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[GRASS AND FORAGE PLANT INVESTIGATIONS.]

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SMOOTH BROME-GRASS.

(*Bromus inermis.*)

Smooth brome has been known in Europe for over one hundred and thirty years. The early agriculturists did not consider it of any value because of its creeping rootstocks, thus resembling the dreaded couch grass. In 1884, however, Stebler and Shroeter demonstrated by experiments conducted for thirty years at Magocs, Hungary, that it had the power to withstand long periods of drought when all other grasses succumbed.

These experiments resulted in introducing the grass into cultivation in Hungary where it still retains the name of Hungarian brome-grass. Its introduction to the United States must have taken place about the same time for we find the seed is offered for distribution in Bulletin 22 of the California Experiment Station, issued November 5, 1884, and the statement made that "our experience indicates that it will do well here either with or without irrigation." Since then the experiment stations of Colorado, Minnesota, Manitoba, North Dakota, South Dakota, and the different grass stations of the Agricultural Department, Washington, D. C., have conducted extensive experiments and all speak of it in the highest terms.

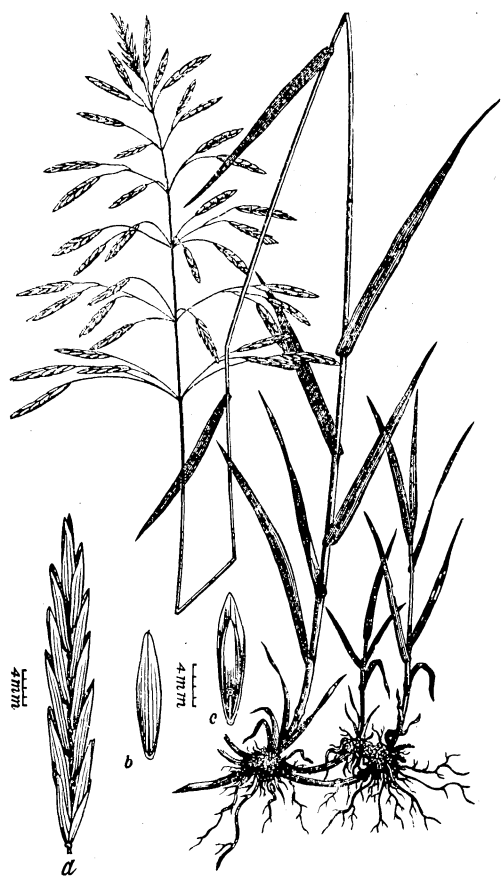

FIG. 1.—Smooth brome-grass showing rootstocks, seed-head, spikelet, and parts of flower.

GENERAL CHARACTERS.

Smooth brome-grass is a native of Europe and Asia, ranging from France eastward into Siberia, growing along roadsides, river banks, borders of fields and woods, and upon sterile hillsides and pastures. It is a vigorous, hardy perennial with strong, creeping rootstocks, smooth, upright, leafy stems, one to four feet high, and loose, open panicles, or "seed heads" four to eight inches long. In a few years it forms a very tough sod, soon crowding out other grasses, clovers, and weeds. Its remarkable drought-resisting qualities have proved it to be the most valuable grass for dry regions where other grasses could hardly exist.

As it is thoroughly permanent and grows with wonderful rapidity, producing heavy crops and luxuriant pasture, its value to the farmers of dry regions can not be over estimated. All kinds of stock eat it with relish and the chemical analyses made show that it is rich in flesh-forming ingredients, much more so than timothy. It is very hardy and not injured by severe spring and fall frosts when once established. As it starts to grow very early in the spring before any of the grasses upon the native prairies show any signs of life, and remains green and succulent far into November, it will supply the long-felt want of early spring and late fall pastures.

DISTRIBUTION OF SEED.

Since 1896 six hundred and three experimenters have received seed of smooth brome-grass from the Department of Agriculture, Washington, D. C. This distribution does not include the State experiment stations to some of which large quantities were sent. The packages sent out varied in amount from one quart to thirty-five pounds. The larger part of this seed was purchased from Russia by the Secretary of Agriculture and distributed directly by this Division, or through the Section of Seed and Plant Introduction. Almost every State in the Union is represented in this distribution as shown by the following table:

TABLE I.—*Number of experimenters and distribution of smooth brome grass seed.*

FISCAL YEAR.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Indian Territory.	Iowa.	Kansas.	Kentucky.	Louisiana.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.
1896–97	0	0	0	0	13	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1897–98	2	7	4	10	27	0	4	2	6	5	6	11	80	1	1	5	2	0	5	4	1	4
1898–99	0	0	0	8	1	0	2	2	0	1	0	3	4	2	0	0	0	1	2	1	1	2
Totals	2	7	4	18	42	0	6	4	6	6	6	14	85	3	1	5	2	1	7	5	2	6

TABLE I.—*Number of experimenters and distribution of smooth brome-grass seed*—Continued.

