

## Chapter 22. Sweetpotato Production in Florida

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### BOTANY

#### Nomenclature

**Family** - Convolvulaceae

**Sweetpotato** - *Ipomoea batatas*

#### Origin

Originating in tropical America, the sweetpotato was cultivated by pre-Inca farmers.

#### Related species

Water convolvulus, water spinach, and kangkong (*Ipomoea aquatica*), both upland and aquatic types, are grown as leafy vegetables in the tropics. This crop is illegal in Florida due to the noxious weed potential in fresh waterways. The tops of sweetpotato, especially varieties with short internodes, are sometimes used as a substitute for water convolvulus.

### VARIETIES

Sweetpotato varieties grown in Florida include:

- Beauregard
- Covington
- Hernandez
- Jewel
- Picadito (Boniato)

### PLANTING AND SEEDING

Planting dates and seeding information for sweet potato are given in Table 1.

### FERTILIZER AND LIME

Broadcast all P<sub>2</sub>O<sub>5</sub>, micronutrients, and 25 to 50% of N and K<sub>2</sub>O before planting. Better fertilizer efficiency might result by banding P<sub>2</sub>O<sub>5</sub> and micronutrients when beds are made. Sidedress remaining N and K<sub>2</sub>O by banding in side of bed in one or two applications before vines cover sides of beds. Soil test and fertilizer recommendations for sweetpotato on mineral soils are given in Table 2.

### PLANT TISSUE ANALYSIS

Plant tissue analysis information for sweetpotato is given in Table 3. The analysis was done before initiation of root enlargement, using the most recently matured leaf.

### IRRIGATION

Sweetpotato water requirements (see Chapter 3, *Principles and Practices for Irrigation Management of Vegetables*, Table 4 to 6) increase from 20% of ETo during early growth to 60% of ETo during rapid growth and root enlargement (see Chapter 3, *Principles and Practices for Irrigation Management of Vegetables* Table 3). Proper water management is essential for optimum root sizing.

Water requirements and subsequent irrigation requirements may be reduced to 70% of ETo during the last few weeks of growth.

**Table 1.** Planting information for sweetpotato.

| Planting dates                   |                                    |
|----------------------------------|------------------------------------|
| North Florida                    | Mar - June                         |
| Central Florida                  | Feb - June                         |
| South Florida                    | Dec - Sept                         |
|                                  | (orange fleshed types)             |
|                                  | Year-round (boniato/batatas types) |
| Planting information             |                                    |
| Distance between rows (in)       | 36 - 48                            |
| Distance between plants (in)     | 10 - 12                            |
| Planting depth (in)              | 3 - 4                              |
| Transplants needed per acre      | 9,000 - 15,000                     |
| Days to maturity from transplant | 85 - 130                           |
| Plant populations (acre)         | 9,000 - 15,000                     |

**Table 2.** Soil test and fertilizer recommendations for mineral soils for sweetpotato (beds on 36 to 42 inch centers).<sup>1</sup>

| Target pH          | N lb/A <sup>2</sup> | P <sub>2</sub> O <sub>5</sub> <sup>2</sup> |     |    |   |    | K <sub>2</sub> O |     |    |   |    |
|--------------------|---------------------|--|-----|----|---|----|------------------|-----|----|---|----|
|                    |                     | VL   | L   | M  | H | VH | VL               | L   | M  | H | VH |
| (lb/A/crop season) |                     |  |     |    |   |    |                  |     |    |   |    |
| 6.5                | 60                  | 120  | 100 | 80 | 0 | 0  | 120              | 100 | 80 | 0 | 0  |

<sup>1</sup> See Chapter 2 section on supplemental fertilizer application and best management practices, pg 11.  
<sup>2</sup> Seeds and transplants may benefit from applications of a starter solution at a rate no greater than 10 to 15 lbs/acre for N and P<sub>2</sub>O<sub>5</sub>, and applied through the plant hole or near the seeds.

