Fig. 2 Surface fertilized tree on right has most of its roots near the surface while tree on the left has better distribution of roots as a result of fertilizer placed in the subsoil.

Since tree size and number of trees are important to the nurseryman, it follows that a measurement of response should include both. Table 4 contains data to show the effect of treatments on stand times diameter. Again those trees under 5 mm. in diameter in September and December, 1957, were omitted. Treatments were significant at the 5% level of probability at each sampling date. Placement of dolomite in the subsoil was better than the check and also better than application of equivalent amount of dolomite on the surface. Fertilizer placed in the subsoil was no better than the check.

Summary and Conclusions

An experiment was conducted on a flatwood soils with a mottled or heavy-textured layer starting at a depth of approximately 20 inches to determine the effect of lime and fertilizer placement in the subsoil as a means of improving the growth of pecan seedlings.

Dolomite lime improved the stand and diameters of the seedlings at ground level for three sampling dates. Although the average seedlings were not large enough at the end of one year for grafting or budding, practically all of them were large enough for grafting after two years growth.

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CONDITIONS AFFECTING COMMERCIAL MANGO PRODUCTION IN MARTIN COUNTY

David Sturrock

Sturrock Tropical Fruit Nursery

West Palm Beach

The rapid urbanization of the coastal area of southern Florida has raised land values — now above the agricultural uses value — and labor costs to the point where the commercial fruit grower will soon be forced from the warmer coastal area into the interior. This raises several problems the more immediate one being where to find locations suitable for these plantings. The question as to the suitability of lands in the interior of Martin County for commercial mango growing has been raised. This paper is an attempt to appraise conditions as they may affect such plantings.

In Martin County mango trees have been grown successfully for many years on the higher levels of better drained land within the warm coastal area, as in neighboring Palm Beach and Broward Counties where climatic

conditions are comparable. There is the usual coastal ridge of loose overdrained sandy soil behind which lies the low flatwoods of hardpan soil. In Martin County this flatwood area has an elevation of 15 ft. above mean sea level and is poorly drained for the most part. This is the residential area of the future, now rapidly developing. It is intersected by the F.E.C. Railroad and U.S. Highway No. 1. West of U.S. Highway No. 1 lies the low area tributary to the St. Lucie river on the north and the Loxahatchee river on the south. Through this area runs the Sunshine State Parkway. In the north-east part of the county – west of the City of Stuart – is Palm City, an area of approximately six square miles, situated on slightly better drained land on the 20 ft. level.

For a commercial mango planting the conditions of soil and temperature must both be suitable. There are many places in southern Florida where one of these factors may be suitable while the other is not. A look at the soil and contour maps of Martin County, and the available temperature records, may help to clarify the situation as it exists at the present time.

Soils can be modified to a certain extent by correctives and drainage. The temperature, not being readily influenced, may therefore be considered the chief environmental factor of influence in the successful growth and fruiting of the mango tree. The contour map of Martin County shows interesting features of influence upon minimum winter temperatures. The lands in the eastern part of the county are either too high in price or too low and wet for commercial plantings of mango trees. West of the Sunshine State Parkway – six to seven miles inland from the Inland Waterway – the elevation of the land rises from 15 to 20 and 25 ft. This central region, containing about 50% of the area of the county, is known as the Allapattah Flat, and is poorly drained despite the rising elevation. It is also open to cold winds from the slough and marsh lands in St. Lucie and Indian River Counties to the north. In the center of the Allapattah Flat are several long narrow ridges of 30 ft. elevation. These ridges have a north-south axis and are marked on the maps as the Center Ridge area. On the western edge of the Allapattah Flat the elevation rises from 25 ft. to 30 ft. at Indiantown on the south, to 40 ft. further north then dropping to 30 ft. toward the north edge of the county. The 40 ft. elevation is over 5 miles long and about three miles wide, situated upon the 30 ft. ridge of over 8 miles wide and reaching from Indiantown in a northwestern direction into St. Lucie and Okeechobee Counties. This is known as the West Ridge along the western edge of which run the Seaboard Railroad and State Highway 710. From the West Ridge the land slopes to the 15 ft. level near the east side of Lake Okeechobee. A branch of the F.E.C. Railroad runs along the west side of the county, on the 20 ft. level, 1½ to 2 miles inland from the Lake. Between the West Ridge and the Lake lies a triangular area of approximately 50,000 acres. Due to the ameliorating influence of the waters of Lake Okeechobee this area is comparatively free from injurious low winter temperatures and, as far as minimum winter temperatures are concerned, would be quite suitable for commercial mango growing. Effective drainage is possible on approximately 40,000 acres of this triangle, between the two railroads, on the 20 ft. to 30 ft. levels.

