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Planting Success Rates-Standard Trees,

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Summary

The results of a survey of standard and larger trees planted in 1979 revealed only 54% survival after 5 years. Reasons for the failures are suggested.

Introduction

1. In 1984, after almost a decade of funding landscape planting, the Scottish Development Agency commissioned a survey to assess the effectiveness of tree planting practices adopted on schemes financed by the Department. The survey, which was restricted to standard trees (BS:3936 Part 1) and larger at the time planting, concentrated only on those landscape schemes completed 5 years earlier – that is, trees planted in 1979. All sites surveyed were owned and maintained by local authorities.

The Survey

2. The survey examined all the trees and, where known, the planting positions of standard and larger trees on 30 of 76 possible sites. The sample included a range of both site types and sizes. The scope of the survey was restricted by an absence of as-built plans and management data.
3. Tree survival was the main criterion used in the survey, but attempts were made to determine the reasons for success or failure of individual trees. Details of site characteristics were also recorded.

Results

4. Table 1 summarises the data collected:

Table 1	No.	Sub-Section %	% of Total
Trees planted in 1979	5671		100
Trees alive in 1984			
a. good or excellent condition*	1830	60.1	32.2
b. fair condition*	1095	36.3	19.3
c. poor condition*	120	3.6	2.2
Total	3045	100.0	53.7
Failures			
a. dead or missing	2516	95.9	44.3
b. Broken but sprouting from base	110	4.1	2.00
Total	2626	100.0	46.3

***Definition of condition categories**

poor = alive but little growth

fair = elongation of all branches by 1m approximately over 5 years

good = elongation of all branches by 1m approximately over 5 years and closing of the crown to give a dense appearance.

Possible reasons for failure

5. the survey results were analysed to see if there was any correlation with:

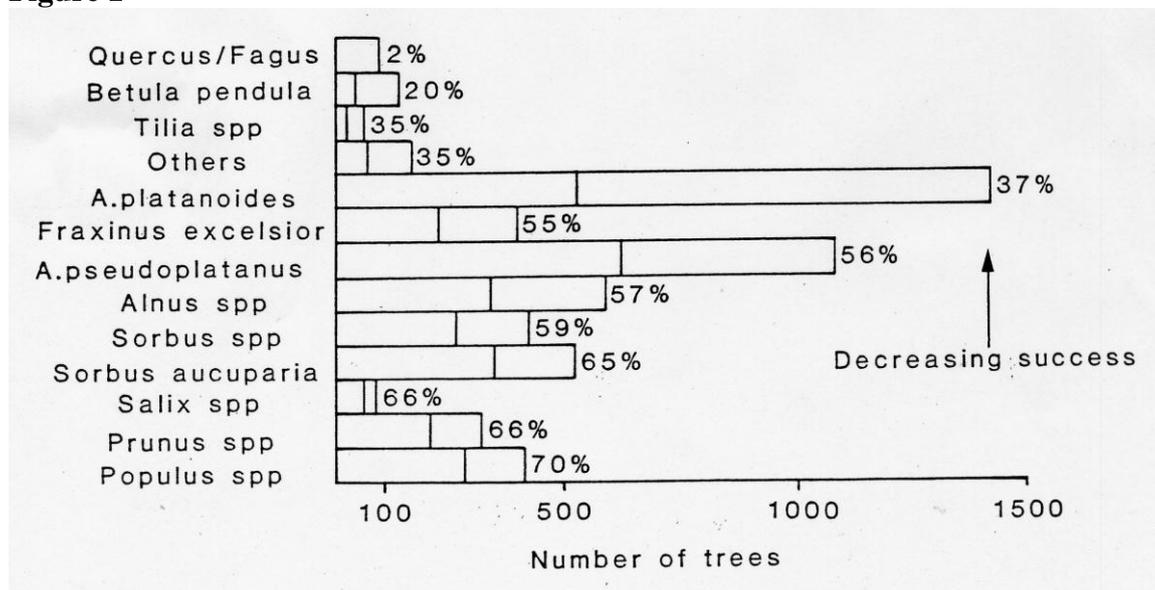
- Species choice Scheme size Exposure to vandalism
- Ground conditions Type of scheme Location of trees in scheme

6. **Species choice:** Beech, oak and birch, which accounted for 4% of all trees planted, showed very poor survival. Lime and Norway maple (*Acer platanoides*) performed slightly worse than average, while ash, alder and sycamore (*A. pseudoplatanus*) were marginally above the average. Much more successful than average were poplar, willow and cherry.

