
Section 3: Vegetable Production in Miami-Dade County: Descriptions, Cultural Practices, and Technical Inputs

by

Stephen O'Hair
Y.C. Li
H.H. Bryan,
W. Klassen
M. Lamberts
T. Olczyk

SECTION 3
VEGETABLE PRODUCTION IN MIAMI-
DADE (BUSH AND POLE BEANS)

Bush and Pole Bean Production in Miami-Dade County, Florida¹

Y.C. Li, H.H. Bryan, W. Klassen, M. Lamberts and T. Olczyk

SITUATION

Beans are an important traditional vegetable crop in Miami-Dade County with acreages varying between 3,600 and 13,400 acres during 1980-1996. Yields averaged about 175 to 300 bushels/acre. The production cost in 1999-2000 was approximately \$13.5 per bushel or \$2,700/acre for an acceptable yield of 200 30-pound bushels/acre. Beans produced in Miami-Dade County are sold for the fresh market nationwide during the winter and spring months.

Varieties

Refer the Vegetable Production Guide for Florida for variety selection. The major varieties currently grown in Miami-Dade County are the bush beans: 'Opus', 'Leon', 'Mirada', 'Seville', and 'Golden Rod', and the pole beans: 'McCaslan 242' and to some extent 'Genuine'.

Soils, Land Preparation and Planting

Beans in Miami-Dade County are grown mainly on gravelly soils (Krome or Chekika soil series) or a mixture of gravelly soils and marl soils. At the present time, beans are rarely grown on marl soils, because these soils are at low elevations, and prone to flooding. Traditionally beans are not planted on raised beds, but better yields can be obtained on raised beds than on flat land, especially on flood-prone soils.

The planting season extends from September into February. Bush beans are planted with 18–36 inches between rows and 2-4 inches between plants within the row. Pole beans are planted with 30-40 inches between rows and 3-5 inches between plants within the row. All pole beans are supported on a trellis system. The trellis consists of a wire about 4-ft above the ground fastened to a post at each end of the field and midway between rows. Six-foot long canes of bamboo are leaned from the base of each plant to the wire in the middle of the aisle. Each pole bean plant twines along a cane.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Therefore, tissue analysis can be used to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the Miami-Dade County Cooperative Extension Service. Information on plant tissue analysis for beans

² This document is a written specifically for growers in Miami-Dade County as a supplement to http://edis.ifas.ufl.edu/MENU_CV:VEGPROD or to D. N. Maynard and S. M. Olson (editors), 2000. Vegetable Production Guide for Florida, University of Florida and Citrus & Vegetable Magazine. 247 pages. The date first released: May 2001.

is provided in the Vegetable Production Guide for Florida. Preplanting fertilizer formulas of 4-4-8, 5-5-8, 6-3-12, 6-12-12 or similar formulas are satisfactory. Liquid or dry nitrogen and potassium fertilizer should be used as side dressings. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Generally 50-100 lb N per acre has been satisfactory for bean production. However less inorganic fertilizer should be applied if a cover crop or soil organic amendments has been used. Magnesium nitrate or sulfate and iron sulfate should be applied foliarly if deficiency symptoms appear.

Irrigation and Freeze Protection

Low volume in line, pivot or big gun systems can be used for bean irrigation. A tensiometer installed at 6" depth can be used for irrigation scheduling. Optimal plant growth and yields are achieved when the soil moisture is maintained at tensiometer readings between 10 to 15 cbars. The Miami-Dade County Cooperative Extension Service provides relevant information and calibration services for tensiometers.

Bean has modest resistance to frost. Freeze chilling injury occurs when temperatures drop to 28 °F for 30-45 minutes. When frost is predicted, especially a radiation freeze, growers should irrigate while temperatures are still warm, allowing time for plants to dry before temperatures drop below freezing.

Insect Management

Refer to the Vegetable Production Guide for Florida, SP 170, for extensive information on insect control. Major pests include silverleaf whitefly, melon thrips, leafminers, armyworm, looper, and bean leaf roller. Currently all major insect pests can be controlled with available insecticides, however only a few of the insecticides are highly effective, and all of these are quite expensive.

Disease Management

Refer to the Vegetable Production Guide for Florida, SP 170. Major diseases include Rhizoctonia, bacteria, alternaria, rust, and viruses.

Weed Management

Refer to the Vegetable Production Guide for Florida.

Harvest

The harvest season extends from November to the middle of April. Beans are harvested by hand or by mechanical harvester. Mechanical harvesting is labor efficient but results in losses of 10-15 percent of the pods. It also causes higher postharvest losses because of broken pod ends.

Multiple Cropping/Rotation

Since bean is a 55-67 days crop, several successive crops can be planted and harvested during the season. Bean can be rotated with squash, boniato, cucumber, tomato or eggplant.

Cabbage Production in Miami-Dade County, Florida¹

Y.C. Li, H.H. Bryan, W. Klassen, M. Lamberts and T. Olczyk²

SITUATION

Cabbages in Miami-Dade County, are grown annually on 100 to 500 acres, and sold nationwide during the winter in the fresh market. Yields for cabbage range from less than 300 crates/acre to more than 800 crates/acre. The production cost in 1999-2000 was about \$6.56 per 50-pound crate or \$2,788/acre for an acceptable yield of 425 crates/acre.

Varieties

Refer to the Vegetable Production Guide for Florida for variety selection.

Soils, Land Preparation and Transplanting

Cabbages in Miami-Dade County are mainly grown on gravelly soils. Cabbages can be transplanted or direct seeded with 24 to 36 inch spacing between rows, and 9-16 inches between plants in a row. The planting season extends from September to January.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available presently. Therefore, tissue analysis is recommended for determining the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the County office of the Cooperative Extension Service. Information on plant tissue analysis for Cabbages is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Generally 150-200 lb N per acre has been satisfactory for cole crops production. However less inorganic fertilizer should be applied if a cover crop or a soil organic amendment (compost, biosolids, manure) has been applied. Preplanting fertilizer formulas of 6-6-6, 6-3-6, 10-10-10 or similar formulas are satisfactory. All P and 20-30 percent of N and of K should be incorporated into the soil prior to planting. The remaining fertilizer should be side-dressed 2-3 times starting 3 weeks after planting. Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

Irrigation and Freeze Protection

A big gun or linear sprinkler irrigation system can be used for cole crops. The water requirements for young plants are very low. A tensiometer installed at a 6-inch depth can be used for irrigation scheduling. Optimal plant growth and yields are achieved when the soil moisture is maintained at tensiometer readings between 10 to 15 cbars. The Miami-Dade

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County Cooperative Extension Service provides relevant information and calibration services for tensiometers.

Cabbage does not sustain frost injury until temperatures drop 10° to 16° F below freezing. Therefore growers in Miami-Dade County do not arrange for freeze protection of cabbage from freezing.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. The most damaging pest is the diamondback moth for which several materials are available.

Disease Management

Refer to the Vegetable Production Guide for Florida.

Weed Management

Refer to the Vegetable Production Guide for Florida.

Harvest

The harvest season extends from November to April. Cole crops are picked by hand.

Multiple Cropping/Rotation

Cole crops can be rotated with tomatoes, squash, beans, okra and cucumbers.

Cassava Production in Miami-Dade County¹

S.K. O’Hair and Mary Lamberts²

BOTANICAL DESCRIPTION

Nomenclature

Family: Euphorbiaceae

Cassava (yuca) – *Manihot esculenta* Crantz

Origin

Cassava originated in Brazil and Paraguay, and was first domesticated by South American Indians. Production has spread throughout the humid tropics and subtropics.

Varieties/Related Species

There are no related species of this crop that have economic importance.

