

# PROPAGATION AND NUTRITION OF DAPHNE CUTTINGS AND TISSUE CULTURE PLANTLETS

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## INTRODUCTION

Due to an increasing demand for High Health (virus-free) stock plants of *Daphne odora* 'Leucanthe', the rapid bulking-up of cuttings using a small population of existing stock plants was investigated. Owing to a shaded growing environment, shoots of stock plants had become elongated and unbranched, unlike plants grown in the open.

The literature available on propagation of *Daphne* is limited compared with that for many other genera. Reports tend to stress that shoots of current season's growth should be used (1), or tip cuttings only, preferably terminated (2). One report states that stem cuttings are not used because the leaves can yellow and defoliate even though they are sound at the time of making the cuttings (2). However, this can also happen with tip cuttings. The acceptability of plants raised from cuttings taken from different parts of the parent plant needed to be studied under our conditions.

It has been stated that *Daphne* plants must have acid soil conditions to grow well. However, *Daphne genkwa* grows naturally in limestone areas and many others are found on alkaline soils. It has also been said that satisfactory plants can be produced over a wide range of pH values (1). In a second experiment the response to applications of dolomite and limestone to the growing medium used for raising *Daphne odora* 'Rubra' and 'Leucanthe' tissue-cultured plantlets was investigated.

## MATERIALS AND METHODS

Plant material was collected as complete stems (30 to 40 cm) and cuttings were taken from three positions on the same stem:

1. the terminal shoot as a firm tip cutting;
2. the region below the terminal shoot, of more mature wood, taken as an internodal cutting referred to as a first nodal cutting; and
3. the region below the first nodal cutting, in a still more mature state, referred to as the second nodal cutting.

The cuttings were approximately 8 cm long and comprised of six nodes. The lowest two leaves were removed and the base lightly wounded. After wounding they were dipped in IBA (0.8%) in talc.

The cuttings were placed in individual containers (8 cm tubes) using a medium of peatmoss and pumice (50:50). They were then drenched with benomyl and placed in a propagation house, where

they were misted for five seconds every 40 minutes, given bottom heat at 21°C, and shaded to hold the ambient temperature at approximately 24°C. The trial was established in late summer (February 1, 1989).

The cuttings were observed every two weeks for ten weeks and the number of roots per cutting recorded. The rooted cuttings were potted in individual containers (90 mm diameter) using a peatmoss and pumice medium (80:20) containing slow-release fertilisers, and grown on a capillary sandbed in a greenhouse with a daily maximum temperature of 24°C. A record was kept of when the plants flowered and the number of new shoots growing away over the next 14 weeks.

In a second experiment, exflasked tissue-cultured plants of *Daphne odora* 'Rubra' and 'Leucanthe' were potted in a peatmoss and pumice medium (4:1) to which had been added 7 rates of either dolomite or limestone (0, 2.5, 5, 7.5, 10, 15 and 20 g/l). In addition, all media contained exactly the same fertilisers, namely 18-2.6-10 long-term Osmocote (1.8 g/l, Sierra), 14-6.1-11.6 short-term Osmocote (0.55 g/l, Sierra) and PG Mix (1.8 g/l, Smiths Industries).

With five replicates of all treatments in a completely randomised design, the plants were grown on capillary matting in a greenhouse held at 18 to 24°C. The experiment was started late autumn (May 1), and concluded 20 weeks later. Shoot length and dry weight of tops were recorded and the pH of the growing medium measured, using the 1:1.5 by volume extraction method (3).

## RESULTS

After 6 weeks the nodal cuttings had initiated roots, especially in the second nodal cuttings. After 10 weeks the terminal cuttings had produced a number of adventitious roots, but the nodal cuttings had greater numbers of roots per cutting (Table 1) and they were longer. Axillary shoot growth was in progress in nodal cuttings whereas there was no evidence of growth in the tip cuttings.

**Table 1.** Effect of cutting type on rooting of *Daphne odora* 'Leucanthe' cuttings

Cutting type	Percent of cuttings rooted	Average number of roots per cutting
Terminal shoot	90	9.4
First nodal	75	10.1
Second nodal	95	14.3

After a further 14 weeks plants raised from tip and first nodal cuttings had produced similar numbers of inflorescences ('flowers'), whereas those from second nodal cuttings produced relatively



few flowers. However, while the plants from second nodal cuttings were not flowering, shoot growth had started. Both first and second nodal cuttings produced plants with a large number of shaping branches (Table 2).

**Table 2.** Effect of cutting type on flowering and number of branches of rooted cuttings of *Daphne odora* 'Leucanthe'

Cutting type	Average number of flowers per rooted cutting	Average number of shoots per cutting
Terminal shoot	1.5	1.4
First nodal	1.3	4.0
Second nodal	0.3	4.3

In the experiment on the effects of dolomite and limestone on growth of tissue-cultured *Daphne* plantlets, both of these additives affected pH similarly. The pH of the medium was raised from approximately 4.2 to a plateau value of 6.0 at rates of 10 g/l and above. Both cultivars responded well to the increasing pH, particularly for increasing height, although not so obvious as for shoot dry weight. Best growth by these measures was at pH values of approximately 5.5 for 'Leucanthe' and 6.2 for 'Rubra'. These were given by limestone or dolomite additions of 7.5 and 10 to 15 g/l, respectively.

A notable feature of the experiment was the unhealthy state of plants of 'Rubra', which showed tip necrosis at all rates of limestone or dolomite addition. This was in marked contrast to the plants of 'Leucanthe' which were all a healthy dark green.

## DISCUSSION

From reports in the literature, the percent of cuttings rooted in these trials is satisfactory even for stem cuttings (2, 4). Although there have been reports that stem cuttings are unsatisfactory, under our conditions this material gave good results. The plants tended to have a better structure than those raised from terminal cuttings.

The pH trial showed that the two cultivars can behave as quite dissimilar plants, responding best at different pH values, with 'Rubra', unlike 'Leucanthe', exhibiting symptoms of what was believed to be iron deficiency. Further work is in progress to substantiate this suggestion.

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## LITERATURE CITED

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