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TO: COUNTY EXTENSION DIRECTORS AND AGENTS (VEGETABLE AND HORTICULTURE)

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VEGETARIAN NEWSLETTER 80-11

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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS, STATE OF FLORIDA, IFAS, UNIVERSITY OF FLORIDA, U.S. DEPARTMENT OF AGRICULTURE, AND BOARDS OF COUNTY COMMISSIONERS COOPERATING
THE VEGETARIAN NEWSLETTER

I. NOTES OF INTEREST

A. Susan Gray Added to Vegetarian Contributors

Starting with this issue, Susan Gray, Assistant in Vegetable Crops will be contributing articles on the youth and master gardening programs to the Vegetarian. We welcome Susan to the team.

(Sherman)

B. Commercial Vegetable Crops Extension Planning Conference

A statewide Extension Planning Conference for commercial vegetables has been scheduled for Longboat Key, December 4 and 5, 1980. The objective of the meeting is to aid agents, specialists, and extension administration in the development of an effective statewide educational plan. The conference will be held at the Holiday Inn of Longboat Key. We hope to see each of the agents with commercial vegetable programs participating in the conference. You should have mailed your room reservations in by now. If you have any questions, please call Bill Stall or Mark Sherman at 904/392-2134, Suncom (322-2134).

(Sherman and Stall)

C. New Publication

A new Vegetable Crops Fact Sheet entitled "Postharvest Water Loss Control for Vegetables" prepared by Professor R.K. Showalter has been just been released. A supply can be ordered from IFAS Editorial or single copies from this department.

(Sherman)

II. PESTICIDE UPATE

A. Oxamyl Given Section 18 Clearance for Use on Green Beans for Control of Specific Nematodes

Oxamyl (Vydate L) has been given an emergency section 18 exemption for use in green beans for the control of root-knot, sting, and reniform nematodes in Palm Beach, Broward, and Dade counties.

Oxamyl may be applied as a single soil treatment or as two foliar applications.

The applicator should consult the label for treatment rates and all restrictions specified for the exemption.

(Stall)
III. COMMERCIAL VEGETABLE PRODUCTION

A. Calculations for Water Application with Drip Irrigation on Vegetables

Improper design and use of drip irrigation installations in the state have resulted in reduced yield and quality of vegetables for some growers. Precise management of water and nutrients is essential with drip irrigation.

Crop water needs change during the growing season. The water needed is also modified by soil type and environmental factors.

Evapotranspiration (ET) is the total water used by the plant plus the direct evaporation from the soil surface. During a typical season, ET varies from 2 to 5 inches/month. (See Rogers and Marlow, 1976. Water Needs of Florida Vegetable Crops, Water Resources Council, WRC2).

The net irrigation requirement (NIR) is the portion of the ET not supplied by rainfall. In addition, the amount of water calculated to apply is influenced by the efficiency of the irrigation system and the total land area irrigated.

Drip irrigation has a high efficiency (95%) since only the bed area is irrigated, this represents about 50% of the total land area.

To calculate the water needed by drip irrigation, assume an NIR of 1.25 acre inches per week for a crop at peak water requirement on a 4-foot bed. The water per day would equal: 1.25 x 27,154 gal/acre divided by 0.95 (irrigation efficiency) times 0.50 (area irrigated) times 1/7 (1 day). (1)

\[
\frac{1.25 \times 27,154 \times 1}{0.95 \times 7} = 2,550 \text{ gal/day}
\]

Good water distribution on most soils has been obtained with emitter sizes of 0.4 gal/hr or larger. If the emitters are 1 foot apart on 4-foot beds then there would be 10,890 emitters per acres (43,560 divided 4). Each emitter then would apply 0.23 gallons (2550 gal divided by 10,890 emitters = 0.23 gal/emitter). The total time needed to apply 0.23 gallons if the emitter size is 0.4 gal/hr is approximately 34 minutes.

On sandy soils, high volume emitters are more desirable due to better horizontal water movement. With emitters of a lower discharge rate, the soil wetting pattern may extend only 5 to 6 inches on each side of the emitter in an inverted cone pattern. To increase the wetting pattern,
inverted cone pattern. To increase the wetting pattern, many growers have tried to run the system for 24 hours without appreciable success. Soluble nutrients are moved with irrigation water and in many cases leached with prolonged irrigation.

Increased yields are not uncommon with the use of drip irrigation. To produce maximum yields, however, both water and nutrients must be applied in the correct manner and in the correct amounts.


