

Neptune messina

An annual pasture legume for saline and waterlogging prone soils

Key features

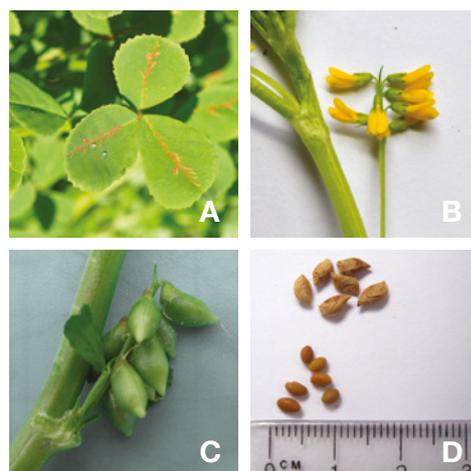
- Higher combined tolerance to salinity and waterlogging than all other current pasture legumes.
- Best suited to winter-wet saltland areas of southern Australia with ≥ 375 mm annual rainfall and soil $\text{pH}(\text{CaCl}_2) \geq 5.5$.
- Recommended for grazing in combination with other pasture species.
- Supplies nitrogen to N-deficient soils, provided it is inoculated with a specially developed salt-tolerant messina rhizobia.



Neptune three years after sowing on a saline valley floor at Woodanilling, WA.

Plant description and soil requirements

- Messina (*Melilotus siculus*) is native to the Mediterranean basin. It was identified in trials by DAFWA and SARDI as the only pasture legume tested able to persist on highly saline, waterlogged soils and Neptune was subsequently selected as the most productive and persistent messina variety.
- Neptune is an aerial-seeding annual legume that grows up to 0.8 m tall.
- Neptune is adapted to winter waterlogged areas where summer-early autumn topsoil (0–10 cm) salinity levels are 8–30 dS/m E_{ce} (moderate-high salinity).
- Neptune requires soil $\text{pH}(\text{CaCl}_2) \geq 5.5$ or $\text{pH}(\text{water}) \geq 6.0$, which is important as messina nodulation is sensitive to soil acidity (liming may be required).
- Neptune is suited to a range of soil textures from sands to heavy clays.



(a) Leaf, showing typical early season red-orange flecking
(b) Flowers (c) Developing pods (d) Mature pods and seed

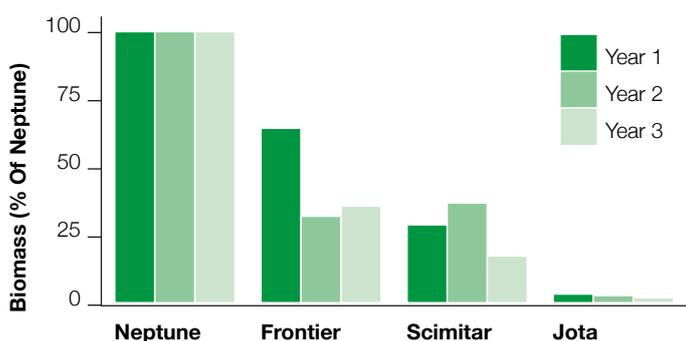
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Dormancy and maturity

- Neptune is moderately hard-seeded. A study in South Perth WA in 2010-11 found 26% of Neptune seeds remained hard in June, compared to only 6% for Frontier balansa clover. This provides a reserve seed source for germination in future years and results in staggered germination to cope with fluctuating salt levels and avoiding false breaks
- Neptune starts flowering around 98 days in Perth (WA) and 121 days in Keith (SA) from an early June sowing, 3-5 days later than Frontier balansa clover.

Biomass production

Neptune messina produced considerably more biomass than Frontier balansa clover, Scimitar burr medic and Jota white melilot at five saline, waterlogged trial sites in WA and SA in 2010 and 2011.



Mean biomass production of Neptune messina, Frontier balansa clover, Scimitar burr medic and Jota white melilot (as a percent of Neptune) over three years at the three most saline sites (Darkan and Tambellup, WA and Keith, SA).

Grazing value

Neptune messina has similar digestibility and protein levels to balansa and subterranean clovers, has no known chemicals that pose a threat to livestock health and produces meat acceptable to consumers.

Grazing trials with crossbred ewe lambs and crossbred ewe hoggets in Kybybolite SA in 2015 and 2016 showed Neptune tended to be less palatable than subterranean clover. This suggests liveweight gains may be limited if Neptune messina is the sole feed source, but weight should be maintained.

