

# PRODUCTIVE LEGUME PASTURES

## FACTSHEET #1

# DROUGHT RESILIENT LEGUMES FOR GRAZING



## ABOUT THE P.O.D.S. PROJECT

**Annual legumes**, especially medics and subterranean clovers, are vital for pastures in South Australia's medium to high rainfall zones, where livestock graze on permanent pastures or fodder crops. Over the past 30 years, various alternative annual legume species have been developed, but most haven't been tested under South Australian farm conditions. These species offer traits that could **boost production and drought persistence**, such as high levels of hard seed, deeper roots, longer growing season, and adaptation to different soil pHs and textures.

Between 2022 and 2024, the PODS team trialled several cultivars under different management and seasonal conditions. These trials demonstrated pasture management strategies that **extend feed production** and **improve seasonal ground cover**. Improved pastures that offer longer soil cover will help prevent wind erosion, increase soil porosity, and build organic matter, benefiting both livestock and cropping in mixed farming systems. This approach **boosts farm productivity and resilience**, especially during and after droughts, while supporting the natural capital of grazed landscapes



## KEY FINDINGS FOR GRAZING IN DRY TIMES

- Less common legumes such as **French serradella**, **Arrowleaf clovers**, and highly adapted **Medic** performed better than subclover under dry conditions
- Frequent defoliation (2-week intervals) improved **early biomass use** but **stressed plants**, limiting growth in dry conditions.
- **Less frequent** defoliation allowed for **more resilient** growth without sacrificing cumulative biomass or pasture composition.
- Metabolizable Energy (ME) and Crude Protein (CP) peaked early in the season, with **frequent defoliation boosting feed quality** later in the season.

FOOD FOR THOUGHT: DROUGHT RESILIENT, HARD-SEEDED LEGUME VARIETIES

| Species             | Sub species                   | Characteristics and cultivars | Ideal Soil pH                                                                       | Ideal Soil Type                                                    |
|---------------------|-------------------------------|-------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Subterranean Clover | <i>Tribolium subterraneum</i> | <i>subterraneum</i>           | Black seeded, low-medium rainfall.<br>Early: Izmir, Dalsa, Uрана, Seaton Park, Losa | Neutral to acid (4.5)<br>Tolerates most textures                   |
|                     |                               | <i>yanicum</i>                | White seeded, medium rainfall<br>Early: Miltaro, Rosedale<br>Mid: Antas, Koala,     | Neutral to acid<br>medium-heavy                                    |
|                     |                               | <i>brachycalcinum</i>         | Mid: Gosse, Riverina<br>Late: Meteora, Napier                                       | Mildly acidic-alkaline<br>medium-heavy, poorly drained/waterlogged |

Hardseededness varies with variety, all varieties listed have moderate to high hard seed *for subclover (lower than other species such as medic and serradella)*  
It is recommended to sow at least 2 sub-clover varieties with different flowering dates to spread timing of flowering and seed-set. Factors like frosts, drought, grazing, pests, and herbicides can impact seed set or lead to failure, it is recommended to plant both early and mid-flowering varieties in regions with an early spring. In areas with a later spring, a combination of mid-maturing and late varieties should be sown.

|               | Species                                    | Characteristics and cultivars                                                                                                                                             | Ideal Soil pH                       | Ideal Soil Type                      |
|---------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------|
| Annual Medics | Burr Medic<br><i>Medicago polymorpha</i>   | Tolerates low rainfall, can tolerate some waterlogging.<br>Newer varieties don't have spines on the pods - reducing fleece contamination<br>Early-mid: Scimitar, Cavalier | Neutral to alkaline                 | Medium-heavy, tolerates a wide range |
|               | Barrel Medic<br><i>Medicago truncatula</i> | Low-medium rainfall<br>Early: Sultan SU, Penfield, Caliph<br>Mid: Jester SU,                                                                                              | Neutral to alkaline                 | Loam, clay                           |
|               | Strand Medic<br><i>Medicago litoralis</i>  | Low-very low rainfall, remains green longer in the season<br>Mid: Seraph                                                                                                  | Neutral to alkaline, tolerates acid | Sand, loam                           |

Medics tend to be higher in hard seed than subclovers

|            | Species                                               | Characteristics and cultivars                                                                                                                                                                                                        | Ideal Soil pH | Ideal Soil Type   |
|------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------|
| Serradella | French "pink" Serradella<br><i>Ornithopus sativus</i> | Low to moderate rainfall, deep root system increases resilience to poor soils and dry periods, aerial seeding - this allows harvesting with conventional machinery rather than a vacuum harvester<br>Early: Fran2o<br>Mid: Margurita | Acid (pH<7.5) | Deep, light soils |
|            | Yellow Serradella<br><i>Ornithopus compressus</i>     | Low to moderate rainfall, deep root system increases resilience to poor soils and dry periods, aerial seeding, very hard seed<br>Early: Santorini, Serramax<br>Mid: Avila                                                            | Acid (pH<7.5) | Deep, light soils |



FOOD FOR THOUGHT: DROUGHT RESILIENT, HARD-SEEDED LEGUME VARIETIES

# FAILING TO PLAN IS PLANNING TO FAIL

Pasture renovation is a significant investment, averaging \$200-350/ha, but with careful planning, it can greatly improve productivity.

