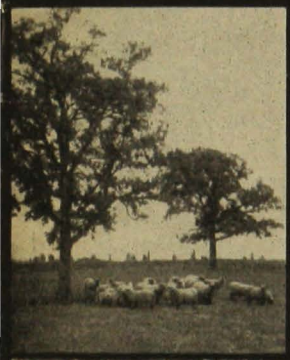
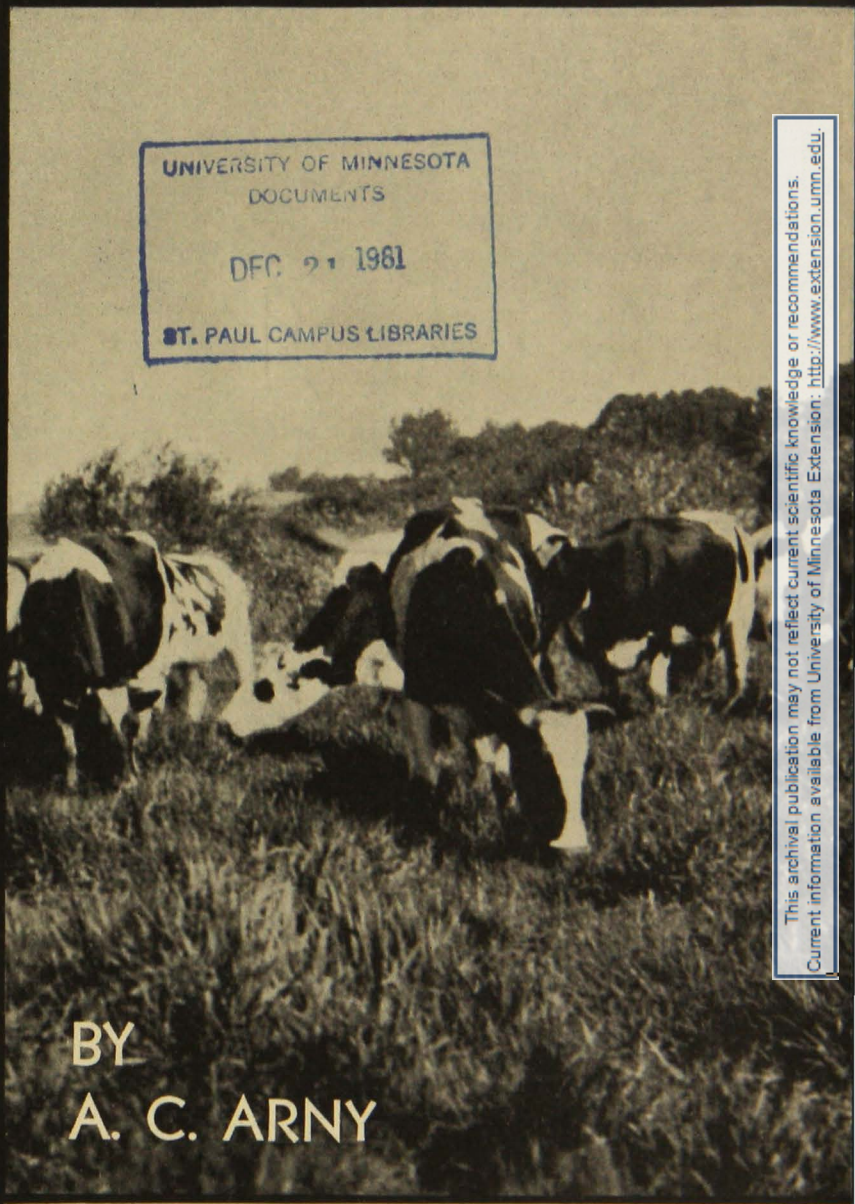
Extension Bulletin 137 Revised December 1939

REED CANARY GRASS FOR MEADOWS AND PASTURES





BY
A. C. ARNY

AGRICULTURAL EXTENSION DIVISION
UNIVERSITY OF MINNESOTA

Reed Canary Grass for Meadows and Pastures

A. C. ARNY, Division of Agronomy and Plant Genetics

REED canary grass *(Phalaris arundinacea)* is comparatively new among the tame forage and pasture crops in Minnesota. Although it grows wild in many parts of the state, it is not an important part of the wild hay crop at present. Farmers, mainly in the south central part, found that it produced high yields of hay on poorly drained lands mostly of a peaty or mucky nature. Many small, poorly drained areas which were bringing in practically no return became highly productive of a nutritious hay and pasture crop when this grass became established there. The success of reed canary in south central Minnesota on land too wet to produce other crops has led to extensive planting of this crop in other parts of the state on poorly drained soils.

