and high light intensity—which endow it with the capacity to grow a host of plant material. Applications of advances in technology—photo-periodism, insect and disease control, plant nutrition, plant breeding and others—along with Florida’s natural resources and the entrepreneurship of flower growers and nurserymen, have contributed to the industry’s growth.

Since by far the major markets for cut flowers are the nation’s population centers, Florida growers must compete with greenhouse growers located closer to market. Sellers of every Florida floricultural crop other than gladiolus3 face competition from growers located close to market, and for some commodities, from distant growers in California and elsewhere.

In addition, offshore production of flowers and foliage plants is on the increase in Latin America and the Caribbean area.

**LITERATURE CITED**


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**EVALUATION OF DOMBEYA INTRODUCTIONS FOR NEW ORNAMENTALS FOR FLORIDA**

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The U. S. Plant Introduction Station has introduced 14 known species of *Dombeya* in the last 60 years. Several of these were obtained through the efforts of E. A. Menninger of Stuart, Florida, between 1951 and 1957. In this genus of over 200 members we have only scratched the surface by our evaluation of so few species. The Dombeyas are native of eastern Africa from Ethiopia to South Africa, including Malagasy Republic and the Mascarene Islands.

Most of the introduced species have conspicuous, colorful flowers, appearing over a 4 to 6 week period. In Florida the earliest species begin flowering in September and the latest reach their peak of bloom in March.

Not all species produce plants of outstanding beauty resulting from 1) over growth; 2) sparse branching habit; or 3) the pendulous, hidden nature of the flower heads. Unfortunately, the majority of the early introductions manifested one or more of these characteristics; and therefore Dombeyas, up to now, have not gained popular acceptance in the home garden.

*Dombeya wallichii* (Lindl.) Benth. & Hook. F., a species familiar to South Florida gardeners, was brought into the country many years ago from the Malagasy Republic. A commercial nursery catalog listed it in 1938, but its actual introduction surely predated that listing by many years. The earliest introduction came to the Plant Introduction Station in 1943 under P. I. (Plant Introduction) 145912.

"Pink Ball" or "Mexican Rose Tree" (2, 3) as it is commonly known, proved too large a subject for most home gardens. It reaches a height of 20 to 30 feet, and will attain an equal spread if allowed to go unpruned.

The flowers, delicate pale pink and white are highly fragrant and beautiful in themselves, but because they are borne in large pendulous umbels, they are hidden by the dinner plate-size leaves. Flowers appear through December and January in Florida.

*D. x cayeuxii* Andre, P. I. 18997, was introduced by the U. S. Department of Agriculture from Madeira in 1907 and again from Cuba in...
1935 as P. I. 110682. This hybrid between *D. wallichii* are dominant. Therefore the hybrid first to be raised in the genus.

In Florida it also flowers during December and January. The dried, brown flowers often remain for 4 to 6 weeks after color has faded. Among gardeners opinions are divided as to the desirability of this characteristic. Some consider the dried flowers attractive on the bush, and others consider them unattractive. Regardless of opinion, they are, when cut, in demand for dry floral arrangements.

Unfortunately the large bush size and pendulous flower habit of the pollen parent (*D. wallichii*) are dominant. Therefore the hybrid has not become popular in Florida.

In England, *D. x cayeuxii* sometimes is treated as an annual (6). Cuttings taken in May flower in December and January. By the time they flower the plants have attained a height of 4 feet and a spread of 3 feet, growing in 7 or 8 inch pots.

Seeds of *D. nairobensis* Engl., P. I. 194501 were received in 1950. This species is described as a small tree or shrub in its native habitat, east Central Africa (1). The two plants in our arboretum, after 14 years in the field, have reached a height of 6 feet. Cordate leaves 4 to 6 inches long are pubescent on both surfaces. Petioles are also pubescent. Both of the plants bear large flowers in pendulous umbels, with few flowers open at one time. One has pure white flowers. The other has pale pink flowers, with fringed petals that are a darker pink at the basal edges. Flowering occurs from January through March.

*D. mastersii* came in 1952 under Miami station number 13463 and again in 1953 under number 13674. The two plants growing in the station arboretum are 5 feet tall, of open form. Both surfaces of the large cordate leaves as well as the petioles are pubescent. The flowers appear 7 or more per umbel, but never in as large quantities as are formed in the clusters of *D. wallichii*. The white flowers have a red splotch at the inside base of the petals. The base of the staminal column also is red. Neither of these introductions are particularly attractive ornamentals.

