PRODUCTION OF FARM TREES

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There has been growing concern in Australia about the problem of tree decline in the rural landscape. In particular there is a vital need to re-establish tree plantations on farms.

We decided in 1979 that there was an opportunity to participate in and promote an activity which we believed was in the national interest as well as offering a commercial opportunity. One of the reasons farmers do not plant as many trees as they should for their own economic good is that the whole business of choosing species from lists, planning layouts, and getting the planting done, is unfamiliar to them and requires considerable effort.

We recognised that the farmer needed a product package which simplified their task and allowed them to use their own equipment and labour to keep costs down. Hardy species were needed, grown and hardened off to survive freighting and establishment, often in harsh conditions. From the nursery point of view, flexibility in production was essential to provide for the high variability in weather patterns which would strongly influence seasonal buying. A system was developed to meet these requirements, partly by intention and good management, and partly by good fortune.

The following is a brief description of our information and ordering system. It seemed essential to protect the farmer from the complexities of plant names and the choice of species to suit conditions. Since height is the key factor in most cases when planting for windbreaks, the starting point was a colour code for mature heights of the plants. The following system was adopted:

Tall trees	over 12m	blue tubes
Medium trees	6 to 12m	green tubes
Small trees	3 to 6m	yellow tubes
Large shrubs	2 to 3m	orange tubes

Some simple rules have been developed for the design of windbreak plantations. One is that a good windbreak needs a mixture of species to provide velocity reduction at different heights. The farmer can order by colour code, and when his trees arrive, can plant by colour code. These days many of our sales are direct as well as by mail, and the look of relief on a farmer's face when he

finds he does not even have to know the name, *Eucalyptus camaldulensis*, let alone pronounce it, is something to be seen. We provide a plant list with the order form, but in the great majority of cases the choice of species is left to us, based on a questionnaire on soil, climate, drainage, etc., filled in by the farmer.

The coding and nursery selection procedure achieves an important step toward the end result as it allows the best selection of species for the purpose. The next step is to get the trees planted properly and in an efficient layout. Using the colour code, we provide a range of layouts for windbreaks of different heights, numbers of rows, etc. Laying the plants out in the field is then simple, requiring no squinting at Latin names on labels.

Our guide to planting procedure emphasises the importance of tender, loving care, and a surprisingly high percentage of clients take it to heart. The feedback on the whole package has been good, both as to the simplicity of the exercise and the results obtained, particularly compared with previous experience. Above all, we find many people quickly become interested in the whole business and continue planting with enthusiasm.

Two other decisions which we made for good reasons have been fully vindicated, and have brought unexpected bonuses.

First, the container chosen was a square tube 50 mm × 50 mm × 125 mm (2 × 2 × 5 in.), which Hans Kosmer designed for use by the Forests Commission in Victoria. It has many advantages, as its capacity of 250 ml is nearly twice that of the traditional veneer tube, its square shape uses space both in the nursery and in a carton more effectively than round tubes, and above all, the bottom is open which is very important. We were also lucky to find that these tubes were produced for the Commission in a range of colours, so our colour coding problem was solved.

The next decision we made was to use capillary watering. Following Murray Richard's paper (2) at the Perth IPPS conference in 1978 on this technique, we set up a small trial using a synthetic felt—a melded fabric imported from ICI Limited, U.K. It was used for about a year to water ferns in propagating tubes. It was the only water the plants received and was successful. This encouraged us to adopt capillary watering, based on felt matting, for farm tree production. The main reason initially was convenience, but we have since found other very important benefits.

Four tables, each 2.4 m × 1.2 m, are arranged end to end with troughs between each and at the ends of the row (Figure 1). The central trough is a wallpaper pasting trough and it is fitted at one end with a mains pressure water supply controlled by a small float valve and at the other with a 12 mm polypipe connection to the other troughs to control them to the master level. The tables are 500 mm high and the surface is fibre reinforced cement sheet.

