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## Arboriculture Research Note 75

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### **Alginure Root Dip and Tree Establishment**

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#### **Summary**

The effects of Alginure Root Dip on tree establishment appear to be small. Under some conditions it was slightly beneficial but under others it was slightly harmful.

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#### **Introduction**

1. Bare-rooted trees are easily damaged while out of the ground. Insley (1980) showed that desiccation of inadequately protected trees during plant handling killed many of them; and growth of the survivors was also reduced.
2. One possible way to increase the success of new plantings that has received much publicity and been widely adopted, is the use of Alginure Root Dip. This material is largely alginate derived from seaweed, but also contains a preservative and some clay. When diluted (one part Alginure to three parts water) as instructed on the label, it forms a gelatinous slurry which coats the roots of plants dipped in it.
3. If this coating is to protect roots from desiccation, trees should be dipped soon after lifting from the nursery-bed. Alternatively, dipping shortly before planting might rehydrate partially desiccated trees. (Insley and Buckley (1985) found that although most of the damage done by desiccation was irreversible, soaking the roots of partially desiccated trees in water for two hours did produce some improvements in their subsequent survival, health and growth.)
4. Because of the interest in this product, the Forestry Commission has conducted two experiments with it and had some simple laboratory tests done.

#### **Filed experiments**

5. **The first experiment** compared the effects of Alginure and water root-dip treatments on bare-rooted transplants: undipped trees were included as a control. Two species were used: Corsican pine (*Pinus nigra* var. *maritima*) and Swedish Whitebeam (*Sorbus intermedia*). Trees were kept in polythene bags until they reached the planting site. They were dipped for about 30 seconds shortly before planting which was in April 1985 on a chalky site in Hampshire where tree establishment had proved difficult in the past.
6. In the first two seasons, height and diameter growth of the undipped trees was slightly greater than that of the dipped trees (both Alginure and water); survival of dipped and undipped trees was very similar. None of these differences were statistically significant ( $p \leq 0.05$ ).

7. **The second experiment** also compared bare-rooted transplants that had their roots dipped in diluted Alginure or water, and undipped controls. Each of these three treatments was split-half of the trees being exposed in a well-ventilated shed to stimulate poor handling – giving six treatments. In the four dipping treatments, trees were dipped either before (T1), after (T2), or both before and after (T1+T2) the exposure treatment, giving 14 different experimental treatments.
8. Birch (*Betula pendula*) was exposed for 24 hours and oak (*Quercus robur*) for 72 hours; (earlier experiments had shown birch to be more sensitive). Trees were dipped up to the root collar for 2 hours. They were protected in polythene bags except while being exposed or dipped. All the trees were planted on 17 March 1986, a few days after the exposure and dipping treatments, on a sandy site in Hampshire.
9. All the trees were weighed before and after exposure and dipping treatments. As expected, the exposed trees lost weight. Dipping in water after exposure reduced this weight loss. Trees dipped in Alginure appeared to gain weight because Alginure stuck to their roots. But exposed Alginure-dipped plants lost as much weight as exposed water-dipped plants, possibly owing to evaporation from the Alginure coated on their roots.
10. In the summer after planting, the treatments appeared to have had no effect. But by careful assessment and statistical analysis some effects were detected.
11. A health assessment in July 1986, based on leaf number, size and colour, gave each tree a score from one (very healthy) to six (dead). The water-dipped birch were healthier (mean score 1.98) than the Alginure-dipped birch (mean score 2.41). First-year diameter growth of the exposed birch (5.8mm) was less than that of the non-exposed birch (7.1mm). Also for birch diameter growth the interaction between type of dip and time of dip was significant ( $p < 0.01$ ):

#### Birch Diameter Growth (mm)

Treatment	T1	T2	T1+T2
Water	5.8	7.1	7.5
Alginure	7.2	5.5	5.9

Mean diameter growth of the undipped birch was 6.0mm. Alginure before exposure was beneficial but not after exposure; whereas water was beneficial after exposure but not before. There were no other significant effects on height or diameter growth, health or survival of either species.

#### Laboratory tests

12. Because Alginure appeared to be slightly harmful under some conditions, simple laboratory analyses were conducted using Alginure diluted in three parts distilled water. The slurry was slightly saline (electrical conductivity values around  $3 \text{ m S cm}^{-3}$  were obtained); the sodium concentration was rather high ( $37 \text{ mmol dm}^{-3}$ ). The material was quite alkaline (pH 8.4). The boron concentration was around 10 to 20  $\text{mg dm}^{-3}$  (4 to 10  $\text{mg dm}^{-3}$  is considered slightly toxic for many trees). Any of these factors might have a deleterious effect on trees.

#### Discussion

13. Many tree planters use Alginure Root Dip just before planting. The first experiment simulated this but dipping was not beneficial. In the second experiment the dipping and exposure treatments had little effect. It is possible that Alginure would have a larger effect with other species or in a different season or had the exposure treatment been more severe. Further work would be needed to test this.

14. The interaction between type and time of dip, described in paragraph 11, is intriguing. Here is one tentative explanation: Alginure before exposure was beneficial because it protected the roots from desiccation; Alginure after exposure had a slightly harmful effect, outweighing any benefit it might have given through rehydration. Water before exposure soon evaporated off the roots; but dipping in water after exposure rehydrated the partially desiccated roots.
15. If plants are dipped in Alginure Root Dip soon after lifting in the nursery, and before a period of exposure, the treatment may be beneficial. But since the benefits appear to be small, and since under some conditions Alginure appears to be slightly harmful, it is safer to rely on good packaging, polythene bags for example, to prevent desiccation.
16. If plants do dry out during handling they can be rehydrated by soaking their roots in water, and this sometimes improves their subsequent performance. But bare-rooted plants are easily killed by desiccation and no amount of soaking will resuscitate dead plants.

## References

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