Varieties are often separated based on their cyanogenic glucoside (HCN) content into either low HCN, a.k.a. “sweet”, or high HCN, a.k.a. “bitter”, types. The term “bitter” comes from a bitter flavor that is commonly believed to accompany the HCN. No named varieties are currently known in southern Florida. ‘Senorita’ was locally popular in the 1980s and attempts were made to promote the Brazilian variety ‘Mantiqueira’ at the same time because it was able to produce high yields even with high rootknot nematode levels. The range of local genotypes covers a few unnamed clones that have been imported from various Caribbean basin countries. Federal regulations prohibit further importation of cuttings or botanical seed.

Soils, Land Preparation and Transplanting

Cassava grows best when the soil is turned 2 to 3 months before planting. Plowing early helps rot plant debris and reduce some nematode and disease problems. Soils in Miami-Dade county (except for marl soils) should be scarified or “rock plowed” prior to planting to improve drainage and increase available soil depth.

For cassava marl soils will always produce the best-shaped and best-looking storage roots. However, these soils are prone to flooding, making them less desirable for cassava production. Plants grown in rockdale soils must be irrigated during periods of dry weather to avoid reduced yields. Wet weather for extended periods can cause leaching of N and K, requiring the addition of more fertilizer. More frequent applications of lesser amounts of fertilizer are suggested for rockdale soils.

¹This condensed document was adapted from an original publication on cassava with the same title.

² S. K. O’Hair, associate professor, Tropical Research and Education Center, Mary Lamberts, extension agent IV, Miami-Dade County; Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Homestead

Plants are established in rows on flat land. During the cultivation process, ridges are formed down the rows of plants. Ridges provide a place for storage organ formation, improve drainage and facilitate harvesting.

Fertilizer and Lime

Apply all P_2O_5 , micronutrients, and 25 to 50 percent of N and K_2O in a band along the planted row one to two months after planting. Sidedress the remaining N and K_2O by banding them on the side of the bed four months after planting as a layby. Specific fertilizer recommendations for rockdale soils are not available due to lack of a reliable and readily available solid analysis procedure for this soil type. In general, cassava has a medium requirement for N, P_2O_5 , and K_2O . Since the soils in Miami-Dade have high pH, liming is not needed. There are no remediation materials for the high pH condition, though chelated micronutrients such as Fe, Mg, Mn, and Zn can be applied to treat deficiencies.

Irrigation and Freeze Protection

Cassava has relatively low requirements for irrigation. But, during active growth stages it must be irrigated when extended dry spells occur. Water requirements and subsequent irrigation requirements are reduced during the last few weeks of growth. This usually coincides with the dry season when cassava is most likely to be affected by mites, a situation that can be helped by irrigating.

In Miami-Dade County, cassava theoretically can be planted year round. Normally, the planting is done in the early spring due to slow early growth and susceptibility to frost. Stem cuttings 8 to 10" long are selected from the lower mature sections of healthy plants and planted horizontally 3 to 6" below the soil surface in the shallow rockdale soils. Cuttings are planted by hand in furrows spaced 48" apart with an in row spacing of 24". Since the unrooted cuttings are sensitive to water loss, the field should be irrigated soon after planting.

Insect and Nematode Management

Whitefly, spider mites, shoot fly and tomato hornworm are occasionally observed. Since there is no documentation of economic loss due to these pests, pesticides are not normally used. Although mites can cause leaf drop, they are normally not present in significant numbers until the winter months when the plants are nearing harvest.

Keeping fallowed fields free of feral plants is recommended.

Cassava can be damaged by root-knot nematodes. It may cause stunting and yield loss; root-knot nematodes in the storage roots may cause cracking or internal dark lesions that severely reduce the value of the product. The only step to minimize nematode injury to cassava is to include crop rotation, unless nematode-tolerant varieties can be introduced or developed.

Disease Management

There are several virus diseases of cassava. However, none have been reported to occur in the United States. Systemic diseases are also common in cassava. Planting material should pass through a phase of tissue culture and thermo therapy. Cassava bacterial blight and *Cercospora* leaf spot are known disease problems in the United States. When pathogens

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are present, yields can be reduced by 50 percent if healthy, pathogen-free or disease resistant cuttings are not used. This emphasizes the need to select clean, healthy planting material. Since cassava is vegetatively propagated, virus and other systemic diseases can be carried from one planting to another in the planting material.

Effective disease control for cassava is based on prevention. Most of the important diseases are caused by pathogens that can be easily spread by wind, rain and workers, or are capable of spreading systemically through the plant. It is generally not possible to restore the health of an affected plant once the disease can be detected. A crop rotation of at least 3 years is an important means of controlling diseases. There are no chemicals approved for management in cassava diseases that are known to occur in Florida.

Weed Management

Cassava is a long season crop. Control of weeds during the production can be difficult. Early season competition of weeds is extremely critical and a major emphasis on control should be made during this period. Growers must plan a total program that integrates mechanical and cultural methods of weed control with the use of herbicides.

At the present time, there are no preemergence residual herbicides for cassava. Cultivation is an effective way to manage weeds early in the season. Hilling blades can uproot many annual weeds that have emerged since the last cultivation. Roundup® may be applied as directed, spray between the rows using a shielded applicator. Contact with the plants will cause significant yield reduction.

Herbicide performance depends on weather and accurate application and timing.

Harvest

The crop should be harvested 9 to 12 months after planting, when it has produced the highest percentage of edible storage roots of the desired size. The crop should be harvested before, or soon after killing frosts. Once harvested the roots are very perishable. Waxing of roots is a common practice to improve shelf life.

Multiple Cropping/Rotation

There are usually not as many root-knot nematodes where the preceding crop was a grass or small grain. Most vegetable crops are among the worst crops to precede cassava, from the standpoint of building up hazardous nematode populations. Sweet corn may be the best rotation crop of the vegetables. Do not plant cassava in the same field in successive years.

Additional Information Concerning Cassava

Fresh roots and leaves are toxic due to the presence of free and bound HCN. The total HCN content varies considerably with variety, environment, and plant age. Levels in the peel, peeled root and leaves ranged from 5 to 77, 1 to 40 and 0.3 to 29 mg/100g (fresh wt.), respectively. Cooking the leaves or roots and changing the cooking water are methods for reducing HCN concentrations. Roots should always be peeled prior to cooking.

Toxicity from cassava may develop when considerable quantities are consumed over a period of time. This is particularly true if the prepared cassava has high HCN concentrations and the diet is poorly balanced nutritionally.

Cucumber Production in Miami-Dade County, Florida¹

Y. C. Li, H. H. Bryan, W. Klassen, M. Lamberts and T. Olczyk

SITUATION

Cucumber, a traditional vegetable crop in Miami-Dade County, is grown on annual acreages of 200 to 900 acres. Yields range from less than 300 bushels/acre to more than 600 bushels/acre. Production costs may exceed \$8.00 per bushel or \$4,850/acre for an acceptable yield of 600 55-pound bushels. Cucumber produced in Miami-Dade County is sold mainly on the fresh market during winter nationwide.

Varieties

Refer to the Vegetable Production Guide for Florida for variety selection. The major varieties currently grown in the Miami-Dade County for pickling are 'Eureka', 'Napoleon', and 'Transamerica', and for slicing are 'Speedway', 'Greensleeves', 'Dasher II', 'Thunder', and 'Lightning', 'General Lee'.

Soils, Land Preparation and Seeding

Cucumbers in Miami-Dade County are mainly grown on gravelly soils. To be suitable, gravelly soils must be a minimum of 6 inches deep above the bedrock. Periodic rock-plowing increases soil depth. Cucumbers are relatively sensitive to flooding. There is a high risk of losing cucumber crops by flooding of low elevation marl soils. Planting on raised beds reduces losses during periods of flooding.

Typically cucumber beds are 36-40 inches wide, 6-8 inches high and spaced 6 ft between the centers of adjacent beds. Preplant fertilizer should be applied in two parallel bands, each about 9 inches from the center of the bed, and incorporated into the soil by rototilling to a depth of 4 to 6 inches. After rototilling, the bed must be re-formed. The bed should be irrigated and kept moist for at least one week to promote the germination of weed seeds. Then, if the bed has become dry, it should be irrigated again one day before the application of a fumigant. Either one irrigation T-tape or two T-tapes, 12 to 14 inches apart, are installed in the surface layer, and the bed is immediately covered with plastic mulch.