Two layers of capillary matting are used. Both the bottom layer,

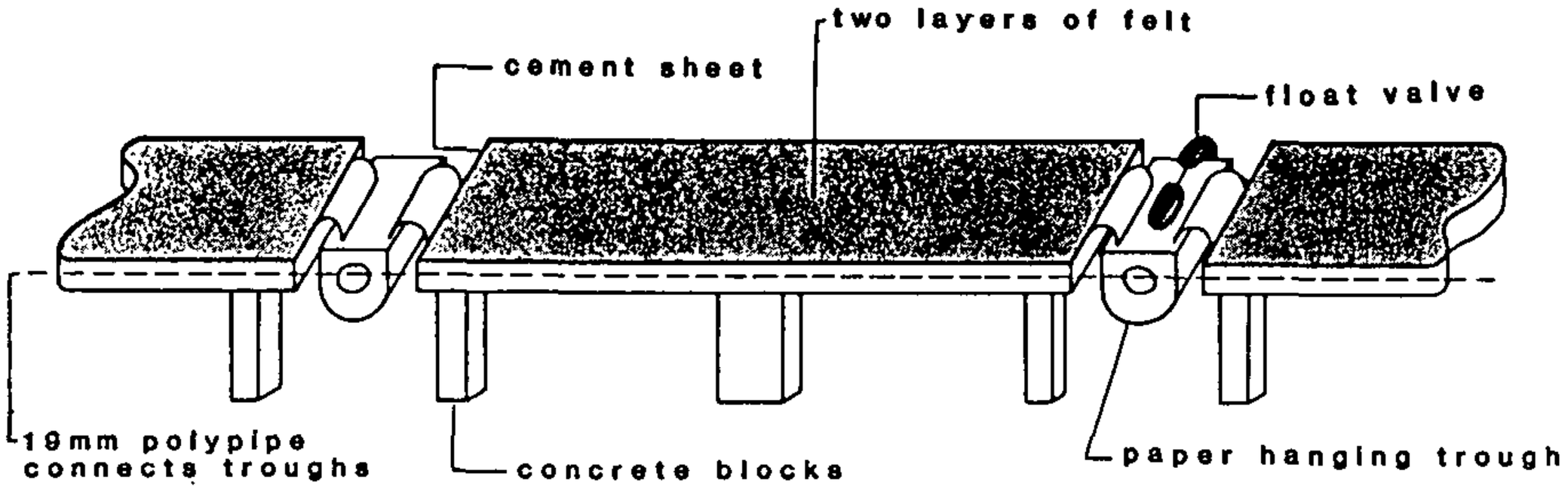

Figure 1: General view of capillary watering system

and the "wick" into the trough, are a white polyester interlining felt, 200g/sq m, used in the clothing trade. This was chosen because its close texture gives it excellent capillary properties, first to lift water about 5 to 15 mm out of the trough, and then to transport it horizontally along the table. The tables are set up with a dip in the middle of about 5 mm which assists the capillary flow.

The black upper felt is a melded fabric—a felt in which the fibres are bonded together in a very open structure. This is manufactured for use as a car carpet by Melded Fabrics Pty Ltd, Dandenong, Victoria. Its density is 350g/sq m. It has inferior capillary properties to the dense bottom felt, but its purpose is to provide a cushion so that the pots, sitting in wire baskets, make intimate contact with the mat. It is also tough and durable.

The tubes are handled in baskets 300 × 200 × 125 mm made from 1.3 mm welded wire fabric, 12 mm mesh, double galvanised. They hold 24 plants. The wire is thin and flexible enough to allow good contact between tubes and matting.

Capillary action in the soil then acts to convey water to the top of the 125 mm (5 in.) deep tubes. Surprisingly little contact with the pot is necessary for effective capillary flow, and the tubes can lie at an angle with only point contact and still provide effective irrigation.

It has been found that capillary watering alone is sufficient to prevent wilting and maintain moist soil up to a few mm from the surface in all but the most extreme conditions. Occasionally, in very hot, windy conditions supplementary overhead watering is applied as a precaution, but it is not often necessary.

One potential problem is the build-up of electrolyte from slow release fertilisers added when potting and when liquid fertilisers are applied overhead. To prevent this, one overhead watering per week is applied if rain has not fallen.

I have said nothing about difficulties, as there are no serious ones that we are aware of. Outbreaks of fungal attack, such as powdery mildew, do not appear to spread any further or faster than we might expect with overhead watering, and they are controlled by

spraying. There is some growth of moss and weeds on uncovered areas of the matting but these are readily cleaned off by scraping with a tile layer's trowel. The build-up of roots from the plants in the mats has little or no effect on their efficiency and, so far, it seems that at least three years can be expected from each felt.

LITERATURE CITED

1. Bunt, A. C. 1976. Modern Potting Composts, London; George Allen and Unwin Ltd. pp 208–213.
2. Richards, Murray. 1978. Capillary watering of container-grown plants, *Proc. Inter. Plant Prop. Soc.* 28:411–413.

THE BASICS OF PROPAGATING BOUGAINVILLEA

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Bougainvillea plants grow readily in tropical and sub-tropical areas, and can easily be produced in the Sydney metropolitan area. Care must be taken however, in positioning these plants in the colder and more frosty areas. With careful positioning these delightful scramblers can be encouraged to grow indoors, and in glasshouses and arbortariums.

There is a lucrative market for bougainvillea in Australia, as they give a beautiful display of colour throughout the summer, which makes them very popular.

To successfully grow this plant a sanitation program to eliminate disease should be used. This should begin before the cuttings are taken from the mother plant, rather than trying to arrest problems after the cuttings have been made.

Mother plants are grown in large shrub tubs in polythene tunnels to produce the correct type of cutting material. They are watered by trickle irrigation, because the sprawling habit and the large thorns make conventional watering very difficult.

Mother plants are sprayed on a weekly basis with Zineb at 60 g/100 liters, Benlate 7 g/100 liters and 5 ml wetting agent per 100 liters.

Spraying is discontinued one week prior to cuttings being taken to reduce the hazard to the staff. Cuttings are not sprayed after they are made because the leaves are prone to drop off.

Bougainvillea drop their leaves quickly after being severed from the mother plant if they are not watered immediately. It is