**Table 3.** Plant tissue analysis for sweetpotato just before roots begin to enlarge. Dry wt. basis.

| Status         | N        | P        | K        | Ca       | Mg        | S        | Fe                | Mn      | Zn      | B       | Cu     |
|----------------|----------|----------|----------|----------|-----------|----------|-------------------|---------|---------|---------|--------|
|                | Percent  |          |          |          |           |          | Parts per million |         |         |         |        |
| Deficient      | <3.0     | 0.2      | 2.0      | 0.5      | 0.25      | 0.2      | 40                | 40      | 25      | 25      | 5      |
| Adequate range | 3.0 -4.0 | 0.2 -0.3 | 2.0 -4.0 | 0.5 -1.8 | 0.25 -0.5 | 0.2 -0.4 | 40 -100           | 40 -100 | 25 - 40 | 25 - 40 | 5 - 10 |
| High           | >4.0     | 0.3      | 4.0      | 1.8      | 0.5       | 0.4      | 100               | 100     | 40      | 40      | 10     |

**Table 4.** Chemical weed controls: sweetpotato

| Herbicide   | Labeled crops   | Time of application to crop                | Rate (lbs. AI./Acre) |       |
|---|---|--|----------------------|-------|
|   |   |  | Mineral              | Muck  |
| Carfentrazone (Aim)   | Sweetpotato   | Preplant<br>Directed-hooded<br>Row-middles | 0.031                | 0.031 |
| <b>Remarks:</b> Aim may be applied as a preplant burndown treatment and/or as a post-directed hooded application to row middles for the burn-down of emerged broadleaf weeds. May be tank mixed with other registered herbicides. May be applied at up to 2 oz (0.031 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant at recommended rates. |   |  |                      |       |
| Clethodim (Select 2 EC) (Arrow) (Select Max)  | Sweetpotatoes, Yams (other tuberous and corm vegetables)        | Postemergence                              | 0.09-0.25            |       |
| <b>Remarks:</b> Postemergence control of actively growing annual grasses. Apply at 6-16 fl oz/acre (Select, Arrow) or 9-16 fl oz/acre (Select Max). Higher rates are listed for perennial grasses. Use a crop oil concentrate for Select and Arrow, but a non-ionic surfactant may be used for Select Max. Do not apply within 30 days of harvest.  |   |  |                      |       |
| Clomazone (Command 3 ME)  | Sweetpotato   | Pretransplant<br>Posttransplant            | 0.48-0.56            | ---   |
| <b>Remarks:</b> For control of annual grasses and broadleaf weeds, apply broadcast 1.3 pints/acre. Also, may be applied as a single application post transplant to the crop and prior to weed emergence at a maximum rate of 1.5 pints/acre.  |   |  |                      |       |
| Clomazone (Command 3 ME)  | Tuberous and Corm vegetables (arracacha, cassava, taniar, yams) |  | 0.75-1.24            | ---   |
| <b>Remarks:</b> For control of grasses and broadleaf weeds apply 2 to 3.3 pints/acre broadcast. Try on trial basis only on arracacha, cassava and taniar.   |   |  |                      |       |
| DCPA (Dacthal)  | Sweetpotato   | Posttransplanting or layby                 | 8-10.5               | ---   |
| <b>Remarks:</b> Controls germinating annuals. Apply to moist soil or overhead-irrigate. Apply to weed-free field up to 6 weeks after transplanting.   |   |  |                      |       |
| Fluazifop (Fusilade)  | Sweetpotato, Yams   | Postemergence                              | 0.188                | 0.188 |
| <b>Remarks:</b> Controls actively growing grass weeds. A total of 48 oz. product may be applied per season. Do not harvest within 55 days of application. Apply a crop oil concentrate or non-ionic surfactant in the spray mixture. Consult the label for specific rates and growth stage for best control.  |   |  |                      |       |
| Glyphosate (Roundup)  | Sweetpotato   | Preplanting                                | 0.5 - 1.0            | ---   |
| <b>Remarks:</b> Apply as directed for "Cropping Systems" under conditions described on label. Does not provide residual weed control.   |   |  |                      |       |
| Napropamide (Devrinol 50 DF)  | Sweetpotato   | Posttransplanting                          | 1-2                  | ---   |
| <b>Remarks:</b> Apply to soil surface immediately after transplanting. Will not control emerged weeds.  |   |  |                      |       |

Table 4. Continued.

