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Prepared by Extension Vegetable Crops Specialists

J. F. Kelly  
Chairman

James Montelaro  
Professor

J. M. Stephens  
Associate Professor

S. R. Kostewicz  
Assistant Professor

J. R. Hicks  
Assistant Professor

R. K. Showalter  
Professor

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

FROM:  James Montelaro, Extension Vegetable Specialist

VEGETARIAN NEWSLETTER 75-7

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A. Vegetable Extension Specialists--Area Assignments

For some time it has been evident that we have been unable to adequately maintain contact with county extension personnel. We have discussed the concept of assigning area specialists for up to five areas of the state. With two production specialists, we were unable to even begin this approach. With the return of Dr. George Marlowe from Vietnam, we are now able to make our first move in the direction of area assignment. Dr. Marlowe, a regular full-time member of our Vegetable Crops extension faculty, has been located at the Bradenton Agricultural Research & Education Center. This permits us to assign our three vegetable production specialists primary responsibilities in the counties as indicated on the accompanying map.

As in the past, the Vegetable Extension Specialists will operate as a team and each will be available to all counties to fulfill special needs. As such, some specialists will operate statewide--Jim Stephens to cover gardening and youth projects and problems, Jim Hicks and Bob Showalter to cover handling and postharvest problems. Jim Montelaro will exercise leadership in the area of crop fertilization and pest control, George Marlowe in crop varieties, and Steve Kostewicz in weed control, greenhouse production and rural development. The three area production specialists will maintain close contact with supporting discipline specialists in Food & Resource Economics, Entomology and Nematology, Plant Pathology, Agricultural Engineering and Soil Science.

By addressing their inquiries to the appropriate specialist, county personnel can do their part to assure a more effective statewide extension program in vegetables.

(B) Index for 1974-75 Vegetarian Newsletters

We consider our production season for vegetables to be from July 1 to June 30. With this, the first issue of the new production season, we are enclosing an index for the twelve monthly issues of the past season (July 1, 1974 to June 30, 1975).

County Extension Agents wishing to maintain a reference file of the Vegetarian Newsletter should place last season's issues in a folder together with the index. When needed, it is a simple matter to check each annual folder for the material desired. There are on file in this office indexes for the 1971-72, 1972-73, 1973-74 seasons, as well as a "catch-all" index for the more important articles spanning from the early fifties to 1971. These are available upon request from this office.

(Montelaro)

II. COMMERCIAL VEGETABLE PRODUCTION

A. Water--Hints on Finding Good Quality for Irrigation of Vegetables

This is the last in a series of three articles dealing with problems related to irrigation water to be used in vegetable production. The first and second articles defined water quality and suggested practices which might be used to solve problems encountered with poor-quality irrigation water. In this article, we give some pointers which should prove helpful in the search for best quality irrigation water possible.
Primary Responsibilities for Vegetable Extension Specialists
(Commercial Agriculture, Production)

Area 1
Kostewicz
Northern counties
Disclines:
- Weed control
- Rural development
- Greenhouse and hydroponics
Production guides:
- Sweet potato
- Okra
- Southern peas
- Onion
- Eggplant

Area 2
Montelaro
Eastern counties
Disciplines:
- Fertilization
- Pest control
Production guides:
- Snap bean
- Sweet corn
- Watermelon
- Cabbage
- Squash
- Lettuce & endive
- Tomato
- Pepper
- Cantaloupe
- Cucumber
- Strawberry

Area 3
Marlowe
Western counties
Discipline:
- Varieties
nematodes, protecting them from the action of the nematicide. The soil should be worked thoroughly and far enough in advance so that this material can be broken down.

Prior to application, the soil should be of a "seedbed tilth." This helps by promoting a uniform movement of the nematicide throughout the soil. Large clods, firmly packed areas, etc., can leave pockets of uncontrolled nematodes because of poor penetration of the nematicide into these areas. This can result in rapid build-up of nematodes and reduction in crop growth in these areas.

The soil moisture should be at a level as if the area was to be seeded. Too low a soil moisture allows the nematicide to escape into the atmosphere without giving adequate exposure to the nematodes present and poor control will result. Too high a moisture level will prevent a thorough uniform spread of the nematicide in the soil and likewise poor control will result. In addition, a cool wet soil will tend to retain the nematicide longer, increasing the time needed for aeration or dissipation of the nematicide prior to planting the crop.