Within this triangle area, from the 15 to 30 ft. levels, there is quite a lot of fog during the late winter and early spring. On the 30 to 40 ft. levels morning fog is not so prevalent. On a calm cold night the higher elevations of the West Ridge is quite frost free unless the cold spell be severe. This higher elevation is exposed to cold northwest winds and would suffer severely should the cold wave come on a strong wind. Protective windbreaks would be necessary and other measures of precaution, such as stem wrappings and grove heaters, would be requisite for emergencies.

The generalized soil map accompanying "The Soils of Florida" by O. C. Bryan – Fla. State Dept. of Agric. Bull. No. 42, 1958 – shows five different soil formations in Martin County. For the purpose of identification in this paper I list them by number. Formations 1 and 2, the overdrained dunes along the coastal strip and the small area of peaty-muck in the southwest corner of the county, may be eliminated from this discussion. Formation 3 is rare in southern Florida. This is located on the higher elevation of the West Ridge and is classed by Bryan as:- Gray to Black, imperfectly drained acid soils over yellow sands, compact loam and plastic clay, represented by Ona, Blanton, Coxville, Bladen and related

soils. This formation is also represented in isolated places in Central and Northern Florida but nowhere else in southern Florida. The formation occupies the 35-40 ft. elevation of the West Ridge, north of Indiantown, and formed at an earlier geologic time than the lower levels of southern Florida. Soil formation 4 reaches from the center of Brevard County to a point west of Miami in a narrow strip approximately six miles wide. It is classed by Bryan:- Gray to Black, imperfectly to poorly drained soils underlaid with marl, lime or calcareous materials, represented by Parkwood, Bradenton, Delray, Felda, Manatee, Charlotte and related soils. It occupies the 20 ft. level through the center of the east half of the county. This same soil formation covers all of Monroe County, the greater part of Collier and Lee Counties, and is present in varying degree in Hendry, Charlotte, Sarasota, DeSoto, Glades and Highlands counties. It covers almost 50% of southern Florida. Formation 5 occupies the greater part of Martin County, all the west half of the county with the exception of the highest part of the West Ridge – formation 3 – and a small area of peaty-muck near the edge of Lake Okeechobee. It also occupies a narrow strip 3 - 4 miles wide between the coastal strip and formation 4. This formation is classed by Bryan as:- Gray to Black, poorly drained acid soils over organic hardpan and light gray subsoils, represented by Leon, Immokalee, Portsmouth, Rutledge, Plummer and related soils. This is the soil formation which covers the greater part of central Florida with the exception of the higher levels of the Central Ridge. The branch of this formation occupying the west part of Martin County runs out to a point in central Palm Beach County. It also occupies parts of Collier, Hendry and Lee counties.

There are several isolated drainage areas throughout Martin County but the greater part of the interior is not drained. The greater part of the interior lies at the 25 ft. level. Water control for drainage and irrigation will be possible when local land owners and the Central and Southern Flood Control can come to an agreement as to the most effective method of doing so.

Winter temperatures at Indiantown, the triangular area between Indiantown and Lake Okeechobee, and the higher levels of the West Ridge to the immediate north of Indiantown, are comparable to those of the east coast area. In the "Summary of 20 Seasons"– "Winter Minimum Temperatures in Peninsular Florida, 1937-1957, Federal-State Frost Warning Service" – the record compares well with that of Stuart, Hypoluxo and Homestead.

	30°F.	28°F.	26°F.	
Indiantown	6	2	1	times in 20 years
Stuart	10	5	2	" " " "
Homestead	12	7	1	" " " "
Hypoluxo- -(4 miles inland)	14	4	1	" " " "

There are no consistent temperature records for the Center Ridge area of Martin County. Mango trees along Highway 710, five miles north of Indiantown and on the West Ridge, twelve miles north of Indiantown, suffered less injury during the cold winters of 1956-57 and 1957-58 than did many trees of comparable size and age in counties further south.