| Herbicide  | Labeled crops                               | Time of application to crop               | Rate (lbs. AI./Acre) |           |
|--|---|---|----------------------|-----------|
|  |   |   | Mineral              | Muck      |
| Pelarganic Acid (Scythe)   | Root and tuber vegetables, Sweetpotato, yam | Preplant<br>Preemergence<br>Post-Directed | 3-10% v/v            | 3-10% v/v |
| <b>Remarks:</b> Product is a contact, nonselective, foliar herbicide. It has no residual activity. It may be tank mixed with soil residual herbicides. Consult the label for rates and timings.                      |   |   |                      |           |
| Sethoxydim (Poast)   | Sweetpotato                                 | Postemergence                             | 0.188                | 0.188     |
| <b>Remarks:</b> For control of emerged annual and perennial grass weeds. Always add 1 qt oil concentrate per acre. Do not apply to drought-stressed grass weeds. Minimum time from application to harvest - 30 days. |   |   |                      |           |

## CULTURAL PRACTICES

### Soil Preparation

Sweetpotatoes grow 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.

Deep, sandy soils will always produce the best shaped and best looking sweetpotatoes (Fig. 22-1, 22-2). However, long periods of dry weather during the growing season reduce yields if supplemental irrigation cannot be supplied. Wet weather for extended periods can cause leaching of N and K, requiring the addition of more fertilizer than on heavier soils. More frequent applications of lesser amounts of fertilizer are suggested for coarse textured soils.

Soils with more than 2% organic matter are not well suited to sweetpotato production since they usually produce a large percentage of rough or cracked storage roots. Scurf and black rot fungi are more persistent in these soils than in those with less organic matter.

In general, fields that have not been used for sweetpotatoes in the last 2 to 3 years are preferred. Avoid fields that have been idle or have very high nematode populations.

### Bedding

Plants are often established in rows on flat land (Fig. 22-3). During the cultivation process, ridges are formed down the rows of plants. However, beds can be formed ahead of time, especially when preplant fertilizers or pest control chemicals need to be applied to the soil before planting. Vines take root at all locations where vines are covered, providing additional sites for storage root formation. In locations where sweetpotato weevils are present, keeping the storage roots covered with soil helps to minimize damage. Ridges also improve drainage and facilitate harvesting.

### Cover Crops

Cover crops are not recommended immediately after sweetpotato production. Cultivation is needed after harvest to prevent feral plant establishment.

## WEED MANAGEMENT

Herbicides labeled for weed control in sweet potato are listed in Table 4.

## DISEASE MANAGEMENT

Virus diseases are the major group of pathogens affecting sweetpotatoes, though many do not cause problems in the United States. Feathery mottle virus is the most common in the U.S. Losses due to infection are as much as 50% with incidences of single and multiple infections approaching 100% in a field. Since sweetpotatoes are vegetatively propagated, virus diseases can be carried from one planting to another in the propagules. Genetic resistance to sweet potato viruses is not well documented.

Common fungal and bacterial diseases of sweetpotatoes in the U. S. include: bacterial wilt and root rot, black rot, internal cork, pox or soil rot, rhizopus soft rot, scurf, surface rot, circular spot, and wilt (stem rot).

Effective disease control for sweetpotatoes is based on prevention. Most of the important diseases are caused by root pathogens 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. Since sweetpotatoes are vegetatively propagated, pathogens are easily transmitted in the planting stock. A crop rotation of at least 3 years is an important means of controlling diseases. Table 5 outlines the chemicals approved for disease management in sweetpotatoes and yams.

### Physiological Disorders

Hardcore and internal breakdown are the main physiological disorders affecting sweetpotatoes.

### Harvesting/Packing/Shipping

Unlike most vegetable crops, sweetpotatoes do not have a definite stage where they are classified as mature since plants will continue to grow as long as there are green leaves. The crop should be harvested when it has produced the highest percentage of roots of the desired size. Sweetpotatoes should be harvested before killing frosts. Partial or complete freezing of the foliage is not likely to damage the crop unless soil temperature around the roots is less than 55°F for several hours. Because of the sweet potato weevil, Florida is a quarantine state and potatoes may not be shipped through any of the southeastern states that grow sweetpotatoes.

## NEMATODE MANAGEMENT

Sweetpotatoes are frequently damaged by root-knot and reniform nematodes. Either may cause stunting and yield loss; root-knot nematodes in the tubers may cause cracking or internal dark lesions which severely reduce the value of the product. Several steps should be taken together to minimize nematode injury to sweetpotatoes. These include crop rotation; varietal resistance; nematode-free transplants; and nematicides.

### Crop Rotation

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

## NEMATODE-FREE TRANSPLANTS

Do not take nematodes or other soil-borne problems to the field by planting contaminated plants. If plants must be propagated from suspect soil, use un-rooted cuttings to avoid carrying potential problems into the field.

