

ORTANIQUE, A NEW ORANGE-TANGERINE CROSS

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ABSTRACT

'Ortanique', a natural orange-tangerine hybrid native to Jamaica, is a new tangor of great economic importance to the citrus growers of Jamaica, West Indies. The fruit is in high demand for export and brings a much higher price than other citrus fruits. 'Ortanique' trees grow best in shallow bauxitic soils with an elevation of 2,000 to 3,000 feet. Best flavor and yield are obtained from trees grown on hog shaddock rootstock in bauxitic soils. 'Ortaniques' can stand hot, dry weather well for over 3 months, but do not tolerate wet conditions. 'Ortaniques' are similar to 'Temples' in appearance, but quite distinct in flavor and juice characteristics.

INTRODUCTION

The 'Ortanique' is a tangor (tangerine x orange) cross relatively unknown outside of Jamaica, Britain, and New Zealand. In Jamaica, since it was discovered in the early 1900's, it has become one of the most important citrus fruits, commanding a high price, both locally and for export.

Although very similar in many characteristics, 'Ortaniques' and 'Temples' can be easily distinguished from one another by either cutting or peeling the fruit (Figs. 1, 2). The sweetness and rare flavor characteristic of the 'Ortanique' is unlike that of any other citrus fruit in Jamaica. There are a number of 'Temple' trees throughout the island, but there are no groves solely planted with this variety, nor is it sold commercially. The largest concentration of 'Temple' trees is in a citrus variety Museum at the Charlton Station of the Jamaican Government Ministry of Agriculture and Lands, Ewarton, St. Catherine, Jamaica.

The 'Ortanique' had been grown for many years in the Manchester area of Jamaica, al-

though its exact origin is uncertain. According to Rhoden (9), it was first recognized as a distinct variety by Swaby of Harry Watch, Balinor, Manchester, but it was developed commercially by C. P. Jackson of Chellaston, Mandeville (1). In the late 1930's, 'Ortaniques' were exported exclusively by Phillips of Manchester (9). However, when the Citrus Growers Association was formed in 1944, it took over the marketing of 'Ortaniques' for export.

The acreage of 'Ortaniques' has been increasing yearly, and at the present time there are about 2,500 to 2,800 acres in Jamaica.

The majority of the growers have from 50 to 200 acres, and the largest grove, located in Green River, Manchester, has 480 acres planted in 1962 by the United Fruit Company.

'Ortaniques' sell for 14 to 18 shillings per box of 90 pounds (\$2.00 to \$2.50 U.S. dollars), although on the local market they bring only 12 shillings (\$1.70 U.S.). Early in the season the local market price is often higher than the export price.

There have been a few unpublished reports written in Jamaica concerning 'Ortaniques' (1, 2, 3, 7, 10), however, none was found in a review of the literature outside of Jamaica.

'Ortaniques' have been planted in other Caribbean territories, but to date the only commercial groves are in Jamaica (3, 4).

'Ortaniques' introduced into Florida on an experimental basis have not developed as well as in Jamaica, and the fruit has been disappointing.²

The work reported here was the result of a preliminary survey and experiments on 'Ortaniques' carried out during 1964 to 1966 at the Citrus Research Unit of the Botany Department of the University of the West Indies, Kingston, Jamaica.

ORIGIN

Although there are several accounts of the origin of the 'Ortanique', and many growers claim to be responsible for its development, the most authentic version is that of Rhoden (10). According to him, the 'Ortanique' was first

