

AGRICULTURAL EXPERIMENT STATION

KANSAS STATE COLLEGE OF AGRICULTURE
AND APPLIED SCIENCE

MANHATTAN, KANSAS

BUFFALO ALFALFA

DEPARTMENT OF AGRONOMY



Buffalo alfalfa growing on the agronomy farm at Manhattan in a field adjoining Kansas Common. Buffalo is on the left and Kansas Common on the right. This field was seeded in the fall of 1940. Photograph taken in the spring of 1944. Bacterial wilt (*Corynebacterium insidiosum*) was the principal cause of the loss of stand in the Kansas Common. Presence of foxtail (*Hordeum pusillum*) in the Kansas Common is indicative of the poor stand.

BUFFALO ALFALFA¹

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INTRODUCTION

Buffalo alfalfa, a new variety obtained from Kansas Common by close breeding and selection, is important, particularly for its resistance to bacterial wilt. It was developed cooperatively by the Division of Forage Crops and Diseases, United States Department of Agriculture, and the Kansas Agricultural Experiment Station. Buffalo has been widely tested throughout the United States and the results of those tests, as well as tests made in Kansas, have been used in preparation of this circular. The Fort Hays and Garden City branch experiment stations in Kansas aided especially in the development of this variety by growing selected seed.

HISTORY

Buffalo alfalfa originated from an old strain of Kansas Common alfalfa which is known to have been grown in Kansas before 1907. The superiority of this strain over Kansas Common was brought to the attention of L. E. Call, then head of the Department of Agronomy, in the early twenties by W. J. Sayre, a farmer formerly of Chase county, Kansas. Seed was first planted on the agronomy farm at Manhattan in 1922. In that test it was equal to other Kansas Common strains in yield and quality of hay and in cold resistance, and was superior in longevity of stand. Seed was harvested in 1929 from selected plants in the plot sown in 1924. About 1,200 plants grown from that seed were spaced far enough apart to permit study and observation of individual plants. Further selections were made among these and seed was harvested from individual plants. The progeny of the selected plants were tested in observation nurseries for general agronomic character and in wilt nurseries for wilt resistance. The final selection was made after several years of close breeding in isolated blocks at the Garden City

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Branch Experiment Station, during which time selections for wilt resistance and agronomic characteristics were continued. This strain was recognized in 1942 by the Alfalfa Improvement Conference composed of those interested in alfalfa investigational work. It was assigned No. A-11 and tested in advance nurseries in a number of states. In 1943 this strain of alfalfa was named Buffalo. The first field of Buffalo alfalfa for seed production was planted on the Fort Hays Branch Experiment Station in 1942.

CHARACTERISTICS

Buffalo alfalfa, like all strains of common alfalfa, has a bluish-purple flower ranging from a light blue to a reddish-purple. It is upright in type of growth, has a medium-sized stem, and makes a medium to a leafy quality of hay. When grown by itself, Buffalo cannot be distinguished from ordinary Kansas Common alfalfa. Its growth in spring and fall is a little more upright than that of Kansas Common and it makes a slightly more rapid recovery after cutting.

ADVANTAGES

The main advantage of Buffalo alfalfa is its high resistance to bacterial wilt. As a result of this, good stands are maintained longer than is possible with varieties that are susceptible to this disease. Since about 1920, bacterial wilt has been a factor in the production of alfalfa in Kansas. The seriousness of the disease was recognized and varieties were tested to determine their resistance to wilt. Investigational work to develop new wilt-resistant varieties was started in 1929 and has resulted in the production of Buffalo.

