

ESTABLISHING TAGASASTE (TREE LUCERNE) AND  
OTHER FODDER TREES - GUIDELINES FOR SUCCESS

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**TREES COMMONLY USED FOR FODDER**

For the purpose of this paper, fodder trees are described as woody perennials with a maturity height of 2 m or more, and which produce, for consumption by livestock, material which may be foliage, seeds, or pods and other fruits. This definition excludes lower-growing browse shrubs like bluebushes and many saltbushes, but includes old man saltbush.

To date, the trees most widely used for fodder in Australia have been indigenous, the most common including:

Kurrajong	<i>Brachychiton populneum</i>
Mulga	<i>Acacia aneura</i>
Wilga	<i>Geijera parviflora</i>
Boree	<i>Acacia pendula</i>
Casuarinas	<i>Casuarina spp.</i>
Various wattles & hickories	<i>Acacia spp.</i>
Old man saltbush	<i>Atriplex nummularia</i>

Currently, there is a developing interest in the use of introduced trees for fodder. The most promising of these, in suggested order of potential value, are:

Tagasaste	<i>Chamaecytisus palmensis</i>
Willow	<i>Salix spp.</i>
Poplar	<i>Populus spp.</i>
Alder	<i>Alnus spp.</i>
Honey locust	<i>Gleditzia triacanthos</i>

**WHY ESTABLISH FODDER TREES?**

As well as possessing the environmentally desirable characteristics of trees, in terms of the provision of shade, shelter, erosion protection, aesthetic value, timber and bee forage, fodder trees have at least some theoretical advantages over conventional pastures for animal production systems. Of direct importance is the deep-rooted nature of trees, giving them the ability to tap moisture and nutrients from depths below the rooting zone of conventional pastures. Availability of deep moisture allows trees to produce green growth at times of the year when conventional pastures are senescent. This inbuilt drought resistance of fodder trees should improve the stability of grazing systems. For example, in much of the winter-rainfall zone of NSW, there is a dearth of green, high-protein herbage to maintain high growth rates of weaner sheep in late summer-autumn. Availability of summer-autumn green feed from a fodder tree such as tagasaste should improve the performance of weaners compared with weaners on senescent pasture. Willows growing near water courses can provide at least a green feed supplement for mature animals in summer drought.

The extraction of nutrients from depth can result in their addition to the topsoil through leaf fall and/or drip leachate. Browsing animals can also

affect this nutrient cycling. Even if tree fodder is fed to penned animals, nutrients are made available from sources which otherwise are unlikely to be available to domestic livestock.

Some fodder trees such as alders, or legumes such as acacias and tagasaste, form associations with nitrogen-fixing microorganisms and may improve production from associated pasture plants because of a better soil nitrogen environment.

Fodder yields from indigenous trees are fairly low - e.g. for mulga, up to 2 tonnes per ha and of generally indifferent nutritive value. Introduced fodder trees, however, have potential for high fodder yield; for example, estimates of 19 and 12 t of edible dry matter per ha have been proposed for tagasaste in higher rainfall areas of Western Australia and New Zealand respectively. Also, fodder quality of introduced trees such as tagasaste and willow is high, and similar to that of lucerne; animal performance on such fodders, however, has yet to be fully assessed.

#### **METHODS OF ESTABLISHING FODDER TREES**

As the economics of establishing stands of native fodder trees are dubious (except perhaps by allowing natural regeneration from seedlings or suckers to proceed unhindered by defoliation by animals until browsing-resistant stands have been developed) the establishment of only introduced fodder trees will be discussed in this paper.

There are three main ways in which trees can be established - vegetatively (by cuttings), and by seed, either by direct seeding in the paddock or by transplanting seedlings. The last two methods will be illustrated by discussing the establishment of tagasaste, currently the most promising introduced fodder tree for temperate Australia; vegetative propagation will be illustrated by discussing the establishment of willows which may have some potential in well-watered regions.

#### **Tagasaste**

Tagaste can be established either by direct seeding or by transplanting. In NSW the most common establishment method so far has been transplanting; in Western Australia significant areas of tagasaste have been established by direct drilling.

For successful establishment of tagasaste by transplanting, the following procedure is recommended:

- . Obtain good weed control by minimising weed seeding in the spring before planting (particularly with annual grasses such as ryegrass and silver grass). Suggested approaches include heavy grazing, spray-topping and cultivation. In the year of sowing, further weed control can be obtained by grazing, cultivation, and/or knock-down herbicides such as Roundup<sup>®</sup> or Sprayseed<sup>®</sup> pre-planting.
- . Decide on a suitable planting time: autumn for lower-rainfall areas, late winter to mid spring for higher-rainfall tableland areas.
- . Decide on suitable spacing and mark out rows according. Row spacings of 5 to 2 metres, according to rainfall, are suggested (the higher the rainfall the closer the spacing).
- . If the area has not been cultivated, soil loosening along the rows will be needed. A single-tyne ripper can be used, but may not give best plant

establishment results if prolonged rainfall occurs after sowing, due to water-logging in the rip. Throwing up a slightly raised bed over the rip could be helpful. Loosening to a depth of 15 cm with a deep tillage implement such as an Agrowplow<sup>®</sup> has given good results in both cultivated and non-cultivated sites planted to tagasaste.

