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Tagasaste (tree lucerne)

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Tagasaste is the name given on the island of La Palma, in the Canary Islands, to the indigenous plant known botanically as *Chamaecytisus palmensis*. This legume, belonging to the family Fabaceae, has been variously called tree lucerne, false tree lucerne and lucerne tree in Australia. For the sake of uniformity, tagasaste is preferred.

Tagasaste is a shrub or small tree growing to a height and crown diameter of about 5 m, often with long,

drooping, leafy branches. Variations occur, including upright and prostrate types. White flowers appear in profusion, usually in spring, though under some conditions flowering can commence in winter. The flowers develop into flattened pods about 5 cm long, containing about 10 seeds. The seeds, which ripen in summer, are a flattened oval shape, about 5 mm long by 3 mm wide by 1 mm thick. There are about 45 000 seeds per kilogram.

A tagasaste (tree lucerne) shrub in full flower. Photo: G.M. Cunningham, Soil Conservation Service



In its native habitat, tagasaste has long been used for animal fodder. In Australia it has been planted around homesteads for windbreak and decorative purposes and shade in fowlyards, and sometimes used for fodder. Tagasaste has received considerable attention in New Zealand in recent years for fodder and shelter.

Tagasaste, being an evergreen, can provide green feed at any time of the year. However, experience suggests that, because of its relatively slow growth rate and recovery after cutting during winter, its main role could be the provision of high quality fodder during summer and early autumn.

Being a legume, tagasaste roots have nodules containing nitrogen-fixing rhizobium bacteria.

HISTORY IN AUSTRALIA

Tagasaste has been grown in Australia since at least 1879, when seeds were sent from the Royal Botanic Gardens, Kew, in England, and grown at the Adelaide Botanic Gardens, whose director reported favourably on it as a drought-resistant fodder plant. In 1896, G. Valder commented in the *Agricultural Gazette of N.S.W.* on tagasaste's value in drought. J. H. Maiden, Government Botanist, also commented in the *Agricultural Gazette*, in 1899, 1908, and 1915—the latter issue containing a particularly enthusiastic review of tagasaste.

ADAPTABILITY-CLIMATE AND SOIL

Tagasaste grows well in a range of environments and, once established, handles climates ranging from those of the hot western wheat belt to those of the cool tablelands. As a small plant, though, it can be frost sensitive. It is adapted to a range of soils, preferring the more freely drained ones, but it does not do well on low lying sites subject to waterlogging. It may be able to cope with at least moderately acid soils.

USES

Fodder

Fodder is currently the main use of tagasaste. The nutritive value of the foliage depends on the time of the year and the proportion of leaf to stem. New Zealand research indicates digestibilities of 82 per cent for plant tips, and 59 per cent for stems up to 8 mm thick. Figures for crude protein content varied from 18 per cent to 25 per cent for tips, and 8 per cent for stems. These data suggest that the leaves compare well with good pasture forages, whilst the stems are equivalent to the hay normally used for stock maintenance. There seem to be no reports of tagasaste containing compounds toxic to animals.

Research results from Western Australia and New



**Tagasaste trees make excellent shelter plants for sensitive crops such as kiwifruit.
Photo: R. Clarke and J. Rodehoffe.**

Zealand suggest that edible dry matter yields of 11 tonnes per hectare per year can be obtained from dryland tagasaste.

Being a deep-rooted perennial and therefore tapping subsoil moisture, tagasaste is able to produce green feed in rainless summers. It thus has obvious potential for providing high protein herbage to animals in summer and early autumn when pastures are generally of low nutritive value. However, there is a need for research to evaluate tagasaste under actual farm conditions in New South Wales.

Tagasaste foliage could also be processed into high protein stock pellets; again, research is needed to evaluate this use.

Shelter

The value of trees as shade and shelter for livestock is well known. Mature tagasaste trees provide good shade and, if grown in closely planted hedgerows, form an excellent windbreak. The possibility of using the plant as horticulture shelter is being examined in New Zealand, with promising results; a novel approach is to grow a circle of tagasaste plants around individual, wind-sensitive young trees such as walnuts, removing the shelter plants after several years.

Timber

Tagasaste trees do not grow in a form suitable for milling but the timber is fairly dense and suitable for manufacturing small ornaments. It can also be used for firewood.

Bee forage

Tagasaste can begin flowering in its second year, and provide valuable nectar and honey in early spring when many bee colonies are hardpressed for forage. If colonies are able to increase, many field and horticultural crops will benefit from improved pollination, provided bees are not then diverted by the tagasaste.

Agroforestry

As tagasaste is a deep-rooting perennial, it can tap nutrients in the subsoil and transport these to the topsoil in the form of dropped leaves and twigs. As well, being a legume, it will fix nitrogen when effectively nodulated. These features indicate that tagasaste would benefit associated crops or pastures except where direct competition is great.