### Nematicides

Where damaging levels of nematodes exist, the nematicides listed in Table 6 should reduce losses if applied as directed.

Before application of a nematicide, CAREFULLY READ AND FOLLOW THE LABEL.

## INSECT MANAGEMENT

Weevils are the main pest of sweetpotato. In the United States, the sweetpotato weevil is of major concern. Larvae are reared primarily in storage roots and can be transported from one location to another, unnoticed. Their damage to storage roots makes them unmarketable.

Resistance is not well-documented. Selecting pest-free propagules for planting is one method of control and minimizing adult weevil access to storageroots by keeping them well-covered with soil is another. Keeping fallowed fields free of feral plants and maintaining good sanitation in packing and storage buildings is also recommended.

Other pests identified in the U.S. include: southern potato wireworm, the tobacco wireworm, the banded cucumber beetle, the spotted cucumber beetle, the elongate flea beetle, the pale-striped flea beetle, white grub, and sweetpotato flea beetle. Such findings are similar to those of the other root and tuber crops, once production has become extensive in a particular region and scientific attention is available to investigate pest problems. Fortunately, good levels of genetic resistance are available for these insect groups. To supplement this resistance, various chemical pesticides can be used for insect control in sweetpotatoes. These are listed in Table 7.

**Table 5.** Disease management for sweetpotato.

| Chemical  | Fungicide Group | Max. Rate Per Acre Per                              |                       | Min. Days To Harvest | Pertinent Diseases   | Remarks   |
|---|-----------------|---|-----------------------|----------------------|--|---|
|   |                 | Application   | Season                |                      |  |   |
| Mertect 340-F (thiabendazole)   | 1               | 107 fl oz/100 gal water                             |                       | 0                    | Black rot<br>Scurf<br>Root rot                                     | Dip seed roots for 1-2 min  |
| Ridomil Gold EC<br>Ridomil Gold SL (mefenoxam)                            | 4               | 2 pt/treated acre                                   |                       | 0                    | Pythium, Phytophthora root rot                                     | Apply in water or liquid fertilizer & incorporate into top 2 inches of soil |
| Ultra Flourish (mefenoxam)  | 4               | 4 pt / treated acre                                 |                       | 0                    | Pythium, Phytophthora root rot                                     |   |
| Heritage (azoxystrobin)   | 11              | 10.5 oz/ treated acre                               | 2 lb/treated acre     | 0                    | Control many diseases including Alternaria leaf spot,<br>See label | Do not apply directly to water except as specified on the label             |
| Micro Sulf (sulfur)   | M2              | 5 lb/treated acre                                   |                       | 0                    | Septoria leaf spot   | Do not use within 2 weeks of an oil spray treatment                         |
| Botran 75-W (dichloran)   | 14              | 2 lb/15 gal water                                   |                       | 0                    | Scurf  | Dip seed sweet potatoes 10 to 15 seconds                                    |
|   |                 | 3.75 lb/15 gal water per 1000 sq ft of plant bed    |                       | 0                    | Sclerotinia Blight   | Spray potatoes in bed before covering with soil.                            |
|   |                 | 1 lb/100 gal water for spray, 0.5lb/100 gal for dip |                       | 0                    | Rhizopus Rot   | See label for information on making new suspensions                         |
| Quadris (azoxystrobin)  | 11              | Various, See label                                  | Various, See label    | See label            | Control many soil-borne diseases,<br>See label                     | See label   |
| Amistar (azoxystrobin)  | 11              | Various, See label                                  | 2 lb                  | 0 or 14 , See label  | Control many diseases, See label                                   | See label   |
| Headline (pyraclostrobin)   | 11              | 12 oz treated acre                                  | 1.18 lb/ treated acre | 3                    | Various<br>See label   | See label   |
| Armcarb 100 (potassium bicarbonate)                                       | 33              | 5 oz/100 gal water                                  |                       | 0                    | Alternaria, Septoria leaf spot and Botrytis gray mold,             |   |
| Armcarb (potassium bicarbonate)   | 33              | 3 lb/treated acre                                   |                       | 0                    | Alternaria leaf spot, Botrytis gray mold                           |   |
| Serenade Max (biofungicide) (QST 713 strain of <i>Bacillus Subtilis</i> ) |                 | 3 lb/treated acre                                   |                       | 0                    | Botrytis gray mold   |   |
| Trilogy Neem oil (clarified hydrophobic extract)                          |                 | 2 lb/100 gal water per treated acre                 |                       | 0                    | Various, see label   | Do not apply this product through any type of irrigation system             |