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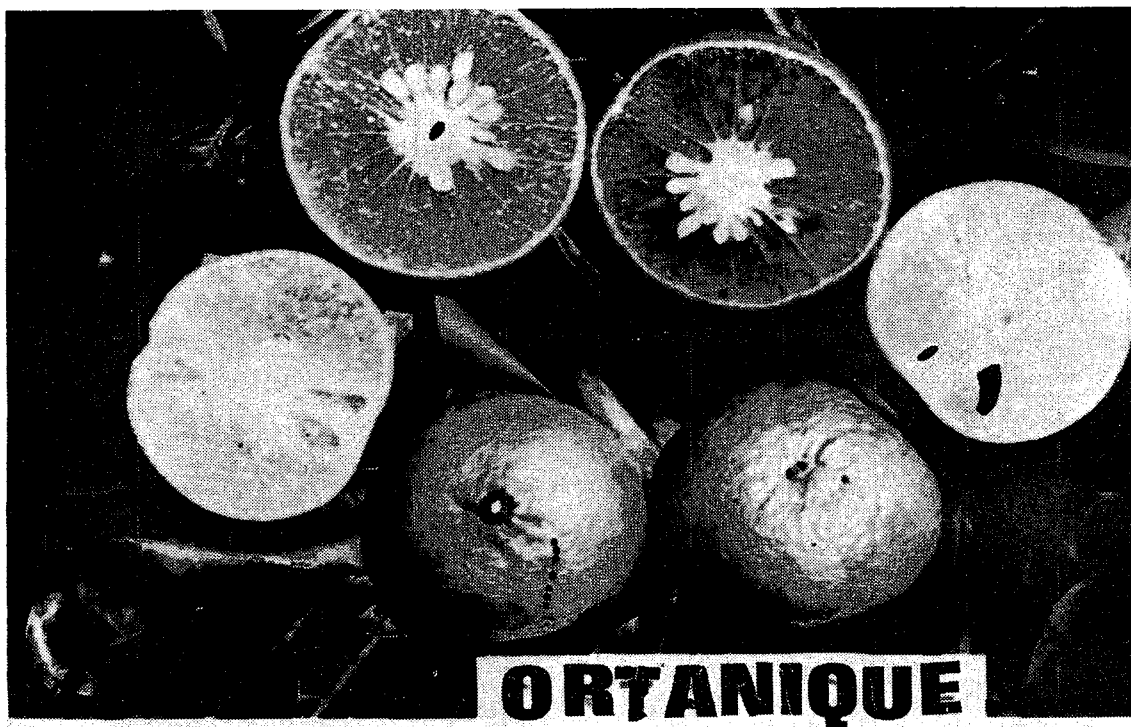


Fig. 1.—Ortaniques cut in half to show the number of segments, thickness of flavedo and albedo in relation to the edible portion.

found in the Christiana market by Swaby, of Harry Watch, Balinoor, Manchester. Swaby purchased 6 fruits from an old woman and planted all the seeds from the most attractive ones. He was able to grow only 6 seedlings, 2 of which eventually developed true to type and yielded 'Ortaniques'. In the early 1900's, Swaby took fruit from these 2 trees to an agricultural show at Shooter's Hill, and it was here that C. P. Jackson first saw "Ortaniques". Jackson brought two fruits, extracted 130 seeds from them, and planted them out. When the resulting seedling trees were about 4 years old, only 2 of them bore fruit, and only 40% produced fruit comparable with the original 'Ortaniques'.

In the selection of trees, Jackson took into consideration the elimination of spines, as some of the trees resulting from the 130 seeds were very spiny. In his selection for better fruit he also attempted to eliminate seed 'Ortaniques'. He named the fruit 'Ortanique' because he considered it to be an "*Orange-tangerine-unique*", or 'Ortanique' (1).

It was rather unfortunate that he kept no records, so that it is only possible to second-guess the selections he made.

Jackson's experiment with seedlessness of 'Ortaniques' are being continued in a limited way by Chapman of the Botany Department, University of the West Indies at Mona, Kingston, Jamaica (7).

The 'Ortanique' tree is not especially distinctive from other tangors, and is quite similar to 'Temple' trees (Fig. 3).

DESCRIPTION

The 'Ortanique' fruit is variable in shape, but is typically oblate. The apex is flat with a slight depression and a ring around the calyx. The stem is small and slender (Fig. 4). The skin is thin when the fruit is ripe, firmly adhering to the flesh (in contrast to the 'Temple', which is easy to peel when ripe), and with an attractive deep orange color (Fig. 1). There is little fruit rag and abundant juice, having a

