

Millet – An Early, Reliable and Safe Summer Grass

Millet is a species of grass, commonly known as Japanese barnyard millet or Japanese millet. It was domesticated from *Echinochloa crus-galli* which originated in Asia. The earliest records of the domesticated form are said to date from 2000 BC in Japan. The genus, *Echinochloa*, includes about 12 species, which are widely distributed in warm and tropical regions.



Echinochloa crus-galli (left) is the wild ancestor of crop millets like *Echinochloa esculenta* (right).

Our Resilient Farms Agronomist, Jade Killoran, says:

“Millet is a summer active, annual C4 cereal species, which can be sown from mid-October onwards in southwest Victoria, or when soil temp is 12-15C and rising. It is grown in some countries for grain harvest, but in Australia usually as stock fodder. Millet is a cost-effective grass/cereal species to include in summer mixes and is usually sown at 3-6 kg/ha in a multispecies mix.

From a grazing perspective, millet can be sown earlier than either sorghum or corn, due to a lower soil temperature requirement, does not contain prussic acid, so has no potential animal health issues (unlike sorghum) and establishes readily on lower fertility soils (unlike corn or maize, which are relatively hungry for nutrients).

Millet is a reasonably cheap, reliable, safe grazing species to include in summer mixes. The most commonly used millet in Australia is Shirohie or Japanese millet”

C4 Plants for Water Efficiency

Millet is a C4 plant, which means that it is better at utilising water than C3 plants such as rice, soybean, ryegrass, clover, wheat, barley, oats. A C4 plant uses a different enzyme in photosynthesis from C3 plants, which makes it more water efficient.



C4 plants evolved in warm, strong sunlight areas of the tropics. As Jade points out:

“C4 grasses are more drought tolerant and grow more productively at higher temperatures than ryegrass pastures. Ryegrass has a low temperature threshold and shuts down over summer, whereas grasses like millet have evolved to grow productively at that time of year.”

C4 plants are among the world's most important crop species (e.g. maize and sugarcane). Although small in terms of total number of flowering plant species (3%), they constitute about 50% of the world's 12000 odd grass species.

Millet Provides Top Soil Maintenance

Like all grasses, millet does not have deep roots but has a fibrous root system which holds topsoil together. Millet roots, like most grass and cereal species, host mycorrhizal fungi which help to aggregate the soil, making it more aerated and friable and increasing nutrient and water holding capacity. Mycorrhizal fungi also help transport nutrients and water to plants, making them more productive and more resilient to stressor events, such as dry conditions, insect attack etc. Sowing species such as millet can help to increase mycorrhizal fungi populations in the soil, which is beneficial environmentally and economically.

Illustration of *Echinochloa esculenta* in the “Seikei Zusetsu”, a Japanese agricultural encyclopedia compiled between 1793 to 1804.



Millet in Australia

According to Wikipedia: “In southern Australia millet is used as a summer quality pasture, utilizing warm temperatures and summer storms. Millet is frost-sensitive and is sown after the frost period, once soil temperature has stabilised at 14 °C or higher. It is sown at a shallow depth.

Millet grows rapidly and can be grazed 5–7 weeks after sowing, when it is 20–30 cm high. The highest feed value is from the young green leaf and shoots. The plant can quickly come to head, so it must be managed accordingly because as the plant matures, the value and palatability of feed reduces.

The Japanese millets (*Echinochloa esculenta*) are considered the best for grazing in particular Shirohie. This is due to a number of factors: it gives better regrowth and is later to mature compared to other Japanese millets; it is cheap – cost of seed is \$2–\$3 per kg (\$3.80 per kg in March 2022), and sowing rates are around 10 kg per hectare for dryland production; it is quick to establish, can be grazed early, and is suitable for both sheep and cattle.



Compared to forage sorghum... animals gain weight faster on millet, and it has better hay or silage potential, although it produces less dry matter. Lambs do better on millet compared to sorghum... There is no need for additional feed supplements such as Sulphur or salt blocks with millet.

The rapid growth of millet as a grazing crop allows flexibility in its use. Farmers can wait until sufficient late spring / summer moisture is present and then make use of it. It is ideally suited to irrigation where livestock finishing is required.”

Fill it with Millet

Andrew Allsop of Notman Pasture Seeds in Purnim has supplied some of the seed for our mixes. He calls Shirohie Millet an excellent “renovation tool” and on his website describes it as:

“a highly productive summer leafy forage crop that grows when you need it most in summer. Fast-growing and versatile, it provides forage for grazing, hay and silage. It has excellent regrowth potential when good moisture and nitrogen levels are available.

