CONTENTS

I. NOTES OF INTEREST
   A. Vegetable Crops Calendar.

II. COMMERCIAL VEGETABLES
   A. Watermelon Fruit Defects.
   B. Everglades Agricultural Area.
   D. Tomato Institute Program.

III. VEGETABLE GARDENING
   A. Using Pressure Treated Wood in Vegetable Gardens.

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I
NOTES OF INTEREST

A. Vegetable Crops Calendar.


II
COMMERCIAL VEGETABLES

A. Watermelon fruit defects.

This is a continuation of my reports on watermelon fruit defects that began in the March issue of the Vegetarian with a discussion of hollowheart and continued in the May issue with a report on rind necrosis. Several other defects are included in this article.

Blossom-end rot. Symptoms begin as a softening and shriveling of the blossom end of partially-grown fruit and progress to a dark-brown, sunken, leathery lesion. Varieties producing elongated fruit are more susceptible to blossom-end rot than those producing round fruit (Hammouda, 1987).

The incidence of the disorder is increased under low calcium regimes (Waters and Nettles, 1961). Recommendations for control of blossom-end rot include liming of soil according to soil test results and maintenance of an adequate, uniform soil moisture through irrigation management (Kucharek and Hopkins, 1992).

Bottleneck. Constricted growth at the stem end of the fruit characterize this disorder. It is attributed to inadequate pollination either because of a low bee population or to poor conditions for bee activity such as cold, wet, or windy weather. The cause of the misshapen fruit can be verified by a cut fruit which will show an absence of seed at the stem end of the watermelon (Johnson, 1992).

Sunburn. This disorder appears on the upper fruit surface as a gray area where the rind pigment has been destroyed by high temperature. Watermelon rind temperature reached 107°F in the sun and was 97°F in the shade when air temperature was 89°F (Maynard, 1991 unpublished). Sunburn damage may be avoided somewhat by selection of varieties with light colored rinds which are less subject to sunburn than dark-rinded varieties. The best means of circumventing sunburn damage, however, is to provide conditions for good vine growth which provides shade for the watermelon fruit.

Cross Stitch. This disorder appears as a series of 1 to 2 cm long necrotic wounds that are perpendicular to the longitudinal axis of the fruit. It was observed in Indiana in the late 1980's and early 1990's and in Florida in 1990 where the name was coined (Latin, 1993).

Greasy Spot. Relatively inconspicuous raised, circular, olive-green areas on the rind surface characterize this disorder first described in Florida. Greasy spot occurs rarely and is thought not to be of economic concern (Latin, 1993).

Target Cluster. Distinctive target-like configurations occur on the rind surface, usually in clusters of three or more (Latin, 1993). It has been suggested, because of their unique appearance that the causal organism may be a ringspot virus, but this has not been confirmed. The disorder is not common but I have noted it in Florida and in Australia.

References


(Maynard, Vegetarian 98-07)

B. Crop rotations in the Everglades agricultural area.

Palm Beach County produces $1.2 billion worth of agriculture production annually. The western half of the county comprises the area designated the Everglades Agricultural Area (EAA). This area accounts for over $800 million of the Palm Beach County production.

Vegetable production in the EAA was king during the World War II era, followed by cattle in the 1950's and 60's, and then superseded by sugarcane in the current era. While livestock has totally disappeared, vegetables have remained an important industry, amounting to $75 million per year.

While there are many small acreages that each owner calls a “farm”, there are less than 100 farms in the EAA that account for 99.9% of the production. Two farms have the 3,000 acres of celery, 3 have the 13,000 acres of radishes, 4-5 have snapbeans, 5 have the 3,000 acres of leafy vegetables, 7-10 have the 24,000 acres of rice, 10 have the 14,000 acres of sod, 15-20 have the 25,000 acres of sweet corn, and 104 have sugarcane. In other words, nearly every vegetable, rice, and sod grower in the EAA also grows sugarcane. This is because sugarcane can take a beating from the weather and still produce a crop. It is used as a very effective insurance crop by the vegetable growers.