*D. rotundifolia* Planch. P. I. 230894 was introduced in 1955 from Nyasaland. It is a shrub 8 feet tall with a spread approximating its height. The form is loose, with long whip-like branches reaching out from a central crown. Leaves are 2 to 10 inches long, ovate, cordate at base, and stellate tomentose on both surfaces. Lateral nerves are prominent beneath. New flushes are reddish. In its native habitat it is a deciduous tree to 20 feet tall, reported to withstand slight frosts (4).

*D. rotundifolia*, said to have white or light pink flowers, has not flowered here, and since it is not deciduous under Miami conditions we believe that its cold requirements are not met. Statewide distribution of clonal material will determine these requirements and is aimed at releasing an excellent new ornamental *Dombeya* for central and northern Florida.

*Dombeya* sp., Miami Station number 18317, was found in 1961 in a Coral Gables, Florida, private garden. The plant attracted attention because the flower heads were large and stood out in full view. The flowers, carried above the dense foliage in large heads, are medium pink. The slightly recurved petals reflect the light to make it an extremely showy plant when in bloom in January and February. It appears to be unaffected by the lowest temperatures in the Miami area.

A seedling population resulting from open pollinations of the clone was set in the field in 1964. This resulted in an amazing array of colors from pure white, through 3 or 4 shades of pink, to deep rose red, and with two individuals having purplish flowers. Variations occur in flower size, shape, quantity, and number per cluster, as well as in leaf shape and bush form. Several plants from this population were selected and propagated, and are being studied as possible new ornamentals.

Few individual plants possess attractive form, as most have an extremely open appearance. Plants of this latter habit, despite the flower beauty, would be suitable only in locations where they would be interplanted with denser, better formed individuals. The potential for breeding within this species is evident, and work is progressing in this area.

*D. dregeana* Sond. P. I. 221175 was received in 1947 from South Africa. It has pure white floors in sparse umbels, borne abundantly on the outside of the bush from October through December.

The leaves are small and margins crenate. The growth habit is medium-dense with long slightly pendulous stems, up to 10 feet. Since it has grown well on our limestone soil with a minimum of care, it is highly recommended as a
species to be tried by the adventuresome home gardener willing to depart from the use of the common-place garden subjects.

*Dombeya* sp. aff. *D. burgessiae* Gerrard, P. I. 205654, (5) introduced originally into the United States in 1951 as *D. elegans*, Cordem. is thought to have come from the Island of Reunion. It was released as the variety 'Rosemond' in 1967 by the Crops Research Division after 6 years of studies of asexually propagated plants at the U. S. Plant Introduction Station. Clones from the original upright growing seedlings were found to assume an almost hemispherical shape, with no tendency to revert to the leggier condition of the parent plant.

Dusty pink flower clusters are carried in profusion over the entire surface of the bush during November and December. The effect is an outstanding display of color.

Plants of *Dombeya Rosemound* were distributed to nurseryman and researchers in 1965. One year later plant evaluation reports were returned to us from recipients in Florida, Texas, Pennsylvania, Virgin Islands, and France. Those reported on, 44 plants, were a small percentage of the actual number distributed.

Twenty-nine of the 44 had been planted outdoors or allowed to remain outside through the winter in large containers. Reports on the results of cold injury varied considerably. In temperatures down to 38° F. no injury was noted. Between 30° and 37° seven plants were uninjured and four slightly injured. In all cases injury consisted of discoloration or loss of leaves. Between 25° and 29° two plants were killed, two were injured, and three were not injured.

From this it can be concluded that *Dombeya ‘Rosemond’* can be grown as far north as central Florida, with occasional leaf and twig damage to be expected. The range might be extended to include northern Florida if the plants are pruned heavily following the early December bloom and then protected until danger of frost is past.

Where flowering had occurred, the enthusiasm was overwhelming in praise of the floral display. Only one recipient mentioned that color needed improvement; it was not "an intense enough pink".

The potential for new variety production through breeding and selection among the Dombeyas appears excellent.

