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

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I. COMMERCIAL VEGETABLE PRODUCTION

A. General Pointers to Efficient Use of Fertilizers for Vegetables

Vegetable growers face a real shortage of fertilizer for the first time in many years. Not only is there a shortage of fertilizer in general, but there are spot shortages of certain sources necessary for specific crops and soil conditions. Can growers in Florida live with the shortage and continue to produce the large quantities of high-quality vegetables they have produced in past years? In the opinion of the writer, it can be done, but only if growers use good management practices and common sense in their fertilizer programs.

For many years most vegetable growers have used more fertilizer than necessary. Too much fertilizer is not only an unnecessary expense, but often results in lower yields and quality and may unnecessarily add salts to the ground water. Growers can help overcome the shortage by using just the right amount of fertilizer at the right time and in the right way. Certainly this is a big order, but there is considerable technology and experience to help growers establish efficient fertilization practices. The subject of how to manage a total program of fertilization will be dealt with in detail in subsequent articles in this newsletter. This article covers some of the general practices which might be used to conserve fertilizer.

1. Use only the best land available for vegetable production. Unproductive areas of fields which are too low or too high in elevation and which cannot be managed like the rest of the field should be left unplanted.

2. Use the good, old proven practices of crop rotation and cover-cropping to maintain an adequate level of organic matter in the soil. Organic matter improves soil tilth and aeration, increases beneficial microbiological activity, moisture and nutrient retention and improves overall plant growth.

3. Use good seed, proper planting method, good drainage and irrigation, proper fertilizer placement and all other practices which will help to insure a good stand, uniform seedling emergence and crop growth.

4. Use soil tests to help determine rate, sources, timing and possibly placement of fertilizer.

   a. Preplant soil test - This test can be used to determine residual levels of nutrient elements in the soil as well as pH. Combined with general guides to fertilization of each crop, it helps to determine approximate needs for the crop.

   b. Total soluble salt determination - This is a simple test available in many soil laboratories which measures electrical conductivity of the soil solution. Converted to total soluble salt readings, the test is a good indicator of the total fertilizer in soil. During the growing season, this test is an excellent way to determine need for sidedressings.

5. Timing of fertilizer - When general needs have been determined by preplant soil tests and in the absence of the total soluble salt readings, plan to apply the fertilizer in split application. The use of split applications tends
to lessen seedling injury from excess soluble salts and reduces the chance of leaching large quantities of fertilizer following heavy rains during the growing season.

(6) Mulches - Whenever possible, use full-bed or strip mulches to eliminate or at least reduce leaching of fertilizer nutrients from the soil. Shortages in these mulching materials may add to the grower's problems in coming seasons.

(7) Use transplants, especially the containerized type, whenever possible. Transplants are produced in a restricted area where relatively small amounts of fertilizer are used. Direct seeding to start a crop requires at least partial fertilization of the whole field for a period of three to six weeks. Fertilizer in soil during this extra period is subject to leaching during periods of heavy rains.

Growers can no longer afford to fertilize vegetable crops on a "guess basis" which often results in over-fertilization. They must use the limited supply available to produce the best yields and most economical returns possible per unit of fertilizer used.

(Montelaro)

B. Prevention of Nozzle Stoppage in Spray Operations

The primary principle of good insect and disease control is complete coverage of all plant surfaces including leaves, stems and fruits. Complete coverage cannot be obtained from a sprayer operating improperly. One of the more common problems observed in actual operation of sprayers in Florida vegetable fields is nozzle stoppage. To correct the problem, inexperienced operators often resort to cleaning with wire or other thin steel objects. Such a cleaning job is only temporary and further reduces efficiency of the sprayer by altering orifice size of the nozzles.

A simple and rather inexpensive modification of the sprayer plus care in operation can practically eliminate the problem of nozzle stoppage according to Dr. W. T. Scudder, Horticulturist at the AREC, Sanford, Florida. Dr. Scudder suggests installation of a line strainer and a quick-action flush valve on the delivery side of the pump. An added benefit from a properly installed line strainer is reduction in wear of nozzles caused by abrasion. The following diagram illustrates where line strainer and quick-action flush valve should be placed.

Line Strainer and Quick-Action Flush Valve Location for Sprayers
The operator must check and properly operate all components of the sprayer in order to insure success. Dr. Scudder makes the following suggestions which, if carefully followed, will greatly reduce nozzle wear, prolong the life of the tips or orifice plates and almost completely eliminate nozzle stoppages.

1. Use a T or Y-type line strainer with a 50 or 60 mesh screen and with a capacity equal to that of the pipe or hose leading to the boom.

