

# Seed-propagated Amphidiploid Dendrobium Cultivars

Dendrobium orchids have become an important florist crop in Hawaii. The long, gracefully arching sprays (racemes) with numerous attractive individual flowers have a variety of uses. The sprays can be utilized in bud vases or combined effectively with other flowers in arrangements, while individual flowers can be used in corsages, wedding bouquets, and leis. The sprays are long lasting and are easy to pack and ship to distant markets.

The Univ. of Hawaii initiated research on breeding dendrobiums for commercial cut-flower production in 1966. Major objectives have been to produce attractive flower sprays in an array of colors, increase yields, obtain year-round flowering, reduce bud drop, and improve the vase life of cut sprays. Prior to 1966, a considerable amount of basic research on the cytogenetics of dendrobiums had been conducted, which made possible the development of improved seed-propagated amphidiploid cultivars.

*Dendrobium* is a large genus with over 1000 species from the Old World tropics. It is subdivided into 40 or more sections. Species hybrids between the *Phalaenanth*e and *Ceratobium* sections have assumed prominence in cut-flower production. The *Phalaenanth*e section consists of only a few species, the most important of which is *Dendrobium phalaenopsis* (Fig. 1) from Queensland, Australia, whereas the *Ceratobium* section comprises a larger group of species native to New Guinea and surrounding areas. *Dendrobium phalaenopsis* has large, showy flowers, but is highly seasonal and the cut sprays do not keep well. *Dendrobium gouldii* (Fig. 2) and *D. grantii* of the *Ceratobium* section are relatively easy to grow, and they flower profusely, usually during spring; however, the individual flowers are small and the sprays are not especially attractive. Two *Phalaenanth*e-*Ceratobium* hybrids, *D. × Neo Hawaii* (*D. phalaenopsis* × *D. grantii*) registered by Walter Carter in 1945 and *D. × Jaquelyn Thomas* (*D. phalaenopsis* × *D. gouldii*) (Fig. 3), registered by Rolla K. Thomas in 1949, were outstanding. These hybrids produced numerous sprays with relatively long vase life throughout most of the year.

In the late 1950s, we identified a tetraploid plant of *D. × Jaquelyn Thomas* in an otherwise diploid progeny. The diploids with one genome each of *D. phalaenopsis* (P genome) and *D. gouldii* (C genome) had exhibited irregular meiosis and reduced fertility.

On the other hand, the tetraploid plant, designated Y166-1, showed good pairing of chromosomes at meiosis and restored fertility. Self-pollination of Y166-1 resulted in abundant, uniform offspring with desirable qualities for cut-flower purposes. Flowers were white with a blush of lavender and were carried on long sprays. Spray yield was excellent. Flower sprays lasted well after cutting, and the flowers had a delightful fragrance. We released this cultivar as 'UH44' in 1972 and renamed it later as 'Uniwai Blush'. 'Uniwai Blush' undoubtedly represents the 1st instance of a seed-propagated amphidiploid orchid cultivar introduced into the trade.

After releasing 'Uniwai Blush', we were faced with 2 questions—could 'Uniwai Blush' be improved through inbreeding and selection, and would inbreeding result in yield depression? In 3 generations of selfing and selection, we were able to select larger, whiter, and more attractive flowers than the original parent as a result of occasional allosyndetic pairing instead of complete preferential pairing within genomes. The spray yield of the 3rd selfed generation, however, was only about 75% of 'Uniwai Blush'. Thus, it is not advisable to inbreed beyond the 1st selfed generation for commercial cropping. On the other hand, the individuals selected for white large flowers have been used as parents to produce other amphidiploid cultivars.

Among the selfed offspring of Y166-1, we selected an individual, K44-50, that had larger

and whiter flowers than the parent. This was crossed to an amphidiploid that originated spontaneously in tissue culture, *D. × Jaquelyn Thomas* 0580 with 2-toned lavender flowers. The offspring were attractive, uniform, and productive, and we released this cross combination as 'Uniwai Supreme' in 1976 (see cover photo). This 2nd seed-propagated cultivar has become one of the fa-

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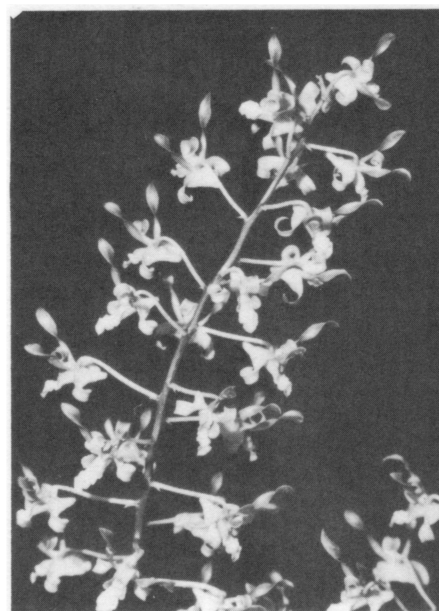


Fig. 2. *D. gouldii*.



Fig. 1. *D. phalaenopsis*.

## Seed-propagated Amphidiploid *Dendrobium* Cultivars

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vorites among growers and is being cultivated extensively.

