Vegetarian 90-04

April 13, 1990

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I. NOTES OF INTEREST

A. Calendar.

May 2 - 3, 1990. Florida Weed Tour. (Contact W. M. Stall or Joan Dusky).

Saturday, June 9, 1990. Live Oak Vegetable and Fruit Crops Field Day, 8:30 AM - 12:00 Noon, Live Oak AREC. (Contact Bob or George Hochmuth or Tim Crocker).

June 11-15, 1990. 4-H Horticulture Institute, Camp Ocala. (Contact Jim Stephens).


B. Florida Weed Tour.

The annual Florida Weed Tour will be held May 2 and 3, 1990. The tour will start at the Horticulture Unit, 7002 N.W. 71 St., Gainesville at 8:30 AM. Weed control plots in sweet corn, watermelon, cucumbers, squash, snap beans, southern peas, pepper, eggplant, cabbage, napa, bok choy will be toured.

In the afternoon of the 2nd the tour will continue at Zellwood with trials in lettuce, several leaf crops, cabbage, napa, bok choy and carrots on the muck. An industry sponsored dinner will follow that evening. On May third the tour will begin in Belle Glade in the afternoon with a tour of lettuce, several leaf crops, celery and carrots.

For more information contact W. M. Stall or Joan Dusky.

C. New Publications.


II. COMMERCIAL VEGETABLES

A. Principles of Liming Soils.

Most vegetable growers are aware of the need to lime acidic soils to produce optimum yields and quality. However, there is often confusion about the basic purpose of liming and about how to determine when and how much lime to apply. The purpose of this article is to explain the effects of soil acidity and give guidelines for correcting these infertile soils.

Soil acidity (or alkalinity) is measured on a logarithmic (pH) scale that ranges from 0 to 14 with 7 being neutral. Soil pH values below 7 are acidic and those above 7 represent alkaline soil conditions. Each change of one unit of the scale represents a 10-fold increase (or decrease) in the intensity of acidity or alkalinity.

Soil pH measures the activity of hydrogen ions ($H^+$) in the soil. It is important to measure $H^+$ since $H$ ions affect many chemical and biological reactions in the soil and thus affect the
performance of our vegetable crops. Most vegetables perform well in a soil pH range of 5.5 to 6.5. Liming soils to pH levels above 6.5 is rarely justified and may even cause reductions in yield.

It was once thought that the negative effects of acid soils on crop growth were due to the high concentration of H ions. However, plants can grow well in nutrient solutions of pH 4.5. The H ion concentration has no direct negative effect on plants until the pH falls to levels probably below 4.0. The poor crop performance in acidic soils is due more to toxic effects of metals such as aluminum or manganese (which are more soluble in acidic conditions) or to nutrient deficiencies of calcium, magnesium, potassium, or phosphorus.

Liming acid soils, therefore, should be targeted at neutralizing toxic elements such as aluminum or manganese. In very sandy soils, aluminum concentrations are usually low so that manganese solubility is often the major problem. However, manganese is an essential element for plants so one does not want to increase the pH too high (above 6.5) which would make manganese unavailable to plants.

The amount of lime to use to correct soil acidity should be estimated by a well-calibrated lime requirement test. The soil reaction (pH) can be measured easily by a water extract of the soil but this measurement only reflects what is called "active acidity." There are still unmeasured H ions on the soil particles. These must be measured and accounted for in a good liming program because they could come into play at sometime during the growing season. Depending on the particular soil testing laboratory, various buffer solutions will be used to estimate this "reserve" acidity.

The choice of liming material depends on several factors including cost, quality, particle size, availability, relative ability to neutralize acidity, and nutrient-supplying capability. Most liming materials, in addition to neutralizing soil acidity, can supply calcium and/or magnesium. Testing soils for magnesium supplying capability can help in choosing a liming material. For example, if a soil needed a pH increase and needed magnesium, then dolomite might be preferable over calcitic lime. Both dolomite and calcitic limestone supply calcium. Gypsum (calcium sulfate) supplies calcium but it is not a liming material and will not neutralize acidity.

Adjusting soil pH to the range of 5.5 to 6.5 has several benefits for vegetable producers. Supplying calcium and magnesium, and reducing metal toxicities have already been mentioned. However there are other benefits to liming acidic soils.

Plant nutrient availability is generally better in soils with a pH in the range of 5.5 to 6.5. Phosphorus, potassium, calcium, magnesium, and ammoniacal nitrogen utilization is better when acidic soils are limed to pH range of 5.5 to 6.5. Liming to levels above this range can have deleterious effects because the availability of nutrients, especially micronutrients such as manganese and zinc can be reduced under alkaline conditions.

Acidic soils also can restrict the activity of certain beneficial soil microorganisms such as the nitrifying bacteria that convert ammoniacal nitrogen to nitrate nitrogen. Liming acidic soils provides a more favorable environment for these organisms. The Fusarium wilt organism of tomato is inhibited by increasing the soil pH. Pushing the pH to 6.5 might be recommended here, even though the crop itself would do well at 6.0 in the absence of the disease organism.

