

Investigation of Mulch Materials for Weed Suppression and Water Management in Container Grown Nursery Stock[©]

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Weed control is one of the main production problems for growers of nursery stock in containers. In Northern Ireland ornamental nurseries are family businesses growing relatively small numbers of a wide range of plants for the local wholesale market and direct sales to the public. The reduced range of chemical herbicides available and the difficulty of applying them on nurseries with a diverse crop range has encouraged adoption of alternative methods including loose mulches and container mulch materials or pot covers.

As part of the knowledge technology transfer programme at the Greenmount Campus, CAFRE, horticulture centre, container mulch materials have been assessed under local conditions for a range of criteria including their performance in reducing weeds and their influence on water management in the container. New technology available to accurately record moisture levels in the growing media has assisted in evaluations. This paper examines results for new types of container mulches such as wool-based materials. Some of these materials have been shown to give effective weed control and retain moisture in the container. The CAFRE technology investigation programme has involved working in conjunction with local growers who have adopted container mulches to share experience and results.

INTRODUCTION

In Northern Ireland there are more than 100 wholesale and retail nurseries producing ornamental plants with a “nursery gate” value of approximately £16 m. The nurseries are family run businesses characterised by production of small numbers of a wide crop range to suit the local market. There is limited specialisation and little exporting.

Chemical weed control programmes are often difficult on such nurseries because of the susceptibility of some species to herbicide damage. Some growers therefore do not use chemical weed-control methods and rely on hand weeding. Bark mulch is used by some growers especially on herbaceous plants. Where herbicides are used, much of the industry relied on Ronstar[®] granules (oxadiazinon) but this product has recently been withdrawn.

There are a number of limitations to existing container weed-control systems relying on herbicides:

- There are no effective contact herbicides that can be sprayed to kill existing weeds on containers and which are safe to the crop.
- Most herbicides used in container plant production are “pre-emergence” so have to be applied to weed free surfaces.
- More than one application of herbicide may be required as persistence in many cases is not long enough for most hardy nursery stock production schedules.
- Some herbicides, such as Flexidor (isoxaben) have a restriction on the number of applications per year.

An alternative to herbicides or hand weeding is to use container mulch materials placed on top of the container after potting. Several new container mulch products, which are generally a fabric or layered material designed to act as a pot cover have been developed in recent years.

In Northern Ireland the College of Agriculture, Food and Rural Enterprise (CAFRE) is responsible for a programme of knowledge and technology transfer and provision of education and training for students and growers. As part of this programme, some of these new container mulch products were evaluated between 2010 and 2014 to test ease of application; durability; permeability; and prevention of weed germination.

INITIAL COMPARISONS

In the initial evaluation five materials were investigated: coco-fibre discs, geo-textile discs, hemp discs, loose pine bark, and rubber crumb.

Ilex × altaclerensis 'Golden King' liners were potted into 2-L containers in August 2010 and placed in a polythene tunnel. Forty seeds of chickweed (*Stellaria media*) were applied per container except control pots which had none. Laboratory germination of the chickweed seeds was 62%. The average number of weeds per pot for each material is shown in Figure 1.

