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## Arboriculture Research Note 71

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**Black Polythene Mulches to Aid Tree Establishment,**  
by R J Davies, Arboriculture Researcher ,Forestry Commission

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### Summary

Black polythene mulches greatly increase the survival and growth of young trees. Mulches should be at least 1m square. Smaller mulches can be used to reduce the risk of herbicide damage which might occur when weeds close to the tree are sprayed.

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### Introduction

1. Without effective weeding, young trees die or make little growth. Herbicides are cheap and effective but care is needed to avoid damaging the trees; they must be re-applied when weeds recolonise the ground.
2. Traditionally, mulches were of organic materials such as bark or leaves. Inorganic granular materials, like gravel, have also been used. These materials usually improve the survival or growth of trees but weeds growing in or through the mulch must be removed by hand or killed with herbicides. A good sheet mulch, applied at planting, obviates the need for further weeding.
3. This Note compares the effects of chemical weed control and black polythene mulches on the survival and growth of young trees. It also investigates how large a sheet mulch should be. A companion Note (Davies, 1987) discusses what to look for when considering other sheet materials for mulching, some practical aspects of using sheet mulches, and problems that may arise.

### Comparison of the effects of black polythene and herbicides on tree growth

4. Different sizes of black polythene mulching mat and herbicide spot were compared in a series of eight experiments. These experiments were on sandy, loamy and clayey soils, each supporting a grass-dominated sward. As well as the individual tree mats and spots (which were square and the largest of which was 1.8 x1.8m), some plots measuring 10 x 8m and containing 12 trees were treated with herbicide or covered in polythene. Trees were planted at 2 x 2m spacing. Some of the plots with individual tree mats had all the ground between the mats with herbicide. Glyphosate, or paraquat, was re-applied when necessary to keep the ground in these plots and in the individual tree spots, fairly clear.
5. Figure 1 shows the effects of these treatments on the diameter growth of Field maple (*Acer campestre*) transplants growing in clay. The unweeded trees did not grow. The further weeds were kept from the trees, the better the trees grew; this was so whether herbicide or polythene was used.
6. Despite the widely differing soils, results from the other seven experiments were similar. When the treated areas were smaller than about 1.2 x 1.2m, herbicide spots were more effective than

polythene mats; but when larger areas were treated, polythene mats were better. This is because weeds around sheet mulches are invigorated by them, root under them, and reduce their effective size. Tree growth is much improved if the weeds surrounding the mulch are killed. If, therefore, polythene mats are used to obviate the need for herbicides, the mats should be large; a minimum of 1m square is recommended.

### **Black polythene mulching and survival of trees**

7. In most experiments, effective chemical weeding or mulching mats improved the survival of trees. Survival effects were particularly marked when poor quality plants were used: weakened trees are easily killed by weeds. Figure 2 shows the first-year survival of poor quality oak (*Quercus robur*) transplants. These plants had many bruised and dead roots, and their small buds indicated that they had not thrived in the nursery. All the unweeded trees and those with 0.3 x 0.3m mats died. Survival was best in the plots where all the weeds were treated with herbicide or covered with black polythene.
8. Large improvements in survival are also obtained on sites with poor moisture retention. Figure 3 shows the effects of black polythene mulching on the survival and growth of Italian alder (*Alnus cordata*) transplants and unrooted cuttings of Violet willow (*Salix daphnoides*) growing on an embankment built of sand. There was no unweeded control in this experiment because earlier experience on the site had shown that all unweeded trees would die. A 0.4m band on either side of the polythene mulch strips was kept clean with herbicides to prevent weeds rooting under them.

### **Why is sheet mulching so beneficial?**

9. The main way in which mulches help trees is by controlling weeds which compete with them for soil moisture. Mulches also reduce the smaller losses of soil moisture which occur by evaporation; this is particularly important on sites with poor moisture retention. Mulches help to maintain nutrient availability; they do this by retaining moisture near the soil surface, where most of the plant-available nutrients are found. On sandy sites, impermeable sheet mulches reduce the loss of nutrients by leaching. Most sheet mulches raise soil temperatures and so encourage root growth. The relative importance of these moisture, nutrient and temperature effects no doubt depends on the site and species involved, and there are probably other factors at work too.