Summary

The present commercial plantings in the coastal area will probably stay in operation for several years. It is doubtful if new plantings will be made in this area due to the high cost of land and labor. The central region of the county is not at present well drained for mango trees and the winter temperatures are not well known. This central region is also exposed to cold northerly winds. The West Ridge, with elevations of 30 - 40 ft., offers locations suitable for mango growing where windbreaks and other precautionary measures are observed. Within the triangular area, between Highway 710 and Lake Okeechobee, there are approximately 40,000 acres on the 20 - 30 ft. levels. There are sloughs and probably not more than one third of the area would be suitable for commercial mango growing. Toward the northern tip of the triangle– approaching the northwest corner of the county–the protection afforded by the waters of the lake lessens considerably. This area is also subject to fog during the late winter and early spring making precautions, in the matter of fungicidal sprays, very necessary throughout the time of bloom and fruit development.

For several years I have been on the lookout for a native tree or bush with a climatic range – minimum temperature level – similar to that of the mango tree. I have come to the conclusion that the coconut is slightly more tender than the mango while the silver-leaf

palmetto is slightly more hardy. Wherever the silver-leaf palmetto is found in small isolated clumps of poorly developed plants – toward the colder edge of its climatic range – the mango tree may be grown as a yard tree under close winter protection. This form of the palmetto is rare in the extreme northwest corner of Martin County and is seldom seen throughout the interior of the county west of Palm City. It is quite abundant in the area immediately north and northwest of Indiantown. I would not however feel easy in my mind about a commercial mango planting beyond the climatic range of the coconut palm.

FLORIDA AND THE MACADAMIA NUT

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Subtropical Florida has no commercial nut crop. This stark fact has apparently failed to register in the minds of those men who help guide the agricultural economy of our State. Considering the time, effort and money which has been expended in the horticultural movement this deficiency seems incredible. California produces 99% of the almonds and 84% of the walnuts grown in the United States. It also grows pecans, pistachios and filberts. Florida's sole contribution to edible nut culture comes from northern Florida where less than 5% of the national production of pecans is achieved.

Florida needs a high value tree crop to complement its heavy concentration in citrus production which reaches a peak when deciduous orchards in other fruit growing regions are bare. Our summer subtropical fruits such as the lychee and mango have to compete with lower priced deciduous fruits particularly from western irrigated valleys and foothills. Delicious as many of our subtropical fruits are, in the long run they are not the answer to bolstering Florida's farm economy. Canning and freezing have helped the citrus industry dispose of its surpluses but there is a foreseeable limit to the continual expansion of orange and grapefruit acreage.

Winters in southern Florida are too warm for the pecan and too cold for the cashew. However, nature has not been so unkind as to deny us the opportunity to establish a profitable nut industry. The answer has come all the way from Australia via Hawaii. The Macadamia, native of the Queensland rain forest, is the light and the way. Since its introduction into Florida this tree with its delicious nuts has thrived in virtual obscurity. For many years only the squirrels recognized its true value. Well established trees in St. Petersburg, Avon Park, Winter Haven, Miami, Palm Beach, Belle Glade, Tampa, Homestead and Bradenton have withstood years of cold, drought, wind and, in most cases, human neglect.

Hawaii and California have not overlooked the Macadamia nut. A thriving industry has arisen in the Islands despite the hold that pineapples and sugar cane have had on available arable land. Hawaiian Macadamia nuts have rapidly gained a paramount position among gourmets. Nut fanciers gladly pay fancy prices for small jars of shelled, roasted, salted and vacuum-packed Macadamias. Knowledge of the delectable and nutritious nature of this nut is spreading to the general public. Acceptance has been spontaneous. Demand has consistently exceeded supply.

Hawaiian growers receive $ .20 per pound for nuts in the shell with outer husks removed. Several small grove owners stated that they averaged at least $1000 per acre from seedling trees whose crops varied from 50 to 200 pounds per tree. Processed Macadamia nuts bring the equivalent of at least $4.00 per pound based on retail prices for 3½ and 7 ounce jars. A price spread such as this between the grower and retailer is most indicative of a gourmet-type product. It would be fallacious to assume that these retail prices would remain so high with any significant increase in production. However, the Macadamia is generally considered the finest eating of all nuts. This, in itself, encourages ample returns to growers and processors.

California horticulturists have already organized a Macadamia nut growers' association. The State has launched an extensive research