Any pest control material must be used in the proper manner if desired control is to be expected. Careful attention or consideration of these factors by growers before applying nematicides can help increase the effectiveness of the material they are using. A good control program involves doing a good job on all the factors for obtaining maximum results.

(Kostewicz)

C. Advance Planning to Avoid Common Mistakes Next Season

On numerous occasions over the past years, we advised vegetable growers to plan carefully in advance of the production season in order to avoid costly mistakes. The September, 1972, issue of this Newsletter contained an article entitled "Planning Before Planting Vegetable Crops." In it, we suggested use of a checklist "as a general guide to be used in an effort to avoid the more common mistakes made in vegetable production in Florida." The list is reprinted below.

Checklist of Items to Consider in Advance Planning

1. Crop Selection - Type, variety, marketability, competition, scheduling plantings, weather hazards, pest hazards, etc.

2. Site Selection - Land adaptability, weather history, water supply, water quality, etc.

3. Land Preparation - Drainage, irrigation, clearing, leveling, timing and other amendments.

4. Soil Pest Control - Nematodes, insects, diseases and weed seeds, pesticide residues, etc.

5. Fertilization - Land use history, rates, sources, timing, placement, supplemental applications, microelements.

6. Disease and Insect Control - Equipment, pesticides, residues, scheduling.

7. Weed Control - Herbicides, application equipment and methods, cultivation, residues.
8. Harvest and Handling - Scheduling, labor, harvest equipment, grading, packing, marketing, destruction of crop residues.


Since this article was written, we have noted mistakes in almost every category on the checklist. However, mistakes within a few categories appeared more often than others. In most cases, they could have been avoided with good advance planning. The five most common mistakes are discussed here as a reminder to vegetable growers for the coming season.

(1) Liming - The most common mistake was the failure to use lime when it was needed. We, also, noted problems with overliming and poor choice in sources of liming materials.

(2) Fertilization - The most common problem in this category was improper placement. Too often, fertilizer was placed under or too close to the sides of the crop where it injured plants severely. In addition, use of excessive amounts was observed quite often. This is not only injurious to the crop, but a waste of expensive fertilizer.

(3) Nematode Control - Failure to properly treat nematode infested soils was observed to cause many crop failures.

(4) Irrigation - Use of poor-quality irrigation water appeared often as a serious problem in vegetable production. A series of three articles, the last in this issue of the Newsletter, emphasizes the importance of this problem and gives suggestions on how to cope with it. Improper timing of irrigation (especially with overhead systems) has been observed to be a serious problem, also.

(5) Disease Control - Poor scheduling and improper application techniques have been noted to be equally serious problems in disease control. Errors made in application techniques involve (1) insufficient and/or poor nozzle arrangement, (2) excessive delivery pressure, (3) wrong kind of equipment, and (4) wrong time of day or when too windy.

There are many other mistakes that can be just as costly to the vegetable grower as the above. However, by pointing out the more common ones, the grower may be prompted to check every other operation carefully, also.

(Montelaro)

III. HARVESTING AND HANDLING

A. Cooling Tomatoes in Ripening Rooms

Many of the tomato packinghouses in Florida have ripening rooms where the tomatoes are partially ripened before shipping. Proper temperature management in these rooms is extremely important since this is the first step in the ripening process. A problem created here will be present throughout the marketing process and will certainly have a bearing on the quality of the tomatoes offered to the consumer at retail.

Mature-green tomatoes should be ripened at approximately 20°C (68°F, range 65°-70°). Higher temperatures (up to about 26.5°C or 80°F) may result in more rapid color development, but the fruit also softens much faster. In addition, decay can
be much more serious at higher temperatures. At temperatures above 30°C (85°F), there is a chance of inhibiting lycopene (red color) development which results in yellowish fruit. Ripening fruit below the recommended temperature also causes problems. At 15.5°C (60°F) coloring is slower, but the fruit may be slightly firmer. Below 10°C (50°F) the fruit softens slowly but will not ripen properly. Green fruit held at low temperatures prior to ripening are extremely susceptible to decay.

