Dalkeith

Sub Clover

Subterranean/Sub clover (ssp. subterraneum)

INTERNATIONAL

KEY FEATURES

- Early flowering 97 days
- Black seeded type
- Very high levels hard seed
- Excellent option in low to medium rainfall pasture zones
- Good companion with other hard seeded annual legumes for long term regeneration pastures

DALKEITH belongs to the Trifolium subterraneum ssp. subterraneum family and demonstrates a prostrate to semi-erect growth habit and persists well on various soil types. It has early maturity requiring a minimum growing season of four months. It has a high hard seed level, which, in combination with its early maturity, makes it well suited to low rainfall cropping rotations. DALKEITH is a superior replacement to Daliak and has been well up-taken into the 350 to 600mm rainfall zones. It is susceptible to a range of diseases, however, most of these occur in higher rainfall environments.

Growing Conditions

Soil Type:
Prefers well-drained sandy loams to clay loams of moderate acidity

Sowing Rate:
Pure 5 - 10kg/ha Dryland
Pure 11 - 15kg/ha Irrigated

Rainfall:
325mm+

pH:
4.5 - 6.5 ($CaCl_2$)

Inoculant:
Group C Rhizobium

Regeneration

Dalkeith has the ability to provide high levels of hard seed (45%). This characteristic allows Dalkeith to build up a strong reserve of seed in the soil over time, thus enhancing persistence and productivity for many years. This, in combination with tolerance to low rainfall, makes it well suited to long term cropping rotations

Disease Resistance

Dalkeith is susceptible to Clover Scorch (Kabatiella caulivora), Phytophthora Root Rot (Phytophthora clandestina) race 1 and 2, Cercosprora Leaf Spot (Cercosprora zebrine) and to Root Rots caused by Pythium (Pythium spp.) and Fusarium (Fusarium spp.). Dalkeith is generally grown in dry, low rainfall environments where the disease pressure of Clover Scorch, Phytophthora, Pythium and Fusarium is significantly reduced. The susceptibility of Dalkeith to these diseases is not considered a disadvantage.

Pest Resistance

Dalkeith, as with all Sub-Clovers, is susceptible to red-legged earth mite (Halotydeus destructor), blue-green aphid (Acyrthosiphon kondoi), blue oat mite (Penthaleus major) and spotted alfalfa aphid (Therioaphis trifolii). Therefore, control is essential at the early seedling stage and appropriate pest management must be implemented as required.

Cultivar Agronomic Guide	
Maturity	Early
Days To Flower	97
Burr Burial Strength	9
Hard Seed Level	9
Waterlogging Tolerance	Poor
Hard Seed Level	1 = Least Hard 10 = Most Hard
Burr Burial Strength	1 = Very Weak 10 = Very Strong

Subteranean/Sub Clover Agronomic Information

Scientific name(s)

Trifolium subterraneum ssp. subterraneum

Strengths

- Tolerant of heavy grazing under set stocking
- Vigorous seedlings provide good winter feed
- Very persistent in medium to high rainfall areas and other areas with infrequent cropping

Limitations

- Poor persistence on deep sands
- Insufficient hard seededness for reliable persistence in tight cropping rotations (1 year crop:1 year pasture)
- Susceptible to germination following ‘false breaks’
- Shallow-rooted, so unable to capture deeper soil moisture and susceptible to premature death in dry springs
- Some older cultivars have high oestrogen levels contributing to ewe infertility

Plant characteristics

A prostrate self-regenerating annual pasture legume tolerant of heavy grazing that grows from autumn through to spring and buries its burrs.

Pasture type and use

Suited to permanent and semi-permanent pastures and to crop rotations (with at least 2 years between crops).
The subspecies subterraneum is best suited to well drained acid soils, with the other subspecies, yanninicum and brachycalycinum, being suited to waterlogged acid and cracking neutral-alkaline soils, respectively.

Where it grows

Rainfall
Adapted to winter-dominant rainfall area of southern Australia with annual rainfall 275 -1200 mm. Early flowering varieties suited to lower rainfall zone, later flowering varieties suited to higher rainfall zone. Can also be grown under irrigation.

Soils
Prefers well-drained sandy loams to clay loams of moderate acidity (pH $CaCl_2$ 4.5-6.5).

Temperature
Widely adapted to the agricultural areas of Western Australia, South Australia, Victoria, Tasmania, New South Wales and parts of south-east Queensland with sufficient winter rainfall. Good frost tolerance.