Liming acidic soils is not a simple nor routine practice. There are many considerations that must go into a sound liming program. Liming must be based on sound justifications and on a well-calibrated lime requirement test. There are still too many instances where growers routinely lime soils without regard to real need (or lack of need). It is possible that this practice is costing those growers in terms of reduced yields and increased fertilizer needs.

(Hochmuth, Vegetarian 90-04)
B. Managing Thrips and Tomato Spotted Wilt Virus in Tomatoes.

Thrips in the genera Frankliniella and Thrips are pests of many crops worldwide. Economic damage can occur from feeding and egg laying activities that result in injury to leaves, flowers, or fruit. Direct injury from thrips causes serious economic losses to numerous agronomic, fruit, vegetable, and ornamental crops. Western flower thrips (Frankliniella occidentalis) were first noted in North Florida in tomatoes in the spring of 1985. A severe form of cosmetic fruit damage was noted on spring tomatoes in North Florida during that year. Subsequent research was conducted in our laboratory to determine the cause of the damage. Three species of thrips were placed on tomato blooms, including western flower thrips, tobacco thrips (F. fusca), and eastern flower thrips (F. tritici). The results of the study revealed that western flower thrips females are responsible for the cosmetic fruit damage occurring in tomato in North Florida. The damage occurred when either small fruit or flowers were infested. The other species of thrips did not cause any cosmetic fruit damage. The mechanism by which western flower thrips damaged the fruit was also investigated. Individual eggs and immatures were observed in the center of scars on damaged fruit. Immature thrips also occurred on damaged fruit several days after adults were removed. These observations demonstrate that the damage is caused by western flower thrips egg laying into small fruit. There are reports that western flower thrips populations are very high this spring in tomatoes and peppers in South Florida and that cosmetic fruit damage is heavy in some fields. This is the first time that heavy damage has been reported in South Florida, which undoubtedly is related to movement of western flower thrips into the region.

Western flower thrips also vectors of tomato spotted wilt virus (TSWV). Other species of thrips that are vectors of TSWV in Florida are tobacco thrips and onion thrips (Thrips tabaci). This disease was first noted in North Florida in tomatoes in the spring of 1986 and has now become a major disease problem in tomatoes and other crops in North Florida. It has recently been found in tomatoes in South Florida production areas.

Studies were conducted in North Florida to determine the seasonal abundance of thrips in North Florida tomatoes during 1987, 1988, and 1989. The results for each spring cropping season are shown in Figure 1. Few were collected in each fall cropping season; therefore, the data are not shown. Adult thrips accounted for about 88% of the total thrips collected in the tomato flowers during the three years of the study. About 97% of these adults were western flower thrips, tobacco thrips, or eastern flower thrips. Populations of each species were greatest from late April to early June each year, with greatest population densities in May. Each species was found to prefer only the tomato flowers, although insecticides used to control other insects may have reduced any populations on other plant structures.

Other studies were conducted to develop a sampling method to estimate density for scouting programs. Time of day when sampling did not influence sample estimates. However, densities of thrips in tomato blooms sometimes differed in marginal and nonmarginal areas of fields. Also, thrips densities were greater for blooms located on the upper half of tomato plants compared with blooms on the lower half of tomato plants. Other studies were conducted to determine economic thresholds of thrips in tomato blooms by determining the relationship between density and the amount of cosmetic fruit damage.

Management of thrips in tomatoes is greatly complicated by several factors. One is their vector potential for TSWV. Insecticides sprayed to control adult thrips moving into tomato fields will not prevent their transmission of TSWV. However, it is believed that control of immature thrips will reduce spread of virus from...
plant to plant within a field. A second problem is identification of thrips. A sampler cannot reliably identify thrips while in the field. All species of thrips cannot transmit the TSWV and only western flower thrips are known to cause cosmetic fruit damage. Therefore, some species are not economically important and control of these species is not necessary. A third problem relates to control of thrips with insecticides. Only one insecticide (Monitor) is known to provide good control of thrips in tomatoes and this product is limited by label instructions in the number of applications during the season. Steve Olson and I are conducting an experiment to determine if other insecticides labeled on tomatoes will provide control, but results will not be available for this upcoming field season.

Based on our current research findings, we are able to suggest some management procedures. Control activities should be focused most intensively from late April to early June. Fields during this period should be sampled twice per week. At other times (including the entire fall cropping season), samples to estimate density should be taken once per week. On each sample date, the presence or absence of thrips in individual blooms should be determined for 15 to 20 randomly selected blooms in both marginal and nonmarginal areas of each field. All samples should be taken from blooms located on the upper half of tomato plants. Control of thrips is not necessary if less than one third of the blooms are inhabited by thrips. Because of the mass movement of adults into fields from late April to early June and the difficulty of control with insecticides, it may be difficult to keep thrips densities below this threshold and some losses from TSWV and direct cosmetic fruit damage may still occur. But, these management procedures should prevent avoidable economic losses.

(Joe Funderburk and Steve Olson
Vegetarian 90-04)
C. National Stand Establishment Conference - April 4-6.

