



Tagasaste - a fodder shrub

This fact sheet is written for conditions in the Mid and Upper South-East of South Australia.

Benefits of tagasaste

The benefits of planting a deep-rooted perennial fodder shrub like tagasaste (also known as 'lucerne tree') include:

- Improved productivity of deep acid sands - tagasaste with good fertiliser and grazing management can increase the carrying capacity on poor sands from around 1 dse/ha to 5 or 6 dse/ha.
- shelter and shade for stock
- provides a "green haystack" in summer and autumn to maintain the condition of stock, reducing the amount of supplementary feeding needed during this period and allowing other paddocks to be spelled
- increased use of soil water, reducing recharge to groundwater systems and therefore aiding in dryland salinity control
- reduced soil erosion when planted in rows against the most damaging wind direction.



Figure 1. Tagasaste growing on deep sands. Photo: Z. Stokes.



Figure 2. Tagasaste stand in autumn – note lack of other sources of green feed. Photo: Z. Stokes.

Other factors to consider

There are a number of factors that need to be considered with respect to the introduction and utilisation of tagasaste including the following:

- it is an exotic plant which can become an invasive weed of bushland if it is allowed to set seed,
- tagasaste is best used for cattle grazing as it is susceptible to ringbarking from sheep,
- it requires careful ongoing grazing management to prevent it from growing above the optimum stock grazing height of 1 metre,
- tagasaste has its best feed quality and leaf production in spring when a bulk of other higher quality feed is also available,

- tagasaste that comprises only a small proportion (<10%) of the total fodder on a property may be difficult to manage as a priority when other feed is abundant,
- it does not provide the weight gains of other improved pastures without supplementary feeding,
- it is only recommended for sites that cannot be clay-spread and sown to other higher quality pastures (e.g. lucerne),
- once established it is costly and difficult to remove so plan ahead carefully.

Site requirements

Tagasaste is rainfall responsive rather than summer or winter active and requires a minimum average rainfall of 350 mm. It does best on deep, well drained, sandy soils and is only recommended where lucerne, perennial grass and sub clovers are unable to be established or do not persist.

Tagasaste will not tolerate, even for short periods, saline or waterlogged soils and should not be planted at sites where the water table regularly rises to less than one metre from the surface. As seedlings are also susceptible to frost, planting on flats will generally give poor results.

The preferred soil pH range is 4.8 to 6.0 (CaCl₂) or 5.5 to 6.5 (water) though it has been known to grow on soils with higher pH.

Establishment

Direct seeding

Machine direct-seeding is an economical and effective method to establish tagasaste. Direct seeding machinery scrapes a 10 to 100 cm wide shallow furrow in which seed is buried to 2 cm deep in a single trail. Contractors are able to sow 50 to 80 km of tagasaste row per day (if not weed spraying as well).

Seed should be sown in winter into a weed-free, moist seedbed (Table 1). Direct seeding contractors use a sowing rate of 400 to 450 grams of seed per kilometre of trail sown, with the aim of achieving at least one healthy plant per 2 metres of row (although densities are often greater than this). Seed needs to be scarified or heat-treated and is usually provided by the contractor. Heat-treated seed is boiled in water for 30 to 60 seconds (no longer), then removed and dried before sowing. Seed is inoculated with tagasaste inoculant bought from seed suppliers.

On non-wetting sands, the use of a wetting agent sprayed over the planting line during seeding can help with moisture penetration and retention.

Table 1: Planting/seeding period guide

Area	Time to plant
Southern Murraylands	Late May - June
Upper South East (North of Keith)	Late June - Early July
Upper South East (South of Keith)	Late June - late July
Mid South East	July - August

Planting seedlings

Planting seedlings may be advantageous compared to direct seeding on erosive/steep slopes and can be used in the year after first establishment to fill in any gaps in the rows where plants have failed.

Bare-rooted seedlings are 12 month old root and top-pruned seedlings supplied in bundles with no soil on the root system. Tubestock seedlings and speedlings (cell-grown) are also available.