2. Install the line strainer between the regulator and the boom control valve.

3. Connect the line strainer so that the inside of the screen is on the inlet side.

4. Attach a quick-action flush valve to the clean-out cap of the line strainer.

5. Open the quick-action flush valve briefly with the pump operating each time the tank is filled and whenever the system is rinsed. This will remove all trapped particles and prevent loading up and breakage of the line strainer screen.

6. Individual nozzle strainers, with 50 mesh screens, are also recommended for each nozzle.

C. Seed and Seed Quality

Many factors regulate or affect seed germination and subsequent seedling growth. Many steps are taken by the grower to provide the proper environment for germination in his operation. Good soil and seedbed preparation, proper fertilization, a pest-free environment and an adequate moisture regime are among usual practices carefully done by the grower. Poor germination, poor stand, non-uniform plants, etc., can usually be attributed to mismanagement of one of these steps or because of weather conditions. The use of poor-quality seed can also result in similar symptoms.

In the vast majority of cases, seed obtained in normal trade channels can be relied upon to be of high quality. However, seed quality can change after the grower has received it depending on how it is handled and stored prior to planting.

What is good seed? A rather simplified definition would be: Seed which is:

1. True to type
2. Has percent germination of proper level (will depend on crop)
3. Has good vitality (related to vigor of seedling growth after germination)
4. Is free of diseases
5. Is free of weed seeds or debris

These attributes are generally those of concern in state seed laws or regulatory statutes which may vary from state to state.
If we look at seed quality in a somewhat broader sense, we can envision the seed in a more general scope. A seed is essentially a live plant in a dormant state, the quality of which is affected by:

1. Preharvest treatment
2. Storage and handling
3. Environmental factors during and following planting

Seed laws generally cover the preharvest aspect and normal production techniques allow for proper conditions after planting. The intermediate step is frequently the source in many problem situations.

The best way to maintain seed quality is low temperatures and low relative humidity. Normal seed packaging in the trade involves a good many light, moisture and air-tight containers such as cans, foil packs, etc., that do an adequate job of protecting the seed. When the package or container is opened, the seed then is subjected to potentially quality degrading factors. Some of the things a grower can do to protect his seed may be the following:

1. Reclose opened containers as thoroughly as possible and store at low temperatures and low humidity.
2. If planting is delayed by weather, etc., place seed in proper storage conditions as rapidly as possible. Don't let the seed ride around on the back of a pick-up for days.
3. Don't store seed near chemicals or materials which can contaminate the seed and affect its subsequent germination, etc.
4. Avoid harsh handling of the seeds at all levels of handling. This is especially critical for large-seeded crops such as beans. Mechanical damage of the seeds can reduce the quality of the seed drastically.

II. HARVESTING AND HANDLING

A. Vegetable Shipping and Shortages

Some shippers experienced some shortages last season, particularly with containers. With the current energy crisis, there will probably be a number of other items (perhaps including trucks) that will also be in limited supply. As containers, trucks, etc., become less available (and even if they are plentiful, they will be more expensive), every effort should be made toward more efficient use of what is available. This cannot be accomplished by the packer-shipper alone, but will involve cooperation all the way from the field to the retail outlets. Since the packer-shipper will have the responsibility for implementing any such program, it is reasonable that he should initiate the ideas as well as the action. The following suggestions are very obvious, but they will require some changes in methods and will also require understanding and cooperation from the entire marketing chain.

1. Grading and Sanitation - Not grading in order to just make grade but throwing out everything that will have to be discarded later in the marketing chain.
Sanitation is also important in that produce may become infected with decay organisms during the harvesting and packing operations and the problem will not become apparent until several days later--after the costs of packing and shipping have been incurred. Maintaining proper chlorine levels (100-150 ppm) in dump tanks, wash water, etc., can greatly reduce losses after packing. Equipment should also be sanitized.

(2) **Proper Handling** - No matter how much care is exercised in grading and packing produce, without proper handling there will still be losses. Handling damage and the resulting losses come from both physical (such as moving and stacking cartons) and physiological (such as temperature, humidity, etc.) sources. Special attention should be given when there is a possibility of chilling damage (e.g. peppers, tomatoes, beans, cucumbers, etc.). Borderline cases can sometimes be handled in such a way as to prevent loss if everyone is aware of the problem and proper temperatures are maintained.

(3) **Containers** - Use the best container available for the produce and do not bulge-pack. Follow recommended stacking patterns for the container used. Since most items are repacked before retailing anyway, thought should be given to bulk containers to facilitate handling and reduce the demand for cartons or crates. Another possibility is going all the way to the consumer pack at the source which would eliminate some handling steps and thus some damage.