Key characteristics:

- Low cost option
- Can be sown earlier than sorghums
- Tall leafy grass with a thin stem which can grow to 1.5 metres in height.
- Minimum annual rainfall of 500mm
- Sowing rate of 5-10 kg/ha on dryland
- Sowing rate of 10-25 kg/ha on irrigation”

Cooler than Rice

Millet is cultivated on a small scale in India, Japan, China and Korea, both as a food and for animal fodder. It has traditionally been grown in areas where the land is unsuitable or the climate too cool for paddy rice cultivation. However, the development of rice varieties that can withstand cold has led to a sharp decline in its cultivation.



Awaokoshi, candied millet puffs, are a specialty of Osaka, Japan.



Eating Millet

Millet grain is a significant food source for humans in many parts of Africa and Asia. As is common for grain domestication, the wild form of millet underwent grain enlargement over 1-2000 years in Japan. Its use as a staple food dates back 10,000 years. The grain is parched, roasted, boiled, ground into flour and can be popped like popcorn.

Millet porridge is a traditional food in Russian, German, and Chinese cuisines. In Russia, it is eaten sweet (with milk and sugar added at the end of the cooking process) or savoury with meat or vegetable stews. In China, it is eaten without milk or sugar, frequently with beans, sweet potato, and/or various types of squash. In Germany, it is also eaten sweet, boiled in water with apples added during the boiling process and honey added during the cooling process.

Millet is also the main ingredient in a Vietnamese sweet snack called *bánh đa kê*. It contains a layer of smashed millet and mungbean topped with sliced dried coconut meat wrapped in a crunchy rice cake. It is a specialty of Hanoi.

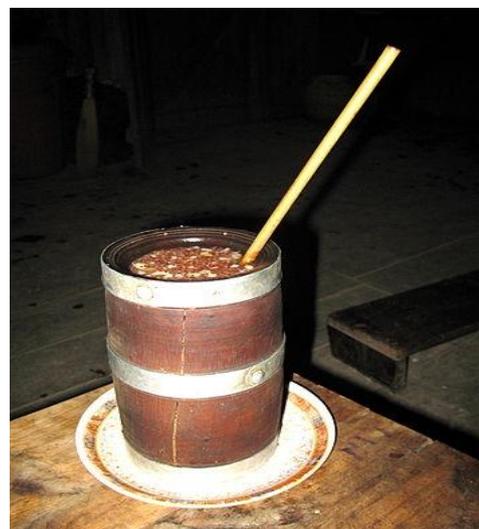
In Japan it remains a favourite and is used in all kinds of foods including macaroni, biscuits and dumplings.). Indian barnyard millet can safely replace rice grain for some traditional preparations in India (Joshi et al., 2016).

The use of millets as food fell between the 1970s and the 2000s, both in urban and rural areas, as developing countries such as India have experienced rapid economic growth and witnessed a significant increase in per capita consumption of other cereals. Millet is however gluten free like buckwheat so is a significant cereal for gluten intolerant eaters.

Drinking Millet

The grain is roasted and used as a coffee substitute (Deane, 2020) In India, various alcoholic beverages are produced from millets.^[38] Millet is also the base ingredient for the distilled liquor *rakshi*, a traditional beverage in Nepal, India and Tibet.

Tongba, a millet-based alcoholic brew found in the far eastern mountainous region of Nepal and Sikkim, India.



Beloved of Birds

Echinochloa species are appreciated by all kinds of wild birds and domestic poultry. Individual plants can produce up to 40,000 seeds per year.

In geese, cockspur grain ranked second after rice in a grain preference trial. It was preferred to sorghum, seacoast bulrush (*Bolboschoenus robustus*), safflower, barley, and woolly-pod vetch (*Vicia villosa*) (McFarland et al., 1963).

In ducks, cockspur grass seeds seems to be readily digested as only a low (1.9%) amount of the grains were recovered intact in the faeces. The passage time of the seeds in the digestive tract was 5.1 hours (Mueller et al., 2002).

A spiky name

Echinochloa gets its genus name from the Greek *echinos* for hedgehog and *chloe* (grass). The seed head resembles a hedgehog, which is to say it is echinate (covered with spines, bristles, or bristle-like outgrowths as the Collins English dictionary defines it.) Little wonder then that Echinacea is a superorder of sea urchins and a daisy-like plant with spikey petals.

It is odd however that neither the hedgehog whose genus is *Erinaceus* nor the porcupine (*Erethizon dorsatum*) include “echino” in their taxonomic names. Nor does the Antipodean equivalent of these two creatures, *Tachyglossus aculeatus*. Except that the common named for this last animal is echidna. So only our spiny anteater has kept its hedgehog heritage or has it?

Echidna was also a terrifying creature from Greek mythology. As the mother of many well-known mythic monsters, she is usually described as half-woman and half-snake. As echidnas have qualities of both mammals and reptiles, this might be the more fitting basis for the name or perhaps it is a happy coincidence of both roots. We’ll never know for sure how a monotreme has come to share a name with millet!



Flora and fauna linked by a spikey name.