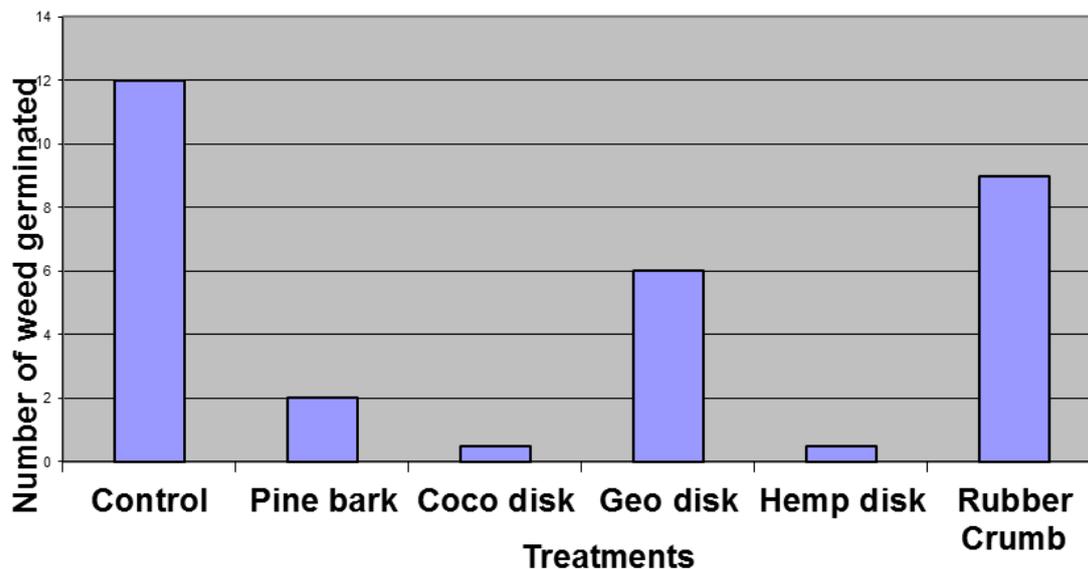


Fig. 1. Average weed germination per container.

Where pots had been seeded but no mulch applied, there was an average of 12 weeds per pot at the end of the trial (approximately 30% germination). The most effective treatments were coco-fibre discs and hemp discs which prevented almost all the seeds from germinating, followed by loose bark with an average of two weeds per pot.

Following this trial a number of local growers were starting to test mulch materials for themselves. One important factor in encouraging interest was that some nurseries had begun to record the costs of the labour requirement in hand weeding and found that they were higher than they had assumed.

2013 TRIALS

In 2013 a new project was initiated to evaluate a locally produced mulch material (Unique Pot Topper made from a blend of recycled fabrics, mostly wool) in more detail. These trials were not intended as a comparison of available container mulch materials. The product was tested for its ability to suppress both liverworts and weeds.

Liverwort Evaluation

The pot topper was put in place 3 weeks after potting when there was already an average 25% liverwort cover. Over a period of 3 months it prevented any further growth of the liverwort, and the existing liverwort died back (Fig. 2).



Fig. 2. Liverwort development in pots with and without recycled wool fabric mulch discs (photographed in October 2013).

Weed Evaluation

The pot topper was evaluated for weed control in April 2014 using box (*Buxus sempervirens*) liners potted into 2-L containers and grown on in a polythene tunnel. Forty weed seeds of chickweed were placed on each container surface except for the non-weed experiment control. The chickweed laboratory germination was 63%.

Figure 3 shows typical results from each treatment. There was significant weed germination on seeded containers which had no mulch (bottom left of photo). The pot topper prevented the majority of weeds germinating. A very small number of weeds germinated around the edge of the mulch (equivalent to 0.4% germination).



Fig. 3. Weed growth in pots with and without recycled wool fabric mulch discs (pot top left was unseeded).

Moisture Levels

Moisture levels in the substrate were measured using Delta T moisture probes (Fig. 4) and the results can be seen in the graph (Fig. 5). The top line shows the moisture levels in the pots with the pot topper. The bottom line shows the moisture with no pot topper.

Moisture levels with the pot topper were slightly higher to start with and rose quickly in both pots (as is shown by the vertical lines). The moisture level in the mulched pot rises to 46%, compared with 32% in the unmulched. Over the next 7 days moisture levels fall gradually to 31% for the mulched pot and 17% for the unmulched. Moisture levels also fluctuated less rapidly in the mulched pot.

Ease of Application

Where the container mulch material is flexible (as in this case) it is not as crucial that the size of the disc matches exactly the pot size. If it is slightly bigger than the pot it can still be put on.



Fig. 4. Delta T moisture and temperature measurement equipment in place. Probes inserted in pot with pot cover and pot without pot cover.