IV. HARVESTING AND HANDLING

A. Water Loss Control

Limp celery, snap beans that won't snap, and dented corn kernels are examples of excessive water loss. This is a major cause of quality deterioration, poor consumer appeal, and a direct loss in saleable weight. The air in the intercellular spaces of most vegetables is saturated with respect to water vapor (100% Relative Humidity). This means that the water vapor pressure inside the vegetable is almost always higher than that of the atmosphere surrounding it. Since water vapor moves from areas of higher to lower concentrations, water dries out of most vegetables during harvesting, handling, and marketing. Vegetables vary greatly in their susceptibility to water loss and some rapidly become unsaleable because of wilting and shrivel. Those with large surface areas such as leafy vegetables, tend to lose water most rapidly.

The structure and condition of the vegetable, plus the anatomy of the epidermis influence the rate of water loss. The epidermis usually has a protective waxy layer (cuticle) with varying numbers of openings such as stomata, lenticels and a stem scar. Water loss increases with the number of openings and skin breaks as well as epidermal hairs. Cuticles are a contact layer between the vegetable and its environment. More water is lost whenever the cuticle or skin is broken by growth cracks, cuts, bruises or other injuries. With no openings in the skin of tomatoes, the stem scar provides the pathway for water loss. The cuticle and rind on watermelons form such a good barrier that water loss is not a problem.
Cuticles develop during early stages of growth and are supplemented with additional wax deposits during maturation. Vegetables harvested immature are much more susceptible to water loss than those harvested when mature. Cuticles on mature tomatoes, squash, cucumbers and peppers get much thicker as they mature. Immature carrots, beets, and potatoes lose water rapidly until the thicker periderm layer forms.

Water loss can be controlled by minimizing the difference between the humidity inside the vegetable and that of the surrounding air, or protecting the vegetable from drier air. The best control measures vary among vegetables and marketing conditions. Water loss is generally highest in freshly harvested vegetables and will continue as long as the commodity temperature is higher than that of the air. Therefore, precooling of many vegetables also controls water loss. During hydrocooling, the moisture content of the vegetable may actually increase. High relative humidities combined with suitable temperatures are essential for many vegetables. Since the rate of moisture loss from a vegetable increases with rate of air movement across the vegetable, special provisions are needed in forced air coolers, open trucks, and storage rooms to minimize the drying effects.

Trimming the tops from radishes and carrots, the outer leaves from cauliflower and celery, and the shank and flag leaves from sweet corn greatly reduces water loss from the edible portions. Most tubers and roots are able to heal skinned and bruised areas if a curing period is provided.

Packaging is a common method of reducing water loss by maintaining a high relative humidity surrounding the vegetables. Plastic bags and liners for shipping containers, film overwraps for heads of lettuce or cauliflower, and plastic wraps for consumer packages are effective against wilting and shrivel. Wax and plastic impregnated fiberboard containers or the most recently developed plastic containers retard water loss. Packaging for controlling water loss has largely replaced waxing of many vegetables in Florida. Water loss from peppers, summer squash, and eggplant could be reduced by waxing, but losses from decay are often greater if organisms on the skin are covered with wax.

Surface coatings (waxes) are applied to most cucumbers and tomatoes shipped from Florida. A coating that covers the entire surface of a cucumber, including the stomata in the epidermis, can reduce water loss by about 50%. Common surface coatings for vegetables are formulated from natural waxes (paraffin or carnauba), mineral oil, oleic acid,
emulsifying agents, and other materials. Carnauba wax is hard, and polishes well, but does not control water loss as well as the softer paraffin. When the proportion of mineral oil is increased, consumers complain about greasy cucumbers and soiled hands. The natural character of the vegetable's surface, and the presence of skin breaks or decay organisms determine the feasibility of applied surface coatings.

Postharvest Water Loss Control for Vegetables by R.K. Showalter is the title of Vegetable Crops Fact Sheet No. 28 just released by the Vegetable Crops Department.

(Showalter)

B. State Fire Marshal Rules Regarding Fruit Ripening Processes

The American Insurance Association publishes a recommended Fire Prevention Code which includes a section on Fruit Ripening Processes. The State Fire Marshal has a similar code for Florida. These rules are published as part of the Florida Administrative Procedures Act and section 4A-17.02 "Use of ethylene" is reproduced below for your information.

4A-17.02 Use of ethylene.

1) The location of buildings in which fruit ripening processes utilizing ethylene are conducted shall be approved by the State Fire Marshal or his deputy.

2) Ethylene shall be introduced by some means under positive control and measured so that the quantity introduced does not exceed 1 part ethylene to 1,000 parts of air.

3) Containers storing ethylene shall be constructed so as to be reasonably safe to persons and property. Evidence that containers storing ethylene are constructed in accordance with the standards as set forth in Title 49, Code of Federal Regulations; Part 78 of Interstate Commerce Commission Regulations and the ASME Code for Unfired Pressure Vessels, 1965 edition of the American Society of Mechanical Engineers, shall be evidence that such containers are reasonably safe to persons and property.

