RECENT ADVANCES IN KARRI REGENERATION TECHNIQUES

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Recently the majority of the sawmill cutting in the southern forest types has moved away from the pure karri stands into the mixed/karri stands. This, when taken with the overall expansion in sawmill cutting of karri, has placed greater pressure on the seed tree system that has been established to cater for karri regeneration.

Seed tree system of natural regeneration

This system involves selecting superior seed trees at a rate of 3 to 5 per hectare; clearfelling and utilizing the remainder of the stand, then burning to create an ashbed and remove the debris. After seedfall has occurred, the seed trees are logged by the sawmillers to remove any shade competition at all from the regenerating stand.

While this system is still the easiest and least expensive method of regenerating cutover karri stands, it has some disadvantages. Because an area can only be burnt when the seed trees have a sufficient seed crop to permit adequate regeneration, some cutover areas have to be left for up to three years unburnt due to the four-year floral cycle operative in karri. This not only constitutes a fire protection risk, but also means that there is a loss of up to 3 years in yield from the stand, as well as delaying restoration of the aesthetic qualities of the sites.

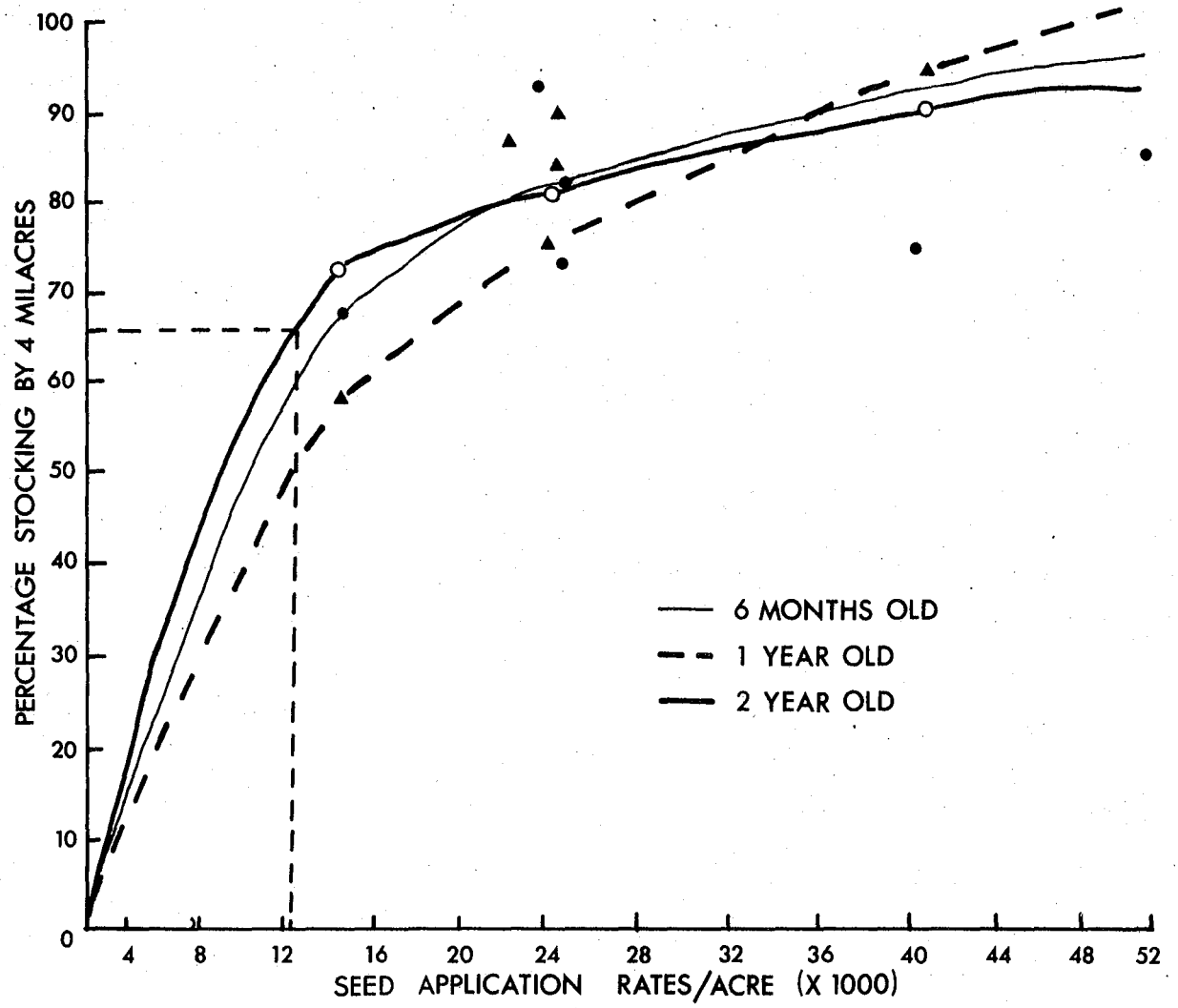
Artificial regeneration - Hand planting

In the past the major method of artificially regenerating cutover karri stands has been hand planting of open rooted nursery stock. This has been proved extremely successful but also has several disadvantages. These include the very high cost of the planting operation, and the need to tie a great deal of the labour resource to the one operation for the eight to ten weeks of the planting season.

