VEGETABLE CROPS DEPARTMENT

The VEGETARIAN Newsletter

October 7, 1976

Prepared by Extension Vegetable Crops Specialists

J. F. Kelly
Chairman

James Montelaro
Professor

J. M. Stephens
Associate Professor

G. A. Marlowe, Jr.
Professor

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

FROM: James M. Stephens, Extension Vegetable Specialist

VEGETARIAN NEWSLETTER 76-10

IN THIS ISSUE:

I. NOTES OF INTEREST
   A. Youth Programs in Vegetable Crops
   B. Vegetable Specialist - North Florida
   C. Departmental Series Publications
   D. Research Report

II. COMMERCIAL VEGETABLE PRODUCTION
   A. pH Benefits from Good Management in Vegetable Production
   B. Nutritional Problems: Deficiency or Excess?
   C. Portable Soluble Salt Meter

III. HARVESTING AND HANDLING
   A. Reducing Postharvest Vegetable Losses

IV. VEGETABLE GARDENING
   A. Timely Gardening Topics
   B. Know Your Vegetables - Lentils

NOTE: Anyone is free to use the information in this newsletter. Whenever possible, please give credit to the authors.
I. NOTES OF INTEREST

A. Youth Programs in Vegetable Crops

Because of the increased demand for support in the home gardening field, we have assigned primary responsibility for youth programs (4-H and FFA) to Susan Gray. Susan has been assisting Jim Stephens in the broad area of gardening. Jim will retain overall responsibility for the broad area, but most work and materials related to the youth programs will be initiated by Susan.

(Kelly)

B. Vegetable Specialist - North Florida

We are pleased to report that Dr. Raymond William has accepted a position in the Vegetable Crops Department. He will be with us in January, replacing Steve Kostewicz as Vegetable Specialist for the northern tier of counties and in the area of vegetable weed control for the state. Steve has moved into an important Teaching-Research position in the department.

(Kelly)

C. Departmental Series Publications

To meet demands beyond those which can be met from the Extension publications budget, the Vegetable Crops Department produces departmental Extension and Research Reports (formerly referred to as mimeos). These reports are produced in limited quantities for distribution from the Department in response to individual inquiries and to County Extension Offices for reproduction locally. We are unable to supply these in large quantities. From time to time, a listing of available reports will appear in the Vegetarian.

(Kelly)

D. Research Report

The second in a series of reports covering vegetable variety responses to planting dates is available for distribution (see above policy statement) to agents and other interested workers. The report by L. H. Halsey and S. R. Kostewicz is entitled "Seasonal Response to Vegetable Crops for Selected Cultivars in North Florida. II. Solanaceous Crops." The first report covered leguminous crops. More will be coming.

(Kelly)

II. COMMERCIAL VEGETABLE PRODUCTION

A. pH Benefits from Good Management in Vegetable Production

Growers probably hear more and understand less about soil pH than any other subject in the production of vegetables in Florida. There is some confusion about discrepancies in readings on the same soil at different times, optimum pH levels for crop production, materials to use and many other factors. Admittedly, the subject of pH and how it should be managed is a complex one. Soil scientists are studying soil pH even now as intensively as ever in an effort to develop more accurate determinations and meaningful systems of managing soil pH.

Most vegetable growers are convinced that good soil pH management is a prerequisite for high yields and good quality in vegetable production. The question is how best to accomplish this task. Probably, the best way is for growers to more fully...
understand the principles underlying good soil pH management. Simply defined, pH is a measure of acidity (sourness) or alkalinity (sweetness) of soil solution. It is reported on a scale of 0 to 14 with 7.0 being neutral. As pH value decreases below 7.0, the soil becomes more acid. Likewise, as it increases above 7.0, it becomes more alkaline.

Armed with a good pH determination, a grower is in a position to adjust it to the most satisfactory level for vegetable production. The advantages of establishing a satisfactory soil pH level (and not below or above it) are best explained by the following chart (Fig. 1). It can be seen from the width of the bar in the chart that iron, manganese, zinc, copper and boron become less available with increasing pH to a point where little, if any, of the 5 nutrients are available at pH 7.5 or above. This is the situation on the limestone soils of Dade County. Growers use more micronutrients and phosphorus than is actually absorbed by plants. Much of the phosphorus and micronutrients applied become insoluble shortly after application to these soils.

In the lower pH ranges, the major and secondary nutrients including nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur are less available to plants. To make matters worse, iron, zinc, manganese, copper and aluminum are highly soluble in the lower pH ranges. In excessive amounts, they are toxic to plants. For reasons which will be discussed in a subsequent article, we recommend that growers "shoot" for a pH range of 6.0 to 6.5 for most vegetable crops.

