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

FROM: James Montelaro, Professor and Extension Vegetable Specialist

VEGETARIAN NEWSLETTER 77-12

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I. NOTES OF INTEREST

A. Abstracts for Papers Presented at the 1977 FSHS Meetings

There were 30 papers presented in the Vegetable Section during the Florida State Horticultural Society meetings held November 1-4, 1977, at Lake Buena Vista, Florida. Anyone wanting a single copy of the abstracts of the papers presented can get one by writing this office.

(Montelaro)

B. Commercial Production Guides

Production Guides on Okra (Circular No. 175E) and Tomato (Circular 98D) were revised recently. Only 3,000 copies of each guide were printed. County Extension offices will receive a small, but adequate supply of each guide for county needs. Agents are asked to use sound judgement in distributing these guides. Because commercial production guides contain information that home gardeners cannot possibly use, distribution should be restricted to commercial growers. Agents needing a few extra copies of any guides can obtain them from a limited supply retained by the IFAS, Publication and Distribution Center, Building 664.

(Montelaro)

C. Plant Science In-Service Training for County Agents

The program for the Plant Science In-Service Training Session to be held in mid-February (week of the 13th) is being finalized now. The Friday morning session has been dropped. The Vegetable Crops Department is planning for a three-day session on Tuesday, Wednesday and Thursday. Part of the program will be planned jointly with the Agronomy Department. Check the final program for exact dates and topics to be discussed.

(Montelaro)

II. COMMERCIAL VEGETABLE PRODUCTION

A. How Big is This Tomato?

The metric system provides a much needed improvement in the size classification of vegetables. The new size categories of tomatoes (very small, small, medium, large, and extra large) have replaced the old 5 x 6, 6 x 6, etc., classes. A medium tomato can be expressed in fractions of an inch, decimal portions of an inch, or in the metric system as centimeters. (The inch is equal to 2.54 centimeters).
The following conversion table has been prepared for your reading interest and reference use. The approximate distribution of Florida tomatoes as reflected in state pack-out figures for the past few years has been: very small 0.1%, small 10.7%, medium 36.1%, large 30.9% and extra large 22.2%.

### Some Conversion Factors Related to the New Tomato Size-Weight Categories

<table>
<thead>
<tr>
<th>Designation Used</th>
<th>Fractional (inches)</th>
<th>Decimal (inches)</th>
<th>Metric (cm)</th>
<th>Weight Average (Gram) (Oz.)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Small</td>
<td>7/8 - 2 1/8</td>
<td>1.87 - 2.12</td>
<td>4.76 - 5.40</td>
<td>75 2.6</td>
</tr>
<tr>
<td>Small</td>
<td>1/8 - 2 9/32</td>
<td>2.12 - 2.28</td>
<td>5.40 - 5.79</td>
<td>93 3.3</td>
</tr>
<tr>
<td>Medium</td>
<td>9/32 - 2 17/32</td>
<td>2.28 - 2.53</td>
<td>5.79 - 6.43</td>
<td>120 4.2</td>
</tr>
<tr>
<td>Large</td>
<td>25/32 - 2 28/32</td>
<td>2.53 - 2.87</td>
<td>6.43 - 7.30</td>
<td>143 5.0</td>
</tr>
<tr>
<td>Extra Large</td>
<td>28/32 - 3 15/32</td>
<td>2.87 - 3.47</td>
<td>7.30 - 9.84</td>
<td>177 6.2</td>
</tr>
</tbody>
</table>

* Oz. = Ounces

(Marlowe)

### B. A Greenhouse Vegetable Enterprise? Some Points to Consider.

Interest in greenhouse vegetable production has increased markedly in the southeastern United States during the past five years. Some growers desire to extend their harvest season to retain market outlets. Others wish to have more control over the growth of high value crops. The most common reason, however, is to receive the high prices usually associated with out-of-season production.