### **Recommendations**

10. Newly planted trees should have at least 1m square around them kept free of weeds. Mulching mats of this size often obviate the need for further weeding. Alternatively, mats can be used to reduce the risk of accidental damage which may occur when weeds close to the tree are treated with herbicides. Smaller mats, say 0.5 x 0.5m, are then appropriate.

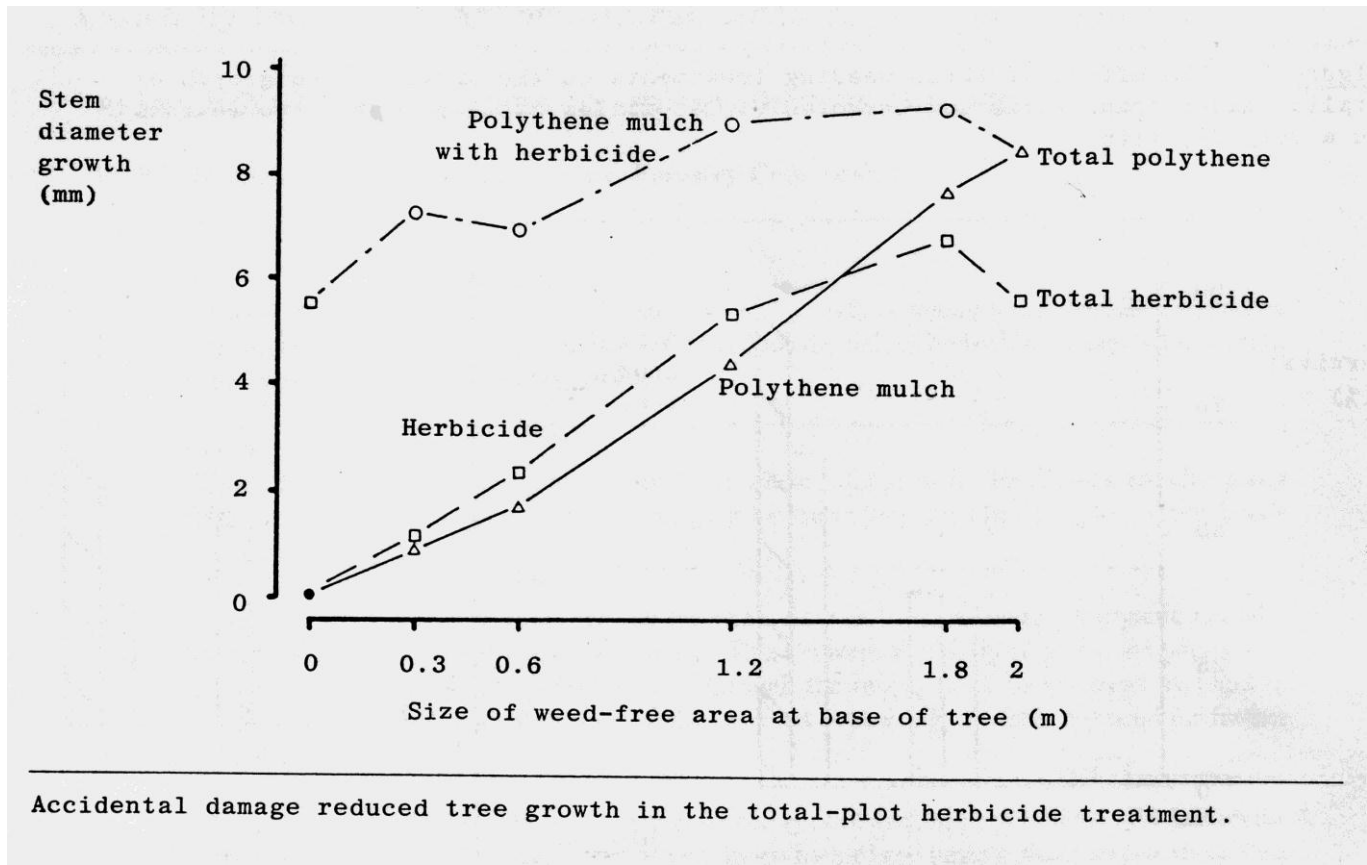
### **Acknowledgements**

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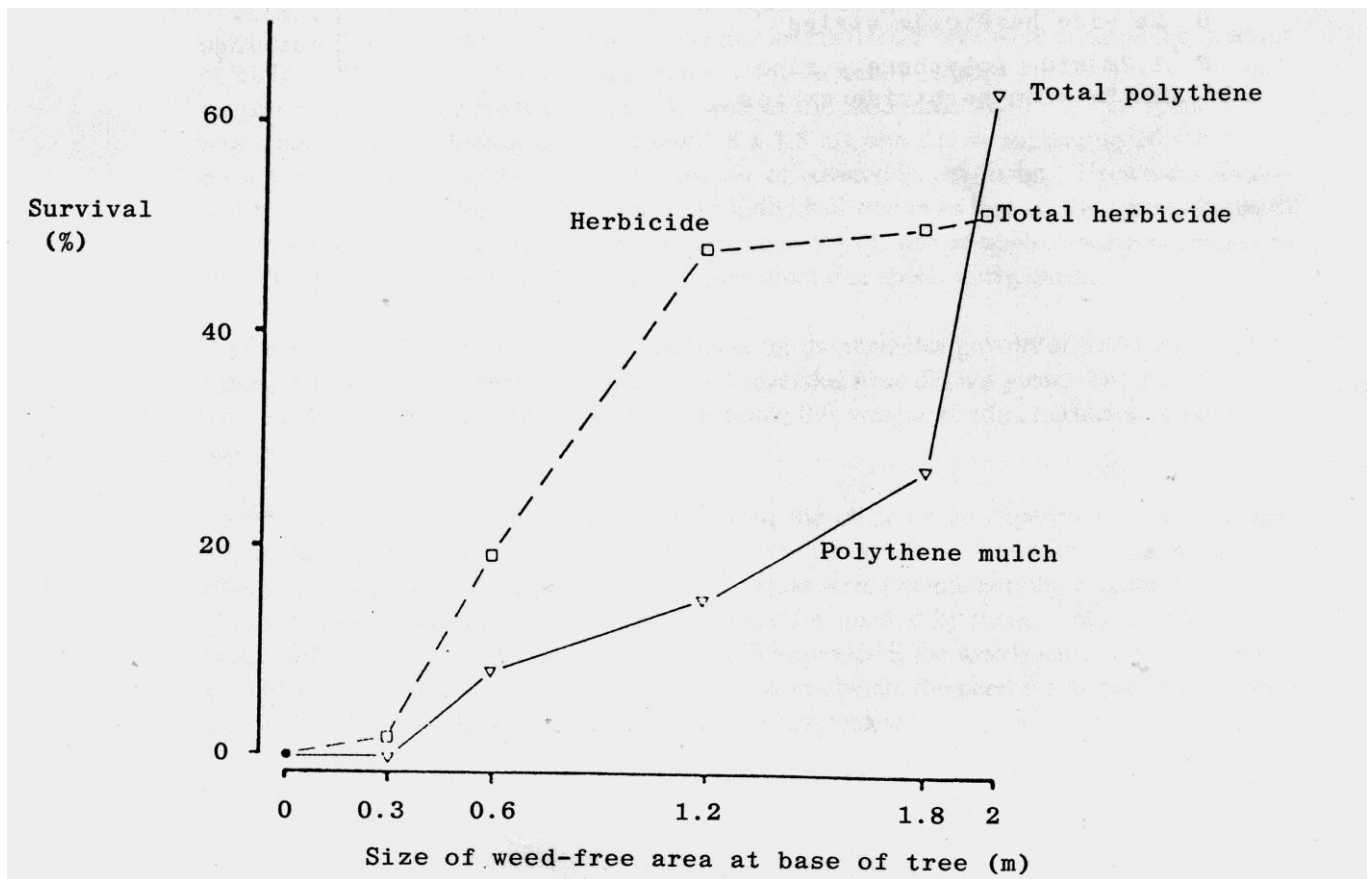
### **Reference**

Davies, R.J. (1987). Sheet mulching: suitable materials and how to use them. *Arboriculture Research Note 72.87/ARB*, Arboricultural Advisory and Information Service, Farnham.