To allow sufficient time for the fumigant to dissipate completely, cucumber seedlings should not be transplanted into the fumigated bed until at least a week after application of the fumigant. Transplanting season extends from October to late February. Seedlings should be spaced 6-12 inches apart, and set 2-3 inches deep. If seedlings are planted in a "double row" (parallel rows 10-15 inches apart on the same bed), the within row spacing should be the same as in a single row planting.

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Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Therefore, tissue analysis is recommended for determining the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the County office of the Cooperative Extension Service. Information on plant tissue analysis for cucumber is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Generally 150-200 lb N per acre has been satisfactory for cucumber production. However less inorganic fertilizer should be applied if a cover crop or soil organic amendment (compost, biosolids, manure) has been applied. Preplanting fertilizer formulas of 6-6-6, 6-3-6, 10-10-10 or similar formulas are satisfactory. Somewhat less than one-half of the fertilizer should be applied to the beds prior to planting. Fertigation should be initiated with a 4-0-8 or similar formula 3-4 weeks after transplanting to provide the remaining fertilizer. The beds should be fertigated once or twice per week with daily rates ranging from 0.5 lb N to 2 lb N per acre. Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

Irrigation and freeze protection

Drip irrigation systems are used for cucumber production in Miami-Dade County. One T-tape per bed has proven to provide adequate amounts of water for the plants. The water requirements for young plants are very low. Irrigation frequencies of once or twice per week suffice for most plastic mulched young plants until 5 weeks after transplanting. Over irrigation should be avoided, since it stresses the plants and leaches the fertilizer from the root zone. A tensiometer installed at a 6-inch depth can be used for irrigation scheduling. Optimal plant growth and yields are achieved when the soil moisture is maintained at tensiometer readings between 10 to 15 cbars. The Miami-Dade County Cooperative Extension Service provides relevant information and calibrates tensiometers.

Cucumber is very sensitive to freezing temperatures of less than 1° F. Therefore, growers in Miami-Dade County arrange for freeze protection of cucumber from late November through February. A high volume sprinkler irrigation system with a water delivery rate of 0.25 inch per hour should be used.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. The major pests of cucumber are the melon thrips, melonworm, pickleworm, and spider mites.

Disease Management

Refer to the Vegetable Production Guide for Florida.

Weed Management

Refer to the Vegetable Production Guide for Florida.

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VEGETABLE PRODUCTION IN MIAMI-
DADE (CUCUMBER)**

Harvest

The harvest season extends from October through mid-December and from February through June. Cucumbers are picked by hand. Cucumbers (slicers and pickles) produced in Miami Dade County are used mainly for the domestic market.

Multiple Cropping/Rotation

Cucumber can be rotated with tomato, eggplant, pepper, herbs or squash. However there is risk in rotating cucurbits with solanaceous crops because of *Phytophthora* blight. This disease is caused by *Phytophthora capsici*, which develops explosively in moist conditions and produces large numbers of infective sporangia. The disease is very damaging and difficult to control.



Eggplant Production in Miami-Dade County ¹

Y.C. Li, H.H. Bryan, W. Klassen, M. Lamberts and T. Olczyk

SITUATION

Eggplant, a traditional vegetable crop in Miami-Dade County, is grown annually on 100 to 300 acres, and sold nationwide during the winter in the fresh market. Yields normally are more than 900 33-pound bushels/ac. The production cost may exceed \$7.50 per bushel or \$10,503/acre for an acceptable yield of 1,400 bushels/acre.

Varieties

Refer the Vegetable Production Guide for Florida for variety selection. The major varieties currently grown in the Miami-Dade County are 'Classic' and 'Megal'. The cultivar 'Thai' is grown for the local ethnic market.

Soils, Land Preparation and Transplanting

Since the fruit of eggplant is easily scratched and scarred by the action of strong winds, growers prefer fields partially surrounded by trees. Sugarcane can be planted to make an effective windbreak.

Eggplant in Miami-Dade County is grown on gravelly soils and occasionally on marl soils. Usually eggplant grows better on raised beds with plastic mulch than on flat fields. Some specialty varieties are grown on beds without plastic.

Typically eggplant beds are 36-40 inches wide, 6-8 inches high and spaced 6 ft between the centers of adjacent beds. Preplant fertilizer should be applied in two parallel bands, each about 9 inches from the center of the bed, and incorporated into the soil by rototilling to a depth of 4 to 6 inches. After rototilling, the bed must be re-formed. The bed should be irrigated and kept moist for at least one week to promote the germination of weed seeds. Then, if the bed has become dry, it should be irrigated again one day before the application of a fumigant. During the fumigation operation either one irrigation T-tape or two T-tapes, 12 to 14 inches apart, are installed in the surface layer, and the bed is immediately covered with plastic mulch.

To allow sufficient time for the fumigant to dissipate completely, eggplant seedlings should not be transplanted into the fumigated bed until at least one week after application of the fumigant.

The main transplanting season extends from September or October through January. Seedlings should be spaced 18-30 inches apart, and set 2-3 inches deep either in a single row or in a "double row" (two rows per bed with 10 to 15 inches between these rows). Eggplant

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does not need to be pruned, but the plants need to be held upright with twine attached to stakes. Each stake is a rod of rebar driven into the limestone bedrock with a 3-pound hammer or with an air-hammer.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Therefore, tissue analysis is recommended for determining the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the County office of the Cooperative Extension Service. Information on plant tissue analysis for eggplant is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Generally 150 lb N per acre has been satisfactory for eggplant production. However less inorganic fertilizer can be applied if a cover crops or soil organic amendment (compost, biosolids, manure) has been applied. Preplanting fertilizer formulas of 6-6-6, 6-3-6, 10-10-10 or similar formulas are satisfactory. All of the P fertilizer and less than one-half of N and K fertilizer should be applied to the beds prior to planting. Fertigation should be initiated with a 4-0-8 or similar formula 4-5 weeks after transplanting to provide the remaining fertilizer. The beds should be fertigated once or twice per week with daily rates ranging from 0.5 lb N to 2.5 lb N/acre (refer to the Vegetable Production Guide for Florida). Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

Irrigation and Freeze Protection

Drip irrigation systems are used for eggplant production in Miami-Dade County. Generally one T-Tape per bed provides adequate water for plants, although a second is beneficial especially while the plants' root systems are small. Water requirements for young plants are very low. Irrigation frequencies of once or twice per week suffice for most plastic mulched young plants until 5 weeks after transplanting. A tensiometer installed at a 6-inch depth can be used for irrigation scheduling. Optimal plant growth and yields are achieved when the soil moisture is maintained at tensiometer readings between 10 to 15 cbars. The Miami-Dade County Cooperative Extension Service provides relevant information and calibrates tensiometers.

Eggplant sustains chilling injury when temperatures drop to 30 °F. Therefore, growers in Miami-Dade County arrange for freeze protection of eggplant from the beginning of December through February. A high volume sprinkler irrigation system with a water delivery rate of 0.25 inch per hour should be used.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. Spider mites, two-spotted and red, plus broad mites and leafminers are serious pests on young plants. The most dangerous pest of eggplant is the melon thrips. However the melon thrips can be effectively controlled with timely applications of Spinosad formulations, such as SpinTor SC. The remaining pests tend not to cause major losses.

**SECTION 3
VEGETABLE PRODUCTION IN MIAMI-
DADE (EGGPLANT)**

Disease Management

Refer to the Vegetable Production Guide for Florida. Major diseases include Alternaria, Phomopsis, Phytophthora root rot, white mold, and southern blight.

Weed Management

Refer to the Vegetable Production Guide for Florida.

Harvest

Most eggplant is harvested from October through April, although some is harvested year-round. The fruit is picked by hand. Most of the eggplants produced in Miami Dade County are shipped to other states.