Table 5. Continued.

| Chemical                             | Fungicide Group | Max. Rate Per Acre Per |        | Min. Days To Harvest | Pertinent Diseases                  | Remarks  |
|--------------------------------------|-----------------|------------------------|--------|----------------------|-------------------------------------|--|
|                                      |                 | Application            | Season |                      |                                     |  |
| Topaz<br>(potassium phosphite)       |                 | See label              |        | 0                    | Control many diseases,<br>See label | Do not apply foliarly to plants treated with copper based compounds at less than 20 day intervals unless instructed to do so |
| Fosphite<br>(potassium phosphite)    |                 | See label              |        | 0                    | Control many diseases,<br>See label | Do not apply foliarly to plants treated with copper based compounds at less than 20 day intervals unless instructed to do so |
| Fungi-Phite<br>(potassium phosphite) |                 | Various,<br>See label  |        | 0                    | Pythium, Phytophthora<br>root rot   |  |

Table 6. Approved nematicides for sweetpotato.

| Product               | When to apply                       | Application pattern                          | Incorporation depth  | Rate  |
|-----------------------|-------------------------------------|--|--|---|
| Mocap 10G             | 2 to 3 weeks preplant               | Row, 12 to 15 inch band                      | 4 to 8 inches with rotary hoe, tiller, etc., or by bedding over the band | 30 to 40 lbs/A or 2.4 to 3.2 lbs/1000 ft of row (min. row spacing 42 ins) |
| Mocap 10 G            | 2 to 3 weeks preplant               | Broadcast                                    | 4 to 8 inches deep   | 60 to 80 lbs/A  |
| Mocap EC              | 2 to 3 weeks preplant               | Broadcast                                    | 4 to 8 inches deep   | 1 to 1.33 gals/A  |
| Vydate L <sup>1</sup> | Within 1 week before or at planting | Broadcast or in furrow.<br>Transplant drench | 4 to 8 inches deep   | 2 to 3 gals/A broadcast or<br>1 to 2 gals/A in furrow                     |

<sup>1</sup> Vydate L has registration for nematode control on potatoes only as a broadcast or in-furrow treatment. Foliar applications are registered for insect control only. For broadcast or in-furrow treatments, Vydate L should be applied in a minimum of 20 gallons of water. As a broadcast treatment thoroughly incorporate to a soil depth of 4 to 6 inches.

Table 7. Selected insecticides approved for use on insects attacking sweet potatoes.