Sugarcane, harvested from 360,000 acres annually in Palm Beach County, is the major crop in the EAA. It is harvested 15 months after planting and re-harvested every 11 months until yields drop off. Currently, on average, sugarcane is on a three year cycle before being replaced. Land replanted to sugarcane (called consecutively planted sugarcane), rotated to vegetables for 3 years, rotated to sweet corn for a spring or fall crop, rotated to rice for the spring/summer, or left as either flooded or weedy fallow.

Consecutively planted sugarcane gives an economic boost to the grower by not losing a harvest season. Although this sugarcane-sugarcane rotation results in a yield reduction, the continuity of income still is an economic incentive. However, when a grower tries to consecutively plant sugarcane for three cycles in a row, yield reduction results in an economic loss. In other words, every six years a sugarcane grower must practice some form of crop rotation. A 6 month sugarcane-free period is the industry norm.

Acreage under the 6 month sugarcane-free fallow period, and the summer fallow for leafy, radish, and celery vegetable acreage, were traditionally kept under an 8-12 week flooded-fallow, or a weed free dry fallow. The flooded-fallow continues to be highly recommended by IFAS because it conserves soil and reduces pest infestations.

Flooding organic soils during the summer is a sound agronomic practice. Environmentally, the EAA is a hot bed of activity stemming from the alleged influence of agriculture on the phosphorus content of water entering the Water Conservation Areas and the Everglades National Park. In reality, most of the measurable nutrient problems in surface water stem from two sources; mineralization of the organic soils releasing bound phosphorus, and nutrients entrained on particulate matter carried by drainage water entering canals.

When the old Everglades swamp was originally drained, three things happened. First, the soils compacted, resulting in a loss of about 30% of their original thickness. Second, in the presence of air, the soil began to mineralize, releasing nutrients to the soil and water and carbon products to the air and water. Third, wind erosion became a factor. The resultant loss of surface elevation accounted for by these three forces of nature is referred to as subsidence. The EAA, on average, lost a half an inch of soil per year during the past ten years. Soil depth to bedrock across the 550,000
acre EAA is currently estimated to average around three feet.

Mineralization of the organic soil is both a chemical and a biological process accelerated by heat and the presence of oxygen. By reducing or eliminating the presence of oxygen, mineralization is significantly slowed. Under flooded conditions, mineralization and both wind and water erosion are controlled, virtually eliminating soil loss. However, normal farming practices dictate well drained soils during most of the growing season. By flooding during the fallow summer period only, which is the time of the highest temperatures and rates of mineralization, soil losses can be significantly reduced.

Because rice is grown under flooded conditions and in the heat of the summer, it is nearly the perfect method for slowing subsidence. Rice grown strictly for a cover crop significantly improves soil tilth when incorporated. When grown as a cash crop, it pays for land improvements and flooding costs, and in many years, returns a small profit. Marketing rice is dependent on a processing mill and favorable markets. Since both are present in south Florida, rice is a natural.

In summary, vegetable production in the EAA occupies a site for three years, including a 4-5 month fallow period during the heat of the summers. Sugarcane production occupies a site for six years followed by a 6 month fallow period, also during the heat of the summer. Keeping these vacant fields under water stops subsidence during these flooded periods and eliminates many pests that would otherwise require chemical controls. In addition, rice can be successfully grown in the EAA during the warm summer months and needs flooded conditions. Rice accomplishes everything a fallow-flood would plus gives an economic as well as agronomic return.

(Thomas J. Schuenneman, is Vegetable Agent with the Palm Beach County Cooperative Extension Service Vegetarian 98-07)

C. Between-crop management practices will influence future productivity.

To leave a field “fallow” connotes inactivity. Fallow actually means that tillage has been completed but nothing has been seeded. Occasional tillage must be performed to control weed growth. While it is used primarily for weed control, fallowing is also very effective in controlling other pests such as wire worms. By taking away their food source, disease and insect pest pressure is reduced. However, it is nearly a worthless practice if it is not managed. A neglected fallow field is nothing more than a weed-seed factory.

