass. It produces nutritious and palatable forage and is higher yielding in most years than other adapted grasses, as shown by Experiment Station tests in South Dakota. It has a large seed that produces a vigorous seedling so that stands are easily established.

The plant has vigorous rhizomes and a fibrous root system which improves soil structure. Because of its drought resistance as well as its other desirable characters, it has been used successfully as a forage throughout many of the western areas of the United States. The greatest improvement, therefore, would be increased seed production.

Oahe is named after the Oahe Dam on the Missouri River in central South Dakota. The name is an abbreviation of the Sioux word for "Big House," a meeting place once located near the site of the present dam.

By J. G. Ross, Professor of Agronomy and S. S. Bullis, Technical Assistant in Agronomy

HISTORY

Oahe was selected from an introduction from Russia (P. I. 98568), which was obtained from Fort Collins, Colorado, in 1937. This was identified as the derivative of a cross between *A. intermedium* and *A. trichophorum* and was released as the variety, Ree, by the South Dakota Agricultural Experiment Station in 1945.

High seed-producing plants were selected in a nursery of self- and open-pollinated progenies by analysis of the percent seed set of each plant. After two succeeding generations of polycross testing and selection for high seed-set, forage yield, and rust resistance, four clones were chosen to make this synthetic variety. Breeder's seed of this synthetic variety will be maintained by the South Dakota Experiment Station. Oahe, prior to being named, was tested as South Dakota 20 in the Regional Variety Tests.

DESCRIPTION

Plants of Oahe are uniform for blue-green color, strong vigor, abundance of leaves, medium sized stems, height of approximately 44 inches, and rust resistance. Seed set

is high and the seeds are large and plump (when the grass is grown under favorable conditions).

SEED YIELD

South Dakota

All of South Dakota is adapted to seed production of intermediate wheatgrass, but it must be recognized that available moisture and nitrogen in a large measure determine the amount of seed produced. Therefore, areas of higher rainfall may be expected to produce higher seed yields.

Oahe has consistently shown high seed yield in all tests. Twenty plants of each of seven varieties were analyzed for seed production at Brookings, as shown in Table 1. A significantly higher seed weight per 10 heads was observed for Oahe than for any other variety. Likewise, when seed production is expressed in terms of a seed set rating, a correspondingly large advantage for Oahe is found. This high seed set is reflected in the high seed yield of this variety as discussed below.

Table 1. Mean Weight of Seed from 10 Head Samples and Seed-Set Rating of 20 Plants per Plot for Intermediate and Pubescent Varieties at Brookings in 1959

Variety	Species	Seed weight 10 heads, gms.	Seed-set* rating
Oahe	Intermediate	3.8	60.5
South Dakota 2	Intermediate	3.1	56.0
Ree	Intermediate	3.0	54.8
Amur	Intermediate	2.0	48.2
Greenar	Intermediate	2.8	55.0
Mandan 759	Pubescent	2.6	52.5
Least significant difference at 5% point		**0.6**	**5.7**

*Weight of seed in 10 heads/unthreshed weight.

Seed yields were obtained from four varieties of intermediate wheatgrass and three varieties of pubescent wheatgrass seeded in rows 3½ feet apart at Brookings in the fall of 1957. Oahe was the top seed producer in each of the 3 years of harvest as shown in Table 2. The consistency of the large differences indicate its superiority.

To obtain further information on the seed yielding capacity of this variety, tests were sown in the fall of 1958 at Cottonwood and Brookings, of 1959 at Eureka, and of 1960 at Highmore (Table 3). At Cottonwood in 1960, Oahe yielded significantly more than any other variety—nearly 200 pounds more than the next highest yielding variety. At Brookings in 1960 and 1961, the yields of Oahe were significantly more than any other variety. Yields were low at Eureka but Oahe demonstrated its superiority in both years tested. At Highmore in 1961 Oahe yielded 75% more seed than any other variety. It will be noted that where mean yields are computed for the four varieties included at the three locations, that Oahe outyields all others by approximately 50%.

Other Locations

The above yield results agree with those obtained at Moscow, Idaho, in 1959 where Oahe (South Dakota 20) yielded 713 pounds per acre, almost 200 pounds more than any other variety. At Mandan,

North Dakota, Oahe yielded 703 pounds of seed, which was 150 pounds more than the next high yielding variety. In western Canada seed yields of Oahe have been correspondingly above other varieties.