FISCAL YEAR.	Montana.	Nebraska.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.	Oklahoma Ter.	Oregon.	Pennsylvania.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Virginia.	Vermont.	Washington.	Wisconsin.	Wyoming.
1896-97.....	6	1	1	0	1	1	0	1	1	1	0	0	1	0	4	0	2	0	0	1	0
1897-98.....	37	28	0	11	8	3	34	9	6	28	5	0	22	9	27	6	4	0	33	11	12
1898-99.....	2	9	0	2	1	1	4	0	2	4	0	2	1	3	10	0	5	1	4	1	5
Totals...	45	38	1	13	10	5	38	10	9	33	5	2	24	12	41	6	11	1	37	13	17

The States receiving the largest amounts of seed as shown by the table, were Kansas, Montana, Texas, Colorado, Nebraska, North Dakota, Washington, and Oregon, in the order named. The North and South Dakota experiment stations have also systematically distributed large quantities of their home-grown seed throughout their State. In the former State it has been so distributed that it is now in the hands of farmers in all but two counties in the State.

METHOD OF SEEDING.

Smooth brome-grass will grow on almost any soil, but its productiveness depends upon the degree of fertility. It seems to germinate well on rich, moist land, but is also able to produce a crop where the soil is poor and the conditions unfavorable for the growth of other grasses. The land should be fall plowed and put in good condition by disking and spring-tooth or peg-tooth harrowing as the land may require. The seed may be sown as early as wheat is seeded, or it may be sown as late as the first of August or September if the land is kept from drying out and from growing weeds, by an occasional surface cultivation. In some parts of California, Washington, and Oregon it has been found better to sow in the fall during the months of October and November.

Some farmers have reported that they had succeeded in sowing the seed with a drill but the large majority abandoned it after a trial and sowed broadcast. The seed is very light and chaffy, weighing only fourteen pounds to the bushel, which makes it difficult to feed satisfactorily through an ordinary seed-drill. The most common plan is to sow broadcast by hand at the rate of from eighteen to twenty pounds per acre and harrow it in thoroughly with a peg-tooth harrow.

If proper seed-drills could be secured, there is a saving of seed, a better chance for germination, and a less likelihood for the grass to become "hide-bound," owing to its spreading rootstoocks, than when sown broadcast The seed may be procured from any of the large seed firms at the rate of about $2.25 per bushel of 14 pounds. When one is desirous of sowing a pasture or meadow and is limited in means,

the following method is recommended by the South Dakota Experiment Station:

"Purchase enough seed to sow a small parcel of land, say an acre. Use good clean land and keep out all weeds. Save the seed sown on this piece of land and sow it the next spring. In a few years a field of the desired size can be obtained at a comparatively small expense. By mixing red clover, alsike, alfalfa, millet, or other short-lived or more tender forage plants with the smooth brome a larger piece of land can be sown, and as these die out the brome-grass will spread and finally fill the field."

VALUE FOR HAY.

The yield of hay from smooth brome-grass varies from one to four and a half tons per acre according to climatic conditions, method of seeding, and fertility of soil. The quality of the hay is excellent, fully equaling that of timothy in palatability and nutritive qualities. In order to obtain the best product, the hay should be cut at time of full bloom. One important feature which distinguishes smooth brome-grass from other hay grasses is that it does not deteriorate rapidly after the flowering period and even if cut when the seeds are ripe the hay will have lost but little of its nutritive qualities, owing to the fact that after the seed-bearing stem has grown up a large number of leafy shoots spring up from the base. After furnishing three or four crops of hay the sod thickens up too much for a good growth of stems. This thickening occurs sooner if the grass is allowed to ripen seed, than it does when it is cut for hay, or if it has been seeded heavily at first.

VALUE OF PASTURE.

