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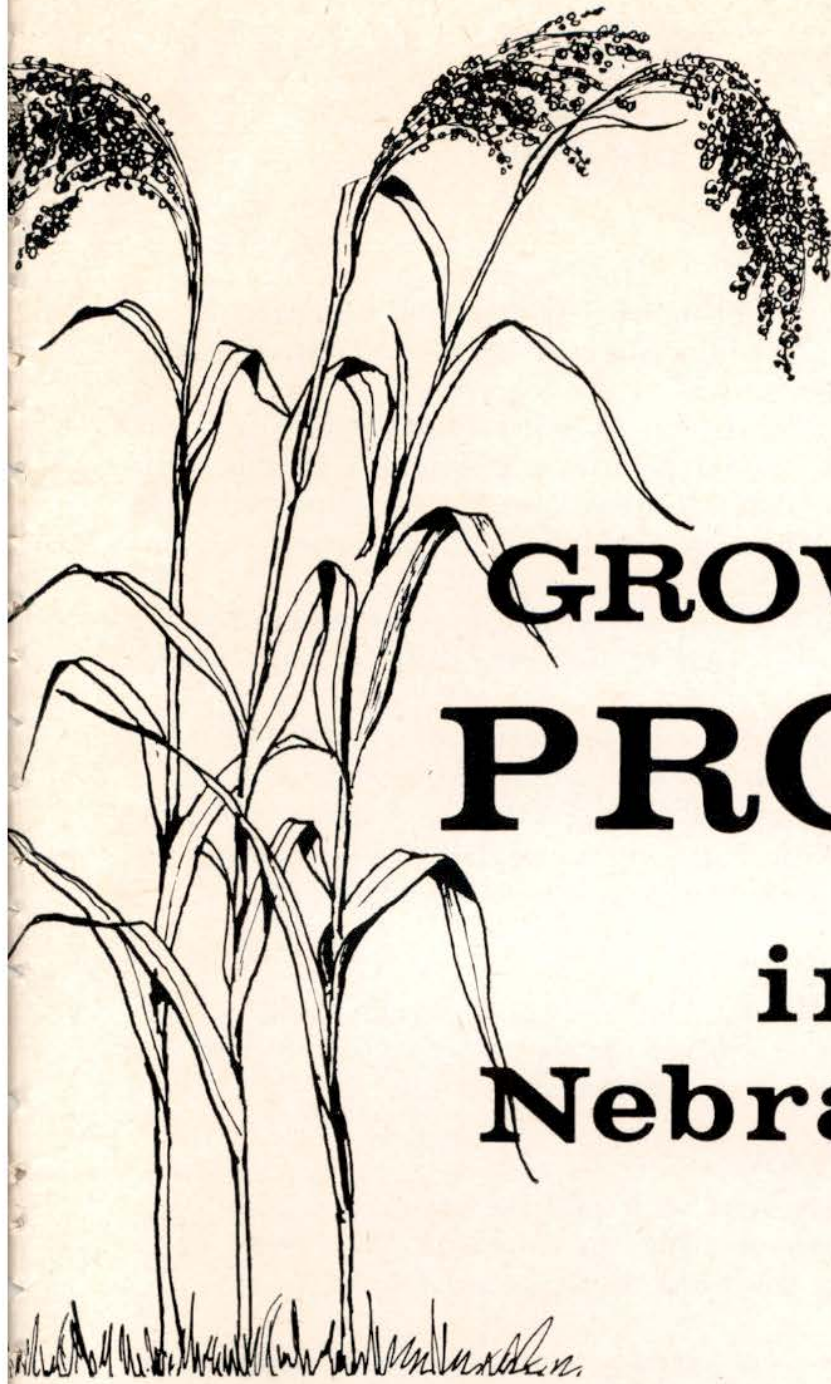
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GROWING PROSO

**in
Nebraska**

UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE AND HOME ECONOMICS
THE AGRICULTURAL EXPERIMENT STATION
E. F. FROLIK, DEAN H. H. KRAMER, DIRECTOR

Growing Proso Millet in Nebraska

By P. H. Grabouski¹

What Is Proso Millet?

Proso, sometimes called "hog millet," is receiving attention in the Nebraska Panhandle as a dryland grain crop because of acreage restrictions and limited crop alternatives.

Proso is an important ingredient in many commercial bird feeds. Some feeders are using it successfully in cattle fattening rations. Shipments have been made to West Coast ports for export. Improved varieties and better cultural practices could make it an important feed grain crop in cattle rations.

