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**MILLET
 BUCKWHEAT
 AND
 ANNUAL
 CANARYGRASS
 PRODUCTION IN MINNESOTA**

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Millet, Annual Canarygrass, and Buckwheat

Production in Minnesota

R. G. Robinson¹

MILLET, annual canarygrass, and buckwheat are grain crops. Millets, particularly foxtail, are also forage crops. They are low-income crops, but their low cost of production and their uses for weed control, bird feed, and emergency crops make them valuable to certain farmers and Minnesota's economy. Millet and buckwheat can be used as second crops following early crops such as canning peas.

The increased feeding of wild and tame birds will probably maintain or perhaps increase demand for millet

and canarygrass seed. The outlook for buckwheat is less favorable due to low consumption of buckwheat flour.

MILLET

Proso and foxtail millets have long been used as grain and forage crops. Proso varieties are now grown for grain for the bird feed market. The usual farm prices have been 1¼ to 1¾ cents per pound for red-seeded and 1½ to 2 cents per pound for white-seeded varieties. Seed color refers to color of hulls. The hulls remain on the grain after threshing in similar fashion to oats and barley.

Foxtail varieties are generally grown for hay or silage but they are also good seed producers. Foxtail seed is usually higher priced than proso because only enough for the planting seed market is generally harvested. For bird feed, it brings about the same price as proso but demand is less.

Legal bushel weight for millet is 48 pounds in Minnesota. Some other states use 56 for proso, 50 for foxtail,

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and 35 for Japanese. As a result, millet is sold by the pound or hundredweight.

KINDS AND VARIETIES

Five millet species are of commercial importance: proso, foxtail, barnyard (Japanese), browntop, and pearl.

Proso or Hog—Most of the proso millet crop is used in grain mixtures for parakeets, canaries, finches, lovebirds, cockatiels, and wild birds. The grain is also fed to sheep, cattle, hogs, or poultry. It is similar to oats or barley in feeding value. Millet should be ground for livestock other than poultry. In the Orient, dehulled proso is used in soups and the ground meal is an important cooked cereal.

Red (orange) seed is preferred by some dealers in wild bird feed because it looks better than white in mixed grain. However, there is no price discrimination and white is freely used in wild bird feed mixes. Early Fortune and Turghai are the only available red-seeded varieties. They are the best millets for most farmers because they have a large market, are early maturing, and are dependable in yield. Certified seed of Early Fortune is not available. Trials at Rosemount of Early Fortune and certified Turghai from North Dakota, Colorado, and Nebraska showed very little difference between them. Tests in Nebraska indicated that Turghai yields more than Early Fortune.

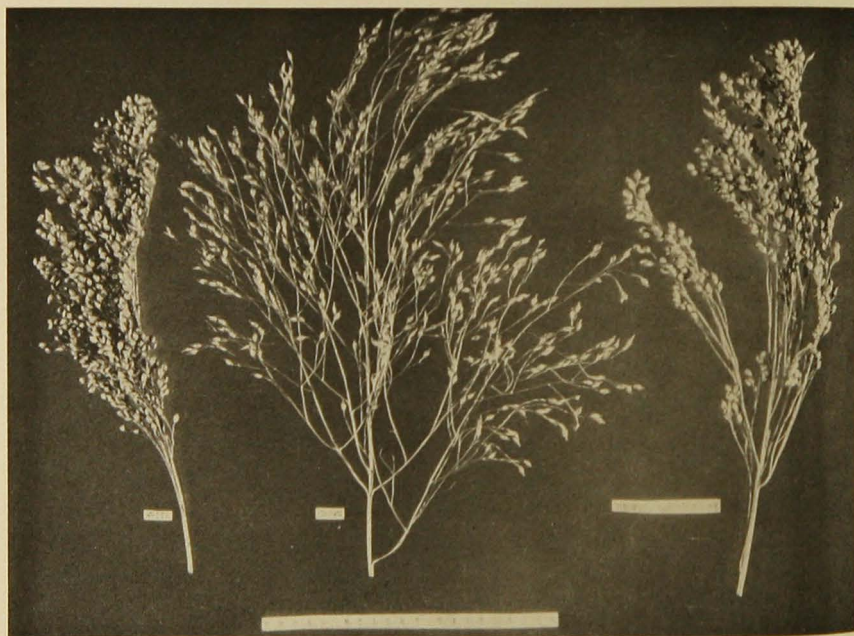


Fig. 1. Proso millets have panicle (branched) heads. Left: White; center: Crown; and right: Turghai, Early Fortune.