(4) **Trimming** - Why pay packing and shipping on those portions of the produce which are going to be discarded before the commodity is displayed on the retail shelves? The classic example of this is sweet corn--for which the advantages of trimming have been known for years. There are other commodities (lettuce, cabbage, etc.) which could and should also be trimmed before shipping.

Although the steps outlined above involve the packer-shippers to a large extent, the buyers and receivers also have to do their part, which may involve anything from adopting new handling procedures to paying for extra services. Changes will not take place overnight and without communication, cooperation and trust among different industry segments, no changes will occur. We are approaching some serious problems. Why not begin to make adjustments before they become acute?

(Hicks)

III. **VEGETABLE GARDENING**

A. **Know Your Vegetables - Yams**

Yam is the common name applied to plants of about 500 species of the genus Dioscorea of the Dioscoreaceae family. Other terms for yam are True Yam, Greater Yam, Tropical Yam and Name. True yams are climbing perennial vines with heart-shaped leaves. Underground tubers vary in size and shape, averaging 3 to 8 pounds but sometimes as large as 60 pounds or more. Aerial tubers are sometimes developed in the axils of the leaves, especially when vines run on the ground. The species occur rather abundantly in tropical and subtropical regions of the world. Several species occur here in Florida and in temperate regions.

A few of the cultivated species bear edible starchy tubers which resemble the potato in food value. In some areas, particularly Louisiana, the sweet
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potato is popularly called "yam." Although resembling each other in many other respects, the true yam and sweet potato are not related botanically.

Many species of Dioscorea contain sapogenin, a compound having medicinal value. Dioscorea species have been collected from all parts of the world and evaluated for steroidal sapogenins. It has been reported that many wild species contain the poisonous principle dioscorine which makes them inedible.

In addition to being food and medicinal plants, some species have strikingly variegated leaves and are of interest as ornamentals.

Some of the edible species and varieties are as follows:

Dioscorea alata L. - Chinese yam, white yam, Lisbon yam, pei tsao, bak chiu and agua yam.

Dioscorea batatas Decne - Japanese yam, nago imo, shan yao and shan yuek.

Dioscorea cayenensis Lam. - Guinea, a popular white-fleshed variety; Congo yellow and Guinea Yellow are yellow-fleshed varieties; purple-fleshed varieties are Purple Ceylon and Mapuey Morado.

Dioscorea aculeata L. - Tango Yam.

Dioscorea rotundata Poir. - Guinea Yam

Of the sapogenin-bearing Dioscorea species, four are most prominent:

D. composita Hemsl. - Large white tubers (yielded best in Florida trials.)

D. floribunda M & G. - Small, yellow, compact, shallow tubers.

D. friedrichsthalii Knuth. - White, intermediate, compact tubers.

D. spiculiflora Hemsl. - Small, white, compact, shallow tubers.

Others of less importance are the wild yams, Dioscorea bublifera L. or Rajania cordota L.

Propagation - Portions of tubers or whole small tubers are used for seed pieces. Each seed piece should weigh 4 to 5 ounces. They can be planted 2 to 3 inches deep in 42-inch rows with plants spaced 18 inches apart; or in hill plantings 3 feet apart. Yams do well when planted in a hill filled with compost. In Florida, tubers should be planted in March-April and harvested 10 to 11 months later. With the sapogenin-bearing species, propagation from seed is considered the most reliable method.

Best results are obtained if the vines are supported with some sort of trellis. Stakes can be used, or yams can be planted along the fence for support.

(Stephens)
B. Calculating Amount of Fertilizer Per Garden Row

There are many instances in which Florida gardeners, and sometimes even farmers, need to know how much fertilizer to apply to an individual row, when all their information is in terms of pounds per acre.

A simple graph has been developed by James E. Garton, Oklahoma Agricultural Experiment Station Engineer, to simplify the conversion of pounds per acre to amounts per row. His graph is reproduced here. To use the graph, one must know the row spacing, row length and the pounds of fertilizer per acre to be applied. Instructions are on the graph.

Example: The dashed line on the graph indicates the solution of a typical problem. The rows are spaced 36 inches apart, and they are 60 feet long. The gardener would like to put on 120 pounds of fertilizer to the acre. How much fertilizer per row will he need?

To Solve: Locate 36 inches on scale 1 and 60 feet on scale 2. Draw a line through these points and extend to pivot line 3. From this pivot point, draw a line to 120 pounds per acre on scale 5. Now, read on scale 4 how much fertilizer per row is required. The answer is about 8 ounces.

(Stephens)
Instructions:
(a) Draw a line from your row spacing on scale 1, through your row length on scale 2 to pivot line 3.
(b) From this pivot point on line 3, draw a line to the pounds of fertilizer per acre on scale 5.
(c) Read amount per row on scale 4.
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