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5-1-1958

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Recommended Citation

Adams, M. W. and Semeniuk, G., "Teton Alfalfa, A New Multi-purpose Variety for South Dakota" (1958). *Bulletins*. Paper 469.
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BULLETIN 469 MAY 1958

AGRONOMY AND PLANT PATHOLOGY DEPARTMENTS
AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE COLLEGE, BROOKINGS

teton alfalfa

A NEW MULTI-PURPOSE VARIETY FOR SOUTH DAKOTA



ON THE COVER—Seed production in rows is the modern method of producing seed of new varieties. In the cover photograph, a field of Teton is being worked with a spring-toothed harrow for weed control.

teton alfalfa

A NEW MULTI-PURPOSE VARIETY FOR SOUTH DAKOTA

M. W. ADAMS and GEORGE SEMENIUK¹

TETON is a new hardy, disease-resistant, multi-purpose alfalfa variety, bred and released by the South Dakota Agricultural Experiment Station.

Its name comes from the Sioux Indian word meaning "the people of the prairies;" Teton also is the name of the largest tribe of the Sioux Nation in the Dakotas.

Origin

Teton was derived from a surviving population of plants which descended from an interspecific cross made at Brookings in 1914 by Dr. N. E. Hansen. Parental stocks of the first cross were (1) *Medicago sativa* (S.P.I. 20711), Hansen's Select Turkestan from Tashkent in Russian Turkestan, and (2) *Medicago falcata* (S.P.I. 24455), Hansen's yellow-flowered Siberian alfalfa from seed of wild plants collected near Semipalatinsk in Siberia.

Breeding

The first selections from these plants were made in 1949 at Brookings. After two generations of intercrossing and progeny testing, four selections were retained as the basic clones to produce this new strain.

Selection was practiced primarily for three attributes: resistance to bacterial wilt, resistance to common

leafspot, and low wide crown. When possible, selection was also based on vegetative vigor, seed producing potential, and general freedom from foliage diseases.

Superior hereditary contributions from the initial parents, plus natural selection from 1914 to 1949, has resulted in Teton possessing a high level of fitness to South Dakota climate.

Characteristics of Teton

Natural and breeder selection operating on a hybrid population from initially hardy and distinct parentage gives the new strain Teton many characteristics setting it apart from common alfalfa. These traits are discussed below.

High winter hardiness. Teton is superior to all other commercial varieties now grown in South Dakota, on the basis of our present information (table 1).

High frost resistance. This refers to late spring or early fall frosts while plants are actively growing.

Moderate resistance to bacterial wilt, induced by the bacterium, *Corynebacterium insidiosum*. Teton has a level of wilt resistance comparable to Ranger alfalfa, which, under normal conditions,

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Table 1. Relative Cold Resistance of Selected Alfalfa Strains at Brookings, 1956

Strain	Average Amount of Regrowth in Grams Fresh Weight of Comparable Plant Samples Following Freezing at -4° F. for 16 Hours
Teton	18.4
Semipalatinsk (yellow-flowered)....	16.2
Vernal	14.9
Ladak	12.5
Ranger	6.0
Rhizoma	4.6
Nomad	1.2
Arizona Chilean	0.0

has been adequate in South Dakota and adjacent areas (table 2).

High resistance to common leaf-spot, induced by the fungus *Pseudopeziza medicaginis*. Teton is definitely superior to all other varieties observed in South Dakota. This is a disease of the early or late summer that effects the leaves, causing discoloration and leafdrop (table 3).

Some resistance to alfalfa rust and yellow leaf blotch. Rust is not normally serious in South Dakota, but yellow leaf blotch frequently is quite costly in terms of forage quality.

High resistance to field infection by *Fusarium oxysporum* and *Fusarium roseum*.² This infection results in wilting and dying of top growth of common alfalfa. The data pertain to only 1 year's results. The disease may not normally be severe in South Dakota.

High forage yields of good quality in first cuttings. These yields have been essentially equal to our

previous best varieties, Ladak and Vernal.

Moderate dormancy after cutting and in the fall. Because of this dormancy, second cutting yields, when taken at the same time as standard non-dormant types, have been somewhat lower than these standard types. In the fall, individual plants of Teton form a rosette type of growth. This is really composed of a great many green leafy but unelongated crown buds. The rosette is formed as a response to the shorter days we have at this latitude in the fall. Rosetting is a trait that is associated with the ability to withstand extreme cold. Winter-tender plants do not go into fall dormancy in South Dakota.

Susceptible to the Spotted Alfalfa Aphid. This is the relatively new pest of forage and seed fields that thrives in the United States

Table 2. Reaction of Selected Strains of Alfalfa to Bacterial Wilt, Greenhouse 1956

Variety	No. of Plants	Score*
Buffalo	50	1.54
Ladak	50	2.04
Ranger	50	1.50
Rhizoma	50	2.97
Teton	50	1.49
Vernal (Wisc. grown seed) 50		1.31
Vernal (Calif. grown seed) 50		1.38
Vernal (Wash. grown seed) 50		1.46
Vernal (Utah grown seed) 50		1.47

*Scale of infection:—1=no infection, 4=severe infection.

²Central Alfalfa Improvement Conference Report, 1957.

Southwest and in the central and southern Great Plains. It has not yet become a serious pest in South Dakota, as this state is apparently too far north to allow the insect to over-winter successfully. All varieties grown in South Dakota are susceptible to this insect pest.

Seedling vigor and seed productivity. Teton is satisfactory but not superior in these characteristics.