Multiple Cropping/Rotation

Eggplant can be rotated with tomato, cucumber, okra, watermelon, squash cucumber, watermelon, cantaloupe, specialty vegetables, and herbs. Often these relay crops are seeded or transplanted into existing beds. Crop rotation is dependent on good field sanitation to suppress pathogens and insects. There is risk in rotating eggplant with cucurbits because of Phytophthora blight. This disease is caused by *Phytophthora capsici*, which develops explosively in moist conditions and produces large numbers of infective sporangia. The disease is very damaging and difficult to control.

Okra Production in Miami-Dade County, Florida¹

Y. C. Li, H. H. Bryan, W. Klassen, M. Lamberts and T. Olczyk

SITUATION

Okra is a traditional vegetable crop in Miami-Dade County grown annually on 200 to 900 acres, and sold nationwide during the winter in the fresh market. Yields range from less than 600 cwt/acre to more than 1000 cwt/acre.

Varieties

Refer to the Vegetable Production Guide for Florida for variety selection. ‘Clemson Spineless 80’ is the major variety currently grown in the Miami-Dade County.

Soils, Land Preparation and Planting

Okra in Miami-Dade County is grown both on gravelly and marl soils. Okra is seeded directly into the soil. Plant spacings are 4-12 inches between plants and 36 inches between rows. Often growers plant okra following a winter vegetable crop, so that the fruits are harvested from early spring to late fall.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Therefore, tissue analysis is recommended for to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the County office of the Cooperative Extension Service. Information on plant tissue analysis for okra is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Generally 120-150 lb N per acre has been used satisfactorily for okra production. It may be possible to use less inorganic fertilizer if a cover crop has been grown. or if a soil organic amendment (compost, biosolids, manure) has been applied. Preplanting fertilizer formulas of 6-6-6, 6-3-6, 10-10-10 or similar formulas are satisfactory. For okra on flat ground all of the P and 20-30 percent N and K should be broadcast and incorporated prior to planting. The remainder of the fertilizer should be side-dressed in 2 or 3 applications beginning at 3-4 weeks after planting. Okra is often planted as second crop on plastic mulch. In this case the fertilizer is provided by fertigation once or twice per week with daily rates ranging from 0.5 lb N to 2 lb N/acre. Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

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Irrigation and Freeze Protection

A water cannon ("big gun") or pivot system can be used to irrigate okra on flat fields. Drip irrigation systems are used for okra on plastic mulch. One T-tape per bed has proven to provide adequate amounts of water for the plants. The water requirements for young plants are very low.

Okra sustains frost injury when temperatures drop 3°F below freezing. Few growers grow okra in the middle of winter.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. The major pest of okra is the melon thrips, which scars the fruit, and aphids. Although the silverleaf whitefly develops prolifically on okra, the plant compensates for the feeding damage. The main concern is that tremendous numbers of this pest migrate from okra fields to other crops, such as tomato, bean and ornamental crops.

Disease Management

Refer to the Vegetable Production Guide for Florida

Weed Management

Refer to the Vegetable Production Guide for Florida

Harvest

The harvest season extends from March through November. Okra is picked by hand and sold for local consumption, but primarily for shipment to other states.

Multiple Cropping/Rotation

If the plants are spaced far enough apart, they can be mowed after several harvests. The mowed plants will produce new growth with good yield. In practice such ratooning is repeated two or three times. Okra can be grown as a second crop after tomatoes, squash, beans, and cucumbers.

Pepper Production in Miami-Dade County, Florida¹

Y. C. Li, H. H. Bryan, W. Klassen, M. Lamberts and T. Olczyk²

SITUATION

Pepper is a very important traditional vegetable crop in Miami-Dade County grown on 3,650 to 13,403 acres during 1980-1996, and sold nationwide during the winter in the fresh market. Yields range from less than 800 to more than 1,400 bushels/acre. The production cost may exceed \$12.00 per bushel or \$12,100/acre for an acceptable yield of 1,000 28-pound bushels.

Varieties

Refer the Vegetable Production Guide for Florida for variety selection. The major varieties currently grown in the Miami-Dade County are as follows:

- Cubanelle type: 'Aruba', 'Key West', and 'Key Largo'.
- Specialty type: 'Habanero', 'Mitla jalapeno', 'Xatapa jalapeno', 'Grande jalapeno', 'Hungariane', 'Hot Wax', 'Messilla', 'Long Thin Red Cayenne', 'Large Red Thick Cayenne'.
- In recent years Bell type pepper has not been grown on a significant scale in Miami-Dade County.

Soils, Land Preparation and Transplanting

Pepper in Miami-Dade County is grown on gravelly soils or transition soils between gravelly and marl soils. Pepper is sensitive to flooding. There is a high risk of losing the peppers by flooding of marl soils, which have high water tables. Planting on raised beds reduces losses during periods of flooding.

Typically pepper raised beds are 36-40 inches wide, 6-8 inches high and spaced 6 ft between the centers of adjacent beds. Preplant fertilizer should be applied in two parallel bands, each about 9 inches from the center of the bed, and incorporated into the soil by rototilling to a depth of 4 to 6 inches. After rototilling, the bed must be re-formed. The bed should be irrigated and kept moist for at least one week to promote the germination of weed seeds. Then, if the bed has become dry, it should be irrigated again one day before the application of a fumigant. During the fumigation operation either one irrigation T-tape or two T-tapes, 12 to 14 inches apart, are installed in the surface layer, and the bed is immediately covered with plastic mulch.

To allow sufficient time for the fumigant to dissipate completely, pepper seedlings should not be transplanted into the fumigated bed until at least a week after application of the fumigant. Transplanting season extends from September to late February. Seedlings should

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be spaced 9-12 inches apart, and set 2-3 inches deep in "double rows" (parallel rows 10-15 inches apart on the same bed). In some varieties the plants must supported by means of a trellis consisting of short rebar stakes and string.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Therefore, tissue analysis is recommended to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the Miami-Dade County Cooperative Extension Service. Information on plant tissue analysis for pepper is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Generally 150-200 lb N per acre has been used satisfactorily for pepper production. Preplanting fertilizer formulas of 6-6-6, 6-3-6, 10-10-10 or similar formulas are satisfactory. All P fertilizer and less than one-half of N and K fertilizer should be applied to the beds prior to planting. Fertigation should be initiated with a 4-0-8 or similar formula 3-4 weeks after transplanting to provide the remaining fertilizer. The beds should be fertigated once or twice per week with daily rates ranging from 0.5 lb N to 2.0 lb N/acre (refer to the Vegetable Production Guide for Florida). Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

Irrigation and Freeze Protection

Drip irrigation systems are generally used for pepper production in Miami-Dade County. Generally one T-tape per bed provides adequate water for plants, although a second is beneficial especially while the plants' root systems are small. Water requirements for young plants are very low. Irrigation frequencies of once or twice per week suffice for most plastic mulched young plants. A tensiometer installed at 6" depth can be used for irrigation scheduling. Optimal plant growth and yields are achieved when the soil moisture is maintained at tensiometer readings between 10 to 15 cbars. The Miami-Dade County Cooperative Extension Service provides relevant information and services regarding tensiometers.

Pepper sustains chilling injury when temperatures drop 2° F below freezing. Therefore growers in Miami-Dade County make arrangements for freeze protection of pepper from the beginning of December through February. A high volume solid set sprinkler irrigation system with a water delivery rate of 0.25 inch per hour should be used. Row covers can also be used.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. The major pests of pepper are the pepper weevil, beet armyworm, tomato fruitworm, looper, and melon thrips. Preventive sprays are required against the pepper weevil, since by the time infested fruit begin to drop, many fruit are already infested. The flowers should be checked for presence of the melon thrips, and if they are present sprays should be applied without delay.

**SECTION 3
VEGETABLE PRODUCTION IN MIAMI-
DADE (PEPPER)**

Disease Management

Refer to the Vegetable Production Guide for Florida. Major diseases include bacterial spot, Phytophthora root rot and mosaic viruses.

