

colloidal phosphate than if unamended. Backfill composition did not affect top weight if Perk plus 16-4-8 was applied. Juniper top weight was greater for colloidal phosphate amended backfills compared to unamended backfills when only Perk was added.

There was an initial effect of backfill composition and fertilization on establishment of *Pittosporum tobira* in the landscape, but there were no differences in top dry weight after 12 months. *Juniperus chinensis* 'Hetzii' did not respond to treatments initially, however, at 12 months there was a significant interaction between backfill composition and fertilization. These results show that container grown woody plants respond differently to amendments and fertilization in the landscape. Therefore, it is difficult, if not impossible, to make broad recommendations for amending backfill.

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## EVALUATION OF THE ADAPTATION OF *COCOS NUCIFERA* L. 'MAYPAN' TO THE FLORIDA LANDSCAPE

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**Abstract.** 'Maypan coconut palms have been tested in Florida on a limited scale since 1976. In 1979, Jamaica agreed to provide 'Maypans' to selected nurseries for commercial production. By 1981, over 5000 'Maypan' seednuts had been imported into Florida. 'Maypans' have been evaluated at the Ft. Lauderdale Agricultural Research and Education Center for 5 years. Limited plantings have been made throughout the coconut growing area of the state. Comparisons of growth rate, cold tolerance, soil adaptation, nutritional requirements, insect pests and disease are being made with the 'Maypan', 'Malayan Dwarf', 'Panama Tall', and 'Jamaican Tall'. Evaluations have also been made based on commercial nursery production.

To date, the hybrid 'Maypan' has horticultural characteristics superior to the golden and yellow forms of 'Malayan Dwarf'. Only the lethal yellowing susceptible 'Jamaican Tall' coconut palm has grown as fast and adapted as well to Florida conditions. Thus, it appears that the 'Maypan' coconut palm can become a valuable part in the Florida landscape and help to replace the coconut palms lost to lethal yellowing.

South Florida has long been known for its tropical landscape. No other plant rivals the palm tree in providing this unique atmosphere. With the loss of the 'Jamaica Tall' coconut (*Cocos nucifera* L.) and several other ornamental palms to lethal yellowing (LY) much of this atmosphere has been destroyed. Compounding this problem has been a reluctance to replant with other palm species for fear they may also be affected by this disease. The vast majority of palm trees removed because of LY have been replaced with shade trees such as the live oak, black olive, or mahogany. As important as these trees might be they do not impart the tropical appeal of the coconut palm.

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The devastation of south Florida's two most important ornamental palms, the coconut and Christmas palm (*Veitchia merrilli*) was enhanced by the narrow genetic base of these 2 palms in Florida. Of the 600 or more varieties of coconut palms in the world, south Florida essentially had only one type, the 'Jamaica Tall'. This variety, thought to have originated in India, became well established in Florida because of its vigor and cold tolerance. Unfortunately, it is also one of the most susceptible coconut palm varieties to lethal yellowing. The Christmas palm ("adonidia") was imported from the Philippines during the 1930's. All of Florida's Christmas palms probably descended from this single seed source. The reliance on a narrow genetic base greatly increases the chances of losing all the susceptible plants in an area where a disease is active. To insure that the devastation caused by a disease such as LY is never repeated, we need to diversify our plantings.

### Research in LY Resistance

Past research in LY resistance of palm trees has been totally dependent on observations of the incidence of LY in established plantings. Early work in Jamaica established the resistance of coconut varieties, most notably the 'Malayan Dwarf' coconut palm. The economic dependence of Jamaica on copra production necessitated replanting the LY-devastated plantations with resistant palms. The vast majority of these replantings have been with 'Malayan Dwarfs'.

Breeding work by Jamaican scientists led to the developments of the recently introduced hybrid 'Maypan' coconut palm. This cross between the 'Malayan Dwarf' and 'Panama Tall' coconut palms exhibits hybrid vigor, giving the palm a more robust habit and anticipated better adaptation to a wider range of habitats. The 'Maypan' coconut palm grows very rapidly during the first 4-5 years, often surpassing 'Malayan Dwarfs' of the same age by several meters. Establishment after transplanting is also more rapid than the 'Malayan Dwarf'. 'Maypan' resistance to LY is high (86-96%) and the palms begin to bear coconuts after 5 years. As a landscape palm the 'Maypan' is more desirable than the golden and yellow form of the 'Malayan Dwarf' because of the faster growth rate, and expected tolerance to more adverse conditions. The weakness of the 'Maypan' is

that seednut production is dependent on hand pollination of each individual floret. Homeowners cannot collect the coconuts from mature 'Maypans' and plant them to produce more 'Maypans'. Seedling coconut palms from 'Maypans' exhibit everything from complete LY resistance to high susceptibility and may resemble 'Malayan Dwarfs'. 'Panama Talls' or intermediates.

