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TO: COUNTY EXTENSION DIRECTORS AND AGENTS (VEGETABLE AND HORTICULTURE) AND OTHERS INTERESTED IN VEGETABLE CROPS IN FLORIDA

FROM: J. M. Stephens, Associate Professor and Extension Vegetable Specialist

VEGETARIAN NEWSLETTER 79-12

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I. NOTES OF INTEREST

A. Ken Jorgensen Wins "Grower of the Year" Award

Kenneth F. Jorgensen, Zellwin Farms, Inc., Zellwood, Florida was honored recently as an outstanding leader and producer by an international trade publication. The Grower published by The Packer selected Ken as "Grower of the Year" for 1979. This, planned as annual award in the future, was the first ever given by this publication. The story and pictures were published in the November, 1979 issue.

I know that Ken's many friends join me in saying "congratulations". It was a well-deserved token of recognition, and we wish him many more years of health and success.

(Montelaro)

B. Ray William Final Salute

Again, a final salute to fellow Extension Specialist Ray William as he leaves for greener pastures in Oregon. We know those of you who knew Ray will want to join us in wishing him and his family the very best in this new location. Ray has worked long and diligently in his three years here in behalf of the growers and agents of Florida. The weeds in Oregon just don't stand a chance.

(Stephens)

II. COMMERCIAL VEGETABLE PRODUCTION

A. Root Environment and Associated Problems

Over the years, this newsletter has carried many articles related to the root environment and the many problems associated with it. Growers of potatoes and other vegetables are familiar with root problems like: (1) sting, stubby and root-knot nematodes, (2) bacterial, Fusarium and Verticillium wilts, (3) Rhizoctonia, Pythium and other root rots, (4) wireworm, grubworm and other soil insects, (5) soluble salt injury, (6) mechanical injury and (7) miscellaneous problems such as corky ringspot virus and tuber brown rot. This is, indeed, a long list of problems that must be contended with at one time or another on potatoes and other vegetables in Florida.

Due, in part, to ignorance of the facts, we have had a tendency in the past to treat root disorders as single problems. The picture is changing for the better as research involving several disciplines unravels the mysteries of possible interactions among causitive agents. This was demonstrated clearly in a recent report on potato root problems by Dr. D.P. Weingartner at the Hastings ARC. Although specific for potatoes in the Hastings area, much of the information can be applied to other vegetables in all areas of Florida.

Some of the more important comments from the report are quoted in the following paragraphs:
"The nematodes. - The most important nematodes affecting potatoes in the Hastings area are the sting (Belonolaimus longicaudatus), southern root-knot (Meloidogyne incognita), and stubby root (Trichodorus christiei) nematodes. Several other plant parasitic nematodes occur in northeast Florida (NEF) potato soils including the root lesion (Pratylenchus scribneri), ring (Cric-onemoides ornatus), sheath (Hemicycliophora sp.), lance (Hopolaimus sp.) spiral (Hemicriconemoides and Helicotylenchus), stunt (Tylenchorhynchus claytoni), Scutellonema bradys, and awl (Dolichodorus heterocephalist) nematodes. In most cases little is known concerning the feeding behavior of these nematodes on potatoes, however, they are considered of lesser importance than sting and root-knot nematodes because the numbers found in most NEF potato soils are below the recognized damage threshold levels on other crops."

"Diseases associated with nematodes. Unfortunately, the soil is inhabited by disease causing microorganisms in addition to plant parasitic nematodes. Root injury caused by feeding activity of the nematodes can provide entry points for soil-borne pathogens. Diseases such as Verticillium wilt, bacterial wilt, and tuber brown rot can be more severe following nematode injury. The soil-borne fungus Rhizoctonia is frequently found in tubers injured by nematodes. Tobacco rattle virus is transmitted directly to potato tubers by stubby root nematodes."

"No single control procedure will control all of the nematode and nematode-related disease problems affecting potatoes in NEF. The situation is further complicated because the different chemicals which are available vary widely in their performance depending upon soil conditions at the time of application and during the period when they are intended to provide control."

"Early dying disease. - In other potato producing sections of the U.S., this disease is caused by Verticillium albo-a-trum. The disease has been reported to be more severe when meadow nematodes (Pratylenchus penetrans) are present. In the North, soil fumigation is used to control the disease which is both tuber and soil-borne in these locations. Although Verticillium is frequently isolated from early dying plants in NEF, the same fields also usually have high populations of sting and/or root-knot nematodes. Since the aboveground symptoms of early dying are similar to those associated with sting and root-knot nematode injury, and since both the disease and nematode problems are controlled by nematicides; the relative importance of Verticillium as a pathogen in NEF has not been determined. Attempts to demonstrate persistance of Verticillium in NEF potato soils, however, have been unsuccessful. This suggests that inoculum for the disease may be limited to that on incoming seed tubers. It is not known whether any of the parasitic nematodes found in NEF potato fields predispose potato plants to attack by Verticillium. The control procedures for early dying disease are the same as those outlined in Table 1 for nematode control."