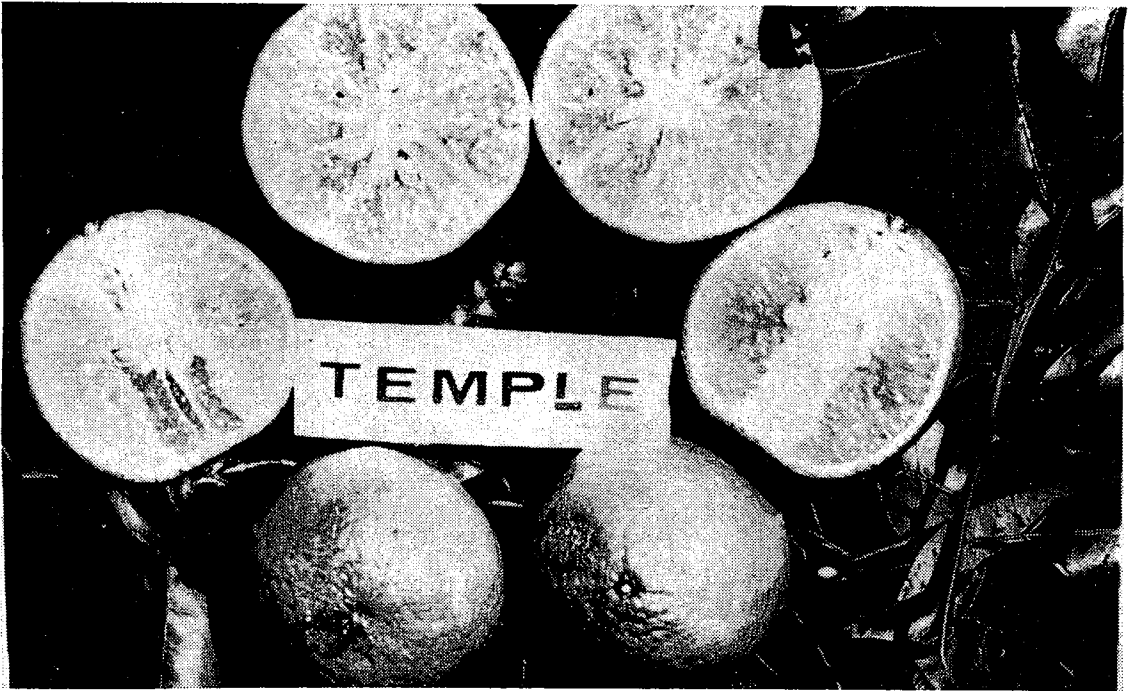


Fig. 2.—Temples cut in half to show the number of segments, thickness of flavedo and albedo in relation to the edible portion.

distinctive flavor equally balanced between acidity and sweetness. The fruit bruises easily if it is shipped immediately after picking according to Bent (2).

'Ortaniques' are sweeter, juicer, and have distinct rare flavor lacking in Valencia oranges according to Harrison.³ Generally 'Ortanique' juice has a higher Brix rating than Valencia juice. The acidity and ascorbic acid contents of 'Ortanique' juice are less than Valencia juice, while the acetaldehyde content of Valencia oil is greater than 'Ortanique' (Table 1). The hot-pack concentrates of both 'Ortanique' and Valencia juices are about the same, however, the 'Ortanique' concentrate is less viscous. Most of the hot-pack concentrate is exported to New Zealand and the United Kingdom.

'Temple' juice is not available commercially, so it was not possible to compare 'Ortanique' with both 'Temple' and Valencia juices. 'Temples' are much sweeter than 'Ortaniques', but lack the rare flavor of the 'Ortanique'. In Ja-

maica, 'Temples' are easier to damage in field crates than are 'Ortaniques.' Those 'Temples' used in experiments at the Botany Department, U.W.I., had to have special handling to transport them from the field to the labs.

Flowering of the 'Ortanique' is considered to be entirely dependent upon the amount of rainfall and the length of the drought periods (10). Early showers will produce flowering in February, but generally flowering occurs during April to late May. It is this flowering that brings on the main crop. Showers during mid-season produce an "off-bloom" during October (9).

'Ortanique' seedlessness had not been satisfactorily explained, but the most logical explanation for this phenomena is the one advanced by Chapman (7), who suggests that it may be the type of pollen, availability, or interference in pollination and/or fertilization that produces both seedy and seedless fruit from the same tree. He also states that it is quite possible that the stock may influence the condition, but is not the principal factor involved. Recent attempts to propagate the seedless condition from budwood of any particular branch have not been successful (2, 9).

³Personal communication from Mr. A. Harrison, Chemist, Citrus Growers Association, Bogwalk Factory, St. Catherine, Jamaica.



Fig. 3.—Ortanique tree showing the lack of difference between it and other tanger trees.

PROPAGATION AND CULTURE

'Ortaniques' have optimum flavor and color when budded on hog shaddock rootstock and grown on shallow bauxitic soils at the higher elevations of 2,000 to 3,000 with proper wind breaks. The trees will grow in other soils and at lower elevations, but the fruit will have neither the desirable and unusual flavor nor its attractive orange color. Mulching of young trees on bauxitic soils greatly accelerates growth, but is not necessary after the tree is 4 to 5 years old. The parishes of Manchester, St. Elizabeth, St. James, Trelawny, St. Catherine, and St. Ann are the most suitable areas in Jamaica for 'Ortanique' groves.