During the first week of April, 80 scientists representing 15 states and 5 countries met in Minneapolis, Minnesota for the National Symposium on Stand Establishment for Horticultural Crops. The conference was designed to present research specifically in the areas of stand establishment, seed quality, seed priming, seedling emergence, biological and agrochemical seed treatments, and transplant production.

Florida was represented by two of Dr. Cantliffe's graduate students, Carlos Parera, and Daniel Leskovar and Extension Vegetable Specialist, Charles S. Vavrina. Parera presented a paper entitled "Improved Stand Establishment of sh2 Sweet Corn by Solid Matrix Priming and Seed Disinfection Treatments." He concluded that solid matrix priming and sodium hypochlorite (bleach) improved seedling emergence and stand establishment and worked as well as standard chemical seed treatments.

Leskovar presented "Tomato Fruit Yield and Seedling Growth in Response to Transplant Packing and Storage." The main emphasis of this work was to determine if any differences occurred between transplants that arrived in the field in the tray (standard in Florida) and those that were pulled and boxed (standard in northern markets). He found a 65% and a 75% increase in extra-large fruit at first and second harvest respectively, when transplants arrived at the field in the trays. Total marketable fruit yield was not affected by treatment however.

Vavrina presented "Performance of Plant Growth Regulators on Tomato Transplants and Subsequent Field Production." Since Alar (Union Carbide) has been discontinued for use in tomato seedlings, other growth regulators were tested, however, none of the materials tested are registered for use in tomatoes (Sumagic - Valent, Cultar - ICI, BAS 111 - BASF, Tilt - Ciba-Geigy). All provided adequate reduction in tomato seedling growth in the transplant house. Field results indicate high rates of the compounds could reduce average fruit weight and yield, particularly of extra-large fruit. Tilt and BAS 111 treatments were more forgiving with respect to excesses in rate.

The next conference is scheduled for late February 1992 in south Florida, probably in Ft. Myers or Naples. Please hold a spot on your calendar and ready those research and demonstration studies for presentation - we want to be well represented.

(Vavrina, Vegetarian 90-04)

III. VEGETABLE GARDENING

A. The Fifield Hall Organic Gardening Theme Park.

By now many of you have heard that the Vegetable Crops Department has dedicated the student gardens area across Hull Road from Fifield Hall toward the establishment of an organic gardening theme park. The project got underway about the first of February with the completion of a master plan.

The project has 4 basic purposes: 1) serve as a teaching laboratory for college courses in vegetable crops; 2) allow us and other educators to familiarize ourselves with various "organic" products and practices; 3) help us demonstrate best organic techniques to county agents, vo-ag teachers, Duval County Urban Gardening staff members, Florida Master Gardeners, University affiliates, and others who work in public education; and 4) to generate some needed information through observational studies and applied research.

Keep in mind that the focus of the theme park is on organic gardening, rather than organic farming. However, it is anticipated that much of what is learned here can be applied to the production of organically grown vegetables for sale.

The plan includes zones set aside for certain purposes. While the total area
includes about 4 acres, about 1 acre is already occupied by research greenhouses and support facilities. The remainder consists of approximately 2 1/2 acres of open field surrounded by mowed grass, trees, and buildings for storage and support (such as cold frames for transplant growing).

Zone A will include all operations of an "organic" nature. In Zone B, the use of chemical fertilizers and pesticides will be allowed, for comparison purposes. Zones A and B will be separated by a 100 foot buffer zone (chemical free area).

Establishing the park has been a slow process. With a tight budget and limited labor, we are accumulating raw materials, building fences, putting in irrigation, and constructing grow-boxes. Our stockpile of organic fertilizer materials, soil amendments, and mulches has grown daily. Even so, we have been able to get some individual plant growing projects underway.

To date the following studies and/or demonstrations have been established as of April 1, 1990:

a) Model organic garden (50'x50') - several varieties of vegetables have been planted utilizing sheep manure on one half and chicken manure on the other half.

b) Model chemical garden (50'x50') - using chemical fertilizer and to be sprayed as needed.

c) Model chemical fertilizer garden (50'x50') - using chemical fertilizer but no pesticides.

d) Demonstration of Fertrell (blended organic fertilizer) at two rates with several vegetable varieties.

e) Demonstration of agraferm (composted fertilizer) at two rates with several vegetable varieties.

f) Replicated study of commonly used "organic" pesticides on several garden vegetables.

h) Other studies/demonstrations anticipated include: composted yard waste, municipal waste, raw yard waste, crab waste, mushroom compost, other animal manures, mulching, and a variety of alternatives to synthetic chemical gardening.

Future - We advise all agents to keep on the look-out for new developments here at the organic theme park. We will try to keep you posted so that you can visit the site personally or bring your Master Gardeners or other targeted clientele at the opportune time. Hopefully, we will have planned field days once the park is smoothly running.

Coordinators - Leadership for the project is provided by Dr. Steve Kostewicz, Associate Professor of Vegetable Crops, and Jim Stephens, Extension Vegetable Crops Specialist. We have employed Victor Heidman to assist in the project. The entomology study underway is the work of Don Short and his assistant Paul Ruppert.

(Stephens, Vegetarian 90-04)
Prepared by Extension Vegetable Crops Specialists

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