not as variable as one might consider. This applies generally to different species in the same location, or particular species in different locations. Some exceptions to this are *Eucalyptus maculata* and the bloodwood group of eucalyptus species (e.g. *E. gummifera*) in some areas. Extrusion of kinos is a notable factor with these trees. Experiments are in progress to determine variability.

4. Tree size. Experimental and commercial results on many eucalyptus species indicate that large trees are harder to kill than small trees when calculating dosage from basal area.

The role of tordon herbicides for control of eucalyptus in some grazing areas is well established. The level of control, rapid pasture response and the rate of return on investment, makes tordon herbicides valuable tools in grazing management. The writer forecasts, with improvement in the method of injection, these chemicals will be used prior to bulldozing, to reduce eucalyptus regrowth competition and costs in softwood forests, and for more economical control of competition from co-dominant trees in hardwood forests.

CONTROL OF EUCALYPTUS REGROWTH WITH PICLORAM-BASED HERBICIDES

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Foliar spray, injection, cut stump, granule, and basal bark application techniques, using the herbicide picloram, have been evaluated for the control of eucalyptus regrowth. The range of picloram formulations, i.e. granules, oil soluble, and water soluble, allow versatility in application technique and all have some role to play in a well-planned control programme.

Successful control of regrowth with picloram depends on the selection of the appropriate application technique related to stage of growth, eucalypt species, and environment. Improper placement of chemical, e.g. basal bark spray at only one side of the stem, results in poor performance. Such placement may be a result of poor selection of the proper application technique for a given situation.

An acceptable control programme for a specific plant community must consider a combination of the correct herbicide formulation, method of application, and ultimate cost. It must also consider

the public acceptance of chemical treatment. Careless work can reflect on all control programmes.

GROWTH STAGE RELATED TO APPLICATION TECHNIQUE

Soil Application

Granules (Tordon 2G) are most suitable for the control of regrowth in areas where accessibility for other forms of application is limited. More than 8.0 lb a.i. per acre (8.97 kg per hectare) is required to effectively control the regrowth.

Even distribution of the granules on the soil surface is important. Technical experience has shown that a granule of low percentage active ingredient and fine particle size is preferred.

Basal Bark Treatment

An oil-soluble formulation (Tordon 255) has meant that basal bark treatment is an effective method to control regrowth. Commercial and experimental evidence to date suggests that bark type and stage of maturity are important. Control will be less effective if lignification has occurred, if the bark has thickened physically, or if both processes have taken place. Provided the regrowth stems are at a comparatively optimum stage for treatment, there is little variation in degree of sensitivity between eucalypt species, time of application, or both when used at recommended concentrations.

Foliar Spray Technique

Effective control of regrowth can be achieved using foliar applications of a water-soluble formulation (Tordon 50-D) applied by a mister at 0.25% concentration of picloram. Full coverage is essential. Research findings suggest that the control of broadleaved eucalypts, e.g. *E. oblique* can be improved by the addition of anionic and cationic surfactants. Poor control in the past can be attributed to (a) inadequate coverage and (b) failure to adequately consider the time of application and eucalypt species sprayed. Success of the foliar spray is dependent on the distribution of the emerged stems from the lignotuber, the relative leaf area to lignotuber ratio, and the leaf type.

Cut Stump Technique

Both oil- and water-soluble formulations (Tordon 50-D, Tordon 105, and Tordon 255) are effective when applied as cut stump

treatments. Under competitive vegetation situations, e.g. culling in forests using picloram at 0.25%, stump height (up to basal diameter height) is not critical. In non-competitive situations, it is desirable to cut the stump as near to the ground as possible.

Injection Technique

Injection, using a water-soluble formulation (Tordon 105), offers a proven technique for regrowth control. Number and distribution of suitable injection sites to allow application of the chemical are important considerations.

MECHANIZATION

A complete programme will involve the consideration and integration of ground and aerial application techniques. Equipped helicopters, applying invert emulsions or thickened sprays, are a valuable tool in inaccessible terrain.

THE ROLE OF HERBICIDES IN ASSISTING ESTABLISHMENT OF *PINUS RADIATA* IN NEW ZEALAND

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More than 50,000 acres of *Pinus radiata* are now planted annually in New Zealand. Grass, scrub weeds and/or bracken fern seriously interfere with survival and growth rate of the young trees on most sites. Hand release of pines is only possible to a limited extent, and is especially difficult in more remote, large planting blocks. The present trials using selective chemical sprays for tree release were developed in two stages:

1. Herbicide screening tests to determine tolerance of young pine trees in relation to stage of growth.
2. Field trials to assess herbicidal activity against a range of weeds and selectivity towards pine transplants.

In both the screening and field site trials (1/0 seedlings) planted during winter were broadcast sprayed at two stages.

1. Late winter - dormant prior to 'flushing'.
2. Late spring - during 'flushing'.