'Ortaniques' will grow at faster rate on clay and alluvial soils, but the distinctive flavor will not be as pronounced (10). The lower in eleva-

tion that 'Ortaniques' are planted the less the distinctive flavor, coloration and sweetness of the fruit (2). However, when planted in a number of open areas as low as 800 ft., with good drainage, trees have grown well and produced adequate fruit. 'Ortaniques' are more sensitive to wet conditions than are other citrus, and when grown in these areas the skin of the fruit thins out, greatly reducing the albedo with the fruit tending to drop off earlier. Optimum rainfall for 'Ortaniques' is in the range of 55-60 inches per year, occurring during the months of April to June, and September to October.

When grown in clay soils, 'Ortaniques' will withstand up to 3 months of drought and will flower after half inch of rain. Occasionally, trees will flower sporadically after 2 months of drought. Bent (2), suggests that there may be an association between rainfall and shy-bearing of the trees.

The most favorable rootstocks for 'Ortaniques' in bauxitic soils have been the white and hog shaddocks, although in Manchester hog shaddock has been preferred over the white shaddock (10).

In clay soils, the best rootstock for 'Ortaniques' has been sour orange, although occasionally sweet Seville (a natural cross between sweet seeded and sour orange) has been used. Fruit from trees on these stocks has a thicker albedo, is easier to peel, but is more susceptible to granulation.

At the University of the West Indies Citrus Research plots in Mona, St. Andrews, one of the most undesirable rootstocks for 'Ortanique' has been rough lemon (3). The resulting fruit was larger than usual, with a rough flavedo, and almost no characteristic rare flavor. Such fruit tends to crystalize much more rapidly than does fruit from trees on other rootstocks. This, according to Bent (2), has been the experience throughout Jamaica whenever rough lemon has been used as a rootstock.

'Ortanique' trees will withstand hot, dry weather well, and will tolerate the cooler nights of the higher elevations of Jamaica. Optimum temperatures for best growth are from 70-80° F with cooler night dropping to 55° F, and hot days going as high as 95° F (2).

Under favorable conditions 'Ortaniques' begin to bear consistently after they are 2-3 years old. A fair average yield for a 5-year-old tree has been from 1½ to 2½ field boxes of 90 pounds



Fig. 4.—Ortanique fruit showing the small slender stem, ring around the calyx, the oblate shape, smooth skin, and the flat apex.

each, for a 10-year-old tree $3\frac{1}{2}$ to $4\frac{1}{2}$, and older trees of 15-20 years old from 4 to $5\frac{1}{2}$ field boxes (2,3,9).

DISEASES AND PESTS

The diseases most frequently encountered on 'Ortaniques' have been: melanose (*Diaporthe citri* (Faw.) Wolf), greasy spot (*Mycosphaerella horii* Hara), and felt fungus (*Septobasidium lepidosaphis* Couch) while the only virus disease found was Psorosis A. In the Manchester area, "Crotch-break", and "Branch-wilt", suspected root rot diseases described by Blazquez and Rhoden (6), were prevalent at Connely, Brokenhurst, and Knockpatrick. Two cases of Rosellinia root rot (*Rosellinia* spp.) were found at Kew Park, Bethel Town. The only incidence of Sphaeropsis knot (*Sphaeropsis tumefaciens* Hedges) was found localized at a grove in Seven Rivers, St. James (3).

It is suspected that this outbreak of *Sphaeropsis* knot on 'Ortaniques' at Seven Riv-

ers is due to a microclimate condition. The disease has not appeared on other 'Ortanique' plantings, although other workers (5-8) have established that 'Ortaniques' are susceptible to the disease. In the St. Catherine area, thread blight (*Corticium stevensii* Burt) is most severe at Tullock Estates and McConnel's Farm (5). Burnt stem, a physiological disease encountered at the C.G.A. factory at Bog Walk during the 1962 through 1965 seasons (known in Florida as stem-end rind breakdown), has been eliminated by changes in processing methods.

'Ortaniques' are attacked by most of the pests of other citrus in Jamaica, such as aphids (*Aphis gossypii* Glov.), rust mite (*Phylloceptruta oleivora* Ashmead), Florida red scale (*Chrysomphalus aonidum* L.), and purple scale (*Lepidosaphis beekii* Newm.). In addition, moths of *Tortrix* spp., and particularly the fruit piercing moth (*Gonodonta* spp.), were found quite often on 'Ortaniques'. The West Indian Red Scale (*Selanaspilus articulatus* Morga.), was not found as frequently as the other scales.