SEED TEST WEIGHT

Seed test weight is higher than any of the other varieties, as is also shown in Table 3. Oahe at Cottonwood in 1960 had a test weight per bushel of 20 pounds in comparison

Table 2. Seed Yields in Pounds per Acre from Intermediate and Pubescent Wheatgrass Seeded in the Fall of 1957 in Rows 3½ Feet Apart at Brookings

Varieties	Species	1958	1959	1960	Ave.
Oahe	Intermediate	268	128	355	250
$M_2$10820	Intermediate	200	100	291	197
Amur	Intermediate	214	109	240	188
Ree	Intermediate	228	89	171	163
Utah	Pubescent	74	40	234	116
A-1488	Pubescent	72	50	194	105
Mandan 759	Pubescent	249	94	226	189
Least significant difference at 5% point		**44**	**22**	**120**	**61**

Table 3. Seed Yields in Pounds per Acre in 1960 and 1961 from Intermediate and Pubescent Wheatgrass Varieties Seeded in Rows 3½ Feet Apart in Fall of 1958 at Cottonwood and Brookings and of 1959 at Eureka—Seeding in the Fall of 1960 at Highmore Was Made in Rows 9 Inches Apart

		Cottonwood							
		Test weight lbs./bu.	Yield	Brookings yield		Eureka yield		Highmore yield	
Varieties	Species	1960	1960	1960	1961	1960	1961	1961	Ave.
Oahe	Intermediate	20.0	716	502	329	142	104	266	343
Nebraska 50	Intermediate	18.5	520	—	—	79	32	—	—
South Dakota 2	Intermediate	19.0	487	414	266	81	45	—	—
Ree	Intermediate	17.5	406	—	198	66	—	138	—
Amur	Intermediate	18.8	385	357	221	73	95	131	210
Idaho 4	Intermediate	17.2	326	—	—	—	—	—	—
Idaho 3	Intermediate	17.0	325	—	—	—	—	—	—
Greenar	Intermediate	17.0	320	—	—	—	—	—	—
Utah 109	Pubescent	17.2	204	—	—	—	—	—	—
Topar	Pubescent	—	221	—	—	—	—	—	—
Mandan 759	Pubescent	16.8	485	384	145	79	78	152	221
Least significant difference at 5% point			**98**	**29**	**59**	**31**	**25**	**33**	—

to 18.8 for Amur, which had the next highest seed weight. At Mandan, also in 1960, the test weight was 22.7 for Oahe in comparison to 18.4 for Amur.

FORAGE YIELD

Yield of air-dry hay was also obtained from Oahe and other varieties during the same years. At Brookings (as shown in Table 4) for the years 1958-60, the yields of Oahe were either higher or equal to other varieties. In 1960 the forage yield of Oahe at Cottonwood was significantly higher than those of all other varieties, as shown in Table 5. At Eureka, Presho, and Highmore, Oahe ranked above all other varieties, while at Brookings it was just slightly below Mandan 759 (pubescent wheatgrass) in 1960 but significantly higher in 1961. The overall average yield is well above Amur.

At Mandan, North Dakota, in 1960 the above observations were true for the varieties included in the test at that location, except that Mandan 759 (pubescent wheatgrass) yielded significantly more forage. In Idaho in 1958 and 1959, Oahe and Ree yielded more forage than other varieties.

It therefore can be concluded that, in general, Oahe yields more forage than other varieties of intermediate or pubescent wheatgrass.

ESTABLISHMENT FOR SEED PRODUCTION[1]

For seed production, Oahe should be seeded on land free from noxious weeds, particulary quackgrass, since seed of this weed cannot be separated from intermediate wheatgrass seed and it is particularly difficult to rogue from the growing crop. Irrigated land is preferable since optimum moisture conditions can be maintained. Seeding on summer-fallow land in late August has been found the best time to seed, since annual weeds are not a hazard and sufficient growth is achieved to ensure winter survival.

The seed should be sown in rows approximately 3½ feet apart, at the

[1]For more detailed information regarding establishment, see Fact Sheet 42, "Starting and Managing Grass and Legume Pastures in Eastern South Dakota."