In comparable tests with other varieties in Kansas, Buffalo has yielded nearly the same as other adapted varieties in new stands and has outyielded those varieties when the stands became older. This is illustrated in a test made at Manhattan on wilt-infested soil reported in Table 1, comparing Buffalo with several commonly-grown varieties. The varieties other than Buffalo listed in the table are susceptible to bacterial wilt and probably for that reason did not hold their stands more than three years. The stand figures for 1942 as shown in the table reveal this fact. The wilt-susceptible varieties, which had nearly a perfect stand

in 1939, as shown in the table, had no more than one-fourth stand in 1942, whereas Buffalo maintained its stand of 95 percent throughout the four seasons. The difference in



Fig. 1.—Foundation seed of new strains of alfalfa must be increased in well isolated fields to prevent crossing. This is an increase seed field on the branch experiment station, Garden City, Kansas.

stand is reflected in the hay yield in 1942 of Buffalo, the wilt-resistant variety.

TABLE 1. COMPARATIVE STANDS AND YIELDS OF HAY IN ALFALFA VARIETY TEST AT MANHATTAN, 1939-1942.

VARIETY	Percentage stand		Tons air-dry hay per acre (12 percent moisture)				
	1939	1942	1939	1940	1941	1942	Av.
Buffalo	95	95	3.26	4.01	3.53	3.26	3.51
Kansas Common	100	25	3.69	4.22	3.18	2.53	3.40
Grimm	98	12	3.25	3.92	2.97	2.50	3.16
Oklahoma Common	98	20	3.85	4.29	3.28	2.46	3.47
Dakota Common	98	6	3.50	3.94	3.23	2.85	3.38

In another experiment at Manhattan in which 50 strains and varieties were tested in the advanced nursery for three years, Buffalo outyielded the commonly-grown varieties, and only three Kansas selections that are being developed produced significantly higher yields. Yields of Buffalo and Ranger, the two new wilt-resistant varieties now being produced commercially, are shown in Table 2 in comparison with Kansas Common and Grimm, which are not wilt resistant. The lower yields of Kansas Common and Grimm in 1943 and 1914 are accounted for by the fact that bac-

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terial wilt affected the stand of those two varieties. Ranger alfalfa included in this test is a wilt-resistant variety developed at the Nebraska Agricultural Experiment Station in cooperation with the United States Department of Agriculture.

TABLE 2. COMPARATIVE YIELDS OF ALFALFA VARIETIES GROWN IN THE ADVANCED NURSERY AT MANHATTAN, 1941-1944.

VARIETY	Yield of hay, tons per acre (12 percent moisture)				
	1941	1942	1943	1944	Average
Buffalo	1.62	4.47	4.81	5.27	3.92
Kansas Common	1.75	4.04	3.59	3.48	3.22
Grimm	1.72	4.70	3.55	2.95	3.23
Ranger	1.61	4.80	4.07	4.31	3.70

Data in Table 3, reported by C. P. Wilsie, show similar results for a test on wilt-infested ground at the Iowa Agricultural Experiment Station, Ames, Iowa. The low yield of Kansas Common and Grimm in the third year and fourth year was due to the loss of stand caused by bacterial wilt.

TABLE 3. ALFALFA VARIETY TEST, IOWA AGRICULTURAL EXPERIMENT STATION, AMES, IOWA, 1941-1944.

VARIETY	Yield of hay, tons per acre (12 percent moisture)				
	1941	1942	1943	1944	Average
Buffalo	5.57	4.33	3.60	2.54	4.01
Kansas Common	5.78	4.59	1.75	0.60	3.18
Grimm	5.60	4.47	2.47	0.84	3.34
Ranger	5.39	4.43	3.55	2.34	3.93

As a result of his experiences, Dr. Wilsie had this to say about Buffalo, "I am much interested in this variety as our winter of 1942-'43 was severe, resulting in much winter-killing in the wilt-susceptible varieties. I had noted previously in our 1937 nursery that Buffalo stood our winters very well and a good stand remained for six years, at which time the test was discontinued."

Results of a similar test conducted at Davis, California, under irrigation and reported by Ogden C. Riddle, are given in Table 4.

