PARROT DAMAGE TO BLUEGUMS

Introduction

Damage to Bluegum (*Eucalyptus globulus*) tree crops by the Twenty-eight Parrot (*Barnardius zonarius*) is an emerging problem that could threaten the viability of the Bluegum industry in south-western Australia. The parrots strip bark from the lead shoot of the Bluegums causing the shoots to break off. Consequently lateral shoots develop resulting in deformed (bent or multi-stem) trees unsuited to harvest and utilisation.

There are indications that parrots strip bark from Bluegums to obtain food. These include:

1. A literature review showed various other birds and mammals from around the world also de-bark trees in search of food, often at times of food shortage. The food may be wood- and bark-boring insects (not found in Bluegum shoots) or, more commonly, starches and sugars in the sap, cambium or bark exudates.
2. Monitoring of parrot damage to Bluegums at several sites showed that 'attack rates' consistently decreased when other preferred food (Marri nectar, oats) became available and increased when food supplies (particularly oats) were withdrawn.

However, it is not yet known if the parrots obtain any substantial nutrition from the Bluegums.

Studies of the diet of Twenty-eight Parrots show they are very versatile at using whatever foods are available and quickly adapt to any new foods including introduced crops. Parrot adaptation to Bluegums may be 'learned behaviour' and hence the damage may also develop in areas where it is absent or uncommon now. Currently the zone of worst damage includes around 20% of the total area suitable for Bluegum planting in south-west Australia.

Prospects for controlling parrot damage to Bluegums

In general there are three prospects for control: (1) Reduce the number of parrots; (2) Stop parrots damaging the trees; (3) Rectify the damage after it occurs. As discussed in the following sections techniques fitting each of these prospects are being trialed. Ultimately the best strategy for managing parrot damage may depend on a variety of techniques that could be applied individually, or in combination, according to circumstances.

Reducing parrot numbers

Possibilities for reducing parrot numbers include direct methods (shooting, trapping and poisoning) and indirect methods (encouraging natural predators, reducing food supplies). Of the direct methods only shooting is currently legal, though permits have been obtained to trial trapping.

Trials with trapping and shooting indicate that shooting is a far more efficient means of culling parrots than currently developed trapping techniques. However, neither method appears to have been successful in alleviating parrot damage to Bluegums, e.g. Fig. 1.

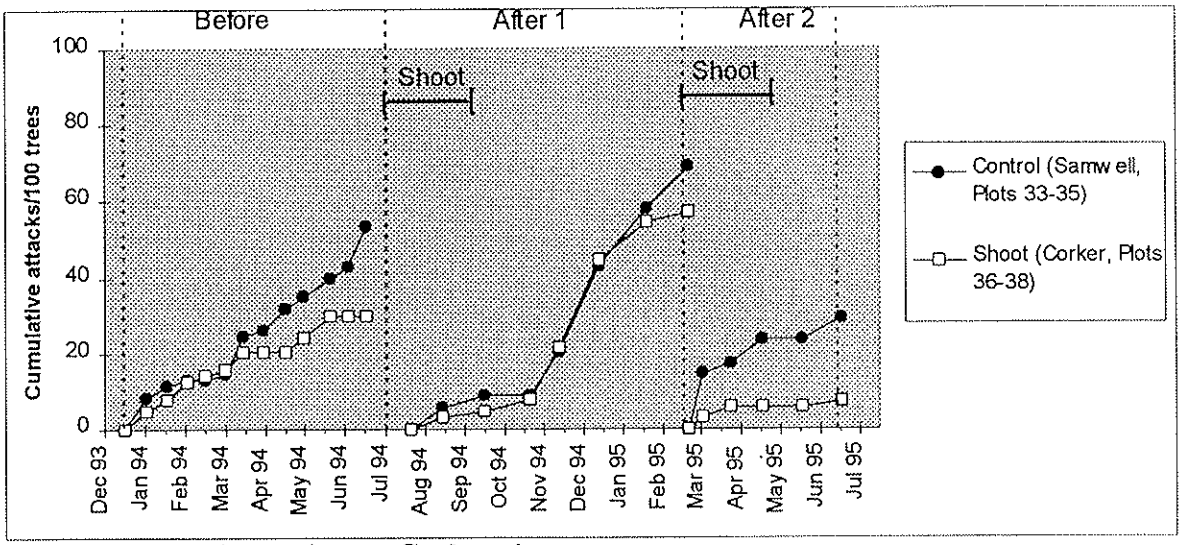

Fig. 1. Effect of shooting at Corker site.