Weeds produce thousands of seeds that sit and wait for favorable conditions under which to germinate and rob the cash crop of nutrients, water, and light. Weeds are a reservoir for pests and disease, interfere with cultivation and harvest, and reduce crop quality. While weed control requires active management, a neglected fallow period only exaggerates the problem. Why not change the word “fallow” to “between-crop management” and get some good out of idle fields.

Immediate incorporation of crop residue after the last harvest begins the between-crop management. This minimizes the impact of that field being a breeding site for pests that a harvested, abandoned field has on neighboring crops. Weed growth is stopped.

This tillage operation will encourage a flush of weed seeds to germinate now, but these will be removed, thereby reducing weed pressure later. As soon as the above mentioned weeds are visible, a cover crop should be planted. Using the proper equipment, the shallow tillage required for drilling the cover crop will also eliminate the weed flush in a one-pass operation.

Growing a cover crop has many advantages over a clean fallow and almost no disadvantages. It reduces soil erosion, reduces nutrient leaching by incorporating left over crop nutrients into the cover crop, smothers weeds, improves soil tilth and drainage, and increases the substrate necessary for good soil microbial activity.
The cover crop can easily be used for green manure. Nutrients can be incorporated into the crop, and then returned to the soil as a slow release nutrient source for the succeeding crop. Again, it must be managed. Good growth for the green manure crop is essential, so supplemental fertilizer may be needed to maximize efficiency. Cover crops should be incorporated before they go to seed. Also, most green manure cover crops have the capability of tremendous top growth. Incorporation must be done before excessive growth becomes a cultural problem.

Under normal Florida conditions fresh cover crop residue is quickly broken down by soil micro-organisms, releasing nutrients for plant use. A three week lead time from cover crop incorporation to cash crop planting is probably sufficient. Usually within six weeks of incorporation, few traces of the cover crop can be found.

In summary, cover crops reduce erosion, scavenge excess nutrients from the preceding crop, improve tilth, suppress weeds, and improve water relationships in the soil. With a little additional management, a green manure cover crop does all these plus stores more nutrients and acts as a slow release fertilizer.

(Thomas J. Schueneman, is Vegetable Agent with the Palm Beach County Cooperative Extension Service
Vegetarian 98-07)

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**Tomato Institute Program**

*Ritz Carlton, Naples*

*September 9, 1998*

**9:00 a.m.** Opening Remarks - Edward Hanlon, SWFREC, Immokalee

**9:10 a.m.**

FREE TRADE AGREEMENT OF THE AMERICAS: CURRENT STATUS AND FUTURE OPPORTUNITIES FOR FLORIDA TOMATO GROWERS - John Van Sickle, IFAS, Food & Resource Dept., Gainesville

**9:30 a.m.**

UPDATE ON TOMATO YELLOW LEAF CURL VIRUS - Jane Polston, Virologist, IFAS, GCREC, Bradenton

**9:50 a.m.**

PHYTOPHTHORA CAPSICI: NEW PROBLEMS FROM AN OLD ENEMY - Robert McGovern, Pathologist, IFAS, GCREC, Bradenton

**10:10 a.m.**

UPDATE ON THE USE OF BACTERIOPHAGES FOR CONTROL OF BACTERIAL SPOT - Jeff Jones, Pathologist, IFAS, GCREC, Bradenton

**10:30 a.m.**

BACTERIAL SPECK: THE OTHER BACTERIAL DISEASE - Ken Pernezny, Pathologist, IFAS, EREC, Belle Glade

**10:50 a.m.**

THE SCIENTIFIC, ECONOMIC, AND POLITICAL REALITY OF THE PHASEOUT OF METHYL BROMIDE - Joe Noling, Nematologist, IFAS, CREC, Lake Alfred and Jim Gilreath, Weed Scientist, IFAS, GCREC, Bradenton

**11:10 a.m.**

EFFECT OF COMMERCIAL BACTERIAL AND FUNGAL MICROORGANISMS TO COLONIZE TOMATO ROOTS AND CONTROL FUSARIAUM CROWN AND ROOT ROT UNDER FUMIGATED AND NON-FUMIGATED CONDITIONS - Lawrence Datnoff, Pathologist and Ken Pernezny, Pathologist, IFAS, EREC, Bradenton.