There are many other benefits to plants from good soil pH management. In addition to the benefits of nutrient availability discussed above, it is an inexpensive way to supply needed calcium and magnesium to the soil. Beneficial soil microbiological activity, including nitrification, proceeds best in this pH range. An adequate supply of calcium, by counteracting the effects of sodium on soil flocculation, helps maintain permeability to water.

This article has discussed the benefits of good soil pH management in vegetable production. The next will discuss accuracy of determination, interpretation and how soil pH should be managed.

(Montelaro)

B. Nutritional Problems: Deficiency or Excess?

The diagnosis of nutritional problems of vegetable crops requires a knowledge of the crop, skilled observation, alertness, and patience. The Extension agent or field man must first assess the nature of problems to see if they are caused by pathogens, insects, water, temperature or whatever. The history of the field is just as helpful as obvious symptoms at hand.

Diagnosis of nutritional disorders requires a familiarity with deficiency symptoms as well as those created by excesses. This brief article may help to clarify some confusion caused by certain nutrient interrelations. This compilation is adapted from three current texts: Hewitt and Smith, 1975; Gauch, 1972; and Chapman, 1965.

1. Nitrogen (N)

   Deficiency: Leaves yellow, plants unthrifty may be stunted, leaves and fruits small, roots very elongate, premature leaf fall. Readily confused with deficiency symptoms of iron and sulfur.

   Excess: Plants very soft, usually dark-green, overly vegetative, few fruits develop. Excess N may induce copper or zinc deficiency.
Fig. 1: The availability of plant nutrients at various soil pH levels. The width of the bar indicates the relative availability of the nutrient.
2. Phosphorus (P)

Deficiency: Plants thin and erect, poor root development, petioles and leaf veins may show purpling, bud development suppressed.

Excess: Reduced growth. Excess P induces copper, iron and zinc deficiency. P excess reduces aluminum toxicity, especially in acid soils.

3. Potassium (K)

Deficiency: Mature leaves show chlorosis first, scorched spots appear between veins at leaf margins, leaves turn down, internodes short, stems may split longitudinally, roots brownish. K deficiency can be associated with iron deficiency. Excess Ca and Mg can induce K deficiency. K deficiency usually more readily noted with ammonium N sources than nitrate N.

Excess: Leaf necrosis, odd-shaped fruits. Excess K hinders absorption of Mg, Mn, Fe and Zn.

4. Magnesium (Mg)

Deficiency: Chlorosis in older, most recently matured leaves first, chlorotic interveinal areas become necrotic, leaves may curl, growth and yield reduced. Deficiency may be caused by high calcium levels, deficiency decreases with nitrate N, increases with ammonium N.

Excess: Leaves deformed, apical portions roll upward, puckered areas in leaf appear mottled and then turn reddish brown followed by dead spots, roots long with few branches.

5. Calcium (Ca)

Deficiency: Because normal cell division is suppressed seed leaves appear necrotic, roots die early and rot, root and top growth inhibited. Dieback of terminal buds. Looks like B deficiency. High salts may induce Ca deficiency, and if Ca level is very low plants are unable to absorb nitrate N which could then resemble nitrogen deficiency.

Excess: Excess liming may induce deficiency symptoms of B, Cu, Zn, Mn, Fe, Mg and K. Excess liming decreases P availability. Most symptoms related to the anion accompanying Ca rather than Ca itself.

6. Sulfur (S)

Deficiency: Stem diameter small, abnormal cell division, smaller cells, growth retarded, leaves necrotic. Resembles N deficiency but with N older necrotic leaves are noted, whereas in S deficiency the young leaves show the most necrotic signs.

Excess: Excess S looks like excess boron. Leaf size is reduced, margins collapse, turn from yellow to brownish red.

7. Iron (Fe)

Deficiency: Young leaves chlorotic, veins remain green, root cell division ceases abruptly, plants stunted. Fe deficiency looks like excess symptoms of copper, Mn, Zn, and N. May be induced by excess liming or excess copper. Iron deficiency
resembles Zn, Mn and N deficiency, but Fe has sharp line between chlorotic area and veins whereas Zn, Mn and N show gradual differences.

Excess: Information not available.

8. Manganese (Mn)

Deficiency: Cotyledons shrivel and appear scorched; leaves become whitish and necrotic areas fall out; leaves small, slender, and weak; premature leaf abscission. Looks like Fe and Zn deficiency, except Mn shows chlorosis on young and old leaves, Fe only on youngest leaves. Calcium ions antagonize Mn uptake.