Fig. 2. Proso millets—left: Crown; right: Red Turghai.

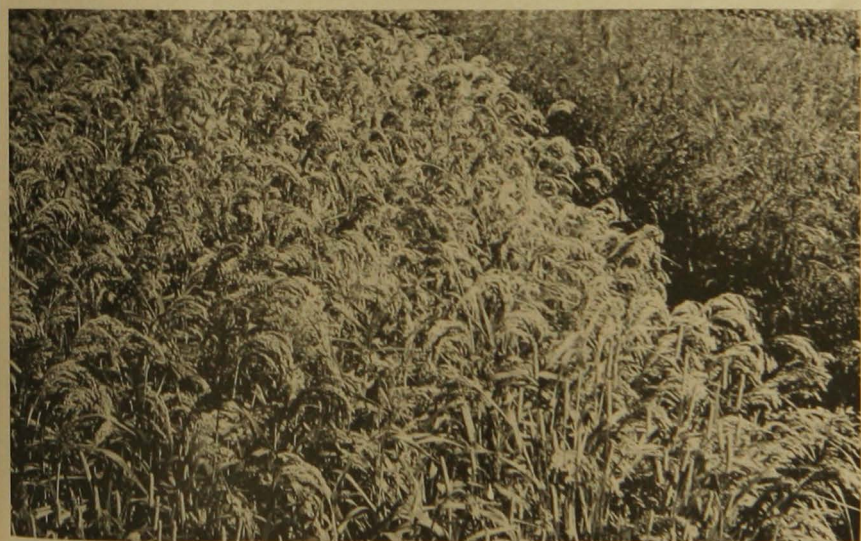


Fig. 3. White Proso in foreground; Early Fortune in rear.

Varieties of white-seeded proso are no longer available. Therefore, White Proso has practically become a variety name for all white-seeded lots. Only white-seeded proso is accepted for parakeets and canaries. It is generally slightly higher priced than red-seeded varieties if pure and of good quality. Otherwise, its price is the same as for red. White Proso is later maturing and somewhat lower yielding than red varieties.

Crown is the earliest maturing proso and is an excellent variety. However, its gray-colored seed is usually not marketable because bird feed mixers won't use it. For forage, Crown is bet-

ter than other proso but inferior to the best foxtail varieties.

Broomcorn millet is sometimes used as a general term for proso. However, some yellow seedlots sold under this name were smaller seeded, later maturing, and lower yielding than red or white varieties.

Foxtail—Foxtail millet is usually grown for hay or silage. Some seed is used in finch feeds and wild bird feeds. It does not necessarily yield more forage than proso but is free of foliage hairs and is finer stemmed.

Hungarian, Siberian, and Manta are very early maturing (later than proso) and low in forage yield. Hungarian is

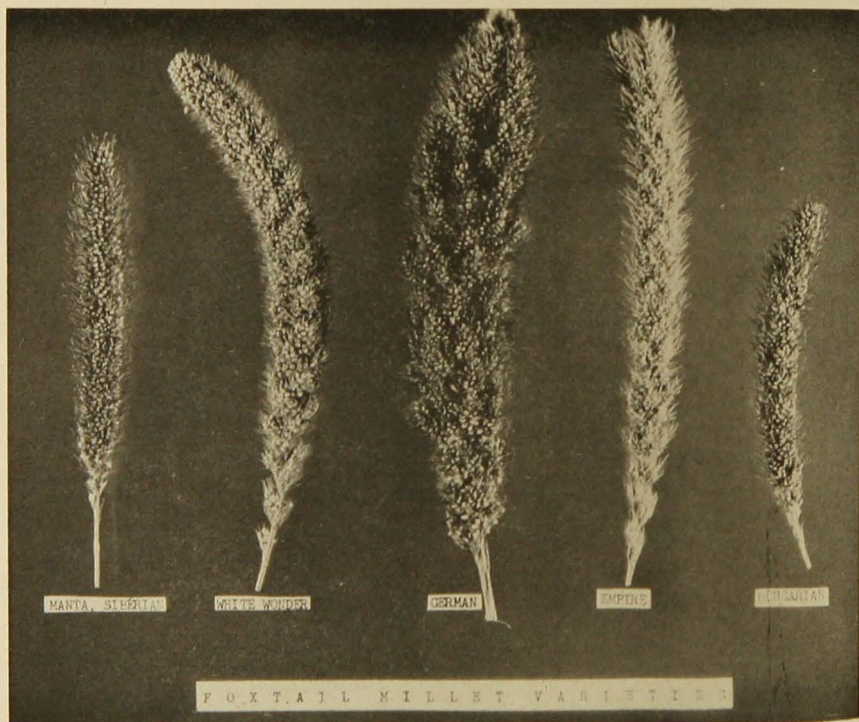


Fig. 4. Foxtail millets have spikelike heads.