Notes:

(i) Treatment and control sites are approx. 10 ha stands of Bluegums on mixed (cereal crops, sheep) farms near Boyup Brook.

(ii) 'Attack' defined as barking (bark removal to expose wood) of the leader(s).

(iii) Shooting by 1 or 2 people, approx. 1 hr/day, at Corker site only. 528 parrots shot in 42 days July-Sept. '94; 335 parrots shot in 50 days March - May '95.

(iv) 'Before' (pre-treatment) period compared with two 'After' periods.

(v) Effect of shooting in reducing attacks not statistically significant ($p = 0.24$, 'After1' c.f. 'Before'; $p = 0.25$, 'After2' c.f. 'Before'.)

Stop parrots damaging trees

There are many possibilities for reducing the incidence of parrots damaging the trees. These include:

1. *Genetic manipulation* - breed a "bitter Bluegum' that parrots don't like (and/or breed a Bluegum with stronger apical dominance, i.e. will develop a single replacement leader rather than multi-leadering following parrot damage). However, results from family/provenance trials indicate little variation in susceptibility to parrot damage.
2. *Barriers* - tree guards (top nets) almost certainly too expensive to be economic. Permanent nets are put up over entire orchards where the crop has high value and bird damage is severe but, again, the cost (>$1,000/ha/yr) would be prohibitive.
3. *Scaring* - experience with parrot damage in orchards in SW Australia indicates little prospect with the usual devices (gas cannons, electronic alarms, imitation hawks, balloons, etc.).
4. *Repellents* - many substances have been developed for application to crops to deter pests. One new repellent (methyl anthranilate) developed in USA show promise as a bird repellent and is to be tested on Bluegums this summer.
5. *Diversionary feeding* - providing a pest with a more attractive food supply to the crop they are damaging may be a simple but effective solution. There are examples of this working effectively elsewhere with wildlife pests. Initial trails also indicate promise for controlling parrot damage to Bluegums, e.g. Fig 2.

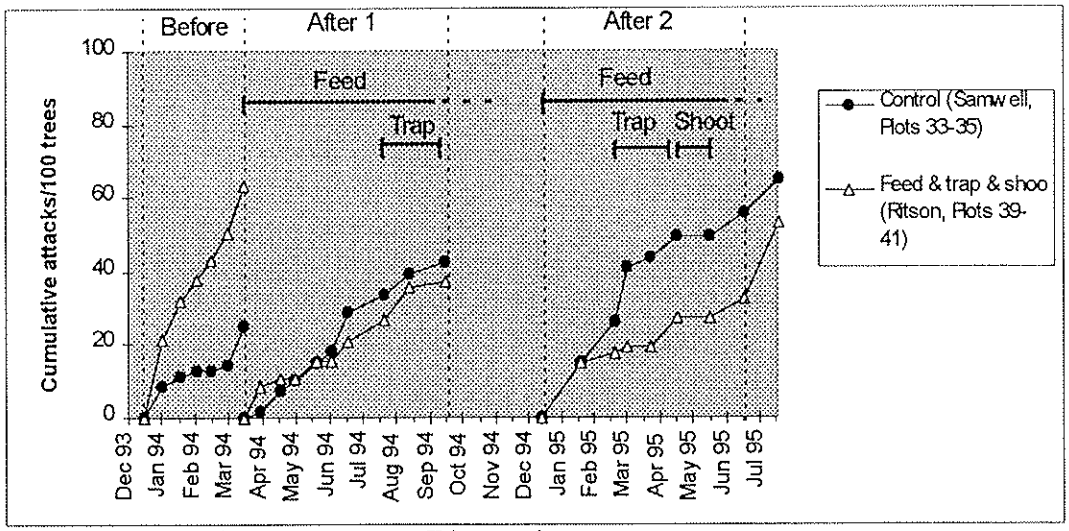

Fig. 2. Effect of treatments at Ritson site.