Excess: Leaves cup, margins become chlorotic, interveinal chlorosis becomes severely necrotic, death of growing points. Excess Mn induces iron chlorosis.

9. Boron (B)

Deficiency: Growing points of shoot and root die, leaves curl, flowers abortive, leaves wilt and have speckled spots, fleshy tissue and fruits may show brown flecks. Resembles calcium deficiency and may be induced by high liming. B has blackened areas at the base of young leaves, whereas Ca blackens at apical area of young leaves. Top leaves may show deficiency while lower leaves express toxic symptoms.

Excess: Progressive necrosis of leaf beginning at tip, leaves develop golden yellow color and then appear scorched and drop prematurely.

10. Copper (Cu)

Deficiency: Shoot dieback, stunting of growth, short internodes, leaf wilt, flower abortion and flower drop are common symptoms.

Excess: Excess copper similar to toxic effects of Zn and Mn. Roots stunted, very little branching, dark in color. Leaves smaller and chlorotic. Excess Cu causes Fe chlorosis.

11. Zinc (Zn)

Deficiency: Vegetative growth reduced, seeds fail to develop normally, root tips split and appear cracked, leaves chlorotic, interveinal chlorosis. Zn deficiency looks like Fe deficiency, but not quite as intense demarcation.

Excess: Zn is a highly toxic nutrient. A yellow-green chlorosis is noted. Excess Zn induces Mn deficiency.

12. Molybdenum (Mo)

Deficiency: Tips of shoots remain green while other leaves turn yellow and wither, older leaves mottle and cup upward and latter scorch; flowers wither before opening. No deficiency similar to N deficiency. Phosphorus enhances Mo uptake; excess Mn causes Mo deficiency. Mo availability decreased in acid soils, increased by liming.

Excess: Leaves of tomato exhibit a golden yellow, cole crops show purplish with excess timing or excess Mo fertilizer application.
Cobalt (Co) and chlorine (Cl) do not meet the requirements for essentiality set forth by many plant physiologists, but both can exert strong influence when in excess or completely absent in certain crops.

Symptoms of sodium (Na) and chlorine excesses may be of interest relative to soluble salt injury.

Chlorine, Deficiency: A wilting of leaf blade tips of young leaves, upward cupping of leaves, bronzing and necrosis of leaves, roots stubby. High levels of nitrate and sulfate generally decrease uptake of Cl.

Excess: Reduced growth, firing of leaf tips, premature leaf abscission. Symptoms easily confused with Fe deficiency.

Sodium, Excess: Growth is generally depressed in relation to the combined moisture stress created by the osmotic tension from the dissolved solids. Leaf injury usually shows necrotic areas on the tips or interveinal areas. Root growth shows a general lack of vigor. The contribution of sodium to injury is generally confused by levels of chloride or other elements.

Diagnosis or troubleshooting is a large part of the extension agent's and fieldman's daily work. It must be approached with care. Less experienced workers often express more sureness than experienced diagnosticians who realize how complex these nutrient interrelations may be.

Following is a list of references on plant nutrition. The list was compiled by Dr. S. J. Locascio.


C. Portable Soluble Salt Meter

A portable meter for rapid determination of total dissolved salts has been tested in Southwest Florida during the past month. This meter could be helpful in field diagnosis and for monitoring of soluble salt levels by growers and fertilizer fieldmen. The model tested is battery operated, transistorized, light weight, and low in cost. A scale of 0-5000 with an extender allows readings from 0 to 10,000 ppm. Each meter should be standardized with known salt concentrations or against a laboratory solubridge.

The operation is rapid and simple. Fifty-five grams (or cc) of water are added to 100 grams of soil at field capacity, stirred and the liquid is poured into the test cell, and read. Multiplication of the direct reading by a factor of 5 gives a reasonably accurate measure of total dissolved salts in the soil solution. Water samples can be read directly.

Other meters may also be available now or in the near future and we will try to alert you to these as soon as we test them. For specific information on the available meter(s), please contact the Vegetable Crops Department.

(Marlowe)

III. HARVESTING AND HANDLING

A. Reducing Postharvest Vegetable Losses

It is never too late to begin planning nor is it ever too early to start. Now is the time. What plans have been made in your area to assist in reducing the excessive losses that occur during harvesting and handling fresh vegetables? We have "improved" techniques, equipment, containers, etc., over the years, but we have not effectively reduced either physical or biological losses. We must continue to estimate that 1/4 to 1/3 or more of the fresh vegetables produced are never consumed because of waste.