Generally, low temperatures in the ripening rooms are not a problem because the fruit temperature at harvest will be above 10°C (50°F). High temperatures are a problem during periods of hot weather or when the fruit are exposed to the sun either on the vine or after harvest. Fruit harvested during hot weather will be close to or above the air temperature. These fruit will respire at a rapid rate and accumulate the heat resulting from respiration. During hot weather, tomatoes mature faster in the field, resulting in a higher picking volume and capacity loading of the ripening rooms. The high pulp temperature, high respiration rate, large volume of fruit and the high differential temperature between the outside temperature and the desired ripening room temperature results in a sizable refrigeration requirement if the reduction in temperature is to be accomplished in a reasonable period.

The following information is offered to help derive general guidelines for refrigeration needs.

Sources of heat:

1. Field heat in the fruit
2. Heat produced by respiration
3. Heat from cartons, pallets, room air, etc.
4. Heat infiltration through doors, walls, ceiling, etc.
5. Heat produced by fans (or blowers), lights, etc.

Field heat: This is the amount of heat that must be removed from the fruit to bring the pulp temperature down to the desired level. Approximately 0.9 Btu is required to change the temperature of 1 pound of tomatoes 1°F. Two examples of the refrigeration requirement for removal of field heat are given below:

**Example 1:** A room is loaded with 75 tons (150,000 lbs) of tomatoes at a pulp temperature of 83°F. The number of tons of refrigeration (1 ton = 12,000 Btu/hr) that would be required to cool the tomatoes to 68°F (disregard the heat of respiration) in 12 hours is calculated as follows:

\[
150,000 \text{ lbs} \times 0.9 \times (83°F-68°F) = 2,025,000 \text{ Btu} \\
2,025,000 \text{ Btu}/12 \text{ hr} = 168,750 \text{ Btu/hr} \\
168,750/12,000 = 14.0 \text{ tons of refrigeration for 12 hours}
\]

**Example 2:** A room is loaded with 40 tons of tomatoes at a pulp temperature of 80°F. To cool to 72°F in 24 hrs would require 2 tons of refrigeration.

\[
80,000 \times 0.9 \times (80°F-72°F) = 576,000 \text{ Btu} \\
576,000 \text{ Btu}/24 \text{ hr} = 24,000 \text{ Btu/hr} \\
24,000/12,000 = 2 \text{ tons of refrigeration for 24 hours}
\]

Respiration heat: Anyone familiar with tomato ripening rooms knows that the fruit produces CO₂. It also produces heat by the same process. Since the rate of respiration is dependent on temperature, the amount of heat and CO₂ produced is directly related to pulp temperature. Since respiration rate is also dependent on
variety, growing conditions, maturity and handling (particularly bruising), estimates of heat produced are not precise. At 80°F the estimation of refrigeration needed to remove the heat of respiration (or to just maintain a constant temperature) is 0.03 to 0.04 tons of refrigeration per ton of fruit. Using the 0.04 ton figure for the 75 tons of 83°F fruit in Example 1, an additional 3 tons of refrigeration would be needed to remove the heat of respiration (75 x 0.04 = 3.0). In Example 2, if we use the mid range (0.035) for 80°F, the requirement is an additional 1.4 tons of refrigeration (40 x .035 = 1.4). At 68°F the amount of refrigeration required to remove the heat produced by respiration would be approximately one-half that needed at 80°-83°F.

Container heat: In relation to the other sources, the heat from cartons and pallets is minor and should not in itself create problems.

Infiltration and utility heat: These heat sources depend entirely on design, construction and operation of the ripening rooms and cannot really be generalized. However, they should be taken into account anytime refrigeration needs are being calculated. A well constructed and operated room may utilize from 5 to 10% of the refrigeration on heat from these sources. Inadequate design, poor construction or sloppy management will result in a considerably higher percentage of the refrigeration being used for purposes other than cooling the fruit. It should also be remembered that the rating on a refrigeration compressor does not necessarily mean that it will always perform at that capacity under all conditions.

In the two examples given, there is a vast difference between the capacity needed to cool and that required to maintain 68°-70°. In Example 1 where 75 tons of fruit are to be cooled from 83°F to 68°F in 12 hours, approximately 14 tons of refrigeration are needed to remove field heat. An additional 3 tons are necessary to overcome respiration heat. After the fruit is cooled to 68°F, approximately 1.5 to 2 tons of refrigeration would take care of the heat from respiration. Since heat from other sources would not vary greatly but would have to be taken into account, a realistic value would be a reduction from about 20 tons required during cooling to about 5 tons for maintaining the temperature. The change in Example 2 is not nearly so great (from about 5 tons to 2) because of the slower cool down, smaller temperature differential and smaller fruit load.

