Alternative pasture species for deep sands

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ALTERNATIVE

PASTURE SPECIES for deep sands

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Although the climate of the Swan coastal plain between Perth and Bunbury is suitable for growing a range of pasture species, some soil types greatly limit this range.

Pasture species commonly grown in the South-West, such as subterranean clover and annual ryegrass, can only be grown successfully on the better soils of the coastal plain—the loams, yellow sands and Joel sands. On the freely drained, deep, infertile Gavin sands such species rarely persist because of the soil’s poor water holding capacity, its water repellency and its poor ability to retain nutrients.

Causes of poor plant growth

Soils such as the deep grey Gavin sands have a water holding capacity of only 20 to 50 millimetres per metre depth compared with 100 to 150 mm per metre depth for a sandy loam.

For germination many seeds must be kept moist for at least two to three days, with further moisture if the roots are not to dry out. With the surface 20 mm layer of sand holding only 0.4 mm moisture, and evaporation averaging 3 to 4 mm/day in April, effective rain is needed almost daily for a week to successfully establish plants on the Gavin sands. Unfortunately such long rainy periods do not usually occur until June or July by which time many seeds have died.

Water repellency, caused by coatings of organic matter on the surface of coarse textured soil particles, exacerbates the problem. It results in uneven wetting of the sands and delayed germination. The later germinated plants are vulnerable to attack from insects such as red-
Leaching of nutrients also contributes to poor plant growth. Water moves rapidly in coarse sandy soils, sometimes up to 10 metres per day. Also the small amount of organic matter, clay and iron oxide in these soils means that applied nutrients such as phosphorus, nitrogen, potassium and sulphur are rapidly leached away from the root zone.

Consequently wheat, for example, growing on a poor sand will have roots only half as deep as on a good yellow sand. With a smaller volume of soil being tapped for nutrients, plant growth is further restricted.

Towards the end of the plant growing season evaporation and transpiration losses increase. Because of the poor water holding capacity of sandy soils, plants can die after short dry periods. In contrast plants growing on soil with a higher water holding capacity could survive to take advantage of later rains. Premature death has disastrous consequences on long term persistence and production of annual plants which rely heavily on seed production each year.

With hindsight it would have been wiser to have left such sandy soils in their native state. However areas have been cleared and advice as to what could be grown is sought. Some success is possible with lupins and serradella but other persistence and production of annual plants is difficult because satisfactory germination requires a minimum temperature of $15^\circ\text{C}$ with an optimum of $25^\circ$ to $30^\circ\text{C}$. On the coastal plain such temperatures occur in spring or summer when soil moisture conditions are unfavourable for reliable seedling establishment. Feed quality appears better than that of lovegrass and it persists better than veldt grass. A mixture of tambookie and serradella could be successful.

**Couch grass** (*Cynodon dactylon*)

Couch grass is a warm season perennial grass which spreads by rhizomes and stolons. Its establishment and growth is poor on recently cleared soils. If soil fertility can be built up by growing lupins, some success is possible. Seed of a number of cultivars is available.

**Tagasaste or tree lucerne** (*Chamaecytisus palmensis*)

Tagasaste is a hardly leguminous perennial shrub capable of producing good quality foliage. The shrubs can be established by direct seeding or by transplanting seedlings. The shrubs should not be grazed for the first one to two years to encourage satisfactory establishment and persistence. Feeding out is a problem but stands can be electrically fenced off if mechanical harvesting is not possible.

**Discussion**

Most of the species mentioned are summer active perennials that can use rain received throughout the year. Because they are perennials, they overcome the major re-establishment problems faced each year by annual species in the poor soil environment. They are all deeper rooted than the common annual pastures and can use the moisture and nutrients deeper in the soil profile. Satisfactory persistence can be achieved with minimal fertiliser applications.

If perennial species are to be grazed they need much more intensive management for successful establishment and maintenance than most annual species. This has restricted their widespread use. Where areas can be fenced off and left ungrazed veldt grass and lovegrass readily establish and spread.

Growing perennial species may improve the productivity of the deep well drained sands compared with that from currently available annuals. They could also be useful on lower sandy slopes where annuals grow poorly. However any pasture established on poor soils will not equal the productivity of species planted on better soils. Lower carrying capacity and lower returns must be expected, particularly where little or no fertiliser is used.