Fig. 5. White Wonder (left) is taller and later than Manta (center foreground).

of mixed seed color—yellow, black, and brown. Siberian has both orange and straw colored seeds. Manta has orange seeds. Manta is the newest adapted millet variety and was released by the South Dakota Agricultural Experiment Station in 1958. Even though short strawed, all three varieties may lodge severely.

Empire, White Wonder, and German have yellow seeds. They are later maturing, taller, and produce more forage than Hungarian, Siberian, or Manta. Empire is the earliest and the best for seed production. However, it lodges more than White Wonder or German so is not as desirable on heavy soil in eastern Minnesota. White Wonder approaches the maturity borderline for seed production but stands fairly well and is a good variety. German and its strains are too late for profitable seed production but pro-

duce a soft feeling, good quality millet hay.

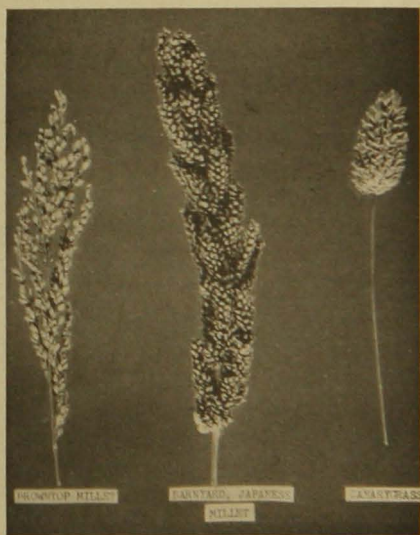


Fig. 6.

Barnyard or Japanese—Barnyard is a high yielding but coarse forage millet. It resembles barnyard grass weed except that it has no beards. It is a good seed producer but shatters sooner than proso or foxtail varieties. It makes regrowth after cutting or grazing.

Browntop—Browntop is used in the South for bird and quail feed plantings on game preserves. It is sometimes sold to Minnesota sportsmen for this purpose. Seed and forage yields were low in Rosemount tests and it did not compete well with weeds.

Pearl or Cattail—Pearl millet is preferred over sudangrass as a forage crop in southeastern United States. Starr and Gahi are improved varieties. Starr did not produce seed at Rosemount and was inferior to foxtail varieties in forage yield. Unlike other millets, the seed threshes free of the hulls. Therefore, it is unsuitable for birds that prefer to dehull their own grain.

SEED TREATMENT

Seed treatment of planting seed is suggested. A normal-looking seedlot of Hungarian was sown at Rosemount and produced nearly all smutted seed. The same seedlot treated with Ceresan M produced a normal yield of smut-free seed.

Don't sell or use treated seed for bird feed!

METHOD, DEPTH, AND RATE OF SOWING

Although millet seed is small, it can develop extreme elongation of the first internode and emerge without difficulty from 1 inch or deeper unless a hard crust forms. Drilling shallow on a good seedbed is generally better

than broadcasting the seed and then dragging or cultipacking to cover. Seed should be in moist soil below the dry lumps on the surface.

Calibrate the grain drill for the desired sowing rate. Suggested rates of sowing per acre are: 30 to 40 pounds for proso, 20 to 30 pounds for foxtail, and 35 pounds for Japanese. For grain drills lacking a millet scale, approximate settings expressed in pecks of oats are: 3 for proso, 2½ for foxtail, and 5½ for Japanese.

TIME OF SOWING AND WEED CONTROL

Millet tolerates a wide range of sowing dates. However, because of length of growing season and need for weed control, sow it from June 15 to July 15 for grain production. Heavy germination of annual grass weeds—pigeon and barnyard grass in particular—should be completed so that seedbed preparation destroys them. Otherwise, these weedy grasses grow and are combine-harvested with the crop. Grain-cleaning machinery removes these weed seeds from the millet. Nevertheless, losses are high because the screenings contain good millet that could have been bird feed quality.