### 'Maypan' Seed Germination

Since 'Maypan' seed nuts are harvested from 'Malayan Dwarf' coconut palms, they appear identical to 'Malayan Dwarfs'. One easy way to avoid confusing the two in a seed bed is to color-code the husks with a small amount of spray paint. Seed nuts should be planted as soon as they are received. We have found the best method for germinating coconuts is to select a site in full sun, clear the area of weeds, apply 12-15 cm of wood chips, bagasse, or coarse sawdust, lay the seed nuts in rows allowing for paths to facilitate transplanting, add more of wood chips, etc. to just cover the coconuts. After a few weeks, the germination media should settle to expose the top portion of the seed nut. The seed bed requires frequent irrigation if it is dry. Often it is necessary to construct a small fence around the seed bed to keep out rabbits.

Time of germination and percent germination are closely correlated with the time of the year. Best germination is in the spring and summer. Spring germination allows for the establishment of larger and hardier seedlings before winter. Germination rates for 'Maypan' seed nuts at the AREC, Fort Lauderdale in 1976, 1978, and 1978 were 71%, 82%, and 68% respectively. All of these seed nuts were planted in the summer. After 3-4 months, the majority had germinated. Other coconut varieties have required as long as 7-8 months to germinate if planted in the fall or winter.

### Transplanting 'Maypans'

Seedling 'Maypans' should be containerized when the first leaf is 30-50 cm high. Care should be taken in removing the germinated seed nuts from the seed bed to minimize root damage. A 20 liter (5 gal.) container will allow for 1-2 years growth before replanting in a larger container, to a field nursery, or directly into the landscape.

Fertilization should begin at once after the palm has been transplanted. Slow release granular fertilizers containing all microelements have given good results. Foliar sprays have also been beneficial. Recommended fertilizer programs are available (1, 2).

### 'Maypans' in The Landscape

Identification of 'Maypans' in the field can be confusing. Pollen used to produce this hybrid may come from either the green or bronze form of the 'Panama Tall' (Color forms refer to the color of the petiole and immature coconut seeds).

The 'Malayan Dwarf' seed parent has three color forms; the green, gold, or yellow. Thus, 'Maypans' can exhibit several color forms. The vast majority of 'Maypans' are derived from a cross of the bronze 'Panama Tall' with the golden 'Malayan Dwarf'. These 'Maypans' are distinguished from 'Malayan Dwarfs' by an orange-bronze appearance to the petiole. Leaves are larger and the individual leaflets longer and wider than 'Malayans'.

When growing 'Maypans' and 'Malayan Dwarfs' of the same age in a nursery, the difference in rate of growth and vigor is readily apparent. After three years growth 'Maypans' are generally 1-2 m taller than 'Malayan Dwarfs' grown under the same conditions. The horticulturally desirable green form of 'Malayan Dwarf' coconut palm approaches the 'Maypan' in vigor, but requires a slightly higher maintenance program and does not adapt to as large a range of environmental conditions.

Trial plantings of 'Maypans' have been made in all Florida counties where coconuts are normally grown. Adaptability to various environmental conditions has been good. Like the majority of ornamental plants, the 'Maypan' has done best in plantings receiving the most care. 'Maypans' did not grow well when they were neglected. Most of the trial plantings also included 'Malayan Dwarf', 'Panama Tall', and 'Jamaica Tall' coconut palms. The 'Maypan' is almost as vigorous as the LY susceptible 'Jamaica Tall' coconut palm and, in all cases, grew better than the 'Panama Tall' and golden 'Malayan Dwarf' coconut palms. The only LY resistant palm that appeared almost equal to the 'Maypan' was the green 'Malayan Dwarf'.

Field observations indicate that 'Maypans' have fewer pest and disease problems than 'Malayan Dwarfs'. Palm aphids can be a serious problem with 'Malayan Dwarfs', but are infrequent in 'Maypans'. A wilt disease of unknown etiology that affects 'Malayan Dwarf' coconut palms growing under adverse conditions has not been seen in 'Maypans'. Since there are relatively few 'Maypans' in the landscape, a more accurate assessment of pest and disease resistance will require more observation in the future.

The 'Maypan' coconut palm appears to be a good replacement for the LY susceptible 'Jamaica Tall' coconut palm. It is horticulturally superior to the golden 'Malayan Dwarf' and increases the genetic base of resistant coconut palms in Florida. Its adaptability to a wide range of environmental conditions indicates that it will require less care to maintain in the landscape if adequate care is given when the palm is first being established.

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