- . Plant transplants along the row, with spacings of say 3 m down to 0.5 m, according to rainfall.

Transplants can be obtained by:

- . Purchase from nurseries.
- . Raising on the farm, using treated seed (scarified, or dropped into boiling water and allowed to cool) planted into suitable containers (e.g. paper forestry pots, peat pots, re-usable plastic pots of various types) with suitable free-draining growing medium (such as a commercial potting mix or the equivalent). Suitable rhizobial inoculant (commercially available, or obtained by stirring soil from around the roots of a healthy, mature tagasaste tree, into water) should be applied to the seedling containers when the seedlings are several weeks old. Further inoculation several weeks before planting could be useful. Commercial complete fertiliser preparations, applied according to the manufacturers' recommendations, may improve seedling growth.

An alternative is to grow open-rooted transplants. Treated seeds are sown fairly densely, say one per square centimetre, in raised well-drained beds. Inoculum is watered into the beds after emergence of seedlings, which are kept trimmed back to about 15 cms. Two weeks or so before transplanting, a spade or tractor-mounted blade is run under the plants about 15 cm below the surface. On the day of transplanting, the plants are lifted, kept covered and moist until planting in the field. Watering of open-rooted transplants is very likely to be necessary at planting. On a smaller scale, seedlings occurring naturally under mature tagasaste trees can be successfully transplanted into the field either directly or after being raised further in containers.

Transplants can be planted by hand or mechanically, using appropriate machinery such as a vegetable planter, tree planter, or some appropriate improvisation such as seating several operators on the footboard of a seed drill pulled slowly across the paddock and placing the transplants into a suitable furrow, or furrows, formed by the disc or tine openers on the drill.

If the site is likely to respond to fertiliser (a soil test will be a guide), the appropriate fertiliser treatment should be applied either at planting, or shortly before. It is suggested that 200 to 400 kg of superphosphate per hectare, with molybdenum, if it is deficient, could be beneficial in many situations.

Post-planting weed control is highly desirable. This can be approached by hand hoeing, using a rotary hoe, scarifying or discing adjacent to the rows, etc. There is a pressing need to develop weed control techniques using selective herbicides.

Irrigation of young transplants could be considered, but hopefully should not be necessary. Experience has indicated that once reasonably established, young tagasaste transplants are remarkably drought resistant.

For successful establishment of tagasaste by direct seeding, seed should first be treated by scarifying, or by using the boiling water method to

overcome the hard seed coat character, and then inoculated with appropriate rhizobia and lime pelleted. It can then be sown into prepared cultivated seed beds, or perhaps direct-sown into a herbicide-prepared seed bed, using a conventional combine with sowing rows blocked-off to give the required row spacing, or some type of precision seeder. Unless a precision seeder is used, dilution of the tagasaste with a carrier - e.g. killed grain, or fertiliser - will be necessary. Seeding rates should be calculated so that 3 to 4 times the numbers of seeds required to give the target plant spacing are sown, to cater for unreliable germination, seedling mortality, etc. Timing of direct seeding should be somewhat earlier than that considered appropriate for transplanting.

For both transplanted and direct seeded tagasaste, protection of the young plants from grazing by either domestic or feral animals is essential.

Methods range from protection of individual trees to appropriate perimeter fencing.

### Willow

Willows are readily established by inserting sets (obtained by cutting branches and stems from willow trees into suitable lengths) directly into the required positions during winter. So long as the soil around the set can be kept moist (preferably not waterlogged) during the following summer, the sets will produce vigorous root and shoot growth. Large poles, say 3 m long and 15 cm in diameter, can be used to give "instant" trees. Sets are commonly placed in water for several weeks before insertion into the soil, to initiate root development.

However, if it is difficult to maintain constantly moist soil conditions during the summer, survival of the sets as plants is likely to be poor. In these situations it is better to plant rooted cuttings. These can be readily produced by inserting appropriately sized (30 to 50 cm lengths, say) cuttings into a freely-draining nursery soil, preferably fairly sandy, in early summer, and irrigating frequently to keep the soil moist. A mixed fertiliser can be used where required. The cuttings will root promptly and produce shoots which, by autumn, will be 2 or 3 m long. It is preferable to restrict the shoots to two or three per cutting, by removing unwanted shoots.

The rooted cuttings can be planted in the field site in late winter. Pruning the shoots back to about 30 cm may improve growth in the following summer, during which, however, good soil moisture will be required, even for the rooted cuttings, to avoid death. Protection against damage by animals will be required for as long as necessary.

### SUMMARY

Major points to consider for successful establishment of fodder trees include:

- . Selection of appropriate species for the environment
- . Proper site preparation
- . Fertiliser
- . Inoculation for tagasaste
- . Appropriate plant spacing for the environment
- . Weed control
- . Watering where necessary for survival
- . Protection from grazing