"Bacterial wilt and tuber brown rot. - A soil-borne bacterium, Pseudomonas solanacearum causes this disease, which can be more severe when root-knot nematodes are present. Bacterial wilt (BW) is most severe in NEF when temperatures and precipitation during March are, respectively, above and below normal. Bacterial wilt was considered to be a major production problem in NEF during the 20's and 30's. However, since about 1938 the disease has occurred infrequently in NEF, probably due to the widespread use of the potato cultivar Katahdin (1938-42)."
and Sebago (1943-present) which are both BW tolerant. During 1975-77, however, several NEF growers sustained losses due to BW and tuber brown rot. Losses were associated with (i) use of cultivars which lacked the BW tolerance of Sebago, particularly when they were planted during successive seasons; (ii) using nonvolatile nematicides after having used soil fumigants for several seasons; (iii) relatively warm and dry weather conditions during March. Although additional data are needed on factors affecting incidence and severity of BW in NEF, the control procedures suggested in Table 1 are based on available evidence.

"Corky ringspot disease (CRS). - This disease is caused by tobacco rattle virus (TRV). In Florida CRS is a disease of the tuber. The virus is transmitted directly to potato tubers by stubby root nematodes (Trichodorus spp.). Soil fumigation does not control CRS in NEF; however, the nonvolatile nematicides, Temik and Furadan, effectively reduce both incidence and severity of CRS. Sebago, the standard variety in NEF, is highly susceptible to CRS as is Red LaSoda. Pungo, Green Mountain, Hudson, Superior, Plymouth, Merrimack, and USDA seedling B6969-2 are resistant to the disease in NEF. See the Hastings ARC Research Report PR77-4 for additional details."

"Rhizoctonia disease. - Rhizoctonia, presumably R. solani, is present in most NEF potato and cabbage fields. The fungus can attack and damage the potato plant in several ways. Emerging stems can be cankered and in severe cases completely rotted beneath the soil surface, thereby delaying emergence and even reducing stands of potatoes. Stolons can be attacked and weakened. The fungus has been reported to infect developing tubers and to cause malformation, cracking, and abnormal russetting. In addition to these quality defects, black microsclerotia (resting bodies) of Rhizoctonia are often observed adhering to tubers at harvest and have been referred to as "the dirt which won't wash off". In NEF the types of abnormal growth and russetting reported to be caused by Rhizoctonia have been reduced following use of nematicides. Also, Rhizoctonia has been frequently associated with these types of symptoms when they occur. In addition, however, numbers of sting nematodes observed in soil have shown a highly significant positive correlation with the same type of tuber quality defects. It is not clear whether Rhizoctonia or nematodes are the primary cause of tuber quality defects in NEF or whether an interaction exists between Rhizoctonia and the parasitic nematodes; whereby injury caused by nematode feeding activity predisposes developing tubers to attack by Rhizoctonia. Nematicides, particularly the nonvolatile chemicals such as Temik, Furadan, and Mocap, have consistently reduced tuber quality defects similar to those associated with Rhizoctonia. We have no evidence that these chemicals reduce cankering of emerging plants or of stolons."

"The chemicals. - Chemicals used for nematode control in NEF can be grouped into two categories, soil fumigants and nonvolatile nematicides, depending upon whether or not they volatilize after application and form a gas in soil. Soil fumigants include such chemicals as Telone, D-D, Telone II, Vidden D, W-85, Terr-O-cide, and Vortex. Nonvolatile chemicals which are registered for use on potatoes in NEF include Temik, Furadan, and Mocap. Temik and Furadan are carbamates and Mocap is an organophosphate. All are highly toxic."

"The effectiveness of soil fumigants is improved when the soil is rela-
The optimum soil moisture for use of soil fumigants in the sandy flatwoods soils found in NEF is less than 5%, however, some nematode control is observed even when soil moisture is approximately 12-15%. Nonvolatile chemicals work best when soil is relatively moist. Best control is achieved when soil is approximately 12-15%.

A copy of the complete report (Hastings ARC Research Report PR 78-1) is available from this office or ARC, Hastings, Florida.