Notes:

(i) Treatment and control sites are approx. 10 ha stands of Bluegums on mixed (cereal crops, sheep) farms near Boyup Brook.

(ii) During 1st feeding period oats placed on ground in and near traps. During 2nd feeding period oats and canola supplied in poultry feeders and also placed in and near traps while trapping.

(iii) 1st and 2nd trapping rounds yielded 45 and 152 parrots respectively; shooting yielded 588 parrots. All treatments at Ritson site only.

(iv) Significant reductions in number of attacks at Ritson site from both rounds of treatment ($p = 0.002$, 'After1' c.f. 'Before'; $p = 0.0006$, 'After2' c.f. 'Before').

(v) Assuming the ratio of attacks Ritson:Samwell established in the pre-treatment period would have been maintained in the "After' periods had there not been any treatments then the reductions at the Ritson site were -
'After1' period: attacks reduced to 34% of that expected;
'After2' period: attacks reduced to 23% of that expected.

Note Fig. 2 indicates that the effect of 'feeding' in reducing attack rates at the treatment site began soon after feeding. Note also the steep increase in attack rate at the treatment site over July '95. This appeared to be in response to cessation of feeding and occurred despite shooting > 500 parrots at the site in May '95. Thus it appears the shooting either did not have any lasting benefit in reducing attack rates at the treatment site or the benefit of shooting was not strong enough to counteract the effect of ceasing feeding.

Similar results to those shown in Fig. 2 were obtained at the only other site (Hilder farm, North Boyup Brook) where the 'feed/trap/shoot' treatments have been applied. At this site the effect of supplying oats and canola in poultry feeders appeared to be to reduce parrot attack rates on the Bluegums to around half that expected. At another site (Cook farm near Darkan) where a 'feed only' treatment was applied there was no statistically significant effect of feeding on attack rates. However, at that site attack rates were generally low and there were problems with the feeders, the parrots making little or no use of the grain provided.

Thus diversionary feeding does appear to offer some promise for controlling parrot damage to Bluegums. However more trials are required to confirm the efficacy of the treatment and, if it is effective, to refine the technique. From 'parrot counts' it appears that

the feeding does increase parrot numbers. Therefore some form of population control to at least cull the 'extra' parrots may be warranted.

Rectify damage after it occurs

Here there may be a place for traditional silvicultural techniques:
Thinning (culling) - badly deformed trees could be removed from the stand concentrating growth on the remaining better form trees.
Pruning - less badly deformed trees could be pruned to re-establish the single-stem growth form important for wood production (Fig. 3).
Coppicing - Likely to be applicable to 'worst case' stands only, i.e. those stands damaged beyond the point where it is worth growing the trees on to harvest. All trees would be felled to waste and the stand regenerated from new shoots (coppice) growing from the stumps. At the time of coppicing it may also be necessary to implement other measures to reduce subsequent parrot damage, e.g. control the number of parrots or divert parrots from damaging the trees. Once the stems reached a height such that fresh damage below the critical height (Fig. 4) is unlikely they could be thinned to the required 1-2 stems/stump.