In northern Minnesota, sowing of later-maturing varieties may need to be completed in June to allow sufficient growing season for seed production.

Because of late planting, early harvest, thick growth, and tolerance to 2,4-D, millet is an excellent control for annual weeds, quackgrass, and thistles. More use should be made of this crop on Minnesota farms for low-cost weed control. Proso millet can be sprayed with 2,4-D, amine, at rates of ½ to ¾ pound per acre.

Table 1. Comparison of millet varieties with sudangrass and Sorghum alnum at Rosemount

Variety	Years of trial	Seedling vigor*	Date heading	Height	Lodging score†	Forage			Grain			
						Date cut	Moisture	Protein‡	Yield per acre‡	Date cut	Weight per 100	Yield per acre
Early Fortune	1958, 1960-1961	2.8	August 4	43	1.9	August 9	82	15.3	3,000	September 13	.58	2,431
Turghai§	1958, 1961	2.8	August 4	41	1.7	August 9	81	14.6	3,327	September 13	.60	2,489
White Proso	1958, 1960-1961	3.2	August 4	41	2.7	August 9	80	14.7	2,352	September 19	.66	1,742
Crown	1958, 1960-1961	1.0	August 5	43	2.6	August 9	79	13.3	3,945	September 13	.60	2,425
Broomcorn§	1960-1961	3.5	August 12	41	2.1	August 15	82	13.0	2,565	September 26	.47	1,538
Hungarian	1958, 1960-1961	1.2	August 9	36	6.0	August 15	78	12.0	3,680	September 28	.22	1,603
Siberian	1958, 1960-1961	1.5	August 10	33	6.1	August 15	79	11.9	3,379	September 28	.26	1,419
Manta	1958, 1960-1961	1.2	August 10	30	5.4	August 15	79	12.3	3,811	September 28	.27	2,091
Empire	1958, 1960-1961	2.5	August 22	45	5.0	August 27	79	10.8	5,544	October 2	.19	1,886
White Wonder	1958, 1960-1961	3.0	August 27	49	3.4	August 29	79	10.3	5,344	October 5	.23	1,670
German 8	1958, 1960-1961	3.3	September 6	43	1.3	September 12	73	9.4	5,782	October 9	.12	291
Barnyard	1958, 1960-1961	1.0	August 27	55	1.2	September 1	80	9.7	7,101	September 28	.36	1,785
Piper sudangrass	1958, 1960-1961	1.5	August 21	77	2.2	August 28	80	8.5	5,163	October 9	.79	789
Sorghum alnum§	1960-1961	2.9	August 30	82	1.7	September 4	74	7.7	7,967	October 9	.67	308
L.S.D. at 5 percent level							1		546			324

* 1 most, 5 least.

† 1 erect, 9 flat.

‡ 15 percent moisture basis.

§ Data for Turghai, Broomcorn, and Sorghum alnum adjusted because of missing year so as to be comparable with other varieties.

TIME OF HARVEST

Proso millet holds its grain until maturity and then shatters badly if harvest is delayed more than a few days. The plants still have green leaves when the grain is ripe. Therefore, windrowing is necessary to dry out the straw before combining. If a freeze kills the plants or if a grain dryer is to be used, the standing crop can be combined without windrowing. Use extreme care to avoid dehulling the seed when combining. Dehulling lowers yield per acre and market quality.

Foxtail millet also has green leaves when the seed is mature, but the seed doesn't shatter as easily as proso. Fox-

tail heads are dense compared to the open heads of proso and, therefore, dry more slowly. Because foxtail is later maturing than proso, shatters less easily, and dries more slowly, harvesting is usually delayed until fall freezes have dried green vegetation.

Proso is rarely used for forage because its coarse, hairy stems are poor feed whether cut early or late. Therefore, cut proso for forage when the grain is well developed because grain content determines quality. Foxtail varieties are finer stemmed and leafier than proso. Therefore, they can be cut early for medium quality forage or later for higher yields. Foxtail varieties retain their leafiness for a long time.

ANNUAL CANARYGRASS

Annual canarygrass is a new crop in Minnesota and the United States. It is an important food of parakeets, canaries, lovebirds, finches, and cockatiels. Much is imported from Middle Eastern countries, Argentina, and Australia. Considerable acreage is grown in North Dakota and Canada.

Yields in pounds per acre obtained in grain drill trial plots at Rosemount, southwestern Minnesota, and Crookston were 1,179, 328, and 569, respectively. Bushel weight is about 50 pounds.