Smooth brome-grass is essentially an early spring and late fall pasture grass. After the hay crop has been taken off a heavy growth of aftermath or second growth springs up. It seems to be especially adapted for permanent pastures. After it has produced several crops of hay it thickens up, forming a very compact sod and a heavy growth of leaves. If one desires to use it for pasture at once it will be better to seed it thickly at the rate of about twenty-five pounds per acre.

As shown by the numerous testimonials received from all parts of the United States it is relished by all kinds of stock. Cows are very fond of it and are said to prefer it to timothy and even clover.

Mr. Gluyas, of Hofflund, Williams County, N. Dak., has tested the palatability of this grass for horses. Some seed was accidentally scattered over the native prairie sod. As a result, about two square rods of smooth brome-grass appeared in bunches. Horses which had access to the pasture cropped the smooth brome-grass close and left the prairie grass around it although the latter was still green and in good condition.

FIG. 2.—Smooth brome-grass.

KILLING THE SOD.

On lands where frequent rotation is desired smooth brome-grass should not be sown. Its creeping rootstocks resemble to some extent those of the common couch, or quitch-grass, and for this reason it is not so easily killed by turning under as the more common grasses used in rotations. Up to the present time the seed has been so scarce and expensive that few farmers who have secured a good field of the smooth brome have felt inclined to destroy the sod, so that our knowledge on this subject is limited.

The results of investigations carried on along this line at the Minnesota Experiment Station and the Manitoba Experiment Station at Brandon, prove that the sod could be thoroughly and successfully killed. It was found by these stations that a crop of hay can be harvested and taken from the land, and if the sod was plowed over immediately afterwards and backset in September, that at the latter date the grass would be all dead. When the grass was allowed to ripen seed, however, it was found that the new shoots at the base had gained such a foothold that when the sod was plowed under at this stage it was not killed at the time of backsetting in the fall.

HARDINESS.

Smooth brome-grass will withstand extreme changes in the temperature without injury. Its ability to produce good pasture during long periods of drought far exceeds that of any other cultivated variety. In Canada where it had been exposed to a temperature of several degrees below zero and not covered by snow it was entirely uninjured. Out of seven or eight hundred varieties tried at the Kansas Experiment Station this proved to be the best. Without doubt it is the grass for the semiarid regions of the West. From the reports received it is evident that it is very little influenced by the changes of climate. It does well in California, Kansas, Montana, North and South Dakota, Tennessee, Utah, Wyoming, and all parts of Canada.

RESULTS OF TRIALS IN FORTY STATES.

Out of six hundred and three experimenters receiving seed of smooth brome-grass two hundred and sixty have complied with a request from the Department for reports as to its success or failure.

During the seasons of 1898 and 1899 report blanks have been sent out to all those receiving seed of smooth brome-grass for trial, containing the following questions:

Kind, conditions, and preparation of soil?

Date and method of planting?

Cultivation, if any?

Date of harvesting and stage of maturity reached when harvested?
Date of full bloom?
Date of ripening?
Yield per acre (if practicable)?
Quality of product?
Notes on growth, probable value, etc.

The following table will indicate the number of reports received from farmers in the different States during the years 1898 and 1899:

TABLE II.—*Number of reports received from experimenters in the different States.*

FISCAL YEAR.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Indian Territory.	Iowa.	Kansas.	Kentucky.	Louisiana.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.	Montana.
1898	0	0	0	6	6	0	1	0	1	1	1	4	18	0	0	0	1	0	2	2	0	0	20
1899	0	1	0	3	3	0	0	0	2	2	0	1	23	2	0	1	1	0	3	2	1	0	10
Totals	0	1	0	9	9	0	1	0	3	3	1	5	41	2	0	1	2	0	5	4	1	0	30

FISCAL YEAR.	Nebraska.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.	Oklahoma Ter.	Oregon.	Pennsylvania.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Virginia.	Vermont.	Washington.	Wisconsin.	Wyoming.	Grand total.
1898	6	0	1	0	2	9	1	2	6	0	0	7	5	1	3	1	0	8	2	6	123
1899	12	0	6	1	1	13	0	2	5	1	0	15	2	8	1	1	0	6	3	4	137
Totals	18	0	7	1	3	22	1	4	11	1	0	22	7	9	4	2	0	14	5	10	260

By comparing Tables I and II it will be seen that in most cases the number of reports received correspond to the number of experimenters receiving seed, the most coming from Kansas with 41, Montana 30, North Dakota 22, South Dakota 22, and Nebraska 18. In California, Washington, and Oregon smooth brome will succeed with or without irrigation. In Colorado it retains its fresh green appearance until December, affording excellent pasture. During the severe droughts in Kansas, Montana, and Nebraska it dies down and appears dead but as soon as rain falls it becomes green again. It is now well established in the Dakotas and is grown extensively both for hay and pasture. In Indiana and Ohio it is said to make about the same growth as orchard grass but withstands dry weather much better.

