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### **SHEET MULCHES: SUITABLE MATERIALS AND HOW TO USE THEM**

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#### **Abstract**

Many sheet materials make good mulches. To be effective they must be properly anchored and should remain intact for at least three years. The best materials are opaque and impermeable.

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#### **Introduction**

1. The survival and growth of young trees is improved when weeds are removed. This was shown in Arboriculture Research Notes 59, 67 and 71 (Davies and Gardiner 1987, Davies 1987a and Davies 1987b).
2. Arboriculture Research Note 71 showed that black polythene mulches can be an effective method of controlling weeds. Forestry Commission experiments have tested a range of other sheet mulching materials and elucidated the characteristics which make some more suitable than others. This Note discusses these characteristics. Practical aspects of using mulches and potential problems are also discussed.

#### **Sheet mulching materials**

3. A suitable material should remain intact for at least three years. Most types of paper and card rot too quickly and are colonised by weeds.
4. Impermeable materials are better than permeable or perforated materials. Weeds may grow through perforations. Even with large (10x8m) impermeable sheets, and vigorous trees drying the soils beneath them, the soil re-wets, usually within a few days of rain falling.
5. Opaque materials are better than clear or translucent materials. If the mulch transmits light, weeds will grow beneath it and probably dislodge it. In sunny weather, very high temperatures are found beneath clear polythene and trees have been killed. Temperatures beneath black polythene are not so high.
6. Many materials meet these criteria reasonably well. If one wishes to purchase material, because suitable waste material is not available, then black polythene is appropriate and cheap. On sites where physical damage is unlikely 38 $\mu$ m (150 gauge) material is usually adequate. If there is a danger of stones, thorns or animals tearing the mulch, 125 $\mu$ m (500 gauge) thickness should be used. The chemical composition of polythene is as important as its thickness: recycled polythene soon becomes brittle in sunlight, as does material containing insufficient ultra-violet inhibitor.

## **Applying sheet mulches**

7. It is usually best to plant the trees before laying the mulch. A slit can be made from the edge to the centre of the sheet, or a hole may be made near the centre of the mat which is then slipped over the tree. Species which coppice can be cut off about 100mm above ground and polythene sheets then pressed down over them, forcing the stumps up through the sheets. Unrooted cuttings of suitable species can be inserted through previously laid mulches.
8. Cutting rank weed growth makes laying sheet mulch easier.
9. Good anchorage is essential. Heavy materials, such as old carpets and bituminised roofing felt, often stay in place without additional anchorage. Turves or other weights can be used for extra security. Polythene and other light materials should have their edges or corners buried and weights placed on top. Tractor-mounted attachments, which lay continuous strips of polythene and bury the edges, are available but they require good soil conditions,

## **Problems with sheet mulches**

10. Some materials are unsightly. These can be covered with bark or gravel, which also anchors them and protects them from sunlight. Weeds around the mulch, if they are not cut or killed, help to hide the mulch and they, too, protect it from the wind and sun. Well mulched shrubs make rapid growth and camouflage the mulch.
11. On extremely ill-drained sites, where for long periods the soils contain little oxygen, large mulches make soil anaerobism worse and trees may grow badly or die. Such sites should be drained before planting. The problem is not that impermeable sheets form barriers to gas exchange between soil and the air. Rather, by preventing evaporation from the soil and transpiration from weeds, mulches keep the soil waterlogged for longer than it would otherwise be. If the soil pores are full of water, gas exchange is very slow. Provided excess water can drain from the pores, changes in atmospheric pressure and soil temperature ensure the renewal of soil gases, even if the soil is covered with a large impermeable sheet.
12. Field voles often nest under sheet mulches and gnaw trees around the root collar. Trees may be killed or even felled. This risk is greatly reduced if weights are placed on the sheet near the tree. Foxes, dogs and cats sometimes tear sheet mulches while hunting for voles. On one site, adders were often found basking in the sun on top of the polythene mulches. Cattle occasionally swallow polythene; but if the mulches are properly anchored and the site fenced to exclude farm stock, there is no danger.

## **Comparison of the costs of sheet mulches and herbicides**

13. The cost of black polythene is related to its thickness; material that is 125  $\mu\text{m}$  thick costs about 20p/m<sup>2</sup>. Suitable grades of bituminised roofing felt cost about 50p/m<sup>2</sup>. Many herbicides, at recommended application rates, cost between 0.2 and 1p/m<sup>2</sup>; however, they must be re-applied when the weeds return. Labour costs must also be added; these are higher for polythene than roofing felt, because the lighter material requires better anchorage. In small planting schemes, where labour costs per tree are high, sheet mulching is often cheaper than repeated chemical weed control. In large plantations, where labour costs are lower, herbicides are cheaper.

## **Conclusions**

14. Many sheet materials make good mulches. They should remain intact for at least three years and must be properly anchored. The best materials are opaque and impermeable.

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