| Trade Name<br>(Common Name)  | Rate<br>(product/acre)  | REI<br>(hours) | Days to<br>Harvest | Insects  | MOA<br>Code <sup>1</sup> | Notes   |
|--|---|----------------|--------------------|--|--------------------------|---|
| <b>Actara</b><br>(thiamethoxam)  | 1.5-3.0 oz  | 12             | 14                 | aphids, potato leafhopper  | 4A                       | Toxic to bees. Do not use after Platinum.   |
| <b>Admire 2F</b><br>(imidacloprid)   | 10-24 fl oz   | 12             | 125                | aphids, leafhoppers,<br>whiteflies   | 4A                       | One application per season.   |
| Admire Pro   | 4.4-10.5 fl oz  |                |                    |  |                          |   |
| <b>Agree WG</b><br>( <i>Bacillus thuringiensis</i> subspecies<br><i>aizawai</i> )    | 0.5-2.0 lb  | 4              | 0                  | lepidopteran larvae (caterpillar pests)  | 11B1                     | Apply when larvae are small for best control. OMRI-listed <sup>2</sup> .  |
| <b>Assail 70WP</b><br>(acetamiprid)  | 0.6-1.7 oz  | 12             | 7                  | aphids, leafhoppers, flea beetles, whiteflies  | 4A                       | Whiteflies not on label for sweet potatoes but are for other crops on label. No more than 4 applications per season.  |
| Assail 30SG  | 1.5-4.0 oz  |                |                    |  |                          |   |
| <b>Aza-Direct</b><br>(azadirachtin)  | 1-2 pts, up to 3.5 pts, if needed   | 4              | 0                  | aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies   | 18B                      | Antifeedant, repellent, insect growth regulator. OMRI-listed <sup>2</sup> .   |
| <b>Azatin XL</b><br>(azadirachtin)   | 5-21 fl oz  | 4              | 0                  | aphids, beetles, caterpillars, leafhoppers, leafminers, thrips, weevils, whiteflies  | 18B                      | Antifeedant, repellent, insect growth regulator.  |
| <b>*Baythroid 2</b><br>(cyfluthrin)  | 0.8-2.8 fl oz   | 12             | 0                  | cutworms, cabbage looper, flea beetles, potato leafhopper, sweetpotato weevil adults   | 3                        | No more than 6 applications.  |
| <b>*Baythroid XL</b><br>(beta-cyfluthrin)  |   |                |                    |  |                          |   |
| <b>Biobit HP</b><br>( <i>Bacillus thuringiensis</i> subspecies<br><i>kurstaki</i> )  | 0.5-2.0 lb  | 4              | 0                  | caterpillars (will not control large armyworms)  | 11B2                     | Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse. OMRI-listed <sup>2</sup> .  |
| <b>BotaniGard 22 WP, ES</b><br>( <i>Beauveria bassiana</i> )                         | <b>WP:</b><br>0.5-2 lb/100 gal<br><b>ES:</b><br>0.5-2 qts/100/gal             | 4              | 0                  | aphids, thrips, whiteflies   | --                       | May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Not compatible in tank mix with fungicides.                       |
| <b>*Capture 2 EC</b><br>(bifenthrin)   | 19.2 oz at-plant (soil)<br>3.2-9.6 oz at lay-by (soil)<br>2.1-6.4 oz (foliar) | 12             | 21                 | cucumber beetles, flea beetles, sweetpotato weevil adults (foliar), white-fringed beetle adults, white grub adults, white grubs (lay-by), wireworm adults, wireworms (at-plant and lay-by) | 3                        | No more than 2 foliar applications, at least 21 days apart. Do not apply more than 0.5 lb active ingredient per acre per season, including soil applications. |
| <b>*Capture LFR</b>  | See label for rates for LFR.  |                |                    |  |                          |   |
| <b>Crymax WDG</b><br>( <i>Bacillus thuringiensis</i> subspecies<br><i>kurstaki</i> ) | 0.5-2.0 lb  | 4              | 0                  | caterpillars   | 11B2                     | Use high rate for armyworms. Treat when larvae are young.   |
| <b>Deliver</b><br>( <i>Bacillus thuringiensis</i> subspecies<br><i>kurstaki</i> )    | 0.25-1.5 lb   | 4              | 0                  | caterpillars   | 11B2                     | Use higher rates for armyworms. OMRI-listed <sup>2</sup> .  |

Table 7. Continued.