Greenhouse production, one of the most challenging, and demanding types of vegetable growing, should be examined closely before a grower commits himself and his valuable resources to this endeavor.

This specialist, working with greenhouse vegetable production since 1959, has seen many successful operations as well as many failures. The difference between these two extremes can be expressed in three little words: Attention to details. The most frequent specific cause for complete failure is plant disease. A missed spray, poor sanitation, excess humidity due to poor ventilation can all contribute to disease development. In the future, energy costs may become prohibitive.
The properly operated greenhouse provides "reasonable control" of temperature, soil moisture, humidity, nutrition, spacing, CO2 level, and many other factors except sunlight. The "ideal" conditions one tries to provide the tomato, cucumber, or lettuce also provides an excellent environment for plant diseases, insects, and nematodes. Many new techniques have been devised to by-pass potential soil-borne pests. Growing crops in sterile vermiculite-peat media, hydroponics (solution, sand, or gravel) and the tube method or nutrient film technique are examples. Each method has advantages and disadvantages. A well fumigated sandy loam soil, for example, will buffer an error in fertilizer application much more than a similar mistake in hydroponics.

Specific points to consider for the potential greenhouse operator are realistic yields, market outlets (time and quantity), cost/price relationships, technology, and attitude.

A. Yield

A great deal of legend often surrounds greenhouse yields. Exceptional greenhouse tomato, cucumber, pole bean, and lettuce yields do exist, but beginners should consider "average yields" of experienced growers as targets rather than yields quoted from demonstration or research trials. Greenhouse tomato growers usually consider 12 to 15 pounds of tomatoes per plant for a spring crop and 6 to 9 pounds for the fall crop as average and respectable yields.

B. Market Potential

1. Time. Is there a unique period in the tomato marketing sequence in which greenhouse production fits? A brief look at the major, fresh market tomato producing sources may be of interest.

<table>
<thead>
<tr>
<th>State</th>
<th>Prod. 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CNT</td>
</tr>
<tr>
<td>Fla.</td>
<td>7387</td>
</tr>
<tr>
<td>Cal.</td>
<td>6885</td>
</tr>
<tr>
<td>S.C.</td>
<td>555</td>
</tr>
<tr>
<td>N.J.</td>
<td>556</td>
</tr>
<tr>
<td>Ala.</td>
<td>518</td>
</tr>
<tr>
<td>Tex.</td>
<td>422</td>
</tr>
<tr>
<td>Mich.</td>
<td>422</td>
</tr>
<tr>
<td>Ark.</td>
<td>350</td>
</tr>
<tr>
<td>N.Y.</td>
<td>349</td>
</tr>
<tr>
<td>Ohio</td>
<td>192</td>
</tr>
<tr>
<td>Mex.</td>
<td>6709</td>
</tr>
</tbody>
</table>

These figures show that target periods may exist for additional production and that much depends on weather conditions in field growing areas.


The following text-table shows that only 81% of the potential consumption is being supplied in the listed sources. How much of the missing 19% is being supplied by home garden production? Does this indicate a place for more high quality tomatoes possibly from greenhouse production?

<table>
<thead>
<tr>
<th>Prod. Million Lbs.</th>
<th>Fla</th>
<th>Other US</th>
<th>Mexico</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Consumption, million pounds</td>
<td>720</td>
<td>630</td>
<td>690</td>
<td>2040</td>
</tr>
<tr>
<td>Percent Supplied</td>
<td>29</td>
<td>25</td>
<td>27</td>
<td>81</td>
</tr>
</tbody>
</table>

From Florida Tomato Committee Yearbook, 1976.

C. Cost/Price Relationships

The price the grower needs to receive for his vegetables is directly related to his investment, production, and marketing costs. Many field tomato growers in Florida feel that their break-even cost per pound is approximately 16-18 cents; whereas, an Indiana study showed that greenhouse growers must get yields of at least 50 tons per acre and receive prices in excess of 27 cents per pound in order to wear a happy smile.

