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A COMPARISON OF THE SURVIVAL AND GROWTH OF TRANSPLANTS, WHIPS AND STANDARDS, WITH AND WITHOUT CHEMICAL WEED CONTROL

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Summary

Survival and growth of rowan, oak and hornbeam were increased by chemical weeding, which also reduced die-back. This was so for all three sizes of tree. Oak transplants survived better than whips and standards; but with hornbeam the standards survived the best. Rowan survived well irrespective of initial size or weeding treatment. For each species transplants grew faster, or died-back less, than standards; but after three years the standards are still taller than the transplants and whips.

Introduction

1. It is often said that transplants grow faster than standards, and so after a few years are taller; but evidence to support this assertion is rarely, if ever, produced. A second similarly unsubstantiated assertion is that big trees need little or no weeding. These two assertions may be linked: standards perhaps grow more slowly that transplants because they are not weeded so well and therefore suffer greater weed interference.
2. This Note reports the results after three growing seasons of an experiment comparing the survival and growth of transplants (0.4-0.7m), whips (0.9-1.4m) and standards (1.8-2.3m), each with or without chemical weed control. (The rowan and oak 'whips' were less that 1.2m tall, the minimum height for whips as defined in BS3936, Part1, 1980. But for convenience they are called whips in this Note.)

Experimental methods

3. Three species were used: rowan (*Sorbus aucuparia*), oak (*Quercus robur*) and hornbeam (*Carpinus betulus*). In order to make the three sizes of plant as comparable as possible, all the plants for each species were obtained from the same nursery. The managers of the supplying nurseries were keen to help. They agreed to supply plants of seedling origin from as similar seed source as possible, lifted as nearly as possible at the same time and all handled and packaged in a similar manner.

4. The planting site was a recently made cutting through London clay near Epping in Essex. Clayey topsoil had been spread and seeded with a mixture of grass and clover. Planting pits about 450mm diameter and 300mm deep were dug and about 8 litres of tree-planting compost were mixed into each. All pits were this size, even those which were to receive transplants. A rabbit fence was erected round the experiment. Each tree was protected by a 200mm tall plastic vole guard.

5. There were 12 replications, each containing four control trees and four chemically weeded trees of each of the three sizes of each of the three species. There were thus 96 trees of each size of each species planted- a total of 864. They were planted over a four-day period in March 1984.

6. Chemically weeded trees had a 1.2m, diameter area at their base kept weed-free with glyphosate. It was re-applied when necessary, with care to keep it off the trees' bark and foliage. Vegetation

around the control trees was cut manually whenever there appeared to be a danger of the grass collapsing on the smaller trees. But when the grass was cut it was cut around all of the trees, not just the transplants, in order to maintain comparability.

Results

7. Survival after three seasons, and mean height and diameter (measured 1.3m above ground) of the survivors, is shown in Table 1. Height was measured to the highest live point on each tree. Figure 1 shows how the mean heights changed over the three years. (Two lines on the hornbeam graph became faint because survival in these treatments fell below 20per cent on 1985)

8. The rowan survived well, irrespective of initial size or weeding treatment. Survival of each of the three sizes of the other two species was improved by chemical weeding. For all three sizes of all three species, height and diameter growth was increased, and die-back reduced, by chemical weeding.

9. Apart from the hornbeam whips, all of the plants appeared to be in good condition at time of planting. The hornbeam whips looked dry; many died and 'growth' of the rest was poor.

Discussion

10. Summer 1984 was dry. Large cracks appeared in the soil up to 80m wide and at least 400mm deep. Most of the deaths are attributed to this drought. Some Arborists are reluctant to use herbicides on soils that shrink in summer, thinking that vegetation lessens soil cracking. Vegetation hides the cracks but it is clear from this experiment that chemical weeding can greatly improve survival and growth of trees on such sites.

11. The oak transplants survived better than the whips or standards. But with the hornbeam the standards survived best. Probably, the attempt to obtain three sizes of each species as similar as possible in all respects except size had not been good enough. The hornbeam whips were clearly inferior. Transplants, whips and standards, even though grown in the same nursery, were inevitably in different beds, and received different weeding, fertiliser and irrigation treatments. They would almost certainly be lifted and handled slightly differently. Rather than concluding that one should plant large hornbeam and small oak, it is safer simply to conclude that good quality plants, whether large or small, and effective weeding are essential.

12. Figure 1 shows that with each species the transplants are growing faster than the standards. With rowan and oak the whips are also catching up with the standards. But in no case have the standards yet been overtaken. This experiment is continuing.

13. Each summer the control trees carried less foliage that the chemically weeded trees. The die-back and sparse foliage of the control trees, especially the standards, made them a sorry sight. Standards are often planted to create an instant impact. But this experiment indicates that unweeded standards may create an eyesore. Properly weeded transplants are more likely to enhance a landscape site than unweeded standards.

Conclusions

14. All newly planted trees, whether small or large, require effective weed control. Without it they are likely to die, die-back or grow poorly. In this experiment transplants are growing faster than standards but have not yet caught up with them.

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Table 1
The effect of chemical weeding on survival, height and diameter of transplants, whips and standards of rowan, oak and hornbeam after three seasons.

		Transplants	Whips	Standards	Stock Size	Weeding	Interaction
Rowan							
Survival (%)	Control Herbicide	96 96	98 90	96 100	NS	NS	NS
Height (m)	Control Herbicide	0.94 1065	1.19 1.75	2.25 2.58	***	***	***
Diameter (mm)	Control Herbicide	8.7 21.4	11.8 22.4	22.5 30.9	***	***	***
Oak							
Survival (%)	Control Herbicide	83 96	44 90	31 83	***	***	***
Height (m)	Control Herbicide	0.50 1.18	0.76 1.27	1.47 2.14	***	***	NS
Diameter (mm)	Control Herbicide	5.8 15.4	11.3 17.6	20.1 25.6	***	***	NS
Hornbeam							
Survival (%)	Control Herbicide	17 69	2 40	56 90	***	***	NS
Height (m)	Control Herbicide	0.77 1.12	0.24 0.87	1.20) 1.81)	No statistical tests conducted owing to poor survival		
Diameter (mm)	Control Herbicide	8.7 14.5	- 11.4	16.9) 20.8)	As above		

Notes: 1. Significance levels:

NS- effect not significant, $p<0.05$
**- effect significant, $p<0.01$
***- effect significant, $p<0.001$

2. Survival percentages were transformed to angles for statistical analysis. Significance levels refer to transformed date.

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