Reed canary grass was first planted in the United States as a tame hay and pasture crop on a field scale in Minnesota in 1899. Two fields sown that year on peat soil in Blue Earth and LeSueur counties are still producing satisfactorily.

ADAPTATION

In the many areas where it grows wild, it is usually found on low-lying, poorly drained lands on which water often stands in the spring and for short periods at other times. It thrives in locations where the water table is practically at the surface of the soil all the time and above the surface part of the time. Where stagnant water covers the land most of the time it does not grow successfully. It is found in the beds and along the banks of shallow streams having been started from seed carried by the water.

No other forage crop, seed of which is available in quantity, will thrive so well on highly productive lands that are too wet for most other crops. On such lands, reed canary has yielded hay and pasture as valuable as, or more valuable than, the crops from equal areas of adjoining well-drained soils. It may be left undisturbed for several years, and thus the best returns are obtained from the investment in seed.

It should not be inferred that it is adapted only to peaty and mucky lands or that it will be equally successful on such land in any part of the state. Conditions may appear similar, but trial often proves that results differ. Reed canary appears to be well adapted to growing on well-drained mineral soils, but here it must compete with many other successful forage crops.

Yields of reed canary grass hay in comparison with those from other hay crops on well-drained mineral soil at Ames, Iowa, proved superior to timothy, brome grass, meadow fescue, and

tall meadow oat grass[1]. It is well adapted to wet mineral lands and should be a desirable hay and pasture crop on the mineral soils subject to overflow along the banks of the Minnesota and Mississippi rivers.

GROWING THE CROP

Securing a Stand

Farmers in Minnesota have learned to produce seed uniformly high in germinating power. Hence the purchase and use of genuine home-grown seed is attended with less risk than is incurred in using seed grown elsewhere. Trials indicate that seed produced in Oregon and Washington will produce successful stands in Minnesota if germination tests are satisfactory. Seed from wild plants, though attractive in appearance, is generally slow in germinating and low in total germination.

Experience has proved that it pays to prepare a good seedbed for reed canary whenever possible. When a well-prepared seedbed is provided, the plants need not compete with others already there and hence can more quickly establish a thick, even stand.

Whenever practicable, the land should be plowed in the fall and the reed canary seed sown as early as the land is in shape to work. When standing water is expected to interfere with getting on the fields in early spring, the plowed surface may be worked down well in the fall and the reed canary sown in October. Seed sown then will not germinate until spring.

Where large numbers of broad-leaved weeds will grow rapidly, either sow the reed canary seed as early in the spring as possible so it will get started ahead of the weeds, or else delay the seeding until late June or early July. The weeds can be killed by frequent disking or other cultivation prior to seeding. Reed canary seedlings are as hardy as those of timothy and other grasses; hence early seeding entails little danger of loss by freezing after growth has started. On the other hand, delaying the seeding until midsummer leaves time for plowing the land in the spring if it was not done in the fall.

Provided that they are not actually covered with water, bogs too wet to bear up horses and machinery during the open season may be seeded while all but the surface soil is still frozen. As soon as 3 or 4 inches of the surface are thawed out, the disk should be used to smooth the surface and work up a fair seedbed. Even if the land is wet, this levels the surface and makes conditions more favorable for the germination of the seed and the growth of the seedlings. Burning the weeds off such bogs enables the disk to do much better work. The burning may be done either in the fall or early spring. Burn when the grass is dry and a brisk wind is blowing so that the fire will pass over the field quickly and make a clean burn. If there is a danger of burning peat land, attention must be given to places where fire starts in it as soon as the surface is burned over.

Fertilizer Requirements

If any peat soil produces good crops of timothy and clover or small grains without any fertilizer, it will also produce good reed canary pasture or hay.

[1] Wilkins, F. S., and Hughes, H. D., "Agronomic Trials with Reed Canary Grass," Jour. Amer. Soc. Agron. 24:18-28. 1932.

However,most peat soils will not produce a satisfactory crop of any kind unless the proper fertilizer is applied either as stable manure or commercial fertilizer. Reed canary needs the same fertilization on peat soils as timothy and clover or small grains. Without fertilizer the yield will generally be very low, and whatever pasture or hay is secured will be of poor quality.