A Tennessee study comparing two of the more "modern" greenhouse production methods shows that annual yields of 11 tons per house per year required prices in the 50 cent range to allow significant returns to original investment.
### Comparison of Two Greenhouse Production Systems
(Brooker, J. R., 1975. TVA Greenhouse Veg. Workshop)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Growing Space: 3276 sq. ft., 992 plts.</th>
<th>Media Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Investment, $</td>
<td>22,781</td>
<td>14,613</td>
</tr>
<tr>
<td>Annual Oper. Cost, $</td>
<td>8,647</td>
<td>9,525</td>
</tr>
<tr>
<td>Yield, Spring</td>
<td>13,094</td>
<td>12,301</td>
</tr>
<tr>
<td>Fall</td>
<td>9,424</td>
<td>8,732</td>
</tr>
<tr>
<td>Total</td>
<td>22,518</td>
<td>21,033</td>
</tr>
<tr>
<td>Return above cash operating costs @ 40¢</td>
<td>9,007</td>
<td>8,413</td>
</tr>
<tr>
<td>at price per lb @ 50¢</td>
<td>11,259</td>
<td>10,516</td>
</tr>
</tbody>
</table>

### D. Technology

Knowledgeable greenhouse operation is the result of continued observation, learning, reading, listening, sharing, and testing of new procedures in a cautious, methodical way. Professional greenhouse vegetable growers in Ohio, Indiana, and Michigan attend frequent short courses, participate in research projects, and try to secure (and study) the most important greenhouse publications available.

### E. Attitude

A successful greenhouse enterprise represents a serious commitment of time, resources, and energy. The determination to look after every necessary detail when it should be dealt with and in the right way is the priority approach of the professional. Tomato flowers must be vibrated daily, European cucumber male flowers must be removed when they develop and the proper fungicide must be applied when needed. As one old timer put it, greenhouse success is 50% resources; 50% hard work, 50% luck, and 50% staying on top of things!

(Marlowe)

### C. Sweet Potato Root Cracking Problems

Vegetable extension specialists in Florida have noted more than usual root cracking problems in sweet potatoes this fall. Cracking may affect most roots in a planting, but is most severe on the larger ones. Severely cracked roots must be discarded or sold at minimal prices as culs.
Solution of the problem is not an easy one. We called on the knowledge and expertise of extension specialist in Georgia in our quest for an answer. They, too, have observed this problem on a number of occasions in Georgia. Their observation agreed with ours to a large extent. Root cracking can be attributed to: (1) variety, (2) uneven growth patterns and (3) soil pests.

Research and extension workers in Georgia have noted a difference in cracking among varieties. Georgia Jet, a variety popular in that state until two or three years ago, is much more susceptible to the disorder than its replacement, Red Jewel. This observation has been verified in field plantings over the state and in test plots in Gainesville.

Uneven growth patterns can result from fluctuations in moisture supply during the growth period. The problem is most serious during root enlargement. Retarded root growth apparently result in a physical change in root tissue. Upon resumption of growth, such roots are subject to severe cracking. This was confirmed in field observations last summer where irrigated sweet potato crops showed considerably less cracking than unirrigated plantings.

Soil pests, especially heavy populations of rootknot nematodes, are known to cause severe cracking. It is possible that certain root-feeding, soil-borne insects can contribute to root cracking in sweet potato, also. Two or more of the three factors discussed above may interact to increase the severity of cracking.

In summary, growers should use every tool at their command to reduce or even eliminate cracking in sweet potatoes. This can be done by (1) planting crack-resistant varieties like Red Jewel, Centennial, etc., (2) using irrigation during droughty periods to avoid uneven growth patterns, and (3) applying an insecticide broadcast and mixed into the soil followed by fumigation for insect and nematode control before planting. Recommendations on materials and rates can be obtained from the local county agricultural extension agent.