Weed Management

Refer to the Vegetable Production Guide for Florida.

Harvest

The harvest season extends from November into April. All peppers are picked by hand.

Multiple Cropping/Rotation

Pepper can be rotated with tomato, squash, okra, cucumber, watermelon, cantaloupe, okra and other specialty vegetables or herbs. However there is risk in rotating peppers with cucurbits because of Phytophthora blight. This disease is caused by *Phytophthora capsici*, which develops explosively in moist conditions and produces large numbers of infective sporangia. The disease is very damaging and difficult to control.

Potato Production in Miami-Dade County, Florida¹

Y. C. Li, H. H. Bryan, W. Klassen, S. K. O'Hair, M. Lamberts and T. Olczyk

SITUATION

Potatoes are an important traditional vegetable crop in Miami-Dade County with annual plantings of 1,500-2,000 acres. Yields are low (ranging from less than 200 cwt/acre to more than 400 cwt/acre), because the crop is grown when the day lengths are short and temperatures low. The production cost in 1999-2000 was approximately \$18.79 per cwt or \$3,758/acre for an acceptable yield of 200 cwt/acre. Miami-Dade potatoes are sold mainly in the spring for the fresh market throughout the U.S. and Canada.

Varieties

Currently the major varieties grown in the Miami-Dade County are 'La Rouge' and 'La Chipper'.

Soils, Land Preparation and Planting

Potatoes in Miami-Dade County are grown on marl soils. Since marl soils are found at relatively low elevations, they are subject to flooding by the occasional occurrence of late season tropical storms or heavy rains. Sorghum/Sudan grass hybrid is commonly grown during the summer rainy season as a cover crop on land available for potato. The cover crop should be mowed, disked and plowed 4-6 weeks before planting. Planting of the cover crop is delayed until July to avoid infestation by the click beetle, whose eggs give rise to wireworms. Then a pre emergence herbicide may be applied.

The planting time for potatoes extends from November into late December. Planting should be in rows 36-42 inches apart with seed pieces placed 6 to 12 inches apart in the 3-4 inches deep furrow. Usually 20,000 to 30,000 seed pieces are planted per acre.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not presently available. Therefore, tissue analysis is recommended to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the Miami-Dade County Cooperative Extension Service. Information on plant tissue analysis for potato is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Generally 150-200 lb N per acre has been satisfactory for potato production. However less inorganic fertilizer should be applied if a soil organic amendment (compost, biosolids, manure) has been applied. Preplant fertilizer formulas of 6-

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6-12, 6-3-12, 6-12-10, 10-10-10 or similar formulas are satisfactory. Normally all of the P and K fertilizer is applied at planting. At least two thirds of the N should be applied with the P and K. Any remaining N should be applied as a side dress in liquid form 30-40 days after planting. Leaching rains may result in the need to side dress additional N. Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

Irrigation and Freeze Protection

Because of the high water table in marl soils, potatoes grown on deeper soils may not require irrigation during most of the season. However, irrigation is critically important for extended periods of drought. Brief periods of water stress can cause significant reductions in yield. A moving pipe irrigation system or overhead water cannon ("big gun") is commonly used for irrigation. Mature plants require approximately 1500 to 3500 gal. per acre per day. Over irrigation should be avoided, since it stresses plants and leaches fertilizer out of the root zone.

Potato sustains chilling injury when temperatures drop 2°F below freezing. However most growers do not provide solid set overhead sprinklers for protection against freezes. Neither the moving pipe irrigation system nor the overhead water cannon provides effective protection against freezing temperatures.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. The major insect pests of potato are wireworms and melon thrips. Other pests such as worms, aphids, whiteflies and aphids can also reach economically damaging levels. The diapaupes root weevil tends to be especially damaging in potato fields bordering on field nurseries. Although not currently a problem, plant parasitic nematodes can cause significant damage to the potato crop.

Disease Management

Refer to the Vegetable Production Guide for Florida.

Weed Management

Refer to the Vegetable Production Guide for Florida.

Harvest

The harvest season extends from March to May. All harvesting is accomplished with mechanical harvesters. The potatoes are normally vine-killed three to four weeks prior to harvest to encourage skin set.

Multiple Cropping/Rotation

Because potatoes are planted late in the dry winter season, few alternate crops develop rapidly enough to mature before or after the potato season. The rainy season begins soon after the potatoes are harvested. At this time, management of alternate vegetable crops would be difficult.

Summer Squash Production in Miami-Dade County, Florida¹

Y. C. Li, H. H. Bryan, W. Klassen, M. Lamberts and T. Olczyk

SITUATION

Summer squash is a very important traditional vegetable crop in Miami-Dade County grown annually on 3,000 to 6,000 acres, and sold nationwide during the winter in the fresh market. The production cost in 1999-2000 was approximately \$13.64 per 42-pound bushel or \$4,093/acre for an acceptable yield of 300 42-pound bushels/acre.

Varieties

Refer to the Vegetable Production Guide for Florida for variety selection. The major varieties currently grown in the Miami-Dade County are as follows:

- Yellow crookneck type: 'Medallion', 'Sunglo', 'Horn of Plenty', and 'Dixie'.
- Straight neck type: 'Enterprise', 'Lemondrop L', 'Fortune', and 'Goldbar'.
- Zucchini type: 'Senator', 'Seneca', 'Cashflow', 'Caiman', 'RSQ5058', and 'Dividend'.

Soils, Land Preparation and Transplanting

Squash in Miami-Dade County is grown on gravelly soils, but occasionally on marl soils. Also, sandy soils in the west Kendall area are suitable for squash. Gravelly soils must be a minimum of 6 inches deep above the bedrock. Periodic rock-plowing increases soil depth. Squash can be planted on flat ground or on plastic mulched raised beds following crops of tomato, eggplant or pepper. Squash is relatively sensitive to flooding. There is a high risk of losing the squash crop by flooding of marl soils with high water tables.

The planting season extends from September into February. When squash is planted on flat ground, rows are spaced 36 inches apart; plants within the row are spaced 10-15 inches apart. Typically squash beds are 36-40 inches wide, 6-8 inches high and spaced 6 ft between the centers of adjacent beds. Transplanted seedlings should be spaced 10-15 inches apart, and set 2-3 inches deep. Usually double rows are used.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Tissue analysis is recommended to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the Miami-Dade County Cooperative Extension Service. Information on plant tissue analysis for squash

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is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Preplanting fertilizer formulas of 6-6-6, 6-3-6, 10-10-10 or similar formulas are satisfactory. Generally 150-200 lb N per acre has been used satisfactorily for squash production. For squash as the first crop on plastic mulch, less than one-half of the fertilizer should be applied to the beds prior to planting. Fertigation should be initiated with a 4-0-8 or similar formula 3-4 weeks after transplanting to provide the remaining fertilizer. For squash as second crop on plastic mulch, only inject N and K through fertigation. For squash on flat land, all of the phosphorus fertilizer and 30-40 percent of N and K should be applied at planting, and the remainder should be side-dressed in 1 or 2 applications before the vines begin to spread. Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

Irrigation and Freeze Protection

For squash on plastic mulch, a drip irrigation system with one T-tape per bed provides adequate water, although a second is beneficial especially while the plants' root systems are small. Water requirements for young plants are very low. Irrigation frequencies of once or twice per week suffice for most plastic mulched young plants until 3-4 weeks after transplanting. A tensiometer installed at 6" depth can be used for irrigation scheduling. Optimal plant growth and yields are achieved when the soil moisture is maintained at tensiometer readings between 10 to 15 cbars. The Miami-Dade County Cooperative Extension Service provides relevant information and calibrates tensiometers.

Squash sustains chilling injury when temperatures drop about 2°F below freezing. Because of the cost of solid set overhead sprinklers, many squash growers in Miami-Dade County do not provide freeze protection for squash.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. Major insects include aphids, whiteflies, melon and pickleworm, thrips Palmi, spidermites, armyworm, and looper.