Except in the northwestern part of the state where phosphate alone is needed, both phosphate and potash are necessary to obtain satisfactory results with reed canary on most peat bogs.

The usual rates of application are 45 per cent phosphate, 100 pounds per acre; and potash, 200 pounds per acre. The fertilizer should be applied after the ground has been plowed and mixed with the peat as the seedbed is prepared.

Rate, Method, and Depth of Seeding

Sowing of 6 pounds per acre of good quality seed is recommended. The seed should germinate 80 per cent or better. If seed of lower germinating power is used, the amount sown per acre should be increased proportionately. Nothing is gained by sowing seed of other grasses or of legumes with that of reed canary. On land suitable to reed canary, it occupies the ground so completely that grass and legume plants growing with it are crowded out. On low-lying land, it is not advisable to sow reed canary seed in a grain crop.

Best stands of reed canary are obtained when the seed is sown on a firm well-prepared seedbed. The best planting depth for reed canary seed is from one-half to one inch. Many of the seeds planted deeper than this are not able to produce seedlings. Broadcasting the seed and covering with a cultipacker, or a harrow with its teeth tilted practically flat, keeps the seed near enough to the surface. On peat lands, the use of a heavy roller after the seed is sown firms the surface and provides good condition for germination.

Care After Seeding

If a thick stand of broad-leaved weeds is growing more rapidly than the reed canary seedlings, the weeds should be clipped back. This retards the weeds and does not injure the grass seedlings materially. Reed canary ordinarily should not be pastured at all the first season. Particularly on wet land, newly established stands should not be pastured until the sod is firm enough to prevent animals from cutting through. If a luxurious growth is made from spring seedings, it is preferable to cut it high as hay rather than to use it for pasture. The best pasture and hay crops are not produced until after a good sod has been established.

UTILIZING THE CROP

Reed canary grass forms a very firm sod when well established. Thus the crop can be readily utilized for either pasture or hay even on fields that were formerly too soft to bear up animals and machinery.

Pasture

Reed canary grass starts early in spring and continues growth later in fall than some other grasses. Where the necessary plant foods are plenti-

ful and the water in the soil is adequate, it produces a good pasturage throughout the entire growing season. Good reed canary pasture will usually carry better than a cow per acre throughout the grazing season. When Kentucky bluegrass pastures on high lands often produce little feed during August, this grass on low lands continues to furnish large amounts of feed.

In Minnesota, a stand established in 1899, cut for hay the first 15 years and pastured for the last 25 years, still has a smooth even sod providing good grazing. Just across the line fence is another pasture of wild grasses that is so hummocky that it provides very little feed.

In pastures where Kentucky bluegrass, reed canary, and red top grow in patches, it has been observed that these grasses are grazed in the order mentioned. The wide use of reed canary in permanent pastures on low-lying, poorly drained areas on farms in Minnesota and other northern states indicates that it is the best grass available for pasture on that kind of land.

Hay Production

Up to the time the panicles (seed-bearing parts of the plant) begin to appear, usually during the first 10 days in June in southern Minnesota, the crop is comparatively leafy. With the appearance of the panicles, the stems elongate until the first seed is mature, about the last of June. The stems often more than double in length during this short period and become more fibrous. The second and third crops produce practically no panicles, hence the hay of these crops does not become stemmy and resembles that of the first crop at the time the panicles begin to appear.

Growers who wish to harvest seed must let the crop stand until the seed has matured. As soon as seed has been gathered, the hay crop should be cut. Each day of delay in getting this crop off the fields delays the second crop. If cut when the seed is mature, large yields of comparatively coarse hay are obtained.

When hay is the only product desired, the cutting time should be determined by the yield, the composition of the hay, and its palatability.

Seed Production

Even when harvested at the proper time, yields of seed varied greatly on different fields in south central Minnesota the same season and on the same fields from one year to the next. Yields of from 40 to 100 pounds of seed per acre were most frequent. On a few fields where the stands of panicles were thick, yields of from 250 to 390 pounds of seed per acre were obtained.

Maturing of the seeds in the panicles is progressive. When the first seeds at the tips of the panicles are mature, as indicated by fully colored gray or brown hulls, other seeds lower down range in color to only a trace or none. The first mature seeds drop out and are lost before the rest are ready to harvest.