For many years, proso has been raised and used as human food in foreign countries. It is still a part of the cereal diet of many people in Asia and Africa.

In Nebraska, proso has been used primarily as a "catch" or emergency crop after another crop has been destroyed by hail, lost to cutworms, or winter killed. It can be planted late and matures in a short season. In Eastern Nebraska, it is sometimes planted as a second crop after wheat harvest if soil moisture conditions are favorable.

Where Is Proso Millet Grown?

Cheyenne, Kimball, Banner, and Deuel Counties lead in proso acreage. Smaller acreages are grown in several other counties of the Panhandle and in several other counties of the state.

What Varieties Are Grown?

It is difficult to obtain seed with positive varietal identification. Seed now sold is frequently identified by color and type. Many of the older varieties have been lost, and there are no known seed sources for them.

Turghai is the only proso variety currently recommended and certified in Nebraska. Turghai has large, yellowish-brown seed and spreading panicles. It matures in about 60 days.

Early Fortune, an early maturing proso with a semi-closed panicle, is grown but not recommended in Nebraska. It generally yields less than Turghai.

White seeded proso is also grown, but there are no released varieties.

The millet seed that is sown is usually locally grown and marketed.

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An example of proso.



Turghai variety.

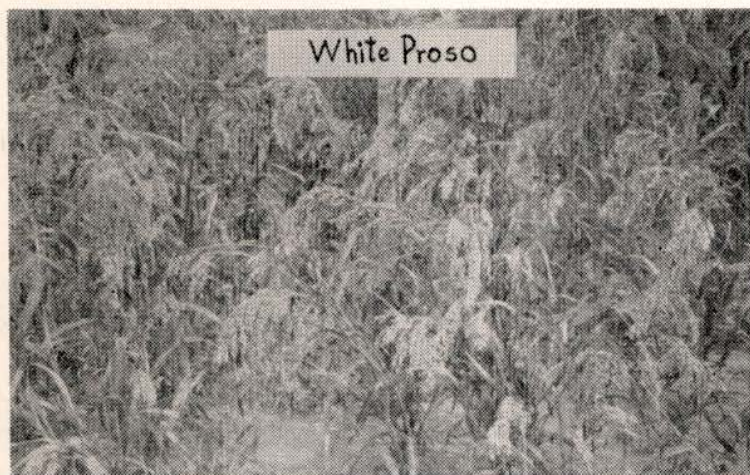
What Yields Are Expected?

Proso yields depend on variety, production practices, and growing conditions. In years of adequate moisture, yields will be similar on stubble or summer fallowed land.

Yields of 1,000 to 2,500 pounds per acre can be expected. In Eastern Nebraska, yields may be as high as 3,000 pounds per acre. At high yield levels, lodging becomes a problem.

How Does Income Compare With Other Replacement Crops for Wheat?

Income from proso may equal that of other replacement crops grown in the Panhandle area. Low price and the fact that farmers do



A plot of white proso.

not like to swath and pick up grain have kept proso production low in past years.

If a uniform supply of proso grain is available, the price will be similar to other feed grains. Recent interest in proso as an alternative crop instead of a catch crop indicates it is a strong competitor to replacement crops in many areas of the Panhandle.

Early harvested, good quality seed is sometimes purchased by bird-seed processors at a premium price. White seeded proso is generally preferred by this trade.

What Is the Length of Growing Season?

Moderately warm weather is necessary for seed germination and plant growth. The soil temperature should be 70-75° or higher for good seedling emergence. Proso is easily injured by either spring or fall frost and is not adapted to areas where summer frosts might occur.

Proso is a short season crop, often requiring only 60-65 days to mature seed. The earliest varieties may mature in 50 days. Late varieties may require 90 days to mature. Proso should not be planted unless there is a probability of at least 60 days before a killing frost. This crop does not ripen well, frequently not at all, during cool autumn weather.

What Is the Value of Proso for Livestock Feed?

Proso is eaten readily by all kinds of livestock but should be ground or rolled before being fed. Early studies indicated nutrient composition of proso similar to oats. More recent data indicate ground or rolled proso is worth up to 90 percent as much as corn for fattening cattle and lambs, from fully equal to 85 percent for swine, and 95 percent for laying hens.

Some proso is being used in pelleted livestock feeds. Feed processors have shown interest because of the adhesive quality of proso when used in pelleted feeds. This may result in greater use of the crop by processors as an adequate supply becomes available.