(Montelaro)

B. Providing Information for Florida Vegetable Growers

Florida's vegetable growers are a diverse group, ranging from educated managers of extensive businesses to field managers or small-scale growers who possess varying educational skills. Communication specialists report that people, regardless of education, comprehend more information when it is presented simply and at readability levels below the actual level attained. A series of production guides and slide/tape sets was developed with average readability scores complementing a majority of Florida's small-scale commercial growers.

Evaluation of these educational materials by several large-scale and numerous small-scale vegetable growers at extension meetings and by people with limited reading skills in North Florida suggested positive and enthusiastic results. The following trends were evident from a statewide survey of county agents conducted by J.M. Nehiley regarding the four-part sweet potato production circular (Circ. 440). (52 counties responded):

1. Agents recognized that Circ. 440 was written for small-scale growers or low income audiences, and stated that the publication would be less effective with large-scale vegetable growers.

2. Agents preferred complete circulars in small or medium sizes, but suggested the larger size could be folded for mailing.

3. In comparison with the standard green production guide, two thirds of the agents perceived that less information was contained in the four-part circular that was written at a lower readability level than the guide despite the fact that the four-part circular contained more than twice as much factual information as the guide.

4. Agents requested additional circulars or fact sheets that were targeted for major audiences in Florida similar to Circ. 440, but that they be printed in a single circular and updated frequently.

Additionally, ten county agents in North Florida have reported enthusiastic results when a series of slide/tape sets were presented as a part of county educational programs at grower meetings. Normally, the introduction which emphasizes planning, business decision-making, soil testing, and field preparation precedes a two-part series containing fundamental production information for each crop. These agents suggested the following educational program formats and uses:

1. Grower meetings with or without specialist assistance.

2. Grower meetings with specialist assistance via telelecture.

3. "Self-help" autotutorial use for individual growers who wish to view the information on a portable projector in the County Extension Office. Agents can advertise this educational opportunity via radio or newspaper.
The following slide/tape sets can be obtained from the IFAS Film Library, Building 116. Scripts of each slide/tape set may be requested from the Vegetable Crops Extension secretaries to review prior to a meeting or to file for future reference.

<table>
<thead>
<tr>
<th>Extension Slide/tape Series</th>
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<tbody>
<tr>
<td>Growing Quality Vegetables for Profit</td>
<td>ST-158</td>
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<tr>
<td>Growing Sweet Potatoes for Profit, Parts I &amp; II.</td>
<td>ST 144 &amp; 145</td>
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<tr>
<td>Growing Okra for Profit, Parts I &amp; II.</td>
<td>ST 146 &amp; 147</td>
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<tr>
<td>Growing Southern Peas for Profit, Parts I &amp; II.</td>
<td>ST 156 &amp; 157</td>
</tr>
<tr>
<td>Growing Boniatos for Profit, Parts I &amp; II.</td>
<td>ST 227 &amp; 228</td>
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(William, Thorne, & Nehiley)

(J.W. Thorne, and J.M. Nehiley are communication and media specialists in IFAS Editorial Department).

III. HARVESTING AND HANDLING

A. County Extension Marketing Program:
   Improper Maturity and Ripeness as Causes of Marketing Losses.

   Improper maturity and ripeness cause marketing losses with fruits and vegetables. Some of these losses can be substantially reduced through effective County Extension marketing programs. The effectiveness of these programs will, of course, depend upon the interest of growers and shippers and their willingness to change related practices.

Maturity and ripeness problems include immaturity, overmaturity, overripeness, and variable or mixed maturity or ripeness. Let's consider each and its effect on marketing losses.

1. Immaturity: This generally occurs at the beginning of a marketing season, sometimes near the end of a season, and often during periods when demand exceeds the supply for a commodity. Problems associated with immature commodities include the following:

   a. They are not so sweet as when harvested at peak maturity (e.g. carrots, muskmelons, watermelons).

   b. They will not ripen to quality products (e.g. tomatoes, muskmelons).

   c. They are more susceptible to surface type injuries because the skin and/or cuticle is not fully developed. This causes increased moisture loss and subsequent shriveling, and increased susceptibility to certain decay causing pathogens. (e.g. immature tomatoes, summer squashes, and Irish potatoes).
d. They are more easily crushed when packed next to mature or overmature product (e.g. Iceberg lettuce heads).

e. Reduced yields because products have not yet reached full size, and because more product may be discarded in grading and sorting prior to packing.