Table 2

	Planted	Survived
<i>Acer platanoides</i>	1418	522
<i>Acer pseudoplatanus</i>	1082	604
<i>Alnus glutinosa</i>	581	333
<i>Betula pendula</i>	138	28
<i>Fraxinus excelsior</i>	392	216
<i>Populus spp.</i>	426	297
<i>Prunus spp.</i>	314	206
<i>Quercus/Fagus</i>	89	2
<i>Salix spp.</i>	82	54
<i>Sorbus aucuparia</i>	527	340
<i>Sorbus spp.</i>	417	254
<i>Tilia spp.</i>	43	15
Other spp.	118	40

Figure 1



7. **Ground conditions.** On 3 sites trees had been planted into waterlogged ground, or into planting pits formed in waste materials, or subsoil with no backfill containing humus. It was considered that on these sites this was the probable cause of failure, while on a further 3 sites similar conditions were contributory to failure.
8. **Scheme size.** Tree failures were not related to scheme size but the condition of surviving trees did relate to the sizes of schemes. When ranked by tree condition, the larger schemes showed strongly in the ‘good or excellent’ category. No obvious reason for this has been established but it suggested that when the schemes were large, consultants with experience of this kind of work were appointed to design the schemes.
9. **Type of scheme.** All types of schemes showed a range of survival rate – sometimes a very wide range. The most successful were industrial estates, river walkways and parking areas. Least successful were housing, playing fields and play areas. Gap sites in towns were intermediate.
10. **Exposure to vandalism.** Where trees survived, but with their tops broken, vandalism was considered the likely cause of damage. The trees were grouped in areas of sites with greatest public usage. In many instances it was impossible to say how an individual tree, which was missing from a site, had died. Missing trees were grouped at site entrances, along walkways and in playgrounds where people, and particularly the young, congregate. These patterns were obvious in 17 out of 30 sites. As patterns were the same as for the broken trees, vandalism was considered to be the likely cause of death on these sites. On a further 4 sites vandalism was considered to be a strong contributory factor.
11. **Location of the trees in the scheme.** There was a strong contrast between survival of trees planted in shrub beds and those on lawns or in pavings. Schemes with a small proportion or no trees planted in shrub beds were markedly less successful than those schemes with high proportion in shrub beds. This may be due in part to ground conditions being better in shrub beds, less competition, or bigger volume of humus-rich cultivated soil and more frequent post-planting maintenance.
12. Other equally important but less tangible observations emerged from the survey. Rows of trees planted along walkways suffered severe damage. Trees in locations raised above the general site level survived better than those which were not, irrespective of whether they were adjacent to a walkway. If sites had clearly defined entrances or gathering places as, for instance, at a children’s play area, then there appeared to be a particular risk.

Conclusions

13. The average success rate for the 30 schemes studied was 54%. This is a very poor achievement and one which every effort must be made to improve. An improvement of 20%, giving a target success rate of 75% over all schemes, should be possible if the recommendations given below are followed. Greater average success than that would mean not planting the more hostile sites.
14. The main points to emerge from the survey were:
 - Do not use the least successful genera, at least as standards.
 - Plant more of the successful genera if standard cannot be avoided, particularly *Salix* spp. And *Populus* spp.
 - Ensure thorough ground preparation to provide good soil physical conditions.
 - Plant in shrub beds and minimise planting on lawns.
 - Plant in raised beds or on banks.
 - Do not plant rows of trees parallel and immediately adjacent to walkways.
 - Give special protection to trees near site entrances and where people are likely to gather.

15. The survey highlights the importance of monitoring the achievement of amenity tree planting if design, species selection and cultural practices are to be improved so that there is greater success from amenity tree planting.
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