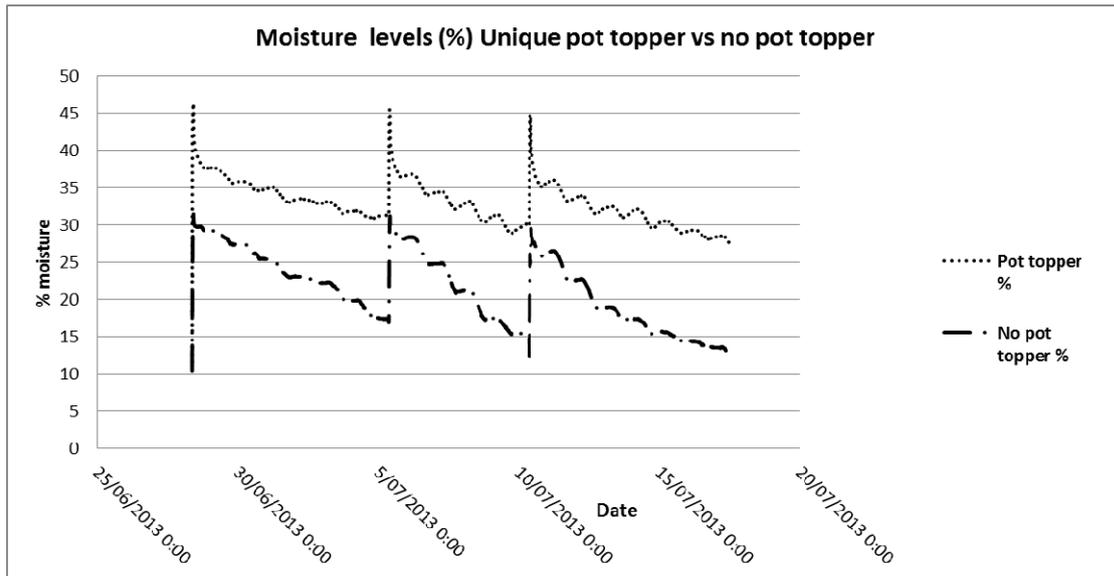


Fig. 5. Changes in moisture level with and without wool container mulch. Vertical axis shows percentage moisture and the horizontal axis time. Readings started June 28 and pots were watered for 1 h. They were watered again on July 5 and 10.

CONCLUSIONS

A number of container mulch materials gave significant and commercially acceptable levels of weed control.

It is important that the container mulch material allows the normal cycle of wetting and drying with no restriction on water entering the container. In the 2013 evaluation where the moisture level was higher to start with, the use of the Unique Pot Topper led to longer moisture retention. The material is itself able to absorb and hold moisture. In practice this could reduce the frequency of watering needed for container plants but this needs to be investigated further in a range of locations.

Mulches made from rigid material take longer to apply than flexible materials and have to exactly fit the container — and in practice container diameter varies between manufacturers for each volume size. It is important that pot toppers or container mulches do not leave any gaps at the edge as this is where weeds are likely to germinate.

Visual appearance of mulch materials can be important for the retail market and can be an indication of degradation. After 12 months the appearance of the Unique Pot Topper was still acceptable. There was some tendency for the material to turn a darker green colour but the discs retained their shape and did not shrink. This means the discs would prevent the majority of weeds germinating and remain intact and functional for at least one growing season.

The investigations at Greenmount have provided information to growers about the performance of container mulches and given them more confidence to adopt them on specific crops such as shrubs or trees in containers.

On plants such as some herbaceous species with a number of stems from the base, discs are not effective in covering the pot surface and loose mulch materials such as bark will be more effective.

Growers have found that container mulch materials do not always give 100% weed prevention. This is because a very small percentage of weeds can germinate in any small gap at the edge of the mulch and the rim of the pot. Growers sometimes have a problem in persuading staff to check batches of plants where container mulches are used as they perceive there are no weeds present.

While it is recommended to apply the mulch at potting, some growers prefer to apply them 3 weeks after potting when any early germinating weeds can be removed, and this

may be more likely to coincide with periods of low labour requirement.

Growers have found that the time saved at dispatch in cleaning and preparing plants is valuable in reducing the labour peak.

Greenmount trials have not looked at container mulches for young plants or liners but some local growers have assessed these and found that they further reduce carry over of weeds to the finished plant.

Growers also have to consider the initial cost of mulches and those who have recorded or measured the labour costs of hand weeding and preparing plants for dispatch are the most likely to adopt container mulches.

Additional Reading

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