| Trade Name<br>(Common Name)  | Rate<br>(product/acre) | REI<br>(hours) | Days to<br>Harvest                                    | Insects   | MOA<br>Code <sup>1</sup> | Notes  |
|--|------------------------|----------------|---|---|--------------------------|--|
| <b>Diatect V; Diatect Multipurpose Insecticide II</b> (diatomaceous earth + pyrethrins + piperonyl butoxide) | 1-6 lb                 | 12             | 0   | aphids, armyworms, cabbage looper   | 3, --                    | Diatect V is OMRI-listed <sup>2</sup> (no piperonyl butoxide)  |
| <b>DiPel DF</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )                                 | 0.5-2.0 lb             | 4              | 0   | caterpillars  | 11B2                     | Treat when larvae are young. Good coverage is essential.   |
| <b>*Endosulfan 3 EC</b> (endosulfan)   | 0.66-1.33 qt           | 24             | 1   | sweetpotato flea beetle, sweetpotato weevil, whiteflies   | 2                        | Do not make more than 3 applications per year or exceed 3.0 lb active ingredient per acre per year.  |
| <b>Entrust</b> (spinosad)  | 1-3 oz                 | 4              | 7   | armyworms, leafminers, <i>Liriomyza</i> , loopers, thrips   | 5                        | Do not make applications less than 7 days apart or apply more than 4 times per crop. Do not apply more than 6.5 oz/acre per crop.  |
| <b>Extinguish</b> ((S)-methoprene)   | 1.0-1.5 lb             | 4              | 0   | fireants  | 7A                       | Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially. |
| <b>Fulfill</b> (pymetrozine)   | 2.75-5.5 oz            | 12             | 14  | buckthorn aphid, green peach aphid, melon aphid, potato aphid   | 9B                       | Allow a minimum of 7 days between applications. Do not exceed 11 oz/acre/season.   |
| <b>Imidan 70 W</b> (phosmet)   | 1.3 lb                 | 24             | 7   | banded cucumber beetle, sweetpotato weevil, whitefringed beetle, suppression of white grub and wireworm | 1B                       | No more than 5 applications per season. Do not apply through irrigation system. Crop must be mechanically harvested.   |
| <b>Javelin WG</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )                               | 0.12-1.5 lb            | 4              | 0   | most caterpillars, but not <i>Spodoptera</i> species (armyworms)  | 11B2                     | Treat when larvae are young. Thorough coverage is essential. OMRI-listed <sup>2</sup> .  |
| <b>Lepinox WDG</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )                              | 1.0-2.0 lb             | 12             | 0   | for most caterpillars, including beet armyworm (see label)  | 11B2                     | Treat when larvae are small. Thorough coverage is essential.   |
| <b>Lorsban 15G, 75WG</b> (chlorpyrifos)  | See labels for rates   | 48             | preplant broadcast treatment, 125 days before harvest | flea beetles, sweet potato flea beetle, wireworms ( <i>Conoderus</i> )                                  | 1B                       | See label.   |
| <b>Malathion 8 F</b> (malathion)   | 1-1.75 pt              | 12             | 3   | leafhoppers, morning glory leafminer  | 1B                       |  |
| <b>*Mocap 15 G, *EC</b> (ethoprop)   | See labels             | 48             | preplant see label                                    | cucumber beetles, flea beetles, white grubs, wireworms  | 1B                       |  |

Table 7. Continued.

| Trade Name<br>(Common Name)                             | Rate<br>(product/acre)                            | REI<br>(hours)        | Days to<br>Harvest   | Insects  | MOA<br>Code <sup>1</sup> | Notes   |
|---|---|-----------------------|----------------------|--|--------------------------|---|
| <b>M-Pede 49% EC</b><br>Soap, insecticidal              | 1-2 % V/V   | 12                    | 0                    | aphids   | –                        | OMRI-listed <sup>2</sup> .  |
| <b>*Mustang Max</b><br>(zeta-cypermethrin)              | 1.28-4.0 oz                                       | 12                    | 1                    | cabbage looper, cucumber beetles, cutworms, flea beetles, grasshoppers, leafhoppers, tarnished plant bug, vegetable weevil, whitefringed beetle (adult), yellowstriped armyworm; aids in control of aphids and beet armyworm | 3                        | A maximum of 0.15 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.   |
| <b>Neemix 4.5</b><br>(azadirachtin)                     | 4-16 fl oz  | 12                    | 0                    | aphids, beetles, caterpillars, grasshoppers, leafhoppers, leafminers, thrips, weevils, whiteflies  | 18B                      | Does not kill adult insects. IGR and feeding repellent. OMRI-listed <sup>2</sup> .  |
| <b>Oberon 2SC</b><br>(spiromesifen)                     | 8-16 fl oz  | 12                    | 7                    | twospotted spider mite, whiteflies   | 23                       | Maximum amount per crop: 32 oz/acre. No more than 2 applications.   |
| <b>Oil, insecticidal</b>                                | 1-2 gal/100 gal                                   | 12                    | Up to day of harvest | leafminers, mites, whiteflies  | --                       |   |
| <b>Platinum</b><br>(thiamethoxam)                       | 5-8 fl oz   | 12                    | Applied at planting  | aphids, Colorado potato beetles, flea beetles, potato leafhoppers  | 4A                       | For most crops that are not on the label, a 120-day plant-back interval must be observed. To manage resistance, avoid using Actara or Provado in conjunction with Platinum. |
| <b>Provado 1.6F</b><br>(imidacloprid)                   | 3.5 oz  | 12                    | 7                    | aphids, flea beetles, leafhoppers, whiteflies  | 4A                       | Limited to 3 applications.  |
| <b>Pyrellin EC</b><br>(pyrethrin + rotenone)            | 1-2 pt  | 12                    | 12 hours             | aphids, cabbage looper, leafhoppers, mites, plant bugs, thrips   | 3, 21                    |   |
| <b>Rimon 0.83 EC</b><br>(novaluron)                     | 9-12 fl oz  | 12                    | 14                   | armyworms, loopers, other foliage feeding caterpillars, whiteflies (suppression)   | 15                       | Do not apply more than 24 oz per acre per season. Limited to two applications.  |
| <b>Sevin 80S; XLR; 4F</b><br>(carbaryl)                 | <b>80S:</b> 1.25-2.5 lb<br><b>XLR, 4F:</b> 1-2 qt | 12                    | 7                    | corn earworm, cucumber beetles, flea beetles, sweetpotato hornworm, sweetpotato weevil (preplant dip), tortoise beetle, whitefringed beetle, yellowstriped armyworm  | 1A                       | Do not apply more than 10 lb (80S) per acre per crop or 8 qt (4F, XLR). See label for preplant dip treatment.   |
| <b>SpinTor 2 SC</b><br>(spinosad)                       | 3-6 fl oz   | 4                     | 7                    | armyworms, leafminers ( <i>Liriomyza</i> spp.), loopers, thrips  | 5                        | Do not apply more than a total of 21 fl oz per acre per crop.   |
| <b>*Telone C-35</b><br>(dichloropropene + chloropicrin) | See label   | 5 days<br>- See label | preplant             | symphylans, wireworms  | --                       | See supplemental label for use restrictions in south and central Florida.   |
| <b>*Telone II</b><br>(dichloropropene)                  |   |                       |                      |  |                          |   |