The USDA examined all fruits and vegetables arriving in New York from 1938 to 1942, and estimated that almost 5% of the vegetables were discarded due to decay alone. Selected studies 25 years later indicated no reduction and a possible increase in decay losses. Value of total vegetable losses during harvesting and distribution was shown by a 1965 USDA report to exceed $170 million annually. The losses for fresh produce had increased to $300 to $500 million in a 1975 estimate quoted by a University of California vegetable marketing technologist. All of these losses cannot be controlled by the grower, packer, or shipper, but each segment of the distribution system can help. These losses occur after production and other costs have been incurred, and prices received by growers do not include an add-on to compensate for waste. This is only the tip of the iceberg—these are only the visible losses. The conditions that cause physical losses also result in deterioration of other quality factors. Consumers are increasingly aware of price and quality, and lost sales are a frequent response to displays of marginal quality produce.

It has been suggested that efforts to reduce these tremendous losses would be the "opening of a second front" in the war against worldwide hunger. Visualize a 20 to 30% increase in available food with little increase in expenditures of resources, or conversely, a reduction in utilization of resources for production of the same amount of food.
What is the answer? We suggest for one a review of the basics, or back to the "Three R's": Respect, Refrigerate, Rush. These will not solve all the problems but they will help. The application of the proper biological principles must be balanced with economic considerations of the moment. However, the basic biological principles demand their due consideration, and ignoring them may be costly.

Most vegetables are harvested prior to botanical maturity. We must, therefore, respect these fragile plant parts and protect them from harm. Their growth has not been completed, and they may continue to grow even after harvest. This can lead to elongation, sprouting, or toughening. These 'youngsters' have tender skins and are easily bruised and broken. Then they discolor, "weep", "bleed", and become infected. Some of the most serious postharvest decay organisms require a skin break before they can establish themselves and produce rots. Excess moisture loss, or wilting and desiccation, is one of the primary causes of quality loss and waste. Immature tissues have not fully developed their natural protection, and surface breaks and bruises add to the seriousness of the water loss. Careful handling is a most important treatment to apply from harvesting until the ultimate use by the consumer.

Proper refrigeration is the single most effective method of slowing metabolic processes of the living vegetables after harvest. Low temperatures also inhibit the growth of most microorganisms and slows the development of decay. Rapid reduction of temperature (precooling) has 3 major effects: (1) it quickly slows the very fast metabolic processes, particularly those such as loss of sugars; (2) it reduces moisture loss by rapidly lowering the product temperature to ambient temperature; (3) it more nearly assures that refrigeration capacity of transport vehicles will be adequate to maintain proper product temperature. Note that we said proper refrigeration. Generally, temperatures near 0°C are most desirable, but do not forget that many of our fresh vegetables such as tomatoes, cucumbers, squash, peppers, beans, etc., are susceptible to chilling injury. These crops may suffer significant losses if improperly held at temperatures below 10°C. Chilling is a time temperature phenomenon, and generalities do not always provide the answer. Good management always is essential.

Trying to extend vegetable life after harvest is somewhat like a pass in a football game: sometimes it is necessary and pays off in big dividends, but more bad things than good are possible. Life after harvest is very limited. Quality is deteriorating and vegetables tend to become more susceptible to decay and discoloration, for example. Further, more vegetables are being harvested daily and entering the pipeline to compete for the market. We are trying to emphasize freshness and quality. Therefore, do not abuse the time-after-harvest period when so many bad things and very few good things can happen. Rush these tender, perishable products through the marketing process under proper refrigeration and with respectful, careful handling.

(NOTE: This article was prepared by Dr. B. D. Thompson, Professor, Vegetable Crops Department, University of Florida, Gainesville, Florida.)

IV. VEGETABLE GARDENING

A. Timely Gardening Topics

These questions and answers are suggested here for your use in developing periodic (weekly) radio or newspaper shorts. They are based on letters of inquiry from gardeners around the state.

(1) Timely Topic for Week of October 17-23.

Question

Is the fall a good time to plant potatoes in my Florida garden?
Fall potatoes may not be successful every time in most areas of Florida, except in the southern portions. The risk is due to the fact that the potato is a cool-season vegetable, yet is damaged or killed by frosts and freezes. The high temperatures of summer prevent early planting, and a September or later planting usually schedules the crop to mature after the first fall frosts. Of course, in South Florida counties where danger of frost is minimal, potatoes may be successfully planted in September and October.