**11:30-1:00** Lunch
What's new in the industry - Industry Representatives

Agricultural labor in southwest Florida - Fritz Roka, Economist, IFAS, SWFREC

The food quality protection act & the FL grower - Dan Botts, Environmental & Pest Management Division, FFVA

Florida Automated Weather Network: A tool for growers - John Jackson, Ext. Agent III, IFAS, Lake County Extension Service

Tomato transplant cell size effects earliness and yield - Charlie Vavrina, Horticulturist, IFAS, SWFREC

Prospective releases from the University of Florida tomato breeding program - Jay Scott, Breeder, IFAS, GCREC

Update on the Florida premium-quality tomato program - Steve Sargent, Postharvest Specialist, Hort. Science Dept., IFAS, Gainesville

Tomato fertilization recommendations-evaluation and review - George Hochmuth, Extension Specialist, Hort. Science Dept., IFAS, Gainesville

(Vavrina, Vegetarian 98-07)

III. VEGETABLE GARDENING

A. Using pressure treated wood in vegetable gardens.

Here is one of the most frequent gardening questions I get: "Is it safe to use pressure treated lumber in the vegetable garden?" I hope to answer this question with the following article. I received most of my information from an article by Ruth Lively in Kitchen Garden, June-July 1998, and George Liebig, Jr., University of California, 1965, Diagnostic Criteria for Plants and Soils.

Wood uses. Gardeners use lumber in the garden in a variety of ways. The most popular use is for the construction of border-boards for gro-boxes (raised beds). Boards in dimensions ranging from 2x6 inches to 2x12 inches provide a sufficient root zone depth. Most gro-boxes are constructed 4 to 5 feet wide to accommodate reaching into the raised beds for planting, weeding and other tasks. Most raised beds are constructed 8-10 feet long.

Wood is also popular with gardeners for staking, trellising, fencing, and construction of compost bins. Since all of these uses involve soil contact, decay-resistant lumber is needed. Naturally-resistant wood such as cedar, redwood, and cypress is sometimes used, as is lumber that is treated with creosote, pentachlorophenol, asphalt, and paint. However, the cheapest, most readily available, and longest lasting decay resistant wood is pressure-treated lumber (PTL).

PTL. To pressure-treat lumber for rot and insect resistance, it is sealed in a vacuum tank. Then a solution of chromium, copper, and arsenic (CCA) is added. The vacuum moves the solution deep into the wood.

Arsenic concerns. Of the three toxic ingredients in PTL, arsenic raises the most concerns, although chromium and copper are also feared. Organic arsenic occurs throughout nature, including in our foods, but the arsenate used in wood is inorganic. People in general fear the word arsenic because it is a well known ingredient in rodent and insect poisons. Arsenic by itself is not poisonous, but many of its compounds are extremely so. Calcium arsenate, lead arsenate, and cupric arsenite (Paris Green) have been used as
insecticides in agriculture for a long time. Sodium arsenite and arsenic trioxide are well-known herbicides. Arsenic sprays have been used to hasten the maturity of citrus fruits.

Of course, arsenic should be feared in acute toxic doses. Large doses can be fatal, while lesser amounts can cause other health problems. Even though arsenic can't be avoided totally, everyone wants to eliminate as much ingestion as possible. Author Lively quotes the Agency for Toxic Substances and Diseases Registry (Atlanta) as reporting that we can ingest up to 0.3 micrograms of inorganic arsenic per kilogram of body weight per day without harm.

So the big concern is: does the arsenic leach out of the wood into the garden soil and become taken up by the vegetables in amounts large enough to cause health problems?