A number of tomato operations in the state have each ripening room on an independent refrigeration system. If the system is capable of removing the field heat in a reasonable time, considerable refrigeration capacity will not be used after the fruit is at the desired temperature. On the other hand, a unit that is completely adequate to maintain the proper ripening temperature will not have the capacity to remove field heat and/or the heat of respiration at high temperatures. Due to the value and highly perishable nature of tomatoes, the feasibility of independent units is apparent. However, there are alternatives to equipping each room for rapid cool down.

(1) Pre-cooling room - This has been used successfully with vine-ripe tomatoes for a number of years. Used in conjunction with mature-greens, it would greatly reduce the demand for refrigeration (and air movement) in the ripening rooms, and alleviate the temperature fluctuations created when warm fruit is moved into a room with cool fruit.

(2) Booster system - Not all ripening rooms will be filled at the same time. A system for utilizing the excess refrigeration capacity from rooms that are at temperature, in rooms that are cooling, is one possibility. Another possibility along this same line would be having central cooling units with a primary or secondary refrigerant being channeled into any room upon demand.
Activa ted sludge is inoculated, air-treated and decomposed primary sewage. Since it is relatively high in nitrogen and free of pathogenic organisms, it is suitable for use as fertilizer.

To summarize, activated sewage sludge is a good source of nitrogen and phosphorus, some potash and other chemical elements useful in plant nutrition. It is the only sewage form that can be safely suggested to be used as garden fertilizer.

(3) Timely Topic for week of July 27-August 2.

Question

I have heard about making compost in just two weeks. Is this possible?

Reply

The time required to produce a good compost depends upon the type of materials used, its texture, and the availability of adequate moisture, nutrients and aeration. It can be made in 14 days if non-woody material is finely ground or pulverized, kept moist and frequently turned to provide good aeration. By grinding these materials, decomposition is speeded up because more surface area is exposed to attack by decay organisms.

(4) Timely Topic for week of August 3-9.

Question

My compost pile gets so hot I can feel the heat. Does this sterilize the compost?

Reply

As organic compost is decomposing, energy in the form of heat is released. You can check for heat energy by feel or by reading a thermometer placed in the interior mass of an active compost heap. Temperatures often reach 170° F. This heat buildup can destroy some disease organisms, insects, insect eggs and weed seeds, but it should not be relied upon to pasteurize the compost. Avoid putting materials in the compost pile that have detrimental effects. These include diseased plants, grass and weed seed, etc.

(5) Timely Topic for week of August 10-16.

Question

How can I practice rotation with only a small backyard for my garden?

Reply

When planning your garden, try to select a spot where vegetables have not been grown before or at least for several years. If you don't know the previous history of the spot, or if you have no choice, plan for and follow a regular rotation of crops within the plot. This consists of planting the same kinds of plants in a different part of the garden each year and in such a way that the same kind of plants are not grown in the same spot anymore often than once every 3 or 4 years. For example, since the tomato, potato, pepper and eggplant all belong to the same plant family and are attacked by many of the same diseases, do not follow one with another in the same location.

(Stephens)
Vegetable growers often fail to consider surface water as a source for irrigation. With a little ingenuity and capital outlay, it is possible to develop a good supply of quality irrigation water in many cases from surface water sources. The other alternative in Florida is well water:

Well water in Florida can range from excellent to substandard for purpose of irrigation. Too often, the only consideration taken into account in digging a well has been flow (volume) of water. According to Mr. Dalton Harrison, University of Florida Extension Irrigation Specialist, quality of water should receive equal consideration. The vegetable grower who finds that irrigation water from a new well is "burning" his crop will agree that there is no room for haphazard in drilling irrigation wells.

Mr. Harrison feels that a few simple suggestions should be followed in planning a search for good well water. They are as follows:

1. Study the available information on potential supply, quality, depth, etc., for well water in the specific areas. Much information is available on this subject including chloride contents, dissolved solids, sulfates, hardness, quantities at different depths, chemical types, etc. The information is available in map form at a nominal price from the Florida Board of Conservation, Division of Geology, Larson Building, Tallahassee, Florida, 32302. With this background information, the well driller can proceed with more assurance.

