Assisting Natural Regeneration of Trees & Shrubs

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Apparently random revegetation events in the landscape can occur through natural means. Closer examination usually reveals that there has been a favourable conjunction of climatic and other ecological events. Foremost among these events are a period of much higher rainfall, the occurrence of a bountiful seed drop and a reduction in browsing pressure. At the same time, this process can be facilitated by appropriate human action at critical times.

The attraction of natural regeneration is its low cost and the ability to reproduce some elements of the original vegetation (including understorey species) in a fairly random way. Regeneration can proceed from lignotubers or roots of some species that have been burned or cut down, but the usual method is from seed.

A. Planning

There must be an adequate source of seed present to allow natural regeneration to proceed. With *Acacia* and other hard-seeded species such as Golden-tip (*Goodia medicaginea*), Native Broom (*Viminaria juncea*) and the bush-peas (*Pultenea* and *Dillwynia* species), there may be sufficient seed in the soil despite the current absence of specimens of seed-producing age. In this case some pre-treatment of the site (ripping, cultivation, or burning) may be needed to allow regeneration of those species. For eucalypts it is most unlikely that seed will be viable 3 years after the last seed drop. With, *Allocasuarina* (except *Allocasuarina luehmannii*), *Banksia*, *Callistemon*, *Callitris*, *Casuarina*, *Hakea*, *Leptospermum* and *Melaleuca* species the seed may remain for years within the woody capsules, but if the shrubs have died those capsules would have released the contents. Revegetation cannot occur if there is no likely seed source.

Having marked on your plan where you would like to try natural revegetation − perhaps among existing vegetation along drainage lines, near isolated paddock trees, in the corners of paddocks, or rejuvenation of bushland remnants − examine the sites to see which may be worth working with. Where eucalypts are present, examine the trees to determine the time of likely seed-drop. Flowering may not occur annually, so there will not always be seed shed each year. Depending on species, the time from obvious bud development to flowering may be 3 months to a year; a further 6 months to a year may be required for the seed capsules to develop and ripen (capsule changes from green to a bronze colour) and the seed may be shed in the following 6 months to 5 years. River Red Gum (*E. camaldulensis*) tends to shed seed within 6 months of its maturation but Manna Gum (*E. viminalis*) and Swamp Gum (*E. ovata*) will retain some seed in the mature capsules for several years. With River Red Gum a likely sequence is the development of flower buds in winter, flowering in that spring to early summer (often in December), capsule development then seed drop in the next spring, during a warm and dry period (often in October).

B. Site preparation

Having determined which trees are likely to shed seed in the winter-spring, help the natural regeneration by providing a receptive seed bed. Little germination will occur amongst grass. Mineral earth exposure is required. Most germination will occur 1/4 to 1 height downwind of trees, according to David Curtis of Armidale and as can be observed with River Red Gum in many paddocks in SW Victoria.

Glyphosate can be used to bare the ground in an area from 1 to 2 tree-heights downwind (usually to the SE) of the seed Red Gum tree. Apply the herbicide in early winter, to produce a grass-free surface before seed is shed. Little (if any) germination will occur under the canopy, due to allelopathic effect of chemicals in shed bark and exudates from leaves and roots, so avoid spraying there.

Twigs with a few capsules (eucalypts, leptospermum, callistemon, melaleuca, etc.) or cones (sheoaks, hakeas, etc.), can be dropped on small spots where soil has been turned over with a spade or mattock. In a few days the capsules/cones open and seed drops onto the soil, to germinate when conditions are right.

Other small areas can be ploughed with a mouldboard in early winter to provide weed control and a seed bed. On saline sites a plough can be used to achieve mounding. This allows salt to be leached from the surface by rain and the mound keeps the seedlings from being water-logged during the following winter.

Where regeneration of acacias is required, some may be promoted by cultivation, which abrades the seed coat and allows germination to proceed. Alternatively, the site can be burned to achieve the same effect. For that to happen there must be enough grass or other residues to produce a fire of sufficient intensity.

Sweet Bursaria sheds seed during a hot windy period in late-summer/autumn. The seed will germinate in mid/late winter, usually after a frost. Where regeneration of this species from existing shrubs is sought it is desirable to prepare the seed bed early − spray the site with *glyphosate* in early winter to allow the fallen seed to germinate in a area free from competition from pasture plants. In some cases you may need to apply a spray in the previous spring to prevent grass seed from being shed on the site.

C. Management

The regeneration site must be securely fenced prior to, or shortly, after germination occurs. At least have the posts driven early, to enable the remainder of the fence to be quickly erected later. Sheep are unlikely to allow any seedling to survive; a common mistake is to turn sheep into an area that has got a reasonable strike. A good result may be 1 seedling every 10 m − these are easily overlooked when small. Cattle may ignore *E. globulus*, *E. camaldulensis* and perhaps other eucalypt seedlings, but are liable to trample or thrash young trees.

Rabbits will remove many small seedlings and Black Wallabies will also browse some species, particularly Blackwood (*A. melanoxylon*), Silver Banksia (*B. marginata*) and Drooping Sheoak (*Allocasuarina verticillata*). Hares can also do some damage, cutting off the seedlings, apparently in an effort to maintain an open grassland/woodland.

A paddock that has been cropped may have seedlings growing in the stubble after harvest, if adjacent trees had shed seed in spring on the receptive bed. Have a good look before turning the sheep in.

In stubble paddocks, tree guards can be put over seedlings that have germinated in the crop. For protection from sheep, cylinders of galvanised mesh may be used. One effective guard is a 1.2 m high x 40 cm diameter cylinder of 2.5 mm thick steel mesh (75 mm x 50 mm) pegged down. This is unclipped and used elsewhere when the trunk no longer requires protection. For cattle, mesh of 100 mm x 100 mm (200 mm x 200 mm if no sheep are present) and diameter 1.5 m is needed. For wallabies, use a guard 60-90 cm high, diameter 40 cm and mesh 50 mm x 50 mm. Old 200 L fuel drums or a stack of old tyres give protection from all stock and other animals but experience has shown that they are rarely removed from the trees and, in time cannot easily be removed. The metal cables in the tyres can cut into the trunk when the tree has grown large.

Where there are clumps of seedlings, a rough-and-ready method is to drive iron posts at an angle (leaning inwards) in a circle around the seedlings, then string barbed wire around the posts. This approach was used on a cattle property by John Whyte, from Kiewa Valley, nearly 70 years ago and the fences around the 10-m clumps may still be functional; cattle dislike treading into a leaning fence. A tidier (and more friendly) alternative is to drive posts in a circle around the trees and affix ringlock and plain wires to the posts.

As with direct-seeding, seedling survival is dependent upon freedom from competition from weeds. If such sites are subject to weed dominance then consider the use of herbicides in the autumn following the spring germination. Residual chemicals (*e.g. simazine*, 3 L/ha or *oxyflourfen*, 3 L/ha) could be applied as an overspray or as a directed or shielded spray in the autumn, before much weed germination occurs. Later, grass can be controlled by over-spraying the trees with *fluazifop-p* (4 L/ha), or by using a shielded or directed spray of *glyphosate* (1-2 L/ha). *Oxyflourfen* or *glyphosate* will also control broad-leaved weeds (*e.g.* capeweed) which can smother slow-growing trees. An overspray of 1.5 L/ha of *haloxyfop* plus 1.5 L/ha *clopyralid* (for eucalypts only) will also control grass and broadleaved weeds.

Be prepared to follow up unsuccessful attempts at natural regeneration with direct-seeding, where you can be assured that seed has been deposited on a prepared site.