Table 7. Continued.

| Trade Name<br>(Common Name)  | Rate<br>(product/acre) | REI<br>(hours) | Days to<br>Harvest | Insects   | MOA<br>Code <sup>1</sup> | Notes   |
|--|------------------------|----------------|--------------------|---|--------------------------|---|
| <b>Trilogy</b><br>(extract of neem oil)  | 0.5-2.0% V/V           | 4              | 0                  | aphids, mites, suppression of thrips and whiteflies | 18B                      | Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed <sup>2</sup> . |
| <b>Xentari DF</b><br>( <i>Bacillus thuringiensis</i> subspecies <i>aizawai</i> ) | 0.5-2.0 lb             | 4              | 0                  | caterpillars  | 11B1                     | Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.    |

**The pesticide information presented in this table was current with federal and state regulations at the time of revision. The user is responsible for determining the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label instructions.**

<sup>1</sup> Mode of Action codes for vegetable pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v.5.2 September 2006.

- 1A. Acetylcholine esterase inhibitors, Carbamates
- 1B. Acetylcholine esterase inhibitors, Organophosphates
- 2A. GABA-gated chloride channel antagonists
- 3. Sodium channel modulators
- 4A. Nicotinic Acetylcholine receptor agonists/antagonists, Neonicotinoids
- 5. Nicotinic Acetylcholine receptor agonists (not group 4)
- 6. Chloride channel activators
- 7A. Juvenile hormone mimics, Juvenile hormone analogues
- 7C. Juvenile hormone mimics, Pyriproxifen
- 9A. Compounds of unknown or non-selective mode of action (selective feeding blockers), Cryolite
- 9B. Compounds of unknown or non-selective mode of action (selective feeding blockers), Pymetrozine
- 9C. Compounds of unknown or non-selective mode of action (flonicamid)
- 11B1. Microbial disruptors of insect midgut membranes, *B.t.* var *aizawai*
- 11B2. Microbial disruptors of insect midgut membranes, *B.t.* var *kurstaki*
- 12B. Inhibitors of oxidative phosphorylation, disruptors of ATP formation, Organotin miticide
- 15. Inhibitors of chitin biosynthesis, type 0, Lepidopteran
- 16. Inhibitors of chitin biosynthesis, type 1, Homopteran
- 17. Molting disrupter, Dipteran
- 18A. Ecdysone agonist/disruptor (methoxyfenozide, tebufenozide)
- 18B. Ecdysone agonist/disruptor (azadirachtin)
- 20. Site II electron transport inhibitors
- 21. Site I electron transport inhibitors
- 22. Voltage-dependent sodium channel blocker
- 23. Inhibitors of lipid biosynthesis
- 25. Neuronal inhibitors

<sup>2</sup> OMRI listed: Listed by the Organic Materials Review Institute for use in organic production.

\* **Restricted Use Only.**