2. If doubt on quantity and/or quality of water exists, it may be cheaper to drill a 2- or 4-inch test well first.

3. The driller should check periodically for volume and quality of water during drilling of the well. The deepest well may not produce the best irrigation water.

No one can be assured that satisfactory irrigation water can be found in every instance. However, we feel that these suggestions are very worthwhile and should be given careful consideration by vegetable growers contemplating having wells drilled in the future.

(Montelaro)

B. Prepare Soil Properly for Best Nematicide Activity

The use of nematicides in Florida vegetable production has become a standard practice with most growers. Drastic reductions in yields can be attributed to uncontrolled populations of nematodes feeding on plant roots. Complete eradication of these pests from a production field is not economically possible; thus growers use various means to keep populations to a low manageable level. One of these means is the use of a nematicide. The objective with these materials is to reduce the population to a low level in the treated area. Thus, a crop can develop a root system and be harvested before levels become high enough to affect the crop.

Emphasis in previous articles in this newsletter has been placed on such "application" aspects such as use of plastic mulches, water seals, rate, placement, etc. Of equal importance are the pre-application considerations such as soil preparation. These are factors which can affect how thoroughly these materials do the job when they are applied. Some of the most important to keep in mind are organic matter, tilth and soil moisture.

Organic matter here is used to denote the green or undecayed plant debris from previous crops. This residue, if not dealt with, can provide a harboring place for
Proper temperatures for ripening tomatoes have a bearing on the final quality of the ripened fruit. Excessive refrigeration capacity is expensive. If there are problems in an existing system, check with a good refrigeration engineer on possible modifications before incurring the cost of additional capacity which may only partially solve the problem.

(Hicks, Gaffney)

IV. VEGETABLE GARDENING

A. Timely Gardening Topics

These questions and answers are suggested for agents' use in developing periodic (weekly) radio or newspaper briefs. They are based on letters of inquiry from Florida gardeners.

(1) Timely Topic for week of July 13-19.

Question

What is causing the eggplants in my garden to be rough and lobed instead of round and smooth?

Reply

The problem is widespread having been reported to occur in many areas of the state, but the cause is not completely understood at this time.

The condition seems to be associated with one variety--Black Beauty. Future analysis may prove other varieties affected also. Apparently, some unusual environmental condition, or an unusual combination of common conditions, has occurred to bring about the abnormal fruit shape. Certainly, we should not discount the possibility of genetically related causes. Chemical injury seems to have been eliminated due to the widespread occurrence of the problem.

(2) Timely Topic for week of July 20-26.

Question

Is it okay to use city sewage in my vegetable garden?

Reply

Many questions arise on the use of municipal sewage for the production of fruits and vegetables. There is probably less concern when materials are to be used in soils to produce grass, flowers and ornamentals.

Sewage sludge is a by-product from the treatment of city sewage. Basically, there are three types--raw sewage, digested sludge and activated sludge.

Raw sewage (primary sludge) is a potential carrier of pathogenic organisms, and is not recommended for use on the soil.

Digested sludge is of different types, but it is settled out and decomposed in such a way that most of the pathogenic organisms are destroyed. This type, also, should not be used in the garden.
Three members of the genus *Momordica* are sometimes encountered in Florida gardens. These are Chinese cucumber (*Momordica cochininchinensis*), balsam pear (*Momordica charantia*), and balsam apple (*Momordica balsamina*). All these cucurbits are fruits of annual running vines, to 10 feet or more, with near round, lobed leaves. They are much more popular in the Oriental countries such as Malaysia, Vietnam and China.

The fruit of the Chinese cucumber is cucumber-shaped, 6-8 inches long, dark to yellowish-green and very warty (humpy) on the outside surface. The hollow center contains several watermelon-shaped, irregularly-etched seeds covered with a scarlet pulp. The fleshy portion of the fruit is the edible part, mainly cooked in soups.

The balsam pear is 4 to 6 inches long, oblong, pointed and furrowed lengthwise. When fully ripe, it splits into 3 divisions. The immature fruit is boiled as a vegetable. The related balsam apple has a smaller egg-shaped fruit and is used in a similar manner. In all cases, production in Florida gardens should be similar to production of cucumbers. Allow 3 to 4 months from seeding to harvest.

(Stephens)