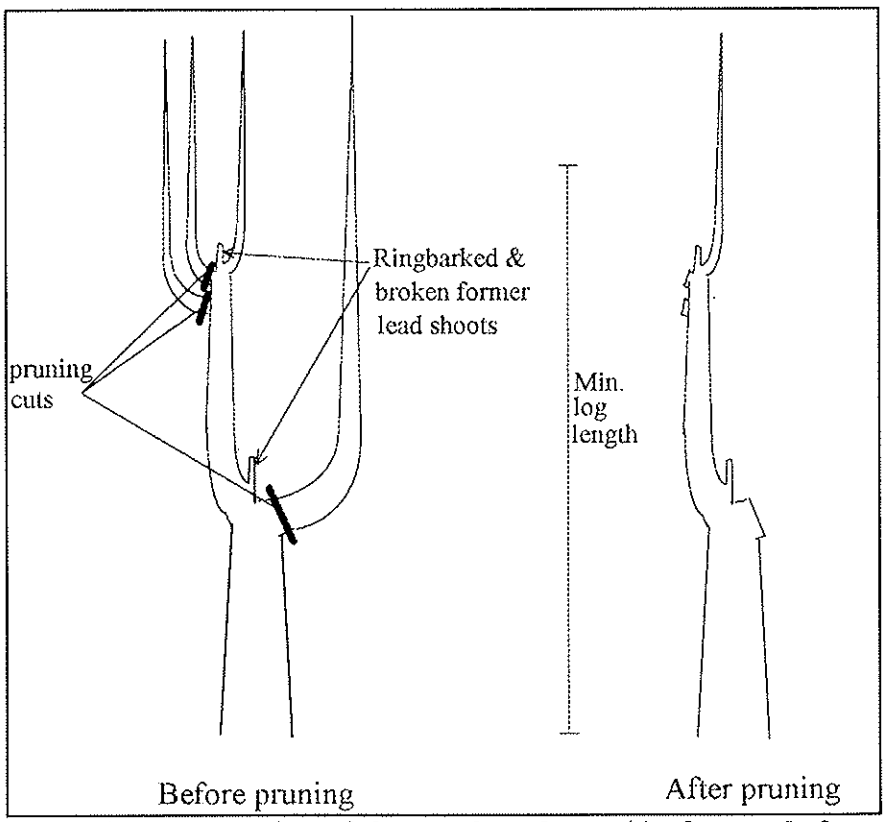

Fig. 3. Representation of the trunk and stem(s) of a tree before and after pruning to correct parrot damage.

Note:

(i) Most parrot attacks are restricted to the top 0.5-1.5 m of the tree. Pruning should be left until any parrot attacks are unlikely to cause unacceptable deformities (severe bends or forks) in abase log of minimum acceptable length. Refer concept of critical height (Fig. 4).
(ii) Sweep in RH stem of tree 'before pruning' too severe to retain that stem.
(iii) The tree as illustrated 'after pruning' may still appear to have fairly severe deformities but the tree will tend to 'grow over' those deformities. If pruning is done at age 2 years then by harvest age (around 10 years) the tree should be nearly 5 times as tall and 5 times the diameter.