Seedlings should be ordered preferably 6 months in advance and bought in bulk. Seedlings can be ordered from the suppliers listed in the following section.

Contractors and nurseries

Contact all contractors and nurseries *at least* 6 months in advance prior to when the tagasaste is to be established. Note: other interstate or SA contractors and suppliers may be available.

- **SE Direct Seeding Service**

Direct seeding, speedlings/tubestock upon advance order, tree planter for hire;
Mig and Peter Brookman, "Cairndale" Keith Ph 08 8756 5019 or fax 8756 5070;
Jamie and Josie Jackson, "Tallawong" Willalooka, Ph/fax 08 8757 8276

- **Triffid Trees**

Direct seeding, seedling planter for hire;
Andrew Bradey, RMB 638 Edenhope Vic 3318. Ph/fax 03 5587 3558

- **Reedy Creek Nursery**

Speedlings/seedlings (advance order);
Mike Quarmby, Kingston – Millicent Rd Naracoorte turnoff, Ph/fax 08 8768 7220

- **Western's Nursery**

Speedlings (advance order), planter for hire. Vasey Rd, Waikerie SA 5330.
Ph 0427 609 293

- **Topline Plant Co**

Speedlings/tubestock seedlings (advanced orders of greater than 5 000 plants only)
Swamp Rd, Uraidla SA 5142.
Ph 08 8390 3369 or fax 08 8390 3603

Establishment costs

Total establishment cost ranges from \$100 to \$250 per hectare, depending on establishment method, design and site conditions. Initial costs are offset by the increased carrying capacity gained and longevity of the plants - there are commercial sites in WA that were established in the 1980's and are still producing profitable stocking rates.

Direct seeding labour generally costs around \$50 per km of row sown. Other costs include seed, fertiliser, wetting agent, herbicide and insecticide. Seed costs around \$50/kg and is sown at 400 to 450 g/km. Wetting agent costs approx \$3/km.

Direct seeding contractors set a minimum fee (eg around \$300 per site). Jobs of over 10 km attract discount rates and some contractors have a maximum day labour rate (eg \$600/day).

Seedling costs range from 20 cents each for "speedlings" up to \$1 each for tubestock. Always order bulk and 6 to 8 months in advance for best price.

Table 2: Guide to help calculate Tagasaste establishment costs

Distance between rows (m)	Metres of row/ha	Initial kg/ha super*	Seed g/ha (at 450g/km)	Plants/ha at 1.5m spacing
7	1428	14	640	952
8	1250	13	560	833
9	1111	11	500	741
10	1000	10	450	667

* At establishment, superphosphate can be placed within 250 mm each side of the row, or below planted seedlings within the row. Table 3 shows the overall kg of super per ha that this will amount to if using 200 kg/ha (10 g/m row). After establishment shrubs will use superphosphate broadcast over the entire site.

Weed control

Thorough weed control, both before and after planting, is vital for good tagasaste establishment. The aim of eliminating weeds is to reduce competition for moisture and allow trash-free machinery operations. The term “weeds” also includes pasture plants. Take particular care to achieve *early* control of veldt grass, clovers, sorrel, wireweed, primrose, lucerne, fat hen, skeleton weed, silver grass, self sown cereals and lupins.

Aim for a *minimum* 2 metre wide weed-free zone on the planting line. If erosion risk is low, a complete “blanket” spray-out is preferred (especially for veldt-grass paddocks – this species is extremely competitive and will stunt the growth of tagasaste). If erosion risk is high, only strip-spray but spray-top the remaining inter-row to prevent seed set.

An effective technique for achieving total weed control is to establish a crop, such as lupins, triticale or cereal rye, leaving a 2 metre wide strip unsown wherever you wish to establish a row of tagasaste. Alternatively, it is possible to sow the whole area to crop and then spray out 2 m of crop along the line where tagasaste is to be established. In some situations however (e.g. where lupins are sown), late germinating crop can become a problem. Cover crops should always be sown early, (late April, early May) and crop selection will depend on wind erosion risk and herbicide history.