4) Containers other than those connected for use shall be stored outside of the building or in a special building except that not more than two portable I.C.C. containers not connected for use may be stored inside the building premises. Such inside rooms or portions of buildings used for storage of these containers shall be constructed in accordance with Rule 4A-30.14(4) and (5).
5) Ethylene piping shall be of iron pipe. Flexible connectors and hose, when used shall be of approved type. Tubing shall be of brass or copper with not less than 0.049 inch wall thickness.

General Authority 633.05. 633.051 FS. Law Implemented 633.01. 633.081 FS. History-New 9-16-65.

The flow-through system currently recommended by IFAS for introducing ethylene into tomato ripening rooms is in compliance with this section. In addition to covering the use of ethylene, the rules also cover electrical equipment, heating, open flames, and housekeeping for ripening rooms. Some of these rules apply more directly to commodities other than tomatoes (e.g. citrus, bananas). I can provide copies of the rules to those interested.

(Sherman)

V. HOME VEGETABLE GARDENING

A. Economic Value of Home-Garden Vegetables in North Florida

In Florida as well as other states, the possibility of saving money is a primary reason for growing one's own vegetables. There have been several recent attempts to determine if gardening is a paying proposition and, if so, to what extent. Stall determined from records kept on a 600 square foot garden in Dade County, Florida, that vegetables grown in South Florida gardens were more economical than vegetables purchased retail and if grown over a five-year period, more economical than from U-Pick operations.

Since there were no studies on record to determine the economic feasibility for vegetable gardening in North Florida where growing conditions are considerably different from the southern end of the state, a garden was grown in Tallahassee and another in Jacksonville in the spring of 1980. Cost and returns records were kept on both gardens and the results are reported in this paper and FSHS Proc. 93, 1980.

MATERIALS AND METHODS

Tallahassee - A 35x40 ft. vegetable garden was grown on the campus of Florida A&M University (FAMU) for three consecutive years (1978-1980) in cooperation with the University of Florida, IFAS.

The 1400 sq. ft. garden was planted March 24, 1980, on a sandy clay loam soil typical of the area. The plan included ten vegetables most liked by the predominantly black families of the area. Cultivars, in-row plant spacing, planting
techniques, and cultural practices were consistent with Extension recommendations. All rows were 42 inches wide and with the exception of sweet corn which had two rows, a single row of vegetables was planted down the center of each raised bed. Tomato, pepper and eggplant were started from transplants, whereas others were seeded. Water was applied as needed by overhead sprinklers.

Jacksonville - The 638 sq ft. garden at Jacksonville was less than half the size of the Tallahassee garden; however, due to very intensive culture, a greater selection of vegetables were produced on it than the larger garden. The intensive culture plan included twenty-four different kinds of vegetables and six herbs. Minimum spacings were used with each crop.

RESULTS

Tallahassee - The weight of the 10 vegetables harvested from April through July, 1980, was 775 pounds worth $384 at retail. The costs for growing the garden vegetables are given in Table 1. The garden returned a net profit of $242.22 even when a charge of labor was included. Excluding labor, the net value rose to $313.52.

Table 1. Costs and returns for 1400 sq. ft. garden, Tallahassee, Florida, 1980.

<table>
<thead>
<tr>
<th>Returns (retail value)</th>
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<tbody>
<tr>
<td>Costs</td>
<td></td>
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<tr>
<td>Equipment (5 yr depreciation)</td>
<td>13.40</td>
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<tr>
<td>Seeds and plants</td>
<td>19.40</td>
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<tr>
<td>Fertilizer</td>
<td>4.50</td>
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<tr>
<td>Pesticides</td>
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<tr>
<td>Water</td>
<td>20.00</td>
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<td>Stakes</td>
<td>3.50</td>
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<tr>
<td>Total (w/o labor)</td>
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<td>Labor (23 hrs. @ $3.10)</td>
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<td>Total (inc. labor)</td>
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<td>313.52</td>
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<tr>
<td>Net value (inc. labor)</td>
<td>242.22</td>
</tr>
<tr>
<td>Net returns per hour of labor</td>
<td>13.63/hr</td>
</tr>
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</table>
Jacksonville - Twenty-two different vegetables were harvested from the 638 square foot garden plot during a 13-week period from April 23, 1980 to July 22, 1980. All of the vegetables grown would have cost $416.10 if purchased at retail. Production costs are outlined in Table 2. Net profit without a charge for labor was $332.91. Even including a charge for all labor inputs, the garden still returned a net profit of $122.11.

Table 2. Costs and returns for 638 sq. ft. garden, Jacksonville, 1980.