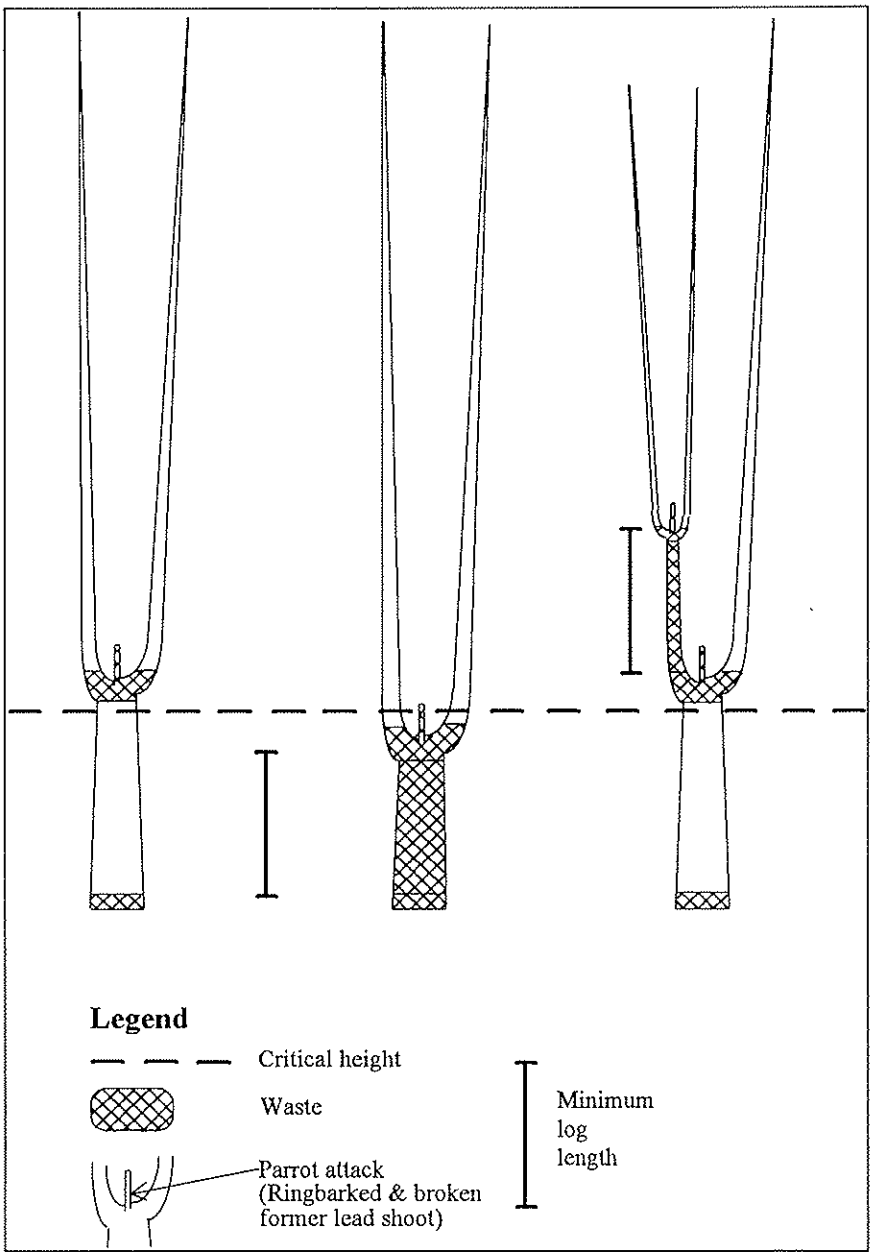

Fig. 4. 'Critical height' for parrot damage.

Left tree: Parrot attack above the critical height, i.e. after allowances made for a stump and removal of the fork crutch it is still possible to harvest a base log of acceptable length. *Minor volume loss only.*

Centre tree: Parrot attack just below the critical height. Base of tree wasted. *Major volume loss.*

Right tree: Two 'unacceptable deformities', both above the critical height but less than the minimum log length apart. *Moderate volume loss.*

Note that a parrot attack causing an 'unacceptable deformity' (fork or severe bend) is likely to be of most consequence if it occurs below the critical height for 2 reasons:

(i) Base logs have the most value per metre length because trees are widest at the base, e.g. base logs of 2, 3 and 6 metres would comprise around 17%, 25% and 47% respectively of the merchantable volume of a typical 25 m tall Bluegum at harvest age.

(ii) If parrot damage causing an unacceptable deformity occurs just below the critical height the base log will not meet minimum log length specifications and will be wasted. Compare waste in 'left' and 'centre' trees above.

A particular advantage of silvicultural approaches to managing parrot damage is that it is possible to "wait and see" if parrots actually damage the trees before taking action. Other techniques must be applied without knowing if they were really necessary. A grower may choose to rely on silviculture to rectify damage (if it occurs) in the following situations:

1. Only light or moderate damage is expected or it is difficult to predict the level of damage that will occur.
2. Other control measures fail or none are developed.
3. The grower does not wish to kill parrots or, alternatively, does not wish to undertake diversionary feeding that may boost parrot numbers even further.

Trials of pruning, thinning and coppicing were established in 1994 at sites near Darkan. One objective is to determine the best age for silvicultural intervention so treatments were applied to 2, 3 and 5 y.o. trees. Some initial results are:

1. Even for the youngest (2 y.o.) stands treated the lowest incidence of bark-stripping by parrots post-pruning was at 3.3 m. That is, a base log of at least 3 m was protected in all prune plots.
2. Coppicing response was generally good even from the 2 y.o. trees. Stump survival rates were $\geq$ 88%, except on one particularly harsh site affected by salt, waterlogging and low soil fertility.
3. The coppice growth on two plots in a site where parrot damage is extremely severe appear to have little chance of reaching the critical height. This is because the parrot damage, once the shoots reached a height of 1.5-2.0 m, is causing all shoots on each stump to break. At this site (76 ha plantation, planted 1989) the trees are so badly deformed that very few would be worth harvesting. However, starting again by coppicing the existing stand does not seem warranted unless something can be done to control the parrot damage.

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