Establishment

Companion species
A range of perennial and annual grasses, lucerne, yellow and french serradella, biserrula, rose clover, arrowleaf clover, purple clover and burr medics, depending on soil type. On paddocks with patches prone to waterlogging it can also be sown with balansa clover, gland clover, persian clover and subterranean clover ssp. yanninicum.

Sowing/planting rates as single species
5-15 kg/ha.

Sowing/planting rates in mixtures
3-8 kg/ha, depending on the number of mixture components.

Sowing time
Sow April-June, into moist soil following good weed control. Shallow sowing (<40 mm) is essential.

Inoculation
Commercial Group C (subterranean clover).
Granular clay inoculants can also be used. Subterranean clover fixes about 25 kg of N per tonne of herbage dry matter. As a result, it can increase soil nitrogen by about 125-200 kg of N/ha/yr.

Fertiliser
Phosphorus (with potassium on deficient soils) at sowing – levels dependent on soil tests. Trace elements (Cu, Mo, Zn) may be required on very infertile soils.

Management

Maintenance fertiliser
Annual applications of superphosphate (with potassium or sulphur on deficient soils) are required to achieve maximum productivity. Levels are dependent on soil tests.

Grazing/cutting
Thrives under set stocking and can be grazed moderately hard while flowering. Likely to be shaded out by more erect plants under lax grazing. Can be cut for hay.

Ability to spread
Slow spread from site of sowing. Can spread by burrs attaching to wool.

Weed potential
Its slow rate of spread, its preference for moderate-high fertility soils and specific rhizobia requirement gives it low potential as an environmental weed. It is readily controlled by a range of broadleaf herbicides within crop.

Major pests
Red-legged earth mite is a major pest, particularly at plant establishment, where it can kill emerging seedlings, but also causes damage in spring. Timerite® has proved an effective means of control. Lucerne flea and blue- green aphids can also cause damage in spring. Refer to chemical labels for suitability and recommended rates for insecticides.

Major diseases
Some cultivars are susceptible to the foliar disease clover scorch (Kabatiella caulivora), found in high rainfall, humid areas. Other foliar diseases in higher rainfall areas include leaf rust (Uromyces trifolii-repentis), powdery mildew (Erysiphe polygonii) and cercospora leafspot (Cercospora zebrina).
Several root rots can attack subterranean clover, causing most damage to emerging seedlings and young plants. They include Phytophthora clandestina, Fusarium avenaceum, Pythium irregulare and Rhizoctonia solani.

Herbicide susceptibility
Refer to chemical labels for suitability and recommended rates for herbicides registered for use on subterranean clover.

Animal production

Feeding value

Excellent as green feed with in vitro digestibility in the order of 70% and crude protein over 20% until mid-flowering. Quality reduces once plants hay off. Dry herbage feeding value over summer is less than maintenance value (often < 50% in vitro digestibility) although animals may be able to obtain sufficient energy and protein by digging up seed burrs.

Palatability

Readily consumed by livestock, either as green or dry feed.

Production potential

Vigorous seedlings provide good early season production. Later flowering varieties are capable of more than 10 t/ha annual production in long-season environments or under irrigation. Herbage production of 4-6 tonnes/ha is achievable in low to medium rainfall environments.

Source: Pastures Australia

Livestock disorders/toxicity

Some older varieties of subterranean clover contain high levels of phyto-oestrogens, which can affect the sheep reproductive system. The most active isoflavone is formononetin, which can cause a decline in ewe fertility. Two other isoflavones, genistein and biochanin A, are also present in all subterranean clover varieties, but these have less impact. If ewes are mated when they are grazing green, potent subterranean clover their reproductive performance can be temporarily impaired. Continued exposure over several years to high levels of formononetin can lead to permanent infertility. Ram fertility is not affected.

Formononetin is present in subterranean clover only while the pasture is green. However, hay produced from oestrogenic varieties can be almost as potent as green pastures. Formononetin levels drop away during late flowering. Generally, dry subterranean clover pastures that result from normal haying-off are not oestrogenic. However, if there is a very early finish to the season, it is possible for oestrogenic varieties to retain some potency in the dry state. All recently released varieties have low formononetin levels. There have been isolated reports of cattle bloat on very clover-dominant subterranean clover pastures.

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