From the data given in table 1 it is evident that the more mature seeds, as shown by the amount of gray or brown on the hulls and plumpness as indicated by weight per 1,000, give a higher percentage of germination. The germination of seeds with the hulls removed is very low.

Table 1. Maturity, Weight per 1,000, and Germination of Reed Canary Seed

Color of hulls	Seeds of the various grades of color present	Weight per 1,000 seeds	Weight per 1,000 seeds	Germination 16 days
	per cent	grams	per cent	per cent
Entirely gray or brown	48.5	0.865	100.0	91.0
Down to 75 per cent gray or brown	23.5	0.775	89.8	83.5
Down to 50 per cent gray or brown	13.2	0.691	79.9	83.0
Down to trace of gray or brown	8.2	0.574	66.4	72.5
Entirely green	4.1	0.452	52.3	51.5
Trace of green	2.5	0.358	41.4	36.5

When to begin gathering the seed crop depends on how rapidly the work can be completed. If gathered by machine, the method employed exclusively in fields of any size in Minnesota, it is probably best to wait until the seeds in the upper half of the panicle are gray or brown in color. This stage of maturity is usually reached from the last week in June to the first week in July in the south central part of the state but may be earlier. Seed on native reed canary meadows in Becker county matured about July 22-25 in 1930 and July 18-22 in 1931. On a field where daily harvests were carried out on a series of plots in 1929, yields of more than 100 pounds of seed per acre were obtained over an 11-day period starting when the first seeds were ripe at the tops of the panicles. The highest yields were 163.3 and 160.3 pounds per acre on the third and fourth days of the 11-day period. In 1930 this field yielded 43.7 pounds of seed per acre. A near-by field yielded 68.5 pounds per acre on July 2 and by July 9 yielded only 6.7 pounds per acre.

Three growers of reed canary in southern Minnesota invented and perfected a machine that harvests the seed rapidly and economically. In making the machines, old binders were remodeled at a low cost. A set of four blueprints showing details of the machine for harvesting reed canary seed and a mimeographed circular giving valuable suggestions for its construction are available.[2]

When the large hopper of the machine is filled with panicles, they are transferred to a wagon having a box rack lined with canvas, in which they are hauled to the drying sheds.

Drying and Threshing the Seed

The plan followed by Minnesota growers is as follows: The seed shattered out in harvesting is usually kept separate from the panicles and spread either on canvas and dried in the sun during the day or in a separate place in drying shed. It is stirred several times daily to prevent heating. The panicles are spread about 4 inches deep on canvas or on a floor under cover and turned regularly six to eight times daily for the first few days to prevent heating. After the drying process has continued for 2 to 3 days, the seed that has shattered out is removed from underneath the panicles so it can dry more rapidly. After the panicles are thoroughly dry, the seed remaining in them is beaten out with a fork. Small

[2] A circular entitled "Machine for harvesting reed canary seed," by A. J. Schwantes, and four blueprints may be obtained for 25 cents from the Bulletin Office, University Farm, St. Paul.

amounts of seed usually remain in the panicles when threshed in this manner. Seed threshed from these panicles by a clover huller has many of the hulls removed and hence is very low grade. Best results from the seed left in the panicles may be obtained by scattering the panicles on land where a stand of reed canary is desired.

When a combine is used to gather and thresh the seed, adjustments must be made so that the panicles are cut with as few leaves included as possible and the seed is threshed without removal of the hulls. Since much of the seed is still green when combined, care must be exercised to prevent heating in the drying process.

YIELDS AND COMPOSITION OF REED CANARY HAY

Yields of hay and percentages and pounds per acre of crude protein for hay harvested at different stages of maturity during the 3-year period, 1929-1931, are given in table 2.

The samples analyzed were dried without exposure to rain or dew. Hay bleached in drying has a distinctly lower crude protein content. After the seed has matured the panicles die off, but the stems below the first leaves and the leaves remain green and succulent. This characteristic accounts for the comparatively slow decline in the protein content of the crop after the seed has matured.

Considering yield and quality of hay for feeding to dairy cattle, it appears desirable to harvest the first crop of reed canary between the time the panicles begin to appear, from June 1 to 10, and the time the majority of them are out, from June 10 to 20, in southern Minnesota. This results in a medium yield of hay high in crude protein content and with a palatability very similar to second-crop hay. Harvesting the first crop during that period has the further advantage of giving the second crop an early start with the possibility of obtaining a third crop or considerable fall pasture after the second cutting. It is probably inadvisable to harvest a third crop of hay from meadows that are to produce seed the following year, or to pasture them after the second crop has been removed. Harvesting the first crop this early often has the disadvantage of competing for labor with corn cultivation.