Disease Management

Refer to the Vegetable Production Guide for Florida.

Weed Management

Refer to the Vegetable Production Guide for Florida.

Harvest

The harvest season extends from October into April. Squash is hand picked.

Multiple Cropping/Rotation

Squash is often used as second crop after tomato and eggplant on plastic mulch and can rotated with bean or okra on flat ground. There is risk in rotating cucurbits with solanaceous crops because of *Phytophthora* blight. This disease is caused by *Phytophthora*

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capsici, which develops explosively in moist conditions and produces large numbers of infective sporangia. The disease is very damaging and difficult to control.

**SECTION 3
VEGETABLE PRODUCTION IN MIAMI-
DADE (SWEET CORN)**

Sweet Corn Production in Miami-Dade County, Florida¹

Y. C. Li, H. H. Bryan, W. Klassen, M. Lamberts and T. Olczyk

SITUATION

In 1995-96, gross sales from approximately 14,300 acres of sweet corn in Miami-Dade County were at \$9.8 million, with an average yield of roughly 300-450 42-lb crates per acre. In 1999-2000 the production cost was approximately \$12.91 per crate or \$3,874/acre for an acceptable yield of 300 42-pound crates per acre. Sweet corn produced in Miami-Dade County is sold for the fresh market nationwide during winter and spring.

Varieties

Refer to the Vegetable Production Guide for Florida for variety selection. Currently the major varieties grown in Miami-Dade County are 'Primetime', 'Summersweet 9730', and 'Sunvolt'. Bt-corn hybrids are not grown because they cannot be exported to Europe.

Soils, Land Preparation and Planting

Sweet corn in Miami-Dade County is grown on both gravelly and marl soils. Sandy soils (west Kendall area) also are suitable for sweet corn. To be suitable, gravelly soils must be a minimum of 6 inches deep above the bedrock. Sweet corn is relatively tolerant to flooding. Nevertheless both, yield and quality are reduced under prolonged flooding.

The planting season for sweet corn extends from early October to January and occasionally February. Typically seed is spaced 6-8 inches within the row and rows are spaced 28-32 inches apart. Seeding rates of 20,000 to 22,000 seeds per acre are used.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Tissue analysis is recommended to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the Miami-Dade County Cooperative Extension Service. Information on plant tissue analysis for sweet corn is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Preplant fertilizer formulas of 6-6-6, 6-3-6, 10-10-10 or similar formulas are satisfactory. Generally 150-200 lb N per acre has been satisfactory for sweet corn production though some varieties may require more. All of the phosphorus and two thirds of the N and K fertilizer should be applied as dry fertilizer prior to planting. The remainder should be side dressed 2 to 4 times during the season.

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Irrigation and Freeze Protection

Center pivot, in line low volume sprinklers or traveling guns can be used for irrigation. Irrigation frequencies depend on plant growth stages, soil type and weather conditions. Normally corn is irrigated once every 5-7 days though more frequent irrigation may be required at certain growth stages during drought weather.

Sweet corn has little resistance to frost. Indeed chilling injury occurs when temperatures drop 2°F below freezing. Because of the cost of solid set overhead sprinklers, most sweet corn growers in Miami-Dade County do not provide freeze protection for sweet corn.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. The major pests are the fall armyworm, the corn silk fly, lesser cornstalk borer, cutworms, and wireworms.

Disease Management

Refer to the Vegetable Production Guide for Florida. Major diseases include maydis, northern leaf blight (*Helminthosporium turcicum*), smut (*Ustilago maydis*) rusts (*Puccinia sorghi*, *P. polysora*), bacterial leaf spot (*Pseudomonas avenae*), corn stunt diseases caused by a spiroplasma and a mycoplasma-like organism and several viruses including maize mosaic virus, maize dwarf mosaic virus, maize stripe virus, and sugarcane mosaic virus.

Weed Management

Refer to the Vegetable Production Guide for Florida.

Harvest

Harvesting season extends from January through April. The harvest date depends on the variety. When hand harvested, sweet corn usually is packed in the field.

Multiple Cropping/Rotation

Because of the long residual action of certain herbicides commonly used in corn production, few crops can be grown in rotation with sweet corn.

Tomato Production in Miami-Dade County, Florida¹

Y. C. Li, H. H. Bryan, W. Klassen, M. Lamberts and T. Olczyk

SITUATION

Tomatoes are an important traditional vegetable crop in Miami-Dade County with acreages varying between 3,650 and 13,403 acres during 1980-1996. Yields range from less than 1,200 25-pound cartons/acre to more than 2,000 cartons/acre. The production cost in 1999-2000 was approximately \$8.22 per carton or \$11,507/acre for an acceptable yield of 1,400 cartons/acre. Tomatoes produced in Miami-Dade County are sold nationwide for the fresh market during the winter and spring.

Tomato Varieties

Refer the Vegetable Production Guide for Florida for variety selection. Currently the major varieties grown in Miami-Dade County are as follows:

- ‘Sanibel’: a late-midseason, determinate, jointless hybrid. Fruit are deep oblate with a green shoulder. Disease tolerant or resistant to: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), Alternaria stem canker, root-knot nematodes and gray leaf spot.
- ‘Florida 47’: a mid- to late season, determinate, jointed hybrid. Fruit are deep globe shaped and uniform green. Resistant to: Verticillium wilt (race 1), Fusarium wilt (races 1 and 2), Alternaria stem canker, and gray leaf spot.
- Minor large-fruited varieties include: ‘Agriset 761’, ‘Solar Set’, ‘Solimar’.
- Plum types: ‘Spectrum 882’, ‘BHN 410’, ‘BHN 411’, ‘BHN 404’, ‘Plum Dandy’, ‘Puebla’
- Cherry types: ‘Cherry Grande’, and ‘Super Sweet 100’
- Grape types: ‘Santa Claus’, ‘Tropical Ruby’

Soils, Land Preparation and Transplanting

Tomatoes in Miami-Dade County are grown mainly on gravelly soils (Krome or Chekika soil series). Most gravelly soils are rock-plowed on a regular basis, a process that creates 6-12 inches soil depth above consolidated bedrock. The optimization of fertilizer and irrigation management for these gravelly soils is essential to obtain high yields. Sandy soils (west Kendall area) are also suitable for tomatoes. At the present time, tomatoes are not grown on marl soils. However prior to the 1950s, tomatoes were only grown on marl soils. Most marl soils are at low elevations, and are prone to frequent flooding.

Typically tomato beds are 36-40 inches wide, and 6-8 inches high with 6 ft between the centers of adjacent beds. Preplant fertilizer should be applied in two parallel bands, each about 9 inches from the center of the bed. Next the bed should be rototilled to a depth of 4 to

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6 inches, and then the bed must be re-formed. The bed should be irrigated and kept moist for at least one week to promote the germination of weed seeds. If the bed has become dry, it should be irrigated again one day before the application of a fumigant. During the fumigation operation either one irrigation T-tape or two T-tapes, 12 to 14 inches apart, are installed in the surface layer and the bed is immediately covered with plastic mulch.

In order to allow the fumigant to dissipate completely, tomato seedlings should not be transplanted into a fumigated bed until at least a week after application of the fumigant. Transplanting season in the area is from August to late February. However, the ideal period for transplanting is from September to late January. Seedlings (“transplants”) should be spaced 18 to 24 inches apart, and set 2-3 inches deep either in a single row or in two rows (“double row”), with 10 to 15 inches between these rows. When planted in a single row the plants are held upright with twine attached to stakes. However when planted in double rows (two rows per bed), the plants are not supported with twine and stakes. Since wooden stakes can be used only on sandy soils, on most fields in Miami-Dade County rebar rods are used. Rebar rods are pounded into the limestone bedrock by means of an air-hammer or with a 3-pound hammer. Plants should be pruned, both before staking and at the early flowering stage, in order to increase fruit size.

Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Therefore, tissue analysis is recommended to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the Miami-Dade County Cooperative Extension Service. Information on plant tissue analysis for tomatoes is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the target yield, variety, soil fertility and other environmental factors. Generally 150-200 lb N per acre has been used satisfactorily for tomato production. However less inorganic fertilizer should be applied if a cover crop has been grown and the residue incorporated into the soil, or if a soil organic amendment (compost, biosolids, manure) has been applied. Preplanting fertilizer formulas of 6-6-12, 6-3-12, 10-10-10 or similar formulas are satisfactory. Somewhat less than one-half of the fertilizer should be applied to the beds prior to planting. Fertigation should be initiated with a 4-0-8 or similar formula 3-4 weeks after transplanting to provide the remaining fertilizer. The beds should be fertigated once or twice per week with daily rates ranging from 0.5 lb N to 2.5 lb N; and the rate adjusted upwards at 3-4 week intervals as the plant biomass increases. Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

Irrigation and Freeze Protection

Drip irrigation systems are used for tomato production in Miami-Dade County. Generally one T-tape per bed provides adequate water for plants, although a second is beneficial especially while the plants' root systems are small. Water requirements for young plants are very low. Irrigation frequencies of once or twice per week suffice for most plastic mulched young plants until 5 weeks after transplanting. A tensiometer installed at 6” depth

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VEGETABLE PRODUCTION IN MIAMI-
DADE (TOMATO)

can be used for irrigation scheduling. Mature plants require approximately 1500 to 3500 gal. per acre. Over irrigation should be avoided since it stresses plants and leaches fertilizer out of the root zone. Optimal plant growth and yields are achieved when the soil moisture is maintained at tensiometer readings between 10 to 15 cbars. The Miami-Dade County Cooperative Extension Service provides relevant information and services regarding tensiometers.

Tomato sustains chilling injury when temperatures drop 2°F below freezing. Therefore growers in Miami-Dade County arrange for freeze protection of tomato from the beginning of December through February. A high volume sprinkler irrigation system, which applies 0.25 inch of water per hour, should be used.

Insect Management

Refer to the Vegetable Production Guide for Florida for extensive information on insect control. The silverleaf whitefly, *Bemisia argentifolii*, arrived in Florida about 1985. This pest reproduces explosively on solanaceous crops, and it has many other hosts. The feeding of this pest causes uneven ripening of tomato. In addition it is a highly efficient vector of geminiviruses. One of the latter, the devastating Tomato Yellow Leaf Curl Virus, appeared in Homestead in 1997. In order to prevent the transmission of this virus, growers are spending about \$200 more per acre of tomato per year for insecticides - mostly for Admire^R - than before the arrival of this virus. Good field sanitation and prophylactic use of a systemic insecticide are essential for the suppression of the silverleaf whitefly. Other major insects include leafminer, armyworm, tomato fruitworm, looper, and aphids.

Weed Management

Refer to the Vegetable Production Guide for Florida.

Disease Management

Refer to the Vegetable Production Guide for Florida.

Harvest

The harvest season extends from December to May. Most tomatoes are picked by hand as "mature greens" for market in the northeastern states. "Vine-ripe" tomatoes, those to be shipped moderate distances or to local markets, are usually harvested by hand at the "breaker" stage or the "pink" stage.

Multiple Cropping/Rotation

After completion of the tomato harvest, squash, okra, cucumber, watermelon, cantaloupe, okra and other specialty vegetables or herbs often are seeded or transplanted into the existing beds. Crop rotation is dependent on good field sanitation to suppress pathogens and insects.

**SECTION 3
VEGETABLE PRODUCTION IN
MIAMI-DADE**

Table 1. Vegetable Production in Miami-Dade County.

Crop common name	Scientific name	Family	Spacing (in.) plant/row	Bedded ¹	Plastic mulch ¹	Drought tol ²	Flood tol ³
Basil	<i>Ocimum basilicum</i>	Labiatae	4-12 / 18-36	Yes/No	Yes/No	No	No
Bean, Bush	<i>Phaseolis vulgaris</i>	Leguminosae	2-4 / 30	No	No	No	No
Bean, Pole	<i>Phaseolis vulgaris</i>	Leguminosae	3-5 / 36-48	No	No	No	No
Bitter Melon (Gourd)	<i>Monardica charantia</i>	Cucurbitaceae	8-12 / 36-48	No/Yes	No/Yes	No	No
Cabbage	<i>Brassica oleracea var. capitata</i>	Cruciferae	5-10 / 36	No/Yes	No/Yes	No	No
Calabaza	<i>Cucurbita moschata</i>	Cucurbitaceae	36-60 / 96-144	No	No	Moderate	No
Cassava	<i>Manihot esculenta</i>	Euphorbiaceae	36 / 36	No	No	Moderate	No
Cowpea, Long Bean	<i>Vigna sinensis var. sesquipedalis</i>	Leguminosae	8-12 / 36-48	No/Yes	No	Moderate	No
Cowpea, Southern Field Pea	<i>Vigna sinensis</i>	Leguminosae	3-6 / 30	No/Yes	No	Moderate	No
Cucumber, Pickling	<i>Cucumis sativus</i>	Cucurbitaceae	6-12 / 48-60	No/Yes	No/Yes	No	No
Eggplant	<i>Solanum melongena</i>	Solanaceae	18-40 / 36	Yes/No	Yes/No	No	No
Eggplant, Thai/Chinese	<i>Solanum melongena</i>	Solanaceae	18-40 / 36-72	Yes/No	Yes/No	No	No
Lemongrass	<i>Cymbopogon citratus</i>	Gramineae	12-48 / 36-48	No/Yes	No/Yes	Slight	No
Malanga	<i>Xanthosoma sagittifolium</i>	Araceae	12-24 / 48-55	Yes	No	No	No
Melon, Watermelon	<i>Citrullus lanatus</i>	Cucurbitaceae	24-72 / 60-108	No/Yes	No/Yes	No	No
Melon, Winter Melon	<i>Benincasa hispida</i>	Cucurbitaceae	36-60 / 96-144	No/Yes	No/Yes	No	No
Okra	<i>Hibiscus esculentus</i>	Malvaceae	4-10 / 36	No	No	Slight	No
Pepper, Bell	<i>Capsicum annuum</i>	Solanaceae	10-24 / 36	Yes/No	Yes/No	No	No
Pepper, Hot	<i>Capsicum annuum</i>	Solanaceae	10-24 / 36	Yes/No	Yes/No	No	No
Potato	<i>Solanum tuberosum</i>	Solanaceae	6-12 / 38	Yes	No	No	No
Squash, yellow	<i>Cucurbita pepo</i>	Cucurbitaceae	12-24 / 36	Yes/No	Yes/No	No	No
Squash, Zucchini	<i>Cucurbita pepo</i>	Cucurbitaceae	12-24 / 36	Yes/No	Yes/No	No	No
Strawberry	<i>Fragaria ananassa</i>	Rosaceae	8-14 / 12-14	Yes	Yes	No	No
Sweet Corn	<i>Zea mays</i>	Gramineae	6-8 / 30	No	No	No	No
Sweetpotato (Boniato)	<i>Ipomoea batatas</i>	Convolvulaceae	5-10 / 48-55	Yes	No	No	No
Taro (Dasheen)	<i>Colocasia esculenta</i>	Araceae	12-24 / 48-55	Yes	No	No	Yes/some types
Tomato	<i>Lycopersicon esculentum</i>	Solanaceae	12-32 / 72	Yes	Yes/No	No	No
Watercress	<i>Nasturtium officinale</i>	Cruciferae	Broadcast	No	No	No	Yes

**SECTION 3
VEGETABLE PRODUCTION IN
MIAMI-DADE**

Table 1. Vegetable Production in Miami-Dade County.

