

Millet for reclaiming irrigated saline soils

Lindsay Evans

Advisory Officer (Irrigated soils), Deniliquin

Millet is one of several plants which could be grown to reclaim saline land using irrigation water. It is a relatively salt-tolerant annual, and has several advantages over more salt-tolerant plants, most of which are perennial species.

The millet crop does not remove the salt. Rather, millet is a good crop to grow while leaching is occurring: it is this leaching of accumulated salts from the root zone using good quality irrigation water or rainfall which achieves land reclamation.

Most importantly, reclamation of saline irrigated land should not commence until the watertable in the field has been lowered to beyond a depth of one metre. This largely depends on soil type, as the watertable should be lower in clays than in sandy soils to avoid salts being brought to the surface by capillary rise.

Field layout should enable rapid watering and drainage, and drains should be present to remove irrigation tailwater and rainfall runoff.

Why use millet when reclaiming soil?

Millet is a quick-growing summer forage or grain crop which is relatively cheap and easy to grow. It can provide income while salt is being leached from the soil. Watertables are generally at their lowest during summer, and the vegetative cover provided by the millet crop prevents capillary rise of groundwater which could lead to further salinisation.

The variety 'Jap' millet tolerates soil salinity (EC_e) up to 6 dS/m (6000 μ S/cm or 3840 ppm) without a significant decrease in dry matter production. At

an EC_e of 9 dS/m, its production is expected to decrease by about 25%.

Experience in Northern Victoria indicates that the salinity tolerance of the 'Sirohie' variety is similar to that of Jap millet (both are *Echinochloa* spp.), but hybrid millets (*Pennisetum* spp.) may be less salt-tolerant and the seed cost is higher.

The main summer-growing alternatives to millet are the forage sorghums, which are far less tolerant of soil salinity. Millet can be watered up and it can withstand moderate periods of waterlogging. As millet seed can germinate when soil temperatures have reached 14°C, it can be sown earlier in spring than forage sorghums. If well-managed, millet produces better quality feed than forage sorghums.

The main disadvantages of millet compared with forage sorghums are that it has a shorter growing season and that it produces less dry matter. Millet can occasionally cause photosensitisation to grazing animals, but it does not cause the hydrocyanic acid poisoning which is a risk with forage sorghums.

Companion sowing and following crops

The most salinity-tolerant summer-growing legume which could accompany millet is strawberry clover, but it is slow to establish and its production is low.

Vegetative groundcover needs to be maintained after millet growth has ceased. Balansa and Berseem clovers with annual ryegrasses provide a moderately salt-tolerant annual pasture mix that produces feed from autumn to spring. They can be sown into millet stubble in autumn, but may need more than two autumn waterings to maintain low salinity levels in the root zone.



Establishment

Millet is ideal as a first crop after landforming saline land. It establishes well in crusting soils and its roots help stabilise the soil.

Good surface drainage is necessary to minimise the extent of waterlogging and recharge to the watertable.

Millet can be sown from early October to mid December. Early sowing generally results in better establishment.

Suggested sowing rates for all millets for grazing are 20–25 kg/ha. Sirohie millet grown for seed can be sown at rates as low as 10 kg/ha. Minimal soil disturbance is desirable when the seed is drill-sown or sod-sown.

Irrigation management

After sowing, a slow first watering is generally beneficial to soak the seed and to begin the leaching process. A second watering within one week will aid emergence and further lower the salt concentration in the root zone.

Irrigation intervals of about ten days should be sufficient from late spring onwards, but the interval may need to be reduced to seven days during very hot summer weather. It is essential that the soil does not dry out while excess salt is still in the root zone as growth may be affected.

Millet usually needs 7–10 ML/ha of irrigation water on good layouts. In non-landformed layouts and in highly permeable soils such as those with a sandy clay subsoil, water use can be up to 14 ML/ha. Water use can also be higher where water is held on the field for lengthy periods to leach salt from highly saline soils. Saline soils with low permeability will take longer to leach.

Conclusion

Provided the watertable is lowered to a suitable depth and the irrigation layout is adequate, millet is one of the most useful crops for reclaiming saline land prior to growing more productive crops or pastures.

Acknowledgement

This Primefact updates a 'Stop Salt' information sheet prepared by Peter Beale in 1988. Thanks to Peter Beale and Kathy Tenison for their comments on this update.

Further reading

Agfact P. 2.5.41 *Forage sorghum and millet*

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