Another factor which must be considered that affects fall planting is the seed dormancy problem. Freshly dug potato tubers are "resting"; that is, they will not sprout right away until this dormancy is broken. In the spring this is no problem, since sufficient time elapses between the digging of the seed potatoes in late summer and their subsequent planting in the spring. However, in the fall, northern seed potatoes are dug just prior to planting. So the dormancy must be broken chemically. Seed dealers usually do this with such chemicals as gibberellins and ethylene. Some varieties have short dormancy periods, and this fact, coupled with their early maturation up north, make them more suitable for planting in the fall in Florida even without treatment. One such variety is 'LaRouge'. Therefore, most Florida gardeners including the southernmost counties should try the 'LaRouge' variety wherever offered by garden supply stores, should they wish to try a fall planting.

(2) Timely Topic for Week of October 24-30.

Question

Is it, as I have been told, wrong to place fertilizer in with the seed? I have always done this and have grown a fine garden each year.

Reply

I suspect you are placing a relatively small amount of fertilizer in the bottom of your seed drill, then mixing it into the soil before dropping in the seed. As long as you use only a little (1/2-1 lb./100 feet of row) and mix it well with the soil, you should have no trouble from fertilizer burning your seeding roots. In fact, some fertilizer, mainly phosphorus, is necessary in the vicinity of the germinating seedling for immediate use by the tiny plant especially in cool soils. In order to insure the plants' early fertilizer needs are met, we suggest a broadcast application over the entire bed surface just prior to planting. Be sure to rake or otherwise mix it well into the soil. This broadcast application should be light—less than 2 pounds per 100 square feet of bed surface. Following the broadcasting, or scattering of the fertilizer over the soil surface, additional fertilizer may be supplied in bands beside the planted row. Organic fertilizer, such as well ground-up compost, may be mixed in the soil in the planting furrow prior to planting.

(3) Timely Topic for Week of October 31-November 6.

Question

What causes my sweet potatoes to develop a hard center after we boil them?

Reply

A condition known as hardcore develops in cooked sweet potato roots that have been stored at low temperatures, then removed to room temperature before cooking. The
procedure that brings this on is storage of the roots in the refrigerator at 32-36°F, for one to three weeks, followed by removal to room temperature of 68° for a couple of days prior to boiling. The longer they are kept at the chilling temperature, the more severe the hardening of the internal core becomes. If they are cooked immediately after removing from the refrigerator, the hardcore condition does not develop, although the overall tissue is firmer than if not chilled. The condition does not show up until the roots are cooked. Hardcore, as described, is different from a common disease called internal cork which develops in roots stored at high temperatures. For best results, store sweet potatoes from 55-65°F.

(4) Timely Topic for Week of November 1-13.

Question

Last year I had trouble getting a stand of parsley. Can it be grown here in Florida?

Reply

Parsley may be grown successfully in all areas of Florida, if planted at the proper time of the year. Being a cool-season vegetable, it should be planted at the beginning or during the coolest part of the year. Once established in the cool months, parsley will remain in fairly good shape through the summer, especially if well mulched. By the second year, it usually goes to seed.

The very small delicate parsley seeds are slow to germinate. Plant them shallow (1/8 to 1/4 inch deep) and keep them moist while they are sprouting. Soaking the seeds in warm water for 6 hours will help them germinate more rapidly. The tiny seedlings are not vigorous growers, so do not let weeds crowd them out. Failure to keep the soil moist in the vicinity of the seeds is perhaps the biggest reason for your poor stand of parsley. Keep in mind, however, that even under the best conditions it takes twice as long for parsley seeds to sprout (two weeks) compared to most other garden vegetables (1 week or less).

B. Know Your Vegetables - Lentils

Lentil (Lens culinaris Medic) or (Lens esculenta Moench) is a bean-like plant that has been grown in the Mediterranean region since ancient times. Seeds are reported to have been found in Egyptian tombs of the 12th dynasty (2,400 B.C.). It is seldom grown in Florida, even in gardens, for it is more adapted to dry droughty conditions. Most production in the U.S. has been centered in the Pacific northwest. Almost 40,000 acres of lentils were produced in 1972. A bushel of dry seeds weighs about 60 pounds.

The leguminous plant may be described as a low, bushy, weakly upright to semi-viny annual having a general appearance to vetch. It has many soft, hairy branches that bear pinnately compound leaves and numerous oval leaflets. Flowers are white, lilac, or pale blue. The pods are oblong, broad, short and smooth. Each pod bears 2 seeds which are thin, lens-shaped, usually smaller than pea seed, and of various colors including brown and yellow. A pound contains 6,000 to 12,000 seeds.

They are cultivated much as are dry beans. Therefore, there should be a period of 2 or 3 weeks of sunny dry weather at harvest time for drying the pods. Young immature pods may be used as a vegetable. The mature dry seeds are a favorite ingredient in soups and stews.

(Stephens)