

# Millet

## General Information

Proso millet, *Panicum miliaceum* L., is a warm-season annual crop grown under dry conditions in the northeast for human and animal consumption. Millet has been a staple grain in Africa for centuries, and is easily digested because it is high in alkaline minerals and counteracts acids. Its resurgence in the northeast is reminiscent of millet's introduction to the U.S. via the east coast,



although today in the United States, millet is primarily grown in Colorado, Nebraska, and the Dakotas.

Edible millet generally refers to either the grain or flour of proso millet, which is used as a grain (de-hulled and sold in seed form) or ground into flour and is quite nutritious, with protein levels comparable to wheat and sorghum and higher than corn, and more essential amino acids than rice, barley, wheat, oats, and rye. Japanese millet is also grown in the United States, but requires a very long growing season and has an

inner hull which makes processing for human consumption all but impossible. Japanese, foxtail, and other types of millet are actually most commonly used as birdseed or for mid-season grazing and forage production.

## Preparation & Planting

Both red and white proso varieties are available, and growers should choose varieties with appropriate maturities and lodging resistance. Millet should be planted after soil temperatures have warmed to about 65°F, relatively late in the season. Millet does well in warm, fertile soils; it often works well to plow and work in a manured sod in early spring. The seedbed should be very well-drained, and firm. Nitrogen inputs should be monitored to avoid lodging in millet; the best way to determine how much nitrogen, phosphorous, and potassium to apply is to have your soil tested prior to planting. The pH level should be at least 5.6 for good millet growth; apply lime in early spring if necessary.

The typical seeding rate is 20-35 lbs per acre, and a grain drill with the seeding depth set to plant 1-3" works best; plant deeper if dry soil conditions are expected. Millet have been known to germinate even if planted at a depth of 4-5", but shallower depths will help germination. Rolling or cultipacking the soil before and after planting improves seedling emergence by increasing seed-to-soil contact. The seed can also be broadcasted (at a slightly higher seeding rate), followed by a light harrowing or packing. Millet emerges quickly in warm soil and is tolerant of moisture extremes but is extremely sensitive to frost. However, its short growing season allows for millet to be planted as late as June or possibly even July. Because millet can be planted so late in the season, it has been known to be planted as an emergency grain if another crop has failed.

## **Cultural Practices**

Millet grows to a height of up to 40 inches, and has large, distinct seed heads. It can grow well in drought-susceptible soils and should be planted in well-drained soils. Because millet does not compete well with weeds, it should either be inter-seeded with another grass or legume, or planted in very thick stands. Frequent cultivation with an implement such as a tine-weeder will also help during the growing season. Millet does cross-pollinate, so it is difficult to grow more than one variety in close proximity.

Head smut and kernel smut can sometimes be problematic in millet. Practicing good crop rotation and treating seed before planting can help minimize smut. The biggest difficulty in growing millet in the northeast is competition with birds, especially close to harvest time. It is not surprising that birds love millet seeds, since they are often grown for this express purpose. Some growers have given up on producing millet because of this hurdle; others have brainstormed ways to net or use scare tactics to protect their crop. Some growers also report grasshoppers causing damage in millet fields.

## **Millet as Animal Feed & Green Manure**

Japanese millet is often used as animal feed; it is a crop similar to Sudangrass but without the prussic acid poisoning concerns for feeding to livestock. Cattle find the forage palatable and it can be cut or grazed multiple times in the season. Forage dry matter yields are generally between 2.5-5 tons/acre, depending on fertility and growing conditions. The feed quality is good if harvested before the boot stage. Highest protein levels are possible when the millet is harvested multiple times and at a crop height of about 2-3 feet. Millet seed can also be harvested and saved for next season's planting or for livestock feeding.

For homestead-scale production there are many possibilities for utilizing both Japanese and proso millet as a seed crop. As livestock feed, millet can be compared to oats and barley. Ground millet is often fed to cattle, sheep, and hogs, and the seed is favored by chickens and other poultry. Simply harvesting the entire plant as a dried bundle would provide both seed and bedding for a small poultry flock, and poultry will readily consume the seed without grinding. Japanese millet is also useful as a green manure crop, known to reduce rhizoctonia problems in succeeding potato crops. The soil after millet crops tend to be mellowed and easy to plant into. It is often possible to follow a millet forage planting with a winter grain crop that has very minimal tillage requirements.

Millet crops can be ready for grazing as soon as 40 days after planting, between the late boot and bloom stage. Typically grazing begins when the plants are 2-3 feet tall and grazed down no lower than 6 inches to allow for good regrowth. Best utilization for grazing is to subdivide the millet field and graze in rotation. The smaller paddock size reduces forage trampling and helps control the grazing height. It is important to begin grazing a large field before the millet becomes too tall as it grows quickly and may become over mature. The millet will generally regenerate quickly and can be grazed every few weeks but will die back when frosted. Millet can be harvested with a single cutting at the early boot stage before heads emerge up until the soft dough stage. It can be difficult to dry down the stems, so allow more drying time than

typical grass crops. Millet can be wrapped, round-baled or chopped. For multiple cuttings, which will yield higher-protein forage, it is best to leave 6-10 inches of stubble for best regrowth.

The straw from this crop can also be baled up for bedding although this process is sometimes complicated by the fact that harvest is late in the fall. It is difficult to get the straw dry enough for proper baling in October. The stubble and straw is also a good ground cover for winter if left on the soil.

### Harvesting & Storing Seed

During late summer when day-length begins to decrease, millet plants begin to set seed. Vegetative growth slows and purple or gray seed-heads form. Under northern conditions the crop is ready to harvest by October, or about 70-90 days after sowing, when the top half of these seed-heads, or panicles, have turned brown. At this point, the lower seeds might still be in the soft dough stage but should no longer be green in color. Millet is sometimes swathed when the seed heads have turned approximately 2/3 brown and allowed to dry further in the field before combining; this practice also allows the straw to dry and makes harvesting easier. It is also possible to direct cut the millet crop with a typical grain header on the combine. Proso millet for grain should yield about 50 bushels per acre or more, depending on conditions.



There is an increasing demand for millet as a cereal grain for bread and flour in the northeast. However, after the grain is harvested and threshed, it must be de-hulled for human consumption. The hulls of millet seeds are variable in color, and can even be striped. Millet should be cleaned of weed seeds and broken kernels, then stored at no higher than 13% moisture. For human consumption, millet can be de-hulled using compressed air or impact de-hullers, and used as is or ground into flour. Millet has a bland flavor, which some describe as slightly nutty. Gene Logsdon, author of Small-Scale Grain Raising, asserts that this nutty flavor can be further brought out if the millet seeds are lightly toasted before using them.

#### References:

Bonsall, Will. 2011. "Small-scale production of unconventional small grains." Presented at Northern Grain Growers Winter Conference. March 9. Burlington, VT.

Logsdon, Gene. 2009. *Small-scale grain raising*. White River Junction, VT: Chelsea Green Publishing.

Oelke, E.A., E.S. Oplinger, D.H. Putnam, B.R. Durgan, J.D.Doll, D.J. Undersander. "Millets." *Alternative Field Crops Manual*. Retrieved March 4, 2011. (<http://www.hort.purdue.edu/newcrop/afcm/millet.html>)