Crop common name	Cold tol ⁴		Damage temp ⁵		Salt tol ⁶		Hurricane tol		N-rate/A ⁷		P2O5-rate/A ⁷		K2O-rate/A ⁸		Irrig. Req ⁹		Insect Req ¹⁰	
	No	Yes	Unk.	Unk.	Unk.	No	No	No	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	High	High	Drip	High
Basil	No	No	Unk.	Unk.	No	No	No	No	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	High	High	Drip	High
Bean, Bush	No	No	40	Low	No	No	No	No	100	0-120	0-120	0-120	0-120	0-120	High	High	Overhead	High
Bean, Pole	No	No	40	Low	No	No	No	No	101	0-120	0-120	0-120	0-120	0-120	High	High	Overhead	High
Bitter Melon (Gourd)	No	No	40	Unk.	No	No	No	No	150	0-120	0-120	0-120	0-120	0-120	High	High	Overhead	High
Cabbage	Yes	No	32	Med	No	No	No	No	175	0-150	0-150	0-150	0-150	High	High	Overhead	High	
Calabaza	No	No	40	Unk.	No	No	No	No	N.R.	N.R.	N.R.	N.R.	N.R.	Medium	Medium	Overhead	Med.	
Cassava	No	No	Unk.	Unk.	No	No	No	No	N.R.	N.R.	N.R.	N.R.	N.R.	Medium	Medium	Overhead	Low	
Cowpea, Long Bean	No	No	Unk.	Unk.	No	No	No	No	90	0-120	0-120	0-120	0-120	Medium	Medium	Overhead	Low	
Cowpea, Southern Field Pea	No	No	40	Unk.	No	No	No	No	60	0-80	0-80	0-80	0-80	Medium	Medium	Overhead	Low	
Cucumber, Pickling	No	No	40	Med	No	No	No	No	150	0-120	0-120	0-120	0-120	High	High	Overhead	High	
Eggplant	No	No	40	Unk.	No	No	No	No	150	0-160	0-160	0-160	0-160	High	High	Overhead	High	
Eggplant, Thai/Chinese	No	No	40	Unk.	No	No	No	No	160	0-160	0-160	0-160	0-160	High	High	Overhead	High	
Lemongrass	No	No	Unk.	Unk.	No	No	No	No	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	Overhead	Low	
Malanga	No	No	40	Unk.	No	No	No	No	N.R.	N.R.	N.R.	N.R.	N.R.	High	High	Overhead	Low	
Melon, Watermelon	No	No	40	Unk.	No	No	No	No	150	0-150	0-150	0-150	0-150	High	High	Overhead	High	
Melon, Winter Melon	No	No	40	Unk.	No	No	No	No	150	0-150	0-150	0-150	0-150	Medium	Medium	Overhead	Med.	
Okra	No	No	40	Unk.	No	No	No	No	120	0-150	0-150	0-150	0-150	Medium	Medium	Overhead	Med.	
Pepper, Bell	No	No	40	Med	No	No	No	No	200	0-150	0-150	0-150	0-150	High	High	Drip	High	
Pepper, Hot	No	No	40	Unk.	No	No	No	No	201	0-150	0-150	0-150	0-150	High	High	Drip	High	
Potato	Slight	No	32	Med	No	No	No	No	200	0-120	0-120	0-120	150	High	High	Overhead	High	
Squash, yellow	No	No	40	Med	No	No	No	No	150	0-120	0-120	0-120	0-120	High	High	Overhead	High	
Squash, Zucchini	No	No	40	Med	No	No	No	No	150	0-120	0-120	0-120	0-120	High	High	Overhead	High	
Strawberry	Slight	No	32	Unk.	No	No	No	No	150	0-150	0-150	0-150	0-150	High	High	Drip	High	
Sweet Corn	No	No	40	Med	No	No	No	No	200	0-150	0-150	0-150	0-150	High	High	Overhead	High	
Sweetpotato (Boniato)	No	No	40	Unk.	No	No	No	No	60	0-120	0-120	0-120	0-120	Medium	Medium	Overhead	Med.-High	
Taro (Dasheen)	No	No	40	Unk.	No	No	No	No	N.R.	N.R.	N.R.	N.R.	N.R.	High	High	Overhead	Low	
Tomato	No	No	Unk.	Med	No	No	No	No	200	0-150	0-150	0-150	0-150	High	High	Drip	High	
Watercress	No	No	40	Unk.	No	No	No	No	N.R.	N.R.	N.R.	N.R.	N.R.	High	High	Flood	High	

**SECTION 3
VEGETABLE PRODUCTION IN
MIAMI-DADE**

Table 1. Vegetable Production in Miami-Dade County.

Crop common name	Fungicide Req ¹¹	Yld/acre ¹²	Unit ¹³	Weight of unit
Basil	High	833	Bun	1 lb
Bean, Bush	High	251	Bu	32 lbs
Bean, Pole	High	279	Bu	32 lbs
Bitter Melon (Gourd)	High	175	Cwt	100 lbs
Cabbage	Med.	602 - 723	Ctn	50 lbs
Calabaza	Med.	110	Cwt	100 lbs
Cassava	Low	150	Cwt	100 lbs
Cowpea, Long Bean	Low	279	Bu	32 lbs
Cowpea, Southern Field Pea	Low	16	Cwt	100 lbs
Cucumber, Pickling	High	287	Bu	55 lbs
Eggplant	High	924	Bu	33.3 lbs
Eggplant, Thai/Chinese	High	727	Bu	50 lbs
Lemongrass	Low	334	Bun	1 lb
Malanga	Low	10	Cwt	100 lbs
Melon, Watermelon	High	315	Cwt	100 lbs
Melon, Winter Melon	Med.	150	Cwt	100 lbs
Okra	Med.	40	Cwt	100 lbs
Pepper, Bell	High	1356	Bu	28 lbs
Pepper, Hot	High	190	Cwt	100 lbs
Potato	High	251	Cwt	100 lbs
Squash, yellow	High	346	Bu	42 lbs
Squash, Zucchini	High	346	Bu	42 lbs
Strawberry	High	2998	Flats	12 lbs
Sweet Corn	High	419	Ctn	42 lbs
Sweetpotato (Boniato)	Low	128	Cwt	100 lbs
Taro (Dasheen)	Low	103	Cwt	100 lbs
Tomato	High	1807	Ctn	25 lbs
Watercress	Med.	632	Cwt	100 lbs

¹¹ Yes/No = normally yes, but not a requirement for growing the crop. No/Yes = Not normally, but there are occasions when beds are used. Bedding and use of plastic mulch are

**SECTION 3
VEGETABLE PRODUCTION IN
MIAMI-DADE**

normally linked, especially when drip tubing is the main irrigation medium. However, exceptions occur for crops such as sweetpotato and malanga.

² Based on casual observations. Nevertheless, adequate and uniformly available water is needed to obtain normal yields in all crops.

³ Based on casual observations. Young plants are more sensitive to flooding than older, taller plants; and root flooding versus whole plant flooding effects are unknown.

⁴ Based data collected in northern states.

⁵ Based on casual observations. Extended cold periods more than 8 hours below 40 can cause reductions in final yield.

⁶ Based on data from USDA Handbook No. 60, 1-160, 1954. Unk. = Unknown.

⁷ Rates are IFAS recommendations for vegetables in Florida. The numbers for most crops have not been validated for Miami-Dade County. N.R. = No published recommendations.

⁸ Rates are IFAS recommendations for vegetables in Florida, based on soil analysis. There is no accurate analysis for this compound for Miami-Dade soils.

⁹ Based on IFAS statewide recommendations.

¹⁰ Based on typical currently-known insect pressure.

¹⁰ Based on current general levels of fungal and bacterial disease pressure.

¹¹ Based on Miami-Dade County USDA-FSA average crop yield data. Use of improved varieties, extended harvests, and optimal growing conditions can result in higher yields.

¹² Bun = bundles or bunches, Bu = bushels, Ctn = cartons, Cwt = hundred weight

**SECTION 4
COMMERCIAL ORNAMENTAL
HORTICULTURE IN MIAMI-DADE**