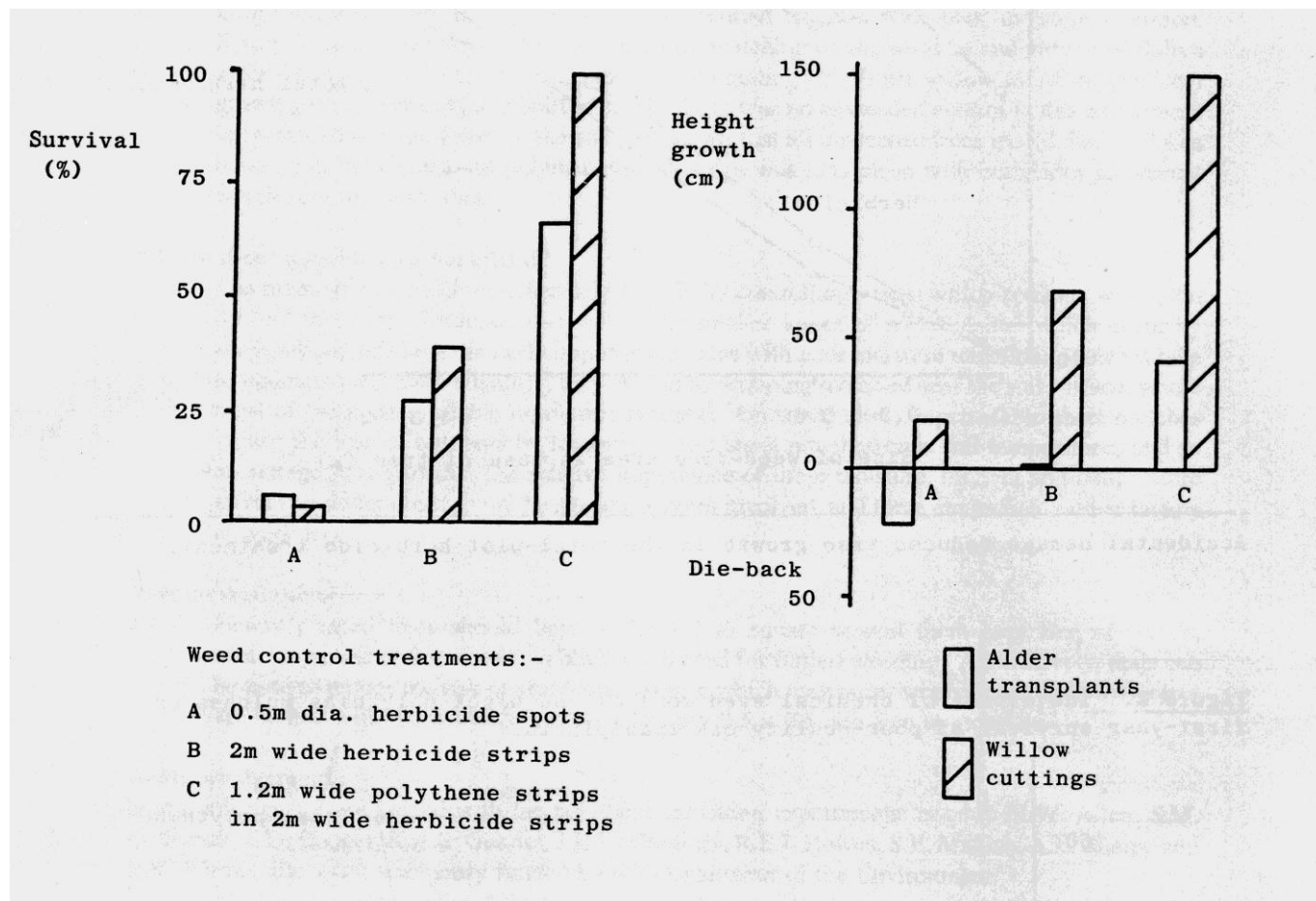
**Figure 1** The effect of chemical weed control and black polythene mulches with or without the rest of the weeds in the plot treated with herbicide on two years' diameter growth of Field maple transplants.



**Figure 2** The effect of chemical weed control and black polythene mulches on first-year survival of poor-quality oak transplants.



**Figure 3** The effect of the three weeding treatments on the survival and growth of Italian alder transplants and unrooted Violet willow cuttings after two seasons on a very dry site.



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Arboricultural Advisory and Information Service  
 Alice Holt Lodge  
 Wrecclesham  
 Farnham  
 Surrey  
 GU10 4LH

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