Sufficient experiments have not been carried on in the South to enable us to state its value for that part of the country, but it is probable that it will be found of considerable value for winter grazing.

The following are a few of the reports which will show the great value that this grass has become to many of the States:

T. E. Pearce, Edgerton, Johnson County, Kans.: The land used was high prairie soil on the bluff of a creek, part of which is underlaid closely with rock. The soil was deeply plowed, disked, and harrowed down fine. The seed was sown broadcast on April 19, 1898, and then harrowed in lightly as the ground was in a very moist condition. I thought it had died out in the fall and so reported to you, because wild grasses had completely covered it up. In the spring of 1899, however, it woke up like a sleeping giant and covered the ground with dense foliage 1 foot high. It did not produce much seed but proved to be an excellent pasture grass. As the grass does not get tough like most grasses do, it is very tender to eat. The green growth starts very early in the spring and I think from what I have seen of it so far, that it will be a fine pasture and hay grass.

W. W. Heideman, Kalispell, Flathead County, Mont.: The land used was a rather light sandy soil plowed this spring. The seed was sown April 13, 1898, without a nurse crop, harrowed three times and then rolled. It bloomed August 5 and ripened September 15; while other grasses were drying up it retained a healthy green color all through the summer.

W. S. Delano, Custer County, Nebr.: The seed was sown broadcast May 14, 1898, and covered by light harrowing. One-third of it was sown with barley as a nurse crop. It made a very good stand but that sown with barley was almost a total failure. On account of the drought the growth was light. In the spring of 1899 it was pastured and then later a crop of hay was mowed July 10. After this cutting its tops dried and died down. In October, however, it started again from the crown and at this date, October 31, it is 3 inches high. It is an excellent grass, starting earlier in spring than alfalfa and thickens into a solid turf. As all stock like it, it promises to be an excellent grass for this section.

Messrs. Guill Bros., Chico, Butte County, Cal.: The seed was drilled in by hand on March 4 and covered two inches deep. The soil is a sandy loam and had been put into excellent condition by fall plowing and harrowing with a spring tooth harrow. The crop was cultivated three times. The vitality of this seed is remarkable. We had no rain to wet the ground for six months, from May to November, yet there was none of the grass that died from drought. The grass made a growth of about 8 inches during the season. During the autumn and early winter it had continued its development and is now in excellent condition. A plot of this grass was sown on October 21, broadcast and harrowed in, and is looking very well at the present time. It has withstood some of our severest winter weather without any ill effects.

W. R. Gluyas, Hofflund, Williams County, N. Dak.: The seed was sown broadcast at intervals from April 15 to November 10, 1898, on well prepared sandy loam and harrowed sufficiently to cover seed. On August 27, 1899, it was harvested for seed. When it had attained its full growth it was five feet 6 inches high and the yield per acre of hay would have estimated 4½ tons. It is an excellent hay and pasture grass, withstanding all the severe climatic conditions and is relished by all stock. When first sown it grows very slowly for a long time and does not make any crop that can be harvested the first year. It stands without any equal for both hay and pasture in the dry belt.

SUMMARY.

Smooth brome-grass is a vigorous hardy perennial with strong, creeping rootstocks, valuable alike for hay and pasturage.

The land should be fall plowed, disked and harrowed thoroughly, and the seed sown in the spring except in California, Oregon, and Washington, and probably in the Southern States, where it is preferable to sow in October or November. Sow broadcast at the rate of 18 to 20 pounds per acre and harrow in thoroughly.

The yield of hay varies from 1 to 4½ tons per acre according to climatic conditions, amount of seed sown, and fertility of the soil. In quality it is equal to timothy, both in regard to palatability and nutritive value.

It is essentially an early spring and late fall pasture grass, producing a very compact sod and a heavy growth of leaves. All kinds of stock eat it with relish.

It has remarkable drought-resisting qualities and is the most suitable grass yet introduced for the dry regions of the West and Northwest. When once established it will withstand a temperature of many degrees below zero without being injured.

Where frequent rotation is desired smooth brome-grass should not be sown as it is not so easily killed as the more common grasses used in rotations.

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Approved:

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