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Production of high quality *Ardisia* plants by stem tip cuttings

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Abstract

To produce commercially acceptable *Ardisia* plants, stem tip cuttings from mature plants were rooted and forced in greenhouses. Ten centimeter long cuttings were either treated with 200 ppm 1-naphthalene acetic acid (NAA) for 2 h, 2000 ppm indole-3-yl-butyric acid (IBA) for 10 s, or 0.5 and 1.0% IBA powder prior to sticking them in the rooting medium. Rooting percentage at 45 days exceeded 76% with 2000 ppm IBA treatment which was a significant increase over non-treated control. Rooted cuttings developed into three types of plants: those forming only vegetative shoots without flowers, those forming reproductive shoots with flowers, and those forming both vegetative and reproductive shoots. The ideal plant produced only vegetative shoots when rooted cuttings were transplanted into pots. About 50% rooted cuttings were forced to finish, producing 31 or 40% of high quality plants when rooted cuttings with vegetative shoots were grown in a greenhouse (GH) at temperatures higher than 21/19 °C (day/night) in 1995 or 21/18 °C GH in 1997, respectively. This method shortened the total production time to less than 2 years as compared to 4 years when starting from seeds.

Keywords: *Ardisia crenata*; Juvenility; Maturity; Cutting propagation; Forcing

Abbreviations: IBA, indole-3-yl-butyric acid; NAA, 1-naphthaleneacetic acid

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1. Introduction

The genus *Ardisia* consists of more than 200 species, generally grown in warm climates of subtropical and tropical areas (Bailey, 1925). *Ardisia japonica* BL., and *A. crenata* Sims. are the most widely grown species. *Ardisia crenata* has been mass produced by seeds, although selected germplasm with horticultural merit should be propagated vegetatively. *Ardisia* has been produced primarily as an indoor foliage plant in the past (Conover and Poole, 1989) and interest could increase when sold with bright red or white berries. Plants typically flower in June and red or white berries are produced around September (Lee, 1998; Lee et al., 2002). However, environmental factors, such as optimum temperature and photoperiod on flowering and berry development, have yet to be investigated. Berries remain attached 12 months or more in low light interior environments.

For many woody plants, a juvenile phase exists when plants are unable to flower. A long juvenile period had prevented extensive investigation of the controlling mechanism of flowering for *A. crenata*. The juvenile period of *A. crenata* can last 2–3 years (Roh, unpublished data) when seedlings are grown in a greenhouse maintained at 18.5/18.0 °C year-round (Lee and Roh, 2001). Only 25% of 2-year-old *A. crenata* seedlings flowered. When started from seeds, only a few shoots produced berries, thus producing plants with a few berries. Rooted stem tip cuttings from mature plants could be a useful production technique to bypass the juvenile period so that new plants could be induced to flower sooner. Cuttings obtained from the mature ivy, *Hedera helix*, retained the capacity to flower for many years even at the high temperatures favoring reversion to juvenile conditions (Wareing and Phillips, 1978). This research was initiated to study the effect of auxins on the rooting of *A. crenata* cuttings and to determine if commercially acceptable high quality plants can be produced for marketing in less than 2 years.

2. Materials and methods

2.1. Vegetative propagation (Experiment 1)

Ten centimeter long, recently matured uniform stem tip cuttings, were obtained from 3-year-old *A. crenata* plants grown in 4.8 L pots (L) in a greenhouse (GH) maintained at 21/16 °C, D/N, in March 1996. All stock plants flowered in the previous year. Cuttings under a vegetative stage were taken from the shoots that were formed above the canopy of shoots with berries that were formed in the previous years. Four to six leaves were attached in clusters at the tip of the stems, and all leaves were retained either during treatment or before sticking cuttings. Cuttings were trimmed to 7–8 cm long and either treated with 200 ppm 1-naphthaleneacetic acid (NAA) for 2 h, 2000 ppm indole-3-yl-butyric acid (IBA) for 10 s, or 0.5 and 1.0% IBA powder prior to sticking them in the rooting medium. Solutions of NAA and IBA were first dissolved in 5 ml of ethanol, and water was added to make the final concentrations. Thirty-five cuttings were used per replication, and three replications were used per treatment. Cuttings were stuck into a rooting medium composed of vermiculite:perlite:peat moss (1:1:1, by volume) in a completely randomized, block