Conservation and reclamation

The ease with which tagasaste can be established and its rapid growth rate make it a potentially valuable plant for revegetating eroded areas. In New Zealand it has been grown successfully on gold dredge tailings and in Western Australia it is being tested for reclamation of saline areas.

An ornamental planting of tagasaste as feature trees in a garden. Photo: author.



Landscaping

Tagasaste is an attractive evergreen tree with its often gracefully drooping habit and masses of white flowers. It could well be used as a feature tree in landscape designs.

ESTABLISHMENT

Tagasaste can be established in two ways: direct seeding and transplanting. Whichever method is used, give attention to land preparation, seed treatment to aid germination, and inoculation with appropriate rhizobium bacteria.

Soil preparation

Soil preparation well in advance of planting is recommended. For transplanting, deep ripping to 30 cm or more along the planting line can be beneficial on lighter soils. It is important that the rip be consolidated to remove air pockets, either by running a tractor wheel along it or allowing sufficient time for the disturbed surface soil to slump. In heavy soils subject to waterlogging, planting in raised beds can lead to better establishment.

Seed treatment

The hard coat of tagasaste seed results in a very low germination of untreated seed. This can be overcome in two ways.

Scarifying. Seed can be scarified by contact with an abrasive surface. Subterranean clover seed scarifiers have been successfully used, by treating the seed a number of times.

Hot water treatment. This involves dropping the seed into boiling water then immediately removing the container from the heat source and allowing the seed to soak in the water as it cools. Successfully treated seed swells and can be sieved off, and the unswollen seed treated again. New Zealand experience indicates that the swollen seed can be re-dried for mechanical planting, retaining its improved germinability.

Inoculation

If the soil into which tagasaste is being planted does not contain rhizobia capable of nodulating the plants and forming an effective nitrogen-fixing relationship, inoculation with appropriate rhizobia is necessary. For direct seeding, inoculate seed in the conventional way, and lime pellet it if it is to be mixed with superphosphate. For transplants, the inoculum can be made into a suspension and watered on to the seedlings in their containers. Suitable inoculum for tagasaste can be obtained from Root Nodule Pty Ltd, 84 Rawson Road, Woy Woy, 2256. Another source of rhizobia is soil from around the roots of a healthy, mature tagasaste tree.



Tagasaste can be planted with a turret planter used for vegetable seedlings. Photo: author.

Direct seeding

Success with direct seeding has been reported from Western Australia. Treated and inoculated seed can be mechanically sown in a number of ways. Methods include through one or two runs of a conventional combine drill (using killed wheat or similar seed as a carrier), or by some type of precision seeder. Fertiliser can be applied at the same time.

Transplanting

Tagasaste seedlings can be produced in a number of ways.

Metal forestry tubes are satisfactory but expensive. Good results have been obtained with paper tubes. These and other degradable containers such as peat pots have the advantage of permitting the seedling to be planted without root disturbance. Other containers are a matter of ingenuity-discarded milk cartons, for example, are excellent.

Speedling® trays and other air root-pruners are satisfactory, despite the relatively restricted root development they impose. Seedlings raised in these containers are now being sold commercially for about 10 cents each (1985 prices). Transport of the trays can add to the cost. Two major suppliers in New South Wales are Narromine Transplants, Narromine, and Central Seedlings, Bathurst.

Sow seeds in small containers about 6 to 10 weeks before the intended transplanting time, if seedlings of 10 to 15 cm height are required. By pinching

vigorously growing seedlings back to about 10 cm and restricting watering, plants can be held satisfactorily until conditions are suitable for transplanting. For plants in larger containers it is important that the plants are not allowed to become rootbound. Experience suggests that establishment is better for small seedlings (about 15 cm tall) than for larger plants.

For open rooted plants, sow seeds in raised, well drained beds. Plants can be inoculated in the beds. Keep top growth trimmed back to about 15 cm. Two weeks or so before planting, run a blade or spade under the plants some 15 cm below the surface. On the day of planting carefully lift the transplants and keep them covered and moist until they are placed in the field. Plants will need to be watered on transplanting. On a smaller scale, seedlings occurring naturally under mature tagasaste trees can be successfully transplanted into the field, either directly or after first being raised further in containers.

Seedlings can be planted by hand or by mechanical planters. Turret planters used for vegetable seedlings are excellent but forestry planters should also be suitable. Semi-manual methods, such as having operators seated on the footboard of a combine drill and placing the seeds into tine or disc furrows, can also be devised.

Spacing

Unfortunately, there is little research information on which recommendations can be made. There appear to be two options:

- Widely spaced trees. Plants can be spaced at 2 to 4 m intervals, in rows about 4 to 8 m apart.
- Closely placed hedgerows. Plants can be spaced to form a dense hedge.

Various modifications within these options are available. For example:

- corners of paddocks can be fenced out to provide copses of tagasaste trees
- trees or hedges can be established in rows across paddocks and spaced sufficiently apart to permit the operation of cultivating and harvesting machinery existing fence lines can be used for the establishment of hedgerows or spaced trees.