TABLE 4. ALFALFA TEST, CALIFORNIA AGRICULTURAL EXPERIMENT STATION, DAVIS, CALIFORNIA.

VARIETY	Percentage stand		Av. yield, tons per acre (3 yrs.)
	1937	1943	
Buffalo	92	87	7.3
Kansas Common	90	32	6.7
California Common	95	42	7.8

Hay yields for 1940 to 1943 were not reported from California, but the stand figures given indicate that Buffalo with a stand of 87 percent would still be able to produce high yields while the yields of the two wilt-susceptible varieties with stands of 32 and 42 percent would be greatly reduced. The yields reported for 1937-1939, while stands were still similar, show that Buffalo is capable of producing as much hay as the common varieties under the conditions at Davis.

SEED PRODUCTION

Buffalo alfalfa is as good a variety for the production of seed as Kansas Common. This is important, not only for planting within the state but also for planting in other states. Seed of Kansas Common is desired for planting in a large section of southeastern United States. Buffalo is well adapted for growing in that section and somewhat farther north. It may be expected, therefore, that seed of Buffalo will be in even greater demand than that of Kansas Common. This is suggested in Table 5 which reports comparative seed yields of Buffalo and Kansas Common in several states.

TABLE 5. SEED YIELDS OF BUFFALO AND KANSAS COMMON IN ADVANCED NURSERY TESTS IN SEVERAL STATES.

STATION	Year	Yield in pounds per acre	
		Buffalo	Kansas Common
Hays, Kansas	1939	126	96
Nebraska	1939	217	223
Ohio	1939	43	57
Oklahoma	1939	38	19
Hays, Kansas	1940	189	178
Average		123	115

WILT RESISTANCE

Artificial inoculation tests with bacterial wilt show Buffalo to have high resistance to the disease and the results of the variety tests reported are proof of the resistance. There can be no question that Buffalo alfalfa is superior to standard varieties where bacterial wilt is a serious factor.

LEAF AND STEM DISEASE RESISTANCE

Information on resistance to leaf and stem diseases has been obtained from numerous advanced nursery tests in Kansas and other states, as reported in the uniform nursery

reports. These readings were obtained on such fungus diseases as leaf blotch (*Pyrenopeziza medicaginis*) leaf spot (*Pseudopeziza medicaginis*) and black stem (*Ascochyta imperfecta*). Averages of these comparable readings are given in Table 6. They show that Buffalo and Kansas Common have essentially the same degree of resistance to these several diseases.

TABLE 6. LEAF AND STEM DISEASE RESISTANCE OF BUFFALO AND KANSAS COMMON IN ADVANCED NURSERIES.

Year	Buffalo	Kansas Common
1938	3.2*	3.6
1939	3.3	2.3
1940	2.0	2.4
1942	4.3	5.1
Average	3.2	3.4

*Rated as 0—none, 5—medium, 9—defoliated.

RANGE OF ADAPTATION

Buffalo alfalfa is well suited for growing where Kansas Common is adapted. This is generally recognized as the central and southeastern areas of the United States, including the east-west range across the country at approximately the same latitude as Kansas and those areas south-east of Kansas. Because of the more rapid recovery of Buffalo after cutting, and its larger fall growth, it may be used more extensively than Kansas Common has been.

TABLE 7. STAND SURVIVAL OF BUFFALO AND KANSAS COMMON IN COMPARABLE TESTS IN ADVANCED NURSERIES IN NORTH-CENTRAL UNITED STATES.

YEAR	Number of states reporting	Percent of original stand	
		Buffalo	Kansas Common
1940	11	91	87
1941	3	89	87
1942	11	95	94
Average		92	88

Buffalo has a higher stand survival in the northern alfalfa areas of the United States than Kansas Common, as shown in Table 7. For this reason its range of adaptation probably will include areas somewhat north of the latitude of northern Kansas. Just how far north Buffalo may be expected to survive the winters successfully is being determined by further cooperative tests.