Neptune appears to be grazed more readily when other species are also present in the paddock and it is, therefore, recommended for use in mixed pastures for livestock production.



Plots of Neptune messina and Frontier balansa clover three years after sowing: (a) Darkan (WA) showing Frontier plot dominated by button weed (*Cotula* sp.); (b) Keith (SA) with very low Frontier density.

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Sowing recommendations

Seed inoculation and dressing

- Neptune messina will be grown on soils unlikely to contain any suitable rhizobia and must be inoculated with the special salt-tolerant messina Rhizobium (strain SRDI554). Other strains of rhizobia will not survive over the summer in the saline soil.
- Seed should be inoculated with a peat slurry, lime pelleted and sown promptly (ideally within 24 hrs) after inoculation.
- Apron fungicide (metalaxyl) has been used in research trials to prevent damage from Pythium and Phytophthora root rots in wet soils. It should be applied to seed before inoculation with rhizobia.

Sowing

- Sow into moist soil in autumn or early winter.
- Ideal timing is to delay sowing until early rains have flushed salts from the surface, but before waterlogging occurs.
- Recommended sowing rate is 10 kg/ha.
- Sowing depth should be 10-15 mm deep, similar to subterranean clover (which has a similar seed size).
- Sow into a well prepared seed bed following good weed control.
- Apply adequate rates of fertiliser to ensure phosphorous, potassium and other trace elements do not limit production.



(a) Sheep grazing Neptune at Kybybolite, SA; (b) Saltland pasture mix of messina, balansa clover, burr medic, puccinellia and old man saltbush.

Other species

Saltland environments are highly heterogeneous for salinity and waterlogging potential. Species mixtures are recommended to enable different plants to colonise parts of the landscape where messina is less suited and to provide a more balanced feed intake. Neptune can be mixed with other pasture legumes, including balansa clover and burr medic and with the perennial grass, puccinellia. It can also be sown as an understorey species with saltbushes.

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Weed control

The paddock should be weed free prior to sowing. No chemicals are currently registered for use on messina and herbicide testing has been limited.

The grass selective herbicides Verdict, Select and Factor (Group A) used on other pasture legumes appear to be safe. Treflan applied pre-sowing at 1.4 L/ha and incorporated appears to be safe, although some damage has been measured at higher label rates. Post-emergent broadleaf weed control options used successfully in field trials include 25 g/ha of Broadstrike (plus label rate of uptake oil) and 50g/ha of Spinnaker at the 3-8 trifoliolate leaf stages. Dual gold and Igran (at low label rate) have also been used safely on messina.

MCPA, Raptor and Simazine have caused significant damage to messina. Messina is very sensitive to the SU herbicide chlorsulfuron (Glean). Growers should avoid paddocks where SU herbicides have recently been used and strictly observe plant back periods on soils where residues persist.

Growers should observe cautions regarding the application of herbicides to waterlogged soils.

Pests and diseases

Messina should be monitored for redlegged earth mites and aphids during emergence and later in the season and controlled as required. Neptune has some susceptibility to powdery mildew.

Breeding and selection

Neptune messina was developed by DAFWA and SARDI as part of the Future Farm Industries Cooperative Research Centre. It is derived from accession SA40002, collected from the wild in Israel.

Seed enquiries

Neptune messina is marketed under the Dyna-Gro Seed brand. For seed enquiries contact Seednet personnel.

Seednet

WA

David Clegg
0408 630 641
david.clegg@seednet.com.au

SA, VIC & NSW

Rob Christie
0427 340 608
robert.christie@seednet.com.au

Technical information

Chris Walsh
0417 891 546
chris.walsh@seednet.com.au

Dyna-Gro Seed logistics

enquiries@dyna-groseed.com.au

Technical information



Department of Agriculture and Food



Dr Phillip Nichols
DAFWA, 3 Baron-Hay Court. South Perth WA 6151
(08) 9368 3547, 0418 955 943
phil.nichols@agric.wa.gov.au



SARDI SOUTH AUSTRALIAN
RESEARCH AND
DEVELOPMENT
INSTITUTE

Amanda Pearce
SARDI, Struan Research Centre,
PO Box 618, Naracoorte, SA 5271
(08) 8762 9105
Amanda.Pearce@sa.gov.au

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