Planting time

For both direct drilling and transplanting, late winter is suggested for lower-rainfall areas and early to mid spring for higher-rainfall tableland areas. In regions of reliable autumn rains or with access to irrigation, early

autumn is a good time. As the small seedlings are susceptible to heavy frosts, planting times should avoid these.

CARE AND MAINTENANCE

Fertilisers

Tagasaste should respond to fertilisers, particularly superphosphate, in the same way as do other introduced legumes such as clover. In Western Australia it is recommended that copper-zinc superphosphate be used at 200 kg/ha. In New South Wales, 200 to 400 kg/ ha of superphosphate (with molybdenum if it is deficient) could be beneficial in many situations. However, there is little research information on which to base fertiliser recommendations.

Weed control

Although tagasaste transplants grow rapidly, weed competition can be a problem, particularly with annuals such as Wimmera ryegrass and capeweed. Again there is little research information regarding weed control in tagasaste. Good seedbed preparation before planting or sowing can often be a help in weed control.

Protection

Tagasaste is very palatable to all types of grazing and browsing animals, from rabbits to kangaroos, making protection of young trees essential. Protection methods range from individual tree guards (netting or plastic cylinders, tyres and drums) to protective fencing (such as rabbit netting if rabbits are a problem). Costs of protection can be considerable, and cheap methods are urgently required. The use of

repellents should be considered. Protection of young plants for the first two years need not necessarily place a paddock out of production: inter-row spaces can be used for cropping or hay production during this period.

Irrigation

One or two irrigations after transplanting can be a valuable aid to establishment. A tanker can be used for watering individual seedlings. Trickle irrigation, microsprays or similar may be feasible in some situations (particularly horticultural) and furrow irrigation in others. Large scale, direct drilled stands would have to depend on rainfall. However, tagasaste plants are remarkably drought resistant: spring plantings near Bookham in 1984 survived and grew during an almost rainless summer.

Plant training

If hedge plantings for self feeding or mechanised harvesting are intended, the plants should not be allowed to grow too tall before cutting back to 1.5 to 2 m. For spaced trees intended for lopping, shape when 3 to 4 m tall, cutting out excess wood to encourage proliferation of finer-stemmed new growth. Very severe pruning of old, gnarled trees, however, can be harmful.

USE AND MANAGEMENT

Grazing

Closely spaced plants (0.5 to 1 m apart) are grazed to about 15 to 30 cm above ground level. The resultant regrowth can be profuse, so control regrowth height to 1 to 2 m, depending on the type of animals being used.

Young tagasaste trees, not yet two years old. Photo: author.



One of the main problems with grazing of tagasaste is that stock are inclined to strip bark from limbs; if this is allowed to continue, plants can be killed.

Another form of grazing is to maintain hedgerows with an electric or netting fence, allowing animals to eat the foliage extending through it.

Mechanical harvesting

Closely planted rows, with row spacings appropriate to the type of machinery to be used, can be mechanically harvested and the cut material fed to animals in other paddocks or yards. Plant population can be anything from 1000 to 3000 per hectare. The moisture content of tagasaste-50 to 70 per cent-is much lower than that of fresh forage crops and pastures.

This makes forage harvesting and feeding out relatively simple. A cutting height of 20 to 50 cm is suggested. The old corn forage harvesters, with a corn pick-up on the front, sickle bar cutter and secondary chaffing head, are ideal for mechanical harvesting, but flail type harvesters, although likely to cause more plant damage, may be suitable also.

A New Zealand farmer is developing a variation in mechanical harvesting with trees spaced 4 m apart in rows 9 m apart. When the trees are large enough to resist damage by grazing animals, they will be trimmed with a tractor-mounted hedge trimmer, and the trimmings consumed where they fall. Pasture between the trees will be conventionally grazed.

Timing of cutting

Until more information becomes available, it is suggested that cutting or grazing be done during the non-frost period. This fits in well with the earlier observation that tagasaste can provide a fresh, high protein feed in summer and early autumn when pasture is often dry and of low nutritive value.

Feed quality of tagasaste seems to decline after flowering. If this can be prevented by earlier harvesting, a more nutritious product may be obtained. However, in practice, this may not be feasible for an entire plantation. Plants cut or grazed during winter make no significant regrowth because of frost damage to new shoots.

PESTS AND DISEASES

The major pest of tagasaste seems to be stem borer. Mature trees growing in a gnarled and twisted fashion seem to be susceptible to borers. This may not be a problem in plantations of tagasaste managed so that many small, leafy stems are produced.

In wet soil conditions root rots, particularly those associated with the fungus *Phytophthora*, may be a problem.

SEED HARVESTING

Copious quantities of seed are shed by established tagasaste trees. Seed can be collected from the ground by various means, including sweeping up and bagging or with suction harvesters, and cleaned. Clean seed is advertised for sale in the rural press.

DISCLAIMER

The information contained in this publication is based on knowledge and understanding at the time of review (May 2003.) However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Agriculture or the user's independent adviser.