(Montelaro)

D. Weed Control for Full-Bed Mulched Vegetables

Vegetable production using full-bed plastic mulch continues to increase in Florida. Presently, most tomato production and increasing acreages of pepper and eggplant are being produced with plastic mulch. In addition to providing a uniformly controlled soil environment, the black (or white on black) plastic mulch prevents germination or growth of many weeds. However, weeds can grow through the plant hole and between mulched beds in the water or tractor furrow. Also, nutsedge can pierce and grow through the plastic. The following information is intended to assist growers in perfecting their entire weed management system when producing vegetables with full-bed plastic mulch.
Control perennial weeds before bedding -- The best time to control most perennial weeds in vegetable fields is during the fallow season. Aggressive management systems and non-selective control measures can be aimed specifically at reducing infestations of perennial weeds during the summer fallow when most weeds are growing rapidly. Additional information relating to control of nutsedge and perennial grasses in vegetables was published in the Vegetarian Newsletter issues 77-4, 77-5, and 77-9.

Multi-purpose soil fumigants and weed control - The proper application of multi-purpose soil fumigants under plastic mulch will reduce weed growth through the plant hole and nutsedge infestations in the bed. The key to effective pest control using multi-purpose soil fumigants is proper soil moisture. All too often, the soil is too dry (or too wet) and control is erratic.

Multi-purpose soil fumigants move throughout the soil as a gas. Effectiveness under plastic is enhanced because lethal amounts of the gas can concentrate at the soil or bed surface under the plastic. However, if the soil is too wet, the gas cannot move throughout the soil. Although the gas can move rapidly in dry soils, the weed seeds and nutsedge tubers may be partially dormant. Effective control depends on fully imbibed seeds or tubers. Therefore, soils should be at or slightly below field capacity for maximum results.

Herbicidal suppression of nutsedge at bedding - For tomatoes, pebulate (Tillam) can be applied over the false shoulder before the complete bed is shaped. Because pebulate is volatile, form the remainder of the bed immediately and cover with plastic mulch. Suppression of nutsedge and susceptible weeds will continue for 4 to 8 weeks under normal planting conditions in Florida. However, do not apply pebulate to tomatoes planted near pepper or eggplant fields.

Weed control in plant holes - Weed seeds sometimes germinate and grow through the plant hole in the plastic. Proper application of most multi-purpose soil fumigants will reduce growth of most weeds at the plant hole. Otherwise, the following herbicides may be applied on the bed surface before laying the plastic mulch:

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Tomato</th>
<th>Pepper</th>
<th>Eggplant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphenamid (Enide)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Trifluralin (Treflan)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pebulate (Tillam)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>DCPA* (Dacthal)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Apply towards base of plant after transplanting. (Use on a trial basis).
Weed control between mulched beds - In soils containing some clay such as in Quincy, cultivation between beds should be considered to break the crust on the soil surface and enhance water infiltration rather than promoting run-off. Otherwise, most growers prefer herbicides because the risk of tearing the plastic mulch is reduced.

Two types of herbicides can be applied to control weeds between mulched beds. First, several residual, soil-applied herbicides are registered for use in tomato, pepper and eggplant. These herbicides must be applied before the weeds begin to germinate, or control will be poor to erratic.

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Tomato</th>
<th>Pepper</th>
<th>Eggplant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphenamid (Enide)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Chloramben (Amiben)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pebulate* (Tillam)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

* Apply to soil near shoulder and "bed-over" or cover with untreated soil from tractor furrow to suppress weeds along the mulch edge.

The second herbicide group consists of postemergence, contact-type, herbicides. Paraquat is the only herbicide in this group registered for use between full-bed mulched tomatoes and peppers, but not eggplant. The chemical should be applied with a nonionic surfactant such as X-77, surfactant WK, Triton X-100, Tween 20 and many others to help wet the weed foliage. Use a shielded boom to avoid drift of Paraquat to the crop. Apply when weeds are 2 to 3 inches (5 to 7 cm) tall. Poor control will always result if weeds are sprayed when 4 inches (10 cm) or taller. In some cases, paraquat can be tank-mixed with residual herbicides such as Chloramben. However, be sure to check the label before tank-mixing herbicides for application to vegetables.