2. Overmaturity: This generally occurs when growers get behind in their harvesting because of bad weather, no market demand, labor strikes in transportation or marketing channels, inadequate harvesting capacity, or inadequate supply of transportation vehicles. Obviously, we have little control over some of these conditions. We can help, however, when overmaturity is caused by a lack of understanding of the maturity requirements of the markets receiving their products. Overmaturity results in the following types of losses:

   a. Reduced shelf-life of products.
   b. Sprouting (e.g. broccoli).
   c. Spreading of tips (e.g. asparagus, cauliflower).
   d. Riciness (e.g. cauliflower).
   e. Toughness (e.g. carrots, beets).
   f. Pithiness (e.g. celery).
   g. Bitterness (e.g. Iceberg lettuce).
   h. Increased sensitivity to decay pathogens.

3. Overripeness: This also occurs because of harvesting delays. In addition, it commonly results from inadequate product temperature management between harvesting and retailing, or occasionally because of accidental exposure to ethylene. Overripeness is also a problem when growers or shippers don't realize how much ripening occurs during transit, distribution, and marketing. Overripeness results in the following:

   a. Reduced shelf-life (all fruits and vegetables).
   b. Increased susceptibility to bruising and crushing (e.g. all fruits and fruit type vegetables).
   c. Excessive softening (e.g. tomatoes, muskmelons, cucumbers).
   d. Unacceptable flavors (e.g. muskmelons, cucumbers).
   e. Increased susceptibility to certain decay organisms (e.g. tomatoes).

4. Mixed or variable maturity or ripeness within packs or lots: This is a major problem for retailers and wholesalers, who generally are not equipped for repacking. Sorting and repacking is expensive, requires extra handling that damages products, and requires storage that results in additional moisture loss (shriveling) and increased decay, resulting in lower quality and less attractive products being displayed to consumers in retail stores. Mixed maturity in packs causes crushing or bruising of the softer products in contact with firm or hard products, (as in cartons on Iceberg lettuce and tomatoes).
County Agents can help growers and shippers to solve some of these maturity and ripeness problems by using the same techniques as used with quality problems i.e. trips to terminal and retail markets, holding commercially packed samples in growers' or shippers' offices or cold rooms, and holding judging or demonstration meetings. Information obtained through these activities will help the industry to understand the relationships between maturity and ripeness problems to marketing losses. They can then correct these problems.

(Kasmire)

*Robert F. Kasmire is Visiting Adjunct Professor and Extension Vegetable Specialist, Davis California.

IV. VEGETABLE GARDENING

A. Boron Deficiency in Cauliflower

Cauliflower is not grown as widely in Florida gardens as are many other vegetables. However, it produces quite satisfactorily in most all locations during the cooler months of the year. One problem that occurs quite often is browning of the curd (head). This problem occurred in 1979 in at least one garden in the Gainesville area and it was diagnosed as boron deficiency. The diagnosis was made based on early and subsequent experiments with borax treatments.

When cauliflower browning is severe, the surface of several or of all the branches composing the head appears water-soaked. These water-soaked areas soon turn rusty-brown, and in periods of dry weather the brown surfaces become hard and woody. Preceding this surface discoloration, there may be small round water-soaked areas scattered through the pith of the main stem and branches of the head. In advanced stages, the pith areas crack, at first longitudinally, then vertically. As a result of the cracking, the main stem and branches may become hollow. The affected curd may be stunted and deformed.

While other vegetables require boron in trace amounts for proper growth and development, apparently they do not react to shortages quite so vividly as cauliflower, beets, radishes, turnips, and celery. The nutrient deficiency within the plant may be due to a shortage or unavailability in the soil. Overliming interferes with boron availability and deficiency symptoms may develop.

When attempting to grow cauliflower in the garden, the gardener should take the cauliflower plant's needs for boron into account. A boron-containing fertilizer should be applied prior to or at planting time and the soil should be limed only to the extent necessary for adequate plant growth. Only recommended amounts of boron should be applied since too much causes toxicities.

Boron is applied to the soil either as boric acid (H₃BO₃) or borax (sodium tetraborate). Boric acid contains about 17.5% boron, while sodium tetraborate has about 11.3% boron. Borax is the main ingredient in such commonly available laundry soaps as 20 Mule Team Borax® and Borateem®. Borax should be applied at 25 pounds per acre, or 1 ounce per 100 square feet. It is best to mix it with about a quart of sand for dispensing purposes. Apply it evenly in the fertilizer band around the plants at planting time. Do not exceed this amount as toxicity may occur. Boric acid may be applied as a soil drench around the plants by mixing 1/2 ounce boric acid in a gallon of water and applying to 100 square feet of soil surface. Perhaps the easiest precautionary measure for avoiding boron deficiency in cauliflower.
is to use fertilizer containing a complete minor element mix, which would include boron. The same minute amounts of boron as suggested for cauliflower would not harm other kinds of vegetables if applied to the soil on which they were grown.

