

## A Propagation System for *Statice* (*Limonium sinuatum*)<sup>©</sup>

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*Statice* [*Limonium sinuatum* (L.) Mill.] is cultured commercially for use in fresh and dry flower arrangements. Wakayama is the most famous production area for *statice* in Japan. *Statice* plants are produced by both seedling and tissue culture methods. Plants produced by tissue culture are expensive but are superior to seedling plants in productivity, quality, etc. The growers, therefore, have recently preferred to use plants from tissue culture. However, the yearly lack of an adequate plant supply to growers in tens of thousands because of troubles in micropropagation, rooting, and acclimatization have occurred. We have developed a rapid propagation system without these troubles which is described below.

**Breeding.** We were selecting many excellent plants from *statice* seedlings in cooperation with growers, experiment stations, agricultural co-ops, and some of these were registered as new cultivars after field testing.

**Propagation by Tissue Culture.** Vitrification of micropropagated shoots of *statice* occurred in high frequency and the vitrification brought about a decline in propagation and rooting. We developed the bottom cooling culture system for preventing vitrification of shoots. The shoots propagated by the bottom cooling culture system rooted directly in soil (ex vitro rooting) in a room for acclimatization and rooting, which was previously developed.

**Propagation by Herbaceous Cutting.** The plant after ex vitro rooting was transplanted to a plastic pot 12 to 15 cm in size. Leaves of the plant increased by continuously pinching off the lower shoots. When the plant had about 60 leaves, all leaves were cut off leaving only the lower leaves. Newly emerged vegetative buds after 15 days were cut off individually from the plants and rooted under intermittent mist (herbaceous cutting). If the plant had small buds, these buds were cut off later after growing on the plant. The rooted cuttings were able to be planted in plastic pots after 15 days.

The number of nursery plants propagated from a mother plant amounted to 100 or more when totaling up the nursery plants propagated by the above-mentioned herbaceous cutting method and by cutting of flowering sprouts.

**Raising of Nursery Plants.** In Wakayama, *statice* is planted in late summer and flowers are harvested from winter to early summer. For flower production during winter, nursery plants have to be exposed to low temperature before planting. Nursery plants should be kept in cold storage (at 2°C, 3 weeks) and nursery plants raised at higher elevations or in a greenhouse with an air conditioner.

**Virus Test.** There is a problem with cucumber mosaic virus (CMV) and turnip mosaic virus (TuMV) infection during production. Recently infection from tomato spotted wilt virus (TSWV) and impatiens necrotic spot virus (INSV), which are from

the Tospoviruses group, has been reported all over the country. We test for these virus diseases with the Immuno Strip test (Agdia) on site, ELISA test in a laboratory, and do gene diagnosis finally.

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## Raising Forest Seedlings in Vietnam: Current Status<sup>©</sup>

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### INTRODUCTION

In 1995, Oji Paper Co., Ltd., Nissho Iwai Corp., and Dai Nippon Printing Co., Ltd. established a forestry company, Quy Nhon Plantation Forest Company of Vietnam Ltd. (QPFL), in Binh Dinh province, Vietnam, for the production of raw material for pulp and paper.

Binh Dinh province is located in a temperate monsoonal area. The rainy season period is from October to December, and the dry season period is from January to September. The mean annual rainfall is 2400 mm and the mean annual temperature is 24°C.

Annual planting area target covers 1500 ha and harvesting period is 7 years. Therefore, the final planting area target totals 10,500 ha. As of 1999, planted area covered about 7200 ha. *Eucalyptus camaldulensis* and *Acacia auriculiformis* are the species planted and the ratio of these species is 4 : 6. The standing density is 1666 trees ha<sup>-1</sup> (spacing is 3 m × 2 m). The number of seedlings raised annual is nearly 3 millions.

### METHOD FOR RAISING SEEDLINGS

The nursery system is a temporary operation and moves each year because road conditions are terrible and planting areas are scattered widely. Therefore, new working nurseries are established every year near the planting sites. A typical nursery has a mean area of about 0.4 ha and 0.4 million seedlings are raised at each nursery (Fig. 1).

The seedling container is a clear vinyl bag with a 5 cm diameter after adding soil medium and the height is 12 cm (Fig. 2). The seedling density on the growing bed is 400 pots m<sup>-2</sup> and the length of seedling bed is 10 m. The potting soil is a mixture of fertile soil, organic fertilizer, and coconut dust.

The seeding bed has a height of about 10 cm and is covered with a vinyl sheet to prevent root growth into the bed and promote root development in the pot (Fig. 3).

Clonal propagation (Fig. 4) began in 1997 with "plus" trees selected from plantation sites for both species. At first plus trees were selected for growth and trunk form. Later, screening for the rooting percentage of cuttings was carried out. High-rooting ratio trees, those over 80%, were used to establish scion orchards in 1998 and 1999 of plantations of 100 ha and 70 ha, respectively (Figs. 5 and 6).