Leaching studies. According to Lively, a study involving utility poles in Canada showed that the wood placed in the soil does leach small amounts of CCA over time.

To determine the distance arsenic travels from the wood into the soil, Lively sent samples from a 3-year old framed bed to a lab for testing. Her soil without PT wood had 4 ppm arsenic. With PT wood, it showed 20 ppm arsenic up to 2 inches from the wood, but showed only 4 ppm at 6-inch and 24-inch distances. Thus, even though arsenic may leach, it doesn't move very far from the wood. Wood scientists concluded that the potential for groundwater contamination from garden use of CCA is pretty much zero.

Arsenic in soils and plants. The fact that arsenic is a natural component of soils was illustrated by Liebig who reported a survey of virgin and other soils showing a range of 0.3 to 38 ppm arsenic (only 20 percent had more than 10 ppm). Sandy soil generally has the lowest levels.

Early surveys showed that levels of arsenic in native plants and vegetables grown on natural soils did not exceed 10 ppm. However, soil contaminated with arsenic did produce vegetation of higher arsenic content than uncontaminated soils. Accumulations of arsenic in soils can have detrimental effects on plant growth. Since arsenic accumulates in larger amounts in or on the roots, root rotting usually occurs in solution culture (and may be evidenced by leaf wilting and plant stunting). Plant growth becomes limited before arsenic can be translocated to the tops. Seed germination and seedling viability are greatly reduced with toxic levels of arsenic.

Lively reported on three studies of vegetables grown on arsenic-enhanced soils. It was found that at certain levels, arsenic did interfere with the growth of some plants, such as beans, but did not affect others, such as tomatoes and carrots, as much. According to Liebig, vegetables may be classified as to tolerance of arsenic in this way: Tolerant: asparagus, potato, and tomato, carrot. Fairly tolerant: strawberry and sweet corn on heavy soils; beets and squash. Low or no tolerance: snap bean, limas, peas, other legumes, onion, cucumber, and strawberry and sweet corn on light soils.

Lively reported that there was no correlation between a crop's sensitivity and its arsenic content. Even where arsenic was high enough to reduce yields by 50%, spinach contained only 1 ppm arsenic and radishes only 8 ppm. Carrots grown with arsenic-laced soil had 0.11 ppm arsenic, as compared to 0.05 ppm in soil without arsenic.

So, is CCA treated wood safe? Lively talked with several food safety experts: Michigan State's Bourquin: "Consumers like to have zero risk. Compared to microbial risks, arsenic exposure doesn't seem a big problem." USDA's Chaney: "There's no evidence that food safety is impaired by growing vegetables around CCA-treated wood." But the USDA spokesman did point to the possibility of a health hazard from touching the wood and transferring the arsenic in that way. University of New Brunswick's Cooper: "Do not make compost bins from treated lumber because the acids arising from composting cause more leaching and reduces lumber's integrity."
My opinion: While the risks from ingesting arsenic in crops growing near CCA treated lumber used in the garden appear to be relatively remote, they are a possibility. Therefore, anyone not comfortable with taking the risk, however small, should use alternatives or precautions.

1. Use alternative materials, such as plastic and concrete, or naturally decay-resistant lumber like cedar and cypress, or treated woods that do not contain arsenic.

2. Handle the CCA treated wood with caution; wear gloves and a dust mask when cutting it. Don't use the sawdust in the garden or compost pile. Don't burn the wood and inhale smoke.

3. Wash and scrub the lumber first to remove any surface residues. Let the lumber weather several months before cutting and assembling.

4. Paint the lumber or cover with a plastic barrier.

5. Do not plant root crops. If planted, sow seeds at least 6 inches from the boards. You might plant flowers between the wood and the vegetables.

6. Do not mix the soil close (2 inches) to the boards with soil further out in the bed.

7. Amend soils with organic matter to reduce the soluble arsenic content in soils.

(Stephens, Vegetarian 98-07)

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