Direct seeding

The major alternative to hand planting at present is artificial seeding. Although fragmented research has been continuing into this technique since 1935, it is only since 1974 when S.D.F.O. Kimber established trials using pelleted seed that the broadcast seeding of large areas has become feasible.

FIGURE 1


PERCENTAGE STOCKING BY 4 MILACRES
100
90
80
70
60
50
40
30
20
10
0
4
8
12
16
20
24
28
32
36
40
44
48
52
SEED APPLICATION RATES/ACRE (X 1000)
6 MONTHS OLD
1 YEAR OLD
2 YEAR OLD

The pelleting and seeding technique are similar to those developed by the Victorian Forests Commission for conditions similar to those found in the karri forests of the south west. Briefly, the pelleting is done in a small concrete mixer where clean seed is continuously rolled and undergoes successive applications of a water soluble glue (Methofas) and kaolin clay (a mass of approximately four times the mass of the seed is eventually added). Small quantities of an insecticide and fungicide are also added. The pelleted seed is then sieved to a uniform size for ease of spreading. To give a manageable volume for spreading, a bulking agent with inert pellets of similar size and density to the seed is used. At present Potato Manure E fertilizer suits this purpose and an application rate for seed and spreader of about 6.2 lb/ac (6.95 kgs/ha) is aimed for.

Three trials in all have now had at least two measurements. The results are shown in Figure 1.

It can be seen that all trials to date have achieved more than adequate regeneration; even at the lower seeding rates, i.e. above the 65% by 4 milacres stocking suggested as a minimum by White, (1972). Metric measurements have not been used here because all surveys up to 1976 have been done using the milacre standard, and this cannot be readily metricated.

The problem is then to determine the optimum application rate for most efficient use of the seed resource. Figure 1 clearly shows that to go above 24,000 seeds/acre does not greatly increase regeneration stocking, but merely results in wasted seed. The minimum sowing level at which seeding can be considered successful is not as well defined due to lack of data, but appears to be in the region of 16,000 seeds/acre. Trials are at present in hand to further research this aspect of broadcast seeding.

A further important aspect of artificial seeding that requires careful examination is the principle of spot seeding on favourable sites. This technique, if developed, will have an important influence on the efficiency of seeding operations as it will economise greatly on the use of seed while still allowing regeneration to fully restock an area. A field trial of this technique is being planned for autumn 1977.

The major disadvantage of the broadcast seeding techniques at present is the high use of seed (approximately 20,000 seeds/acre (50,000/ha), as opposed to around 600/acre (1500/ha) for regeneration by open rooted nursery stock). This means that at present, given the high cost of seed collection, seeding and planting are approximately comparable in cost. However seed collection costs can be substantially reduced as current techniques are refined, and this may reduce the cost of

seeding to below 75% that of planting (R.J. Underwood, pers. comm. 1976). Even under the present cost structure artificial seeding has the advantage of being far less labour intensive, as well as requiring far less time to treat a given area, than is regenerating by hand planting.

At present the seed tree system of natural regeneration is favoured only when the time of burning in a coupe coincides with a heavy seed crop (i.e. in general every fourth year large areas will be regenerated with the seed tree system).

This means artificial regeneration (i.e. hand planting or direct seeding) will become increasingly important in future karri forest management. Of the two artificial methods, hand planting will continue to predominate until the direct seeding operation can be refined by research, principally with the aim of economising in the use of seed.

SUMMARY

Broadcast seeding of karri is a successful and efficient method of regenerating cutover karri stands. At present the high intensity of seed use in the technique, and the accompanying high cost of seed collection limit its usefulness,but this situation is expected to change as seed collection efficiency improves.

The bulk of research to this time has revolved around firstly, testing the success of the technique, and secondly, limited trials of differing sowing rates. Field trials initiated in 1976 are examining the effect of soil type and time of seeding, and those planned for 1977 include trials to test low seeding rates and spot seeding techniques.

REFERENCE

White, B.J. 1972. Regeneration Surveys - Karri. Unpublished Ms. For. Dep. West. Aust.