Proso is not usually grown for hay, but forage yields are often a ton or more per acre. If used for hay, proso should make up only part of the ration because of low palatability.

Proso can be ensiled but yields are too low to make it a profitable silage crop.

What Is the Moisture Requirement?

Proso has a low water requirement. In a Colorado study, about $\frac{2}{3}$ as much water was required to produce a ton of proso as was necessary to produce a ton of durum wheat.

Proso has a shallow root system and cannot stand prolonged drought. Plants often lodge early if the top soil remains dry because roots do not develop properly and the weight of the maturing head pulls the main stem to the ground.

Since proso is planted in late June or the early part of July, there is little moisture remaining in the top 3 feet of soil after harvest. Yields of subsequent crops may be reduced unless winter and spring moisture recharges the soil profile. A year of summer fallow should follow a crop of proso in Western Nebraska.

Should Proso Be Grown Under Irrigation?

Proso should be grown under irrigation only when it is too late to plant any other crop. The maximum yield of proso is 3,000 to 3,500 pounds per acre. Current varieties will lodge if attempts are made to increase production above that level.

If proso is grown on irrigated land, use water sparingly. The greatest demand for water is during the blooming period. When soil moisture is inadequate, supplemental water applied at this stage of growth would be beneficial.

How Does Proso Residue Compare with Other Small Grains?

Proso residue decomposes quickly. Wheat and rye stubble provide much better protection from wind erosion. The two operations of swathing and picking up by a combine help break up proso residue. Proso is generally cut nearer the ground than other small grain crops.

Since millet stubble is difficult to maintain, these fields are often seeded first to insure ground cover to reduce wind erosion.

What Are Some Important Considerations in Growing Proso?

1. Soil type:

Proso grows well on almost any soil in Nebraska. In the Nebraska Panhandle the tendency has been to seed on some of the poorer soils. Land suitable for wheat and barley will usually produce the best yields of proso.

2. Seedbed preparation and residue management:

Winter killed wheat or winter barley fields: Land on which a grain crop has failed should be prepared by: 1. oneway disking and rodweeding, or 2. subtilling and mulch treading or rodweeding.

Moderate to light stubble: If stubble is "light to moderate," a sweep machine or rodweeder with semi-chisels can be used for the first operation. One or two additional operations with a plain rodweeder before planting will firm the seedbed and destroy newly sprouted weeds.

Heavy wheat stubble: Where stubble cover is heavy (2,000 to 3,000 pounds per acre) use a oneway disk, tandem disk, or chisel machine for the first operation. Perform the first tillage about April 1 at a depth of about 4 inches. A second chiseling, disking, mulch treading, or subtilling operation can be performed in mid-April. The field may then be rodweeded once or twice before the crop is planted.

Moldboard plowing: Plowing buries the old crop residue and is more costly than subtilling, onewaying or chiseling. Normally, crop residue should be left on the soil to control wind and water erosion.

When the moldboard plow is used in Western Nebraska, plow after weeds begin growth. If proso is grown as a second crop after wheat in Eastern Nebraska, plow and pack the land immediately after wheat harvest.

Grain sorghum, corn, or safflower stubble: Unless the soil moisture supply has been replenished by winter or spring moisture, it is doubtful if proso should be seeded following these crops in Western Nebraska; however, timely rains after seeding could make a crop.

One shallow operation with a subtiller, oneway disk, or chisel when weeds begin growth, followed by tillage with a plain rodweeder just before planting, should suffice.

Local field and weather conditions determine the type and date of operation. These recommendations are given only as a guide. Stubble burning is not a good conservation practice. It leaves the soil more subject to erosion and destroys organic matter and fertility.

3. Final pre-plant operations:

Seedbed preparation is similar to that used for any other small grain. It is important to eliminate weeds and firm the seedbed before planting. A good seedbed should have moist soil within 2 inches of the soil surface unless furrow openers are used.

4. Seeding date:

Planting dates depend on local conditions. In most areas of Nebraska, June 15 to July 1 should be best. In Western Nebraska, seed proso from June 1 to July 1. When fall frosts are not too early, satisfactory yields have been obtained from fields seeded between July 10 and 15.

5. Drills:

Seeding with a regular drill in 6- to 14-inch spacing has produced higher yields than wider spaced rows with cultivation. The type of drill is not as important as the way it is used. A shoe drill does have an advantage over a disk drill if conditions are dry.