Except when seed is to be gathered, there is nothing to be gained by putting off the hay harvest longer than from the middle to the last of June. Observations indicate that the hay harvested June 30 and later was somewhat coarse.

Table 2. Average Yields of Reed Canary Hay per Acre, 1929-1931, Crude Protein per Acre, and Crude Protein Percentages, 1929-1930, on a 15 Per Cent Moisture Basis

Dates of harvest	Height, first cutting	Hay yields			Crude protein yields			Crude protein	
		First cutting	Second cutting	Total	First cutting	Second cutting	Total	First cutting	Second cutting
	in.	tons	tons	tons	lbs.	lbs.	lbs.	per cent	per cent
6-1	9	0.7	2.9*	3.6	283	677*	960	16.67	11.32
6-10	16	1.2	2.1	3.3	343	467	810	14.21	11.03
6-20	31	1.6	2.2	3.8	369	481	850	11.49	10.83
6-30	37	2.3	1.9	4.2	428	442	870	9.99	10.86
7-10	38	2.3	1.7	4.0	402	382	784	9.08	11.17
7-20	38	2.8	1.4	4.2	544	399	943	9.62	12.93
7-30	38	3.1	.....	.....	558	.....	.....	8.53	.....

* Includes third cutting.

Table 3. Average Yields per Acre of Reed Canary Hay and Crude Protein; also Crude Protein Percentages, all on 15 Per Cent Moisture Basis

Year	No. of fields	Hay yields			Crude protein yields			Crude protein	
		First cutting	Second cutting	Total for season	First cutting	Second cutting	Total for season	First cutting	Second cutting
		tons	tons	tons	lbs.	lbs.	lbs.	per cent	per cent
1929	15	2.8	1.6	4.4	528	367	895	9.43	11.76
1930	20	2.5	2.0	4.5	439	405	844	9.39	10.61
1931	19	2.4	2.0	4.4	.....	.....	.....	.....	.....

Second and third crop hay should be cut as soon as it has ceased making comparatively rapid growth.

Hay yields were determined on a number of reed canary meadows in south central Minnesota for the 3-year period, 1929-1931. The results are given in table 3.

The first cuttings were made during the last of June and the second during early September. Both 1930 and 1931 were years of low rainfall. On these low-lying peat and muck fields the yields averaged as high as in 1929 when rainfall was more abundant.

On some fields the application of nitrogen fertilizers resulted in higher yields and on others there was no increase. On one field barnyard manure applied in spring to a strip through the center of the field brought an increase of 1.7 tons of hay containing an additional 114 pounds of crude protein per acre above the yields obtained from the adjacent unmanured area.

Hay yields from the first cutting were determined in 1930 on a number of bogs where wild reed canary had established pure stands. On three such areas in Becker County the yields on a 15 per cent moisture basis were 2.8, 3.2, and 3.7 tons per acre. In Ramsey and Washington counties the yields ranged from 1.4 to 1.8 tons per acre.

PALATABILITY AND FEEDING TRIALS OF THE HAY

Farmers who have been feeding reed canary hay cut before it became too coarse have found it palatable to all kinds of livestock.

At the Southeast Experiment Station at Waseca, good second-crop reed canary hay was as palatable to cattle, after they became accustomed to it, as good timothy and was superior to wild hay. It was less palatable than alfalfa hay.

A brief feeding trial indicated that dairy cows did not like a sudden change from alfalfa to reed canary hay. They ate only half as much at first, and their production dropped. Gradually they ate more of the hay, but not enough to keep up the milk flow maintained on alfalfa. The crude protein content of the second-cutting reed canary hay used in the trial was 12.7 per cent.

At University farm, colts made better gains on less feed when reed canary was the roughage part of their ration than when they were fed prairie hay.[3]

[3] Harvey, A. L., "Reed canary grass hay for fillies." Proceedings Amer. Soc. Animal Production 29:114-115. 1936.

UNIVERSITY FARM, ST. PAUL, MINNESOTA

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Division and United States Department of Agriculture Cooperating, P. E. Miller, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914. 15M-12-39