Table 1. Properties of Ortanique and Valencia Juices in Jamaica⁵

Properties	Ortanique	Valencia
Brix degrees	11 - 13	10 - 12
Acidity %	0.65-1.25	0.80-1.60
Ascorbic acid content mg/100 ml	25 - 40	56 - 65
Acetaldehyde content in oil %	0.9-1.1	1.3-2.2

⁵Personal communication from Mr. A. Harrison, Chemist, Citrus Growers Association. Bogwalk Factory, St. Catherine, Jamaica.

DISCUSSION

'Ortaniques' were found growing well in various areas of Jamaica, in different soils (beauxitic, alluvial, and clay soils), at various elevations (from 800 to 3,000 feet), and on a variety of rootstocks (Rough lemon, sour orange, hog shaddock, and white shaddock) under varying climatic conditions. Although the trees grew well in other areas, the characteristic Ortanique flavor was consistently found on trees grown in the shallow bauxitic soils of Manchester, either on white or hog shaddock, at the higher elevations of 2,000 to 3,000 feet.

Although the 'Ortaniques' bear well, and most of the fruit has a few seeds, it is difficult to consistently produce fruit with few seeds, and have the trees bear consistently throughout the years.

It is believed that seedlessness and shyness are two separate problems, as Bent (2), and Chapman (7), have suggested; however, there is a possibility that both of these conditions are part of a more complex problem. A number of growers have conducted small budding experiments attempting to propagate the seedless 'Ortaniques.' Unfortunately, they have not been successful, as the budded trees produce both seedy and seedless fruit.

Many suggestions have been made concern-

ing the distinctive flavor of 'Ortaniques.' Most growers attribute it to the bauxitic soils (2,3,9) and favorable elevations, but no conclusive evidence has proven this.

Although 'Ortanique' is a very desirable citrus fruit, it is suggested that when trying this variety in Florida, small plantings should be established to determine the adaptability of the tree to local conditions and to check on the presence of the distinctive flavor of the fruit. Should conditions be favorable, larger groves would then be feasible.

ACKNOWLEDGEMENTS

The author wishes to thank Mr. C. V. Bent, and Mr. L. B. Rhoden for all the assistance given, both in information and guidance in field trips, without which these investigations would not have been possible.

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EFFECTS OF NITROGEN AND POTASSIUM FERTILIZATION ON PERSIAN LIMES ON LAKELAND FINE SAND

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ABSTRACT

Mature Persian lime trees on Lakeland fine sand were fertilized for three crop years with three levels each of nitrogen and potassium in factorial combinations. Yields increased with an increase in either nitrogen or potassium up to the maximum levels, with highest yield where both elements were used at maximum levels. Juice content, soluble solids and acid increased with increased nitrogen fertilization. Increased potassium resulted in some increase in acid. Foliage color and density improved with increasing nitrogen fertilization. Calcium and magnesium levels in leaves decreased as potassium fertilization increased, but the decrease was not sufficient to cause deficiency symptoms.

INTRODUCTION

While a tremendous amount of research has been devoted to citrus nutrition, little attention has been given Persian (Tahiti) limes in Florida. The fertilization of limes has, for the most part, followed practices used for other citrus, as modified by grower trial and error. The major portion of the lime crop is harvested during summer and fall in Florida, but some fruit can be picked every month in the year, as compared

with a relatively short blooming and harvest season for most orange and grapefruit varieties. Furthermore, maturity standards for limes are quite different from those for citrus such as oranges and grapefruit. This everbearing habit of limes and their particular maturity standards suggest that more effective fertilization of limes might be developed through systematic investigation.

Working with limes on Rockdale soil Goldweber *et al* (1) found that increased nitrogen fertilization increased the number of fruits, total yield, juice, soluble solids and acid, but had no effect on weight of individual fruits. Increasing nitrogen also resulted in increased tree growth and improved leaf color. The effect of phosphorus was inconclusive. Yields decreased where potassium was omitted from the fertilizer.

Further studies with limes on Rockdale soil (3) showed that side dressings of potassium nitrate and Uramon increased yields, whereas ammonium sulphate decreased yields. In this investigation, it was found that the natural organic sources of nitrogen were not measurably better for limes than chemical sources. Fertilization at intervals of 60 days was recommended for best results.

It was found that limes on Rockdale soil did well on a relatively low but uniform supply of phosphorus (4).

Although most of the limes grown in Florida are produced on Rockdale soil in Dade County, there is significant production of limes on the sandy and loamy soils in warmer sections of the state. No research had been done on lime nutrition on these sands and loams. An experiment with three rates each of nitrogen and potassium was started in a bearing lime grove near Lake Placid in 1963. This paper reports data obtained between 1964 and 1967.