If establishing into crop residues from the previous season, grazing should be managed, leaving sufficient plant material to minimise wind erosion.

To be most effective, control of weeds must begin in the spring of the year before you wish to establish tagasaste and in late autumn prior to planting. The type of weeds present will determine the chemicals required, but generally a broad-spectrum knock-down (e.g. glyphosate) is used. For the first spring spray, the rate is either set to completely kill any perennials present, or if only annuals predominate, spray-topping rates can be used. For the autumn spray, Simazine has been used successfully at low rates (at least 4 weeks prior to planting) in addition to glyphosate to help give better weed control (particularly for silvergrass).

Always consult chemical advisers and tagasaste establishment contractors for site-specific chemical advice.

Insect and rabbit control

Pest control is essential for tagasaste establishment. Tagasaste is particularly susceptible to attack by rabbits, lucerne flea, red-legged earth mite, pink cut worm and/or pasture loopers. Kangaroos and deer can also damage young seedlings.

Rabbits will cause serious damage, therefore carry out a thorough control program in the summer prior to immediately after establishing tagasaste. All other pests must be controlled as soon as they become apparent.

Planting design

General tips:

- A gap of 15 to 20 m should be left between fences and the tagasaste to allow for the movement of machinery and stock.
- Stands should be fenced in units no larger than 20 hectares in area to ensure evenness of grazing pressure across the stand.
- All fenced units should contain a watering point.
- Do not plant any frost-prone or low-lying areas.
- Some paddocks may have a steep slope or ridge preventing a clear view from fence to fence - a vehicle track along the ridge will help with monitoring stock.

Row orientation

Establish rows in straight parallel lines where possible to assist in mustering and monitoring of stock. Also consider the following when deciding on the orientation of rows:

- To minimise wind erosion, orient rows perpendicular to the most damaging winds.
- To minimise the risk of heavy rains washing seed or young seedlings down planting lines on slopes, follow contours and ensure there are intermittent gaps in the furrows.
- To maximise growth, orient rows north-south to capture most sunlight.

Minimising erosion must be the highest priority in determining layout.

Distance between rows

The distance between rows will vary according to annual rainfall and desired stocking rates. Contractors advise that for ease of access, rows should not be less than 8 metres apart at establishment.

Table 4: Row spacing guide

Rainfall (mm)	Space between rows (m)
<350	9 to 10
>350	8 to 9

Plant density within rows

Direct-seeded stands form a dense hedge. If planting seedlings however, aim for a plant density of one plant per 1.5 to 2 metres of row.

Gaps should be left at intervals (e.g. every 40 metres) along the rows of tagasaste, creating laneways running across the plantation to assist in mustering stock. These gaps should initially be 10 metres wide (but will become narrower as the tagasaste grows).

Pasture or crops between rows

Pasture production in between the rows of a tagasaste stand compromises tagasaste production. Research indicates that for each additional kilogram of green pasture present, a kilogram less of tagasaste is produced due to competition. Establishing a deep-rooted perennial (e.g. lucerne) between tagasaste rows will be detrimental, as plants will be competing for the same supply of water and nutrients.

The inter-row is predominantly a thoroughfare for stock if the distance between rows is less than 10 m. The high stocking rates needed to effectively graze the tagasaste mean that good inter-row pasture is difficult to maintain.

Some landholders have used wide-spaced rows (eg 30 m apart) to grow crops or other pasture between, but most find that the grazing regime for tagasaste is incompatible with that of the other pasture/stubble (usually overgrazing of the pasture/stubble occurs and the tagasaste is under-grazed).

Feed value

The feed value of tagasaste will vary depending on management and season. Tagasaste grown on sites with no fertiliser history and with poor grazing management is of marginal quality for stock maintenance. Well-managed plants however provide excellent feed during winter and spring.