(William)

III. VEGETABLE GARDENING

A. Seaweed in the Vegetable Garden

In some parts of Florida, particularly in the keys and other coastal areas, gardeners have relied for many years on shoreline deposits of seaweed to improve sandy or shelly soils. Liberal additions of the decayed seaweed have always given good results. The lack of available topsoil in the keys has made that area almost completely dependent on seaweed as a soil base for growing vegetables in gardens.
Florida is not unique in the use of seaweed for soil improvement. It has been used successfully in many countries of the world. Scientists in such countries as Japan, Norway, France, and Russia have studied and analyzed the chemical composition of seaweed. Since there are several species of seaweed, and since composition varies among species, locations and even time of year, it is difficult to generalize the contents of seaweed. However, all of the studies show that most seaweeds are very similar to cow manure in the content of the major plant nutrients nitrogen, phosphorus, and potassium. Seaweed contains on the average about .5 to 1.5% nitrogen and 4 to 10% potassium, but only .1% phosphorus. In addition, seaweed may contain as much as 2% calcium and 4% magnesium. It is rich in trace elements such as boron, copper, iron, manganese, molydenum, and zinc, which are essential for plant growth.

On the other hand, seaweed also contains such salts as sodium chloride which may be harmful in large quantities to plants. Most of the salt may be washed away by leaching rainfall or by drenching with a hose.

One should keep in mind that the nutrients contained in seaweed are slowly available to plants. The seaweed must be well rotted or shredded before it is applied to the soil.

In summary, seaweed as found along the coast of Florida appears to be an available form of fertilizer and soil conditioner for Florida gardens. If used properly it can furnish plants with most of the nutrients needed for good growth. It is a fair source of nitrogen, a good source of potassium, and an excellent source of trace elements. However, it is very low in phosphorus.

To use it, one should first wash it thoroughly to leach out the salt, then dry and shred the material before composting it or applying it to the garden plot. Allow a month or longer for the organic material to decompose sufficiently to release its chemicals in a form the vegetable plants can use. Like other organic materials such as cow manure, liberal quantities (25 to 50 per 100 square feet of soil) should be applied. Then, the amended soil may be watered and fertilized as need to make vegetables grow where otherwise impossible or very difficult.

(Stephens)

B. Know Your Vegetables - Celtuce

Celtuce (Lactuca sativa var. asparagina) is known also as stem lettuce celery lettuce, and asparagus lettuce. It looks like a cross between celery and lettuce. This type of lettuce is grown for the edible enlarged seed stalk. The outer leaves resemble loose leaf lettuce, but are a lighter green. These leaves may be eaten in salads at a young tender stage. However, they become bitter and unpalatable rather quickly due to the formation of a milk sap.
Soon after the development of the outer leaves, a central stalk bearing tiny leaves at the top starts to elongate. Allowed to grow, this flower stalk will reach 4 to 5 feet in height. It acts very much like regular lettuce bolting to seed. The outer edges of the round stem contain the bitter milky sap.

When the stem is about 12-18 inches long, it should be cut off down into the leafy portion of the plant, being sure to peel the outer skin, removing the portion containing the bitter sap. The soft, translucent green central core is the edible part. It may be eaten fresh, either sliced or diced into a salad. The flavor is somewhat like a cucumber, yet different. In China, where it is grown in commercial quantities, the fleshy stem is cut into sections and cooked by boiling or stewing.

Celtuce is rarely grown in Florida gardens, but should do well whenever and wherever leaf lettuce is grown successfully. Since it is a cool weather crop, it should be planted from seed in the fall, winter, and early spring, spaced at about 8 inches in the row, and treated about like regular lettuce. Many seed catalogs advertise seed for sale.

(Stephens)

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