Spontaneous chromosome doubling in tissue culture of a white diploid *D. × Neo Hawaii*, resulted in another amphidiploid. This was crossed to a 2nd generation inbred selection of Y166-1. The offspring were uniform as expected, with larger, whiter flowers and higher yield than 'Uniwai Blush'. We named this 3rd seed-propagated cultivar 'Uniwai Pearl' and released it in 1979.

'Uniwai Prince', with purple-violet flowers, and 'Uniwai Princess', with lighter purple-violet flowers, were released in 1982. 'Uniwai Prince' is a cross between amphidiploid *D. × Jaquelyn Thomas* 0580 and a dark purple-violet amphidiploid, *D. × Jaquelyn Thomas* D168-12, whereas the latter is the same amphidiploid D168-12 crossed to a 2nd generation inbred selection of Y166-1. These 2 recently released cultivars complement 'Uniwai Blush', 'Uniwai Supreme' (2-toned lavender), and 'Uniwai Pearl' (white) released previously.

The amphidiploid seed-propagated cultivars released by the Univ. of Hawaii have served as the basis of the dendrobium cut-flower industry of Hawaii. The advantages of seed-propagated dendrobium cultivars over those clonally increased through micropropagation are that they are easier, faster, and cheaper to propagate, and the resulting seed-

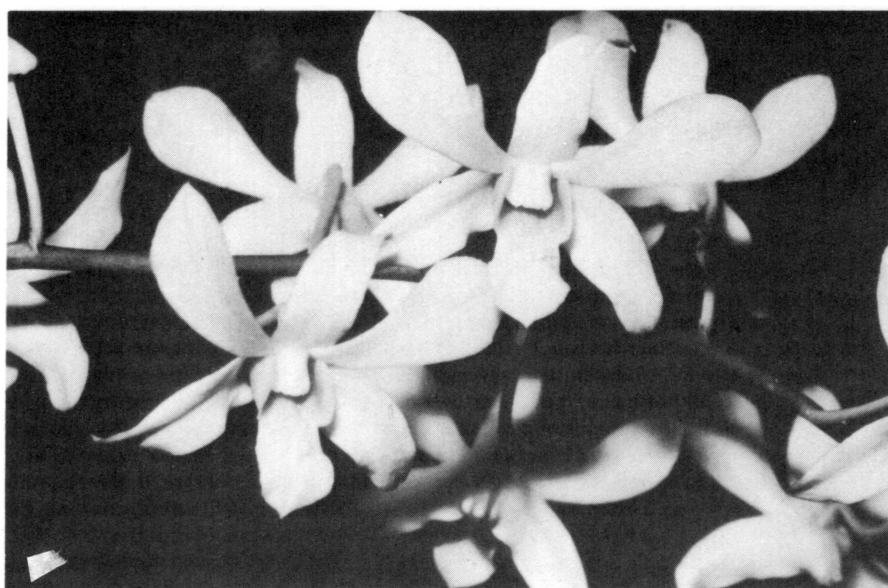


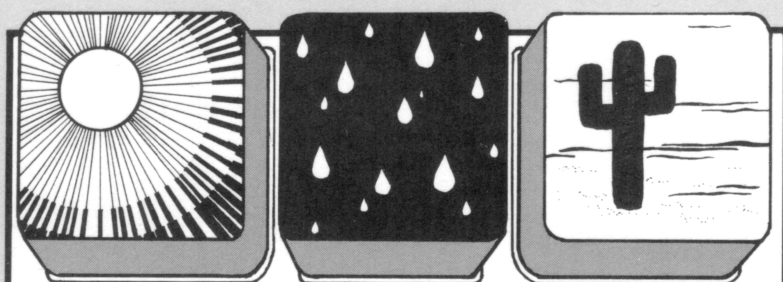
Fig. 3. *D. × Jaquelyn Thomas* (*D. phalaenopsis* × *D. gouldii*).

lings are cymbidium mosaic virus free, since the virus is not transmitted from seeds.

In light of the success in developing dendrobium cut-flower cultivars through utilization of amphidiploids, attention now is focused on inducing amphidiploids of selected species hybrids with colchicine in tissue culture for creating seed-propagated flowering potted-plant cultivars. We have recently released for trial 3 triploid hybrids utilizing an amphidiploid as one parent and

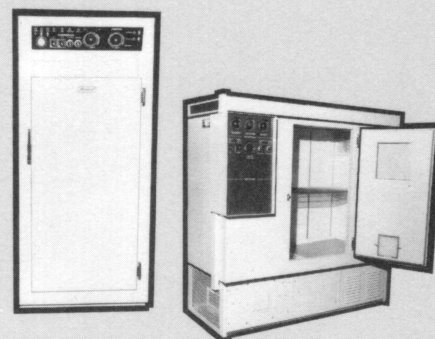
a diploid species as the other parent: amphidiploid *D. × Macrobig* (PPLL) × *D. bigibum* (PP), *D. × Jaquelyn Thomas* (PPCC) × *D. canaliculatum* (EE), and *D. × Caesar* (PPCC) × *D. canaliculatum* (EE).

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