The most nutritious parts of the plants are the fresh leafy tips on the ends of stems under 6 mm in diameter. Testing on plants throughout the Upper South-East has found that new leaf on well-fertilised plants in spring is about 25% crude protein and up to 75% digestible matter compared to 9% crude protein and 46% digestible matter for edible stems.

Feed quality will degenerate if the plants are allowed to flower (in late winter) and set seed. Early grazing or pruning can prevent this, producing a more nutritious fodder.

The nutritional value of tagasaste is at its lowest over the dry summer-autumn period (Table 5), when it also becomes less palatable due to a chemical build up of phenolic compounds. The fodder on offer over summer/autumn is still generally able to maintain body weight if the stand has been managed well, but supplements (mineral licks and grains such as lupins) are needed if stock weight gains are required over this period.

Table 5. Change in feed values of tagasaste (fresh 10 cm long leafy tips) according to season (average of two sites at Coombe and Marcollat).

Feed Value	Nov 96	Feb 97	May 97	Aug 97
Crude Protein (% of dry matter)	20.3	16.9	20.4	26.5
Digestibility (% of digestible dry matter)	73.1	68.1	73.4	74.3
Metabolisable Energy (MJ/kg dry matter)	10.4	9.6	10.5	10.6

Mineral deficiencies

Tissue testing of tagasaste in the Upper South-East has shown that phosphorus, sulphur, copper and zinc can be marginal for stock growth, particularly during summer and autumn. Phosphorus and sulphur can be boosted by regular application of single superphosphate. Copper and zinc deficiencies are not likely to be a problem for stock if they are rotationally grazing other pastures that have adequate trace elements. If the same mob are continuously grazing tagasaste alone, checks should be made for any signs of trace element deficiency and appropriate supplements provided.

Tagasaste staggers

“Tagasaste staggers” is an uncommon condition thought to be caused by mycotoxins in the plant. It appears that the syndrome is most likely to occur if stock are grazing tagasaste that is flowering. Symptoms may range from mild tremors to seizures. These symptoms are most noticeable when the animals are under stress, such as when being moved.

Management for staggers includes isolating and resting the affected individual. Stock will generally recover from the condition within a few hours if provided with good quality feed and not mustered.

Management

Fertilisers at establishment

If the tagasaste is being established with a crop between the rows, fertiliser can be broadcast to benefit both, otherwise for the first year apply the fertiliser in a narrow band within 25 cm of each side of the planting line or underneath, but not on, the seed or young plants.

Field work indicates with soil test levels less than 20 ppm phosphorus (Colwell test), young plants in particular respond to single superphosphate applied at establishment at rates of 200 kg/ha (eg spread at 10 g per metre of row). If soil test indicates less than 50 ppm (Colwell) potassium, young tagasaste plants may respond to super potash 2:1 applied at 10 g per metre of row in the spring of the year of establishment. This must not be applied on the plants but close by as too much potassium (>30 g per metre of row) can kill seedlings.

Use a 'scrub mix' containing trace elements for the first application if none has been spread in the previous 5 years. If there are known manganese deficiencies (yellowing of leaves) in lupins or lucerne in the area, or the sands are alkaline below the surface at the site, it is likely that tagasaste may require an added boost of manganese in the spring immediately after establishment.

Fertilisers for maintenance

It is up to the individual farmer to decide whether the tagasaste is used simply for stock maintenance or optimum stock performance.

Western Australian research found that optimum tagasaste production on sands with no prior fertiliser history was achieved by adding 160 kg superphosphate/ha/year over five years, but that best *stock* performance was obtained by adding 240 kg superphosphate/ha/year. Other trials have found that it can be more economical to boost stock performance over summer/autumn with a mineral lick and grain supplement such as lupins, rather than using rates of super over 200 kg/ha.

Landholders who only wish to use tagasaste to maintain livestock weight should firstly try a fertiliser rate is the equivalent of 100 kg/ha of superphosphate annually and monitor results.