6. Seeding rate:

Seeding rates of proso vary from 15-35 pounds of pure live seed per acre in Nebraska. Weeds may be a problem if the rate of seeding is less than 20 pounds per acre. Seed size and germination may vary from one seed lot to another.

It is important to calibrate the drill for each seed lot to insure proper planting rate.

Calibrate the drill under field conditions. Tie small plastic or cloth bags over the drill spouts and catch the seed dropped. Pull the drill a given distance and weigh the seed to the nearest ounce. Then use the following formula to find the pounds of seed per acre.

Table 1. Seed per foot of row at four rates of seeding.

	Seed per ft. of row ^a			
	15 lb/acre	20 lb/acre	25 lb/acre	30 lb/acre
6"	14	19	23	28
8"	19	25	32	38
10"	24	31	39	47
12"	28	38	47	56
14"	34	44	56	67

^a An actual seed count showed there were 81,250 seeds per pound of proso.

$$\frac{2722.5^a \times \text{ozs collected}}{\text{drill width (ft)} \times \text{distance traveled (ft)}} = \text{pounds per acre}$$

$$\text{Example: } \frac{2722.5 \times 20 \text{ ozs}}{10 \text{ ft} \times 180 \text{ ft}} = 30.25 \text{ lbs per acre}$$

^a This constant was derived by dividing 43,560 (sq ft/acre) by 16 (ozs/lb).

An alternative method would be to consider seeds per foot of row (see Table 1).

7. Depth of planting:

In a good seedbed, plant the seed from $\frac{3}{4}$ to 1 inch deep in moist soil. Never cover seed more than 1 inch. In sandy or dry soil the seed may be sown deeper than in a fine textured moist soil. Seeds need to be pressed firmly into moist soil to prevent drying out.

The amount of soil covering the seed will vary with planting depth, design of the seed furrow opener, and speed of travel. Press wheels are desirable. Moist soil pressed firmly around the seed promotes prompt germination and good seedling vigor. Do not sow millet in dry soil.

8. Weed control:

Limited work has been done in Nebraska on weed control in proso. The use of 2,4-D amine at $\frac{1}{2}$ pound per acre has given effective control of broad-leaved weeds. Proso should be sprayed when small (3-4 inches). Spraying after flowering may reduce yields. For best control apply chemicals when weeds are 2 inches or less in height. Chemicals never take the place of good cultural practices but can supplement them to good advantage.

9. Fertilization:

When proso is used as a second crop after wheat, 20 to 40 pounds of nitrogen is advisable if adequate soil moisture is present.

The proso plant is shallow rooted. An abundant supply of available nutrients near the surface of the soil is desirable.

Where fertilization will boost wheat or barley yields, it will probably increase proso yields providing there is sufficient water present.

10. Diseases and pests:

Smut is the only disease that has been reported on proso. It may be controlled by using one of the standard fungicides commonly used on small grains. Seed treatment helps insure uniform stands of vigorous plants by killing pathogenic fungi on the seed and in the soil.

Proso plants are not known to harbor the wheat curl mite, the insect vector for the wheat streak mosaic virus.

Plants of some varieties of foxtail millets have been found to harbor the wheat curl mite.

Proso, as well as the other millets and spring small grain crops, are subject to chinch bug attacks.

Field mice, gophers, and birds are very fond of proso seed and can be destructive after the seed is ripe.

11. Harvesting:

Proso shatters easily. Timely harvest is important. Proso is harvested with a windrower and later threshed with a combine equipped with a pickup attachment.

Harvest proso when the seeds in the upper half of the heads are ripe. At this stage the plant is still green. If cut earlier there will be much immature seed, and if cut later there will be a sizable loss from shattering.

The combine cylinder should be run slow enough to avoid hulling too much seed. The seed separates easily from the straw so concaves should be lowered or the cylinder raised. The seed is easily cleaned if proper screens are used; however, some difficulty may be encountered with certain weed seeds.

Proso seed discolors rapidly and soon loses its shiny color when exposed to the weather. Timely harvest produces bright seed.

What Are the Essential Steps in Proso Production?

1. Have a firm seedbed.
2. Rodweed the ground immediately before planting.
3. Plant recommended varieties or plant best seed available.
4. Plant between June 1 and July 10, depending on environmental conditions.
5. Plant shallow and be sure seed is pressed firmly into moist soil.
6. Do not cover seed with more than one inch of soil.
7. Plant 15 to 35 pounds of high quality seed per acre.
8. Spray weeds if necessary.
9. Use proper combine adjustments for efficient harvesting.
10. Harvest as soon after maturity as possible.