Major costs to remember when planning to renovate are:

- Seed: High-quality seed is crucial but can be costly. Seed typically makes up 20-30% of the total renovation cost.
- Soil Preparation: soil testing, and addition of soil amendments such as lime & fertilizer,
- Labor: Renovation takes time, for sowing, fertilizing, and ongoing maintenance. Specialized equipment or contractors may be needed, adding to the cost.
- Pest and Weed Control: Ongoing control measures, including herbicides, insecticides, or biological controls, are necessary to prevent weed and pest competition, which can significantly reduce pasture establishment and productivity.

*Seed is roughly 20% of the total cost of seeding once diesel, labour and other inputs are calculated.*

## PLANNING AHEAD

Start preparing your paddock for 12-18 months before your desired sowing date

- ✓ Conduct soil tests: 0-10 cm & 20-30 cm depth
- ✓ Weed/Pest Control: Begin in spring for autumn/winter sowing. Prefer spray fallowing over spray topping.
- ✓ Pre-Sowing Grazing/Cultivation: Reduce pasture residues and promote weed germination, followed by control, reducing weed seed bank.

|                | Species                                          | Characteristics and cultivars                                                                                                                                                                           | Ideal Soil pH                  | Ideal Soil Type        |
|----------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------|
| Annual Clovers | Balansa Clover<br><i>Tribolium michelianum</i>   | Tolerates mild salinity and some waterlogging.<br>Early: Cobra, Frontier, Enduromax<br>Mid: Taipan, Paradana, Border<br>Late: Vista, Viper, Baler                                                       | Neutral to acid                | Tolerates a wide range |
|                | Persian Clover<br><i>Tribolium resupinatum</i>   | Medium rainfall, many Persian clover varieties are NOT hard seeded, make sure to check<br>Early: Nitro Plus,                                                                                            | Neutral to moderately alkaline | Tolerates a wide range |
|                | Arrowleaf Clover<br><i>Tribolium vesiculosum</i> | Medium rainfall, tolerates mild salinity. Poor season autumn/winter growth, provides spring/summer growth in favourable seasons, seed set can be affected by drought<br>Early: Cefalu<br>Late: Zulu II, | Neutral to acid                | Tolerates a wide range |

## STARTING STRONG

Careful management of new pastures in the first year is critical for strong establishment, which will allow persistence and return on the investment in renovation



- ✓ Adequate Soil Moisture: Ensure soil moisture to encourage good germination, this will allow survival after sowing, even if dry conditions follow sowing. *Do not sow into a dry seedbed.* It is better to sow late than to sow dry.
- ✓ Accurate Seed Placement: Place seed in a furrow, in contact with moist soil, with 5% of seed and fertiliser visible at the surface.
- ✓ Monitor Weeds/Pests: Check 10–14 days after germination, then weekly.
- ✓ First Grazing: in good conditions grasses can be grazed 10–15 cm tall, and clover when 3 trifoliate leaves are present. Grazing should aim to leave at least 5 cm (1000 kg DM/ha) pasture height. If it is dry, delay first grazing till after the pasture sets seed.

*Skipping weed control, reducing seeding rate and pushing for an early graze all seem to cut costs in the establishment year, but they increase the risk of failure in new pastures, particularly if the season is challenging*

## ENCOURAGING PERSISTENCE IN GOOD YEARS

Strategic Grazing Management to encourage legumes (particularly subclover) in the sward:

- **Summer:** Short, intensive grazing periods (3–7 days) followed by extended rest periods (up to 70 days). This reduces litter cover, while minimizing damage to perennial grasses.
- **Autumn:** Aim to maintain 1,000 kg dry matter (DM)/ha at the break. Excessive residues can hinder seed germination, whereas insufficient cover may expose soil to erosion.

*Break of season*

- Allow seedlings to develop 3–5 leaves before grazing to ensure root establishment and prevent losses from grazing.
- **Winter:** frequent, heavy grazing to maximize leaf production to enhance flowering and seed set. Aim for post-grazing residual DM levels around 1,500 kg DM/ha grazing to support subclover growth and manage grass dominance
- **Spring:** Continue frequent, heavy grazing until flowering. **Exclude grazing** two to three weeks after flowering begins, typically around early to mid-October. This period allows subclover plants to produce seeds, and replenish the soil seed bank

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