It is difficult to produce good quality canarygrass seed. Dehulled and poor quality seed can replace some millet in wild bird feed but farmers can't afford to raise canarygrass for the price of millet. Canarygrass should be about four times the price of millet before a Minnesota farmer considers growing it. It requires better land than

millet and is not a good weed control crop. MCPA at $\frac{1}{4}$ pound per acre controls wild mustard in canarygrass. It is best adapted economically in northwestern Minnesota.

Annual canarygrass does not resemble reed canarygrass—a perennial forage crop. It is an annual sown in April and harvested for seed in August. It grows about 2 feet tall, stands well, and doesn't shatter seed. The seed heads mature slowly and the leaves remain green. Therefore, there is a long period between full growth and harvest.

No American varieties are available. The Moroccan introduction obtained from R. F. Gunkelman and Sons at Fargo, North Dakota was tested and is the main introduction grown.

A grain drill is used to sow the crop in *very early* spring at a rate of 40 to 50 pounds per acre.



Fig. 7. Canarygrass heading in June. Left: oats; right: rye.

BUCKWHEAT

Buckwheat is an emergency grain crop sown about July 1. It is also used for green manure and bee pasture. Low prices and declining demand for buckwheat flour caused a steady decline in acreage. Although the grain is used for livestock, poultry, and wild bird feed, the heavy hull makes it less nutritious than other grains.

Buckwheat utilizes relatively unavailable phosphate. This may account for its use as a green manure crop. However, it has a relatively small root system, i.e., a high top to root ratio.

VARIETIES

Buckwheat is cross-pollinated, and certified seed is not available. Conse-

quently, variety designations have little value. Many seedlots sold under various variety names were tested at Rosemount and found to be common, mixed buckwheat. Therefore, seed should be bought on the basis of germination and purity rather than variety names. Varieties shown in table 2 were fairly pure for varietal seed characteristics and all lodged severely.

Certified Tokyo seed is available in Canada. However, 1 year's data from Rosemount indicated that it had no advantage over high quality commercial seed.

Tartary buckwheat, a different species, is grown for poultry feed. It is also grown under contract as a source of the drug rutin in Illinois and a few eastern states.

Table 2. Comparison of buckwheat varieties at Rosemount

Variety	Years of trial	Date	Weight of	Bushel	Yield per
		bloom	100 seeds	weight	acre
		July	grams	pounds	
Common	1958, 1960, 1961	24	2.2	43.3	674
Japanese	1958, 1960, 1961	25	2.6	41.9	764
Silverhull	1960, 1961	25	2.2	43.1	657
L.S.D. at 5 percent level					205

GROWING THE CROP

Buckwheat is sown with a grain drill at a rate of 40 to 50 pounds per acre. Legal bushel weight is 50 pounds in Minnesota, but 40 to 48 is used in some states. As a result, buckwheat is sold by the pound or hundredweight. Because it is a poor weed competitor, buckwheat shouldn't be sown until most annual weed seed germination is completed. July 1 to 15 has been a good time in central Minnesota.

The crop produces seed within 1 month after planting and continues flower and seed production until freezeup. Buckwheat lodges badly. Considerable seed loss occurs before and during combine harvesting. As a result, volunteer buckwheat usually appears in the field for several years.

Buckwheat is not a good Canada thistle control crop. In trial plots, it has tolerated 1/2 pound 2,4-D per acre without yield loss, but 1/4 pound in other trials at Rosemount reduced yield. Therefore, 2,4-D is not safe to

use on buckwheat. Under some conditions, the plant recovers from 2,4-D injury and produces a normal yield.

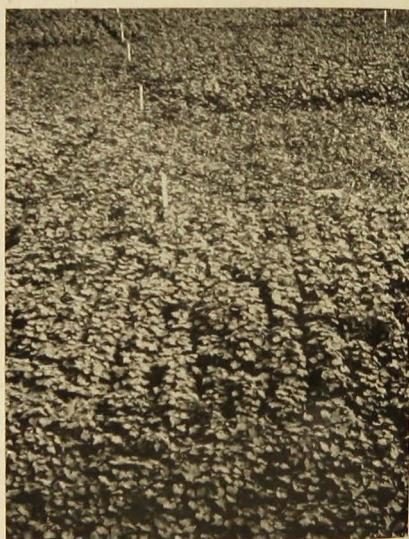


Fig. 8. Buckwheat plots showing 2,4-D injury.