Persistence under grazing conditions. We have learned that an alfalfa strain, in order to persist when continuously grazed, must have the following traits:

- (a) superior cold resistance,
- (b) dormancy at critical periods of the season,
- (c) low crown with aggressive rhizome production, (table 4)
- (d) bacterial wilt resistance

Teton possesses these traits, as a group, more markedly than any other variety we have tested. In a preliminary grazing trial at Brookings where continuous grazing by sheep was practiced from mid-summer to late fall in each of 3 successive years, plots of Teton-type persisted successfully and retained normal vigor, whereas plots of Nomad, Rhizoma, and the standard hay types have been almost completely eliminated.

Region of Adaptation

Because of its early vigor, winter hardiness, and leafspot disease resistance, Teton has appeared superior in test nurseries in South Dakota and adjacent northern states. Wider testing in the North Central Region would be desirable and such tests are being planned in

Aftermath recovery is a factor in persistence. Teton, left, shows delayed recovery; the associated grass is stimulated and relatively more abundant than in the case of Ranger alfalfa, right, where recovery is more rapid.





These photographs show growth form of representative plants of Teton, left, and Grimm, a typical hay-type, right. Teton plants tend to be semi-erect and broad-crowned, in contrast to the coarse, more erect, narrow-crowned hay type.

order to more adequately determine the area of adaptation. At this early stage, however, it seems best to define the region of adaptation as throughout South Dakota wherever a multipurpose variety is desired.

Recommended Use

Because Teton is a multipurpose type it can be used for hay, grazing, or seed in South Dakota. It is particularly suited to a program where it would be grown with a suitable

grass, cut for hay in early June, and grazed the remainder of the season. The moderate amount of aftermath dormancy tends to keep grass and legume growth more nearly in a state of vegetative balance and will therefore be less likely to cause bloat on farms where bloat has been a problem. Teton is sufficiently hardy and disease resistant to be able to withstand abuse on the farm.

With respect to seed production,

Table 3. Field Reaction of Alfalfa Varieties to Certain Foliage Diseases at Brookings, 1957

Variety	No. of Plants	Common Leaf Spot		Yellow Leaf Blotch		Alfalfa Rust	
		% Plants Infected	Severity of Infection*	% Plants Infected	Severity of Infection*	% Plants Infected	Severity of Infection*
Cossack	198	79.0	1.4	78.3	1.6	74.2	1.7
Grimm	196	58.5	1.4	75.4	1.6	79.0	1.6
Ladak	194	51.0	1.4	60.3	1.4	80.1	1.6
Ranger	189	58.7	1.7	72.5	1.6	85.7	1.8
Teton	191	2.6	1.5	29.3	1.1	40.0	1.1
Vernal	199	40.2	1.3	65.3	1.5	83.9	1.6

*Plants scored from 0 to 3, with 0 resistant and 3 susceptible.

Table 4. Rhizome Production of Two Alfalfa Strains Over 2-Year Period at Brookings (1955-56)*

Strain	1955			1956		
	No. of Rhizomes	Total Length (mm)	Fresh Wt. (gms)	No. of Rhizomes	Total Length (mm)	Fresh Wt. (gms)
Teton	92	493	62.1	427	2226	104.4
Rhizoma	46	223	21.8	189	722	40.2

*Data given refer to a 6-plot total for each strain. Each plot sampled by taking at random a 2-foot section of a row, excavated to a depth of 8 inches.

Teton may fill a timely need. Historically, South Dakota has been a seed exporting state; much of our seed has been produced in solid stands, essentially as a by-product of a hay enterprise in years when environmental conditions favored the taking of a seed crop. Seed of our old standard varieties—Grimm, Cossack, and Ladak—found a ready market in the midwest area. Today, this is not true. Newer superior varieties have been developed for much of the northeastern United States, and the older varieties are diminishing in popularity. South Dakota hardy seed is no longer a prized commodity. As a seed producing

state, we need to grow improved strains acceptable in the midwest and northeast. But it may be to our advantage to retain our present system of producing both hay and seed in South Dakota.

If a demand for Teton develops in areas of the midwest, South Dakota growers will be able to produce an improved, adapted forage variety for their own feed needs, and, when feasible, a seed crop of a commodity more readily saleable outside the state.

Method of Increase

We have been able to produce a relatively large quantity of first-

In preliminary grazing trials Teton, left, has maintained its stand and vigor when grown in association with grass while plots of Rhizoma, right, have become weed-infested and few alfalfa plants have persisted.



generation seed, termed Breeder Seed, because the basic clones were vegetatively propagated. If this seed is row-planted, at about a pound per acre, we anticipate approximately a hundred-fold increase at the level of the second-generation, the seed being Foundation Seed. This seed can be broadcast at 5 to 8 pounds per acre to be used as forage and for seed production by South Dakota growers. The seed produced on these fields, if grown under proper conditions of isolation etc., will be eligible for certification as Certified Seed, and can thus be accepted and merchandized to forage producers who want Certified Seed. Seed produced as a result of planting Certified Seed will not be recognized for certification purposes.

Our Goal

About 2.3 million acres of alfalfa are being grown in South Dakota (1957 Crop Reporting Service). Most of this acreage is planted to Common alfalfa, Cossack, Grimm, Ladak, and Ranger alfalfa. It is the

belief of Experiment Station Agronomists that over the next few years, as Foundation Seed of Teton becomes available, the older varieties on approximately one-half million acres should be replaced by Teton alfalfa, seeded in association with an appropriate grass. Foundation seed should soon be available in sufficient quantities to accomplish this goal.

Fields established in this way from Foundation seed may be used for forage and, whenever conditions are suitable, for seed. This seed would be certified seed, eligible for a premium market, if other conditions necessary for certification are met.

The benefit would be two-fold: first, South Dakota farmers and ranchers would have an improved dual-purpose forage type hardy enough to take abuse in their meadows and pastures; and second, whenever conditions allowed the taking of seed, they would have the opportunity of getting it certified and merchandized.

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