Table 4. Forage Yields in Tons per Acre from Intermediate and Pubescent Wheatgrass Varieties Seeded in the Fall of 1957 in Rows 3½ Feet Apart at Brookings

Varieties	Species	1958	1959	1960	Ave.
Oahe	Intermediate	1.02	1.28	2.16	1.49
$M_2$10820	Intermediate	1.11	1.24	2.18	1.51
Amur	Intermediate	0.99	1.13	2.13	1.42
Ree	Intermediate	1.02	1.20	2.04	1.42
Utah	Pubescent	0.60	0.72	2.08	1.13
A-1488	Pubescent	0.50	0.73	1.77	1.00
Mandan 759	Pubescent	1.04	1.04	2.01	1.36
Least significant difference at 5% point		**0.15**	**0.15**	**N.S.**	

rate of 3 pounds per acre. Where soil is subject to wind erosion, cross seeding with a cereal grain such as spring wheat or oats will provide a "living snow fence." Cultivation with corn cultivating machinery will keep down weed growth and preserve moisture for the grass seed crop.

FERTILIZING FOR SEED PRODUCTION

After a stand is established, application of fertilizer is recommended at the rate of about 66 pounds of nitrogen and 20 pounds of phosphorus to the acre; for example, 200 pounds of 33-0-0 and 50 pounds of 0-43-0 in the eastern areas. Under high moisture conditions, higher applications of nitrogen may be advantageous, while under dryer conditions the optimum amount of nitrogen would be less.

HARVESTING SEED[2]

Straight combining of the standing crop appears to be the easiest way of harvesting. The critical period at which harvesting should be undertaken must be determined with care since much seed will be lost if the crop is left too long. On the other hand, seed will also be lost if it is not sufficiently mature to thresh out of the head. It is recommended that combining be performed immediately when seed begins to shatter from the tips of the spikelets. If a windrower or binder is used, start cutting sooner.

[2]For more detailed information see Bulletin 502, "Grass Seed Production."

Table 5. Forage Yields in Tons per Acre in 1960 from Intermediate and Pubescent Wheatgrass Varieties Seeded in the Fall in Rows 3½ Feet Apart at Cottonwood, Brookings, Eureka, 1 Foot Apart at Presho, and 9 Inches Apart at Highmore

		Cottonwood, seeded 1958 harvested	Brookings, seeded 1958 harvested		Eureka, seeded 1959 harvested		Presho, seeded 1958 harvested	Highmore, seeded 1960 harvested	
Varieties	Species	1960	1960	1961	1960	1961	1960	1961	Ave.
Oahe	Intermediate	1.99	2.13	2.39	.61	1.26	1.74	2.71	1.83
Nebraska 50	Intermediate	1.67	—	—	.58	1.18	.96	—	—
South Dakota 2	Intermediate	1.38	2.01	2.24	.56	1.18	1.02	—	—
Ree	Intermediate	1.28	—	—	.50	1.12	.92	2.08	—
Amur	Intermediate	1.25	2.00	2.24	.48	1.22	1.09	2.05	1.47
Idaho 4	Intermediate	1.32	—	—	—	—	1.02	—	—
Idaho 3	Intermediate	1.21	—	—	—	—	.84	—	—
Greenar	Intermediate	1.18	—	—	—	—	.91	—	—
Utah 109	Pubescent	.80	—	—	—	—	—	—	—
Topar	Pubescent	.75	—	—	—	—	—	—	—
Mandan 759	Pubescent	1.47	2.20	1.81	.55	1.16	—	1.90	—
Least significant difference at 5% point		**.26**	**N.S.**	**.42**	**N.S.**	**N.S.**	**N.S.**	**.37**	—

Drying facilities such as an artifical dryer should be available for drying seed. Care must be taken not to use temperatures above 105° F. since viability of the seed may be destroyed at higher temperatures. Spreading the seed in a thin layer on a wooden floor such as the floor of a loft is a satisfactory alternate method. A moisture content of 10 to 13% will ensure safe storage.

LIMITED GENERATION INCREASE

In order to maintain the genetic purity and ensure the preservation of the desirable qualities of this variety, limited generation increase is essential. The Foundation Seed Stock Division established foundation fields in the falls of 1960 and 1961 from which Foundation seed is produced and distributed to the County Crop Improvement Associations. Foundation seed will establish certified fields which will produce certified seed. Certified seed will establish hay and pasture stands. Seed from such fields cannot be certified.

Production from Foundation fields is limited to 5 seed years. Production from certified fields is not limited as long as the fields meet certification standards.

(Project 182 Leader, J. G. Ross. Agronomy Department and project 250 Leader, C. J. Mankin, Plant Pathology Department.)