Note that if the site has a good recent superphosphate history there may not be a response from adding more super after establishment because mature tagasaste is an excellent forager of leached nutrients from deep within the soil profile.

Leaf tissue testing in August to monitor levels of phosphorus and sulphur can be used as a guide to determine when to start reapplying more fertiliser. According to Western Australian trial results, phosphorus concentration in the leafy tips below 0.37% and/or sulphur below 0.21% indicates that applications of single superphosphate at 100 kg/ha or more may be beneficial. Tissue test sample kits can be obtained from Rural Solutions SA (PIRSA) offices.

Note that yellowing of the leaves and leaf shedding on some plants during late winter or early spring can be an indication of manganese deficiency, which can be overcome by applying a manganese fertiliser.

Grazing

Young plants can be grazed carefully with cattle at about 18 months after establishment, with full production reached when the tagasaste is 3 years of age.

At the first introduction of stock to tagasaste (preferably in winter or spring when it is most palatable), they may not eat it immediately. It can take several weeks for them to get a taste for it, which usually occurs after they have grazed all other available pasture. Be patient!

The recommended optimum height of tagasaste to enable cattle grazing is around 1 metre. Experienced growers advise that once the tagasaste grows above 1 metre, the plant concentrates all fresh growth into the taller leaders and quality of available feed rapidly declines. Tagasaste can quickly grow out of reach of stock, especially on productive sites in spring.

Where tagasaste grows beyond the grazing height of the stock it will require mechanical pruning.



Figure 3: Tagasaste requiring pruning.

Tagasaste grazed regularly will have a greater proportion of the more nutritious young leaves and shoots whereas plants grazed only once or twice a year will tend to develop long, rank stems which are less digestible. It is therefore preferable to graze often enough to keep stems short throughout the year (less than 20 cm long).

Grazing pressure should be reduced or stock removed when stems have been eaten down to about 7 mm diameter thickness and only leafy material on bigger stems remains. Do not overgraze. If grazing with sheep, the plants should be monitored daily. Sheep can nibble right to the stem and are known to strip the bark off stems and the lower trunk, particularly when grazing pressure is too high. Aim to start re-grazing when stems have 10 to 20 cm of fresh new growth.

Stocking rates

In WA where some properties have a high percentage of the area established with tagasaste, good management of stock has enabled yearly average stocking rates of 10 to 15 dse/ha.

However in the Upper South East where growers of tagasaste commonly have less than 15% of their total pastures under tagasaste, fertilizer and supplementary feeding is less intensive and average yearly stocking rates of around 5 to 6 dse/ha are more realistic (on country only able to support 1 to 1.5 dse/ha prior to establishing tagasaste).

Tagasaste is often used as a maintenance fodder over the “autumn feed gap” period when there is little feed available in other pasture paddocks. Growers advise that whilst tagasaste is able to carry a similar amount of stock to other pastures (eg lucerne) it does not achieve the weight gains of the other pastures without supplementary feeding over the dry period.

Pruning

Young tagasaste should be topped (cut) in the winter after establishment to a minimum height of 30 cm to promote branching. The cuts must be clean and carried out with sharp blades

similar to a reciprocating mower or a header cutter bar. Blunt blades, especially on slashers and disc mowers, can bruise the plant and reduce the regrowth. If grazing with sheep, a second pruning may be necessary the next year to form a protective low-branch barrier to the trunk.

The state of the plants should be monitored regularly. Occasional pruning of tagasaste may be required in winter to keep a broccoli-shaped hedgerow of quality fodder within reach of stock and to prevent seed set. Effective cattle grazing management will decrease or eliminate the need for costly mechanical pruning.

Pruning contractor with a circular saw is Versatile Trimming (Bill Fisk) at Millicent. Ph 8733 3325 or 0427 369 737.



Figure 4: Well-pruned Tagasaste stand at Naracoorte. Photo: Z. Stokes.

Tagasaste references

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