<table>
<thead>
<tr>
<th>Returns (retail value)</th>
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<tr>
<td>Costs</td>
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<tr>
<td>Equipment (5 yr. depreciation)</td>
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<td>Seeds</td>
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<td>Plants</td>
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<tr>
<td>Fertilizer</td>
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<td>Sulfur</td>
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<td>Pesticides</td>
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<td>Water</td>
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<tr>
<td>Total cost (w/o labor)</td>
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<tr>
<td>Labor (68 hrs. @$3.10)</td>
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<tr>
<td>Total cost (inc. labor)</td>
<td>293.99</td>
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<td>Net value (w/o labor)</td>
<td>332.91</td>
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<tr>
<td>Net value (inc. labor)</td>
<td>122.11</td>
</tr>
<tr>
<td>Net return per hour of labor</td>
<td>4.89/hr</td>
</tr>
</tbody>
</table>

DISCUSSION

As with similar economic feasibility studies of other gardens both North Florida gardens demonstrated a definite economic advantage for growing one's own vegetables. According to the Gallup Poll, the garden at Jacksonville (638 sq. ft.) was about the same size as the national average (620 sq. ft. in 1978 and 595 sq. ft. in 1979). With such variability in the kinds and amounts of vegetables grown in the different locations, it is most remarkable that returns were so similar. The dollar yields from the gardens in the Gallup survey and the two gardens studied here were $386, $384, and $416, for Gallup, Tallahassee, and Jacksonville, respectively. A demonstration garden in Ohio by Utzinger also produced $384 worth of vegetables when expanded from its 150 sq. ft. size to the exact size of the Jacksonville garden. As reported by Stall, the value for a 600 sq. ft. garden in South Florida was $496, slightly higher due to a longer harvest period than the other gardens.
The Tallahassee garden demonstrated the loss of space efficiency that occurs when rows are wide and equally spaced. Retail value of vegetables grown on 1400 sq. ft. was no more than for those grown on 638 sq. ft. at Jacksonville, with less than half the returns per square foot.

(Stephens)

B. Know Your Minor Vegetables - Willow-leaf Lima

The willow-leaf lima bean (Phaseolus lunatus forma salicis Van Esel.) is a form of butter bean (Phaseolus lunatus L.) which keeps surfacing from time to time in home gardens around the state of Florida. In most all respects it is like the normal lima bean, except that it has narrow lanceolate leaflets the shape of a willow or peach leaf.

The lima bean, like many other cultivated plants, includes a considerable number of variations in plant characteristics. These differences have led to the sub-division of the specific name lunatus into 5 formae, and a great many horticultural varieties and cultivars. Most lima beans are Phaseolus limensis Macfady.

Lima beans are of American origin, and evidence indicates that they have been grown in or near the tropics since prehistoric times. Guatemala, Central America, is considered to be the original home of the lima bean, although its naming came from Lima, Peru where it was first thought to have originated. American settlers were growing baby limas about 1700.

Strains of lima beans found in tropical America where it is indigenous always had the broader, ovate leaf pattern, and the indeterminate (vine) form of growth. The alternative characters-lanceolate leaflets and determinate (bush) growth habit-are derived characteristics and are restricted to cultivated types. Thus, it appears that the willow-leaf shape (lanceolate) was derived from a rare mutation. Cultivated varieties of this leaf shape are very few, although this leaf shape had been transferred to most all types.

In conclusion, when one of these willow-leaf limas is found, it is exhibiting a well-known but seldom encountered genetic characteristic. The smooth, white or otherwise colored seeds are edible and the plants should be grown in the garden similarly to the more familiar types of lima beans.

(Stephens)
C. Master Gardener Program

September 1979 marked the beginning of a Master Gardener program for Florida. The volunteer-oriented program is designed to enable county extension horticulture agents to reach more homeowners needing gardening information. During the summer of 1979, volunteers for the program were recruited in three pilot counties, Brevard, Dade and Manatee. Each volunteer agreed to provide a specified number of hours service to the local extension office in return for the 48 hours of training received.

Training was given by Extension Specialists from six IFAS departments. All areas of homeowner horticulture were covered including basic soils; liming and fertilization; fruit, vegetable, and ornamental plant culture; plant propagation; pest diagnosis and control, and household pest control. Following the training, a comprehensive examination was given. Seventy-six participants successfully completed all phases of training including the exam and became Florida's first Master Gardeners.

Service to the local extension programs has been returned in a variety of ways. Master Gardeners work many hours each week in County Extension offices handling telephone, written, and personal requests for gardening information. They have also learned to run simple soil tests for pH and soluble salt levels. Plant diagnostic clinics are being conducted in many communities, thus saving the homeowner a trip to the county extension office. To date, over 2000 hours of service have been rendered.

Based on the positive feedback received from the pilot effort, the program was expanded to Volusia, Hillsborough, and Polk counties where training is now in progress. There is strong potential for this program in Florida's large urban areas. As the interest in all phases of horticulture continues to grow and the demand for information increases, the future looks bright for the Master Gardener program in Florida.

(Gray)

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