In the spring of 1963 seeds resulting from open pollination were collected from *D. dregeana*. Pollen was transferred by bees from the two adjacent plants of *D. sp. aff. D. burgessiae*, since no other Dombeyas were flowering at the time pollination occurred. Subsequent studies revealed that *D. dregeana* is self-incompatible and that pollen of *D. sp. aff. D. burgessiae* is highly compatible on *D. dregeana* as well as other species of *Dombeya* in the collection.

A resulting population of 202 plants was set in the field in July, 1963. Flower color, shape, and size; bush form, vigor, and size are obvious variations which have appeared in this group; and from it several individuals have been selected for evaluation as new ornamentals.

Plants of two clones of this hybrid population were supplied to the Florida State Highway Department for use in its 1966 highway beautification program. They were incorporated in the landscaping plans for the Palmetto Bypass around Miami, and were placed in several locations near the southern end of the bypass. The hybrids are vigorous growers; one flowers in late September and the other in mid-October.

Hybrids between *D. sp.*, Miami number 18317 and *D. ‘Rosemound’* have been made and the progeny is in its second year in the field. Observations of precocious individuals that flowered in 1966, suggest that it may be possible to combine the excellent form of *D. ‘Rosemound’* with the brighter reds of introduction M 18317.

All of the Dombeyas tried thus far have produced roots in propagation beds under intermittent mist. However, ease of rooting varies considerably with species and varieties.

Early studies showed that good results could be obtained by soaking basal ends of 4 to 6 inch tip cuttings in 75 ppm water solution of indolebutyric acid for 24 hours, and by placing the treated cuttings under intermittent mist in a medium of perlite over 70° F. bottom heat.

Insect problems on Dombeyas have been few at the Plant Introduction Station. Certain species and varieties are attacked by a leaf-chewing insect; *D. nairobensis* is particularly susceptible. Holes are frequently observed in the center of the blades, but the insect producing them has not been found. The condition has not been considered serious enough to require special control measures.

As more Dombeya species are introduced by the U. S. Department of Agriculture, through the efforts of its plant explorers and cooperators in Africa, we hope to expand the area in which
Dombeyas will be grown to include all of Florida and the Gulf regions where fall and early winter flowering shrubs are now in demand.

LITERATURE CITED

COPPER AND OTHER NUTRIENT REQUIREMENTS OF 'BACCARA' ROSE IN LIGHTWEIGHT POTTING MEDIUM

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ABSTRACT
Measurements were made to determine effect of 2 Cu, 4 P and 3 K levels in factorial combination on scion size and growth quality of 'Baccara' rose on R. fortuniana rootstock grown for 3 months in 3-3-2 vol/vol mix of limed sphagnum peat, Perlome perlite and Turface baked clay with uniform monthly supplements of N. Basic copper sulfate foliar spray produced the greatest improvement in growth quality rating, and regulated scion size response to supplements of P and K. The amount of 1026 ppm available elemental K present in baked clay ingredient of the potting mix, supplied plant K requirement. Addition of K was found to be unnecessary, whereas addition of Cu foliar spray and P fertilizer were needed. Linear growth increase effects obtained from serial increments of P and K where no Cu spray was applied, and from serial increments of K where no P was added, are attributed to low levels of Cu present in P and K fertilizer residue and filler materials. Cu deficiency effect on growth of the test plant is described.

Introduction
Efficiency in growing roses from small size liner grade plants to salable size in containers requires a root environment optimal for growth. This investigation was directed toward determining nutrient supplements needed to sustain growth during the first 3 months in nursery cans when a standard lightweight rooting medium is used in place of potting media containing native soil.

Ideally, the level of nutrient elements present in a nurseryman's potting mixture should be the same each time it is prepared. One approach toward this ideal is that of substituting synthetic or mined and processed products (shredded styrafoam, vermiculite, perlite or baked clay) for the native soil ingredient that is usually in nursery potting mixtures. The manufactured or processed materials have a more predictable chemical composition than locally available soils, and greater freedom from weed seed and parasite contaminants. Together with improved sanitation, the advantages of more uniform content and retention of nutrient elements may offset increased cost associated with eliminating the native soil ingredient from potting mixtures.

Combinations of processed mineral and organic materials provide the "soilless" rooting media frequently used in propagation of nursery stock. The same combinations used as media for rooting stem cuttings can serve as media for growing plants, when appropriate elements are added to raise their generally low nutrient levels (4, 8, 11, 27).