(Stephens)

B. Blanching Cauliflower by Tying

Cauliflower is unattractive and has an off-flavor if the curd (head) is grown exposed to sunlight. To prevent this discoloration and keep the head snowy white, the leaves must be tied around the developing head to exclude light. Some varieties are called "self-blanching" due to their long, inwardly curving leaves which cover the head well enough to exclude most light.

The 'Snowball' strains are the main varieties grown in Florida home gardens. These are not self-blanching, so tying is necessary to keep the heads snowy-white (blanched).

To blanch, tie the plant when the small curd is just peeping through the small central leaves. Gather the longest outside leaves over the head and tie with a rubber band, tape, or soft twine. Fast growing cauliflower will mature the head in about 4 to 5 days after tying. In cooler weather, it may take as long as two weeks. Check the condition of the head periodically to determine when to harvest.

(Stephens)

C. Know Your Vegetables - Honeydew Melons

The Honeydew melon is one of the most popular melons, belonging to the Inodorus Group of Cucumis melo that also includes the Casaba melon. Of course, the best known member of the melon group is one that we all call "cantaloupe". Perhaps this is a misnomer, since they belong to the Reticulatus Group instead of the Cantaloupe Group. Honeydew is an American name for the French variety, White Antibes, which was grown for many years in Southern France and Algeria for foreign shipment.

While Honeydew is similar to muskmelons except for more lobing of the leaf, the fruits are distinctively different. They are round to slightly oval, about 8 inches long, and are extremely smooth with no netting or ribs. Some soft hairs are present on the surface in early stages. Rind color is greenish white when immature, becoming somewhat creamy yellow when ripe. The flesh is light green, thick, juicy, sweet, and uniquely flavored.

Commercial varieties of Honeydew that have come along over the years have not done well in Florida. Greatest success with their culture has been with irrigation in semiarid regions of the country. Our humid conditions and accompanying diseases (primarily) and insect problems have made them a poor choice for both gardeners and commercial farmers alike. The strains or varieties available were extremely susceptible to downy and powdery mildew, two serious diseases of other cucurbits in Florida.

Whenever melons were produced, there was much difficulty in harvesting and ripening them. Fruits of most Honeydews do not slip (separate) from the vine at maturity as do muskmelons, so must be clipped. Without this signal of maturity, other fruit characteristics such as size, skin color, and smoothness must be used to determine when to pick.

A breakthrough was made for Florida gardeners and growers back in 1962 when a
variety called 'Floridew' was released. It has resistance to downy mildew and to a lesser extent powdery mildew. However, the fruits still did not slip and had to be treated with ethylene gas for proper ripening. Failure of growers to learn to grow and ripen it properly resulted in a decline of available seed stock and interest in the Honeydew.

Interest in Honeydews was regenerated in 1976 with the release of 'Morgan' by a Florida plant breeder named James Morgan Crill. The 'Morgan' melon resulted from a cross between a regular Honeydew and a cob-melon (unknown origin). The 'Morgan' is similar in size, shape and color to 'Asgrow Honeydew'.

Like other Honeydews, 'Morgan' melons will not slip from the vine at harvest except for about 25% of the fruit. Thus, easy removal from the vine cannot be used as a guide for maturity in most cases. Gardeners should watch for the development of distinct blotches or streaks of yellow appearing on the creamy white surface as an indication for time to harvest. This should occur in 80-90 days from seeding to first fruit picking. It was reputed to have high tolerance to downy, but not to powdery mildew. However, grower trials in Florida indicated moderate to severe foliage damage in many instances where conditions were ideal for the downy mildew disease. 'Morgan' in Florida is still a promising variety, but a gardener should expect mediocre to discouraging results in some instances, and excellent results in others.

In addition to 'Morgan' and 'Floridew', two other varieties worth trying are 'Earlidew' and 'Tamdew'. The Honeydew is a warm weather crop and should be planted to grow in a frost-free period. (Gardeners should follow similar cultural practices as for muskmelons).

Ripening is a problem with Honeydews. Home gardeners who have trouble getting their melons to ripen should place one or more melons in a sealed plastic bag along with ripening tomatoes or apples. The natural ethylene gas released in the ripening process will trigger the ripening of the Honeydew.

(Stephens)