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I. NOTES OF INTEREST

A. Vegetable Crops Calendar.


II. COMMERCIAL VEGETABLES

A. N Fertilization of Carrots on Mineral Soil.

Florida carrots are grown on the Histosols of central and southern Florida. There are, however, a few growers in northern Florida and southern Georgia growing carrots on sandy soils. Little information is available on fertilization of mineral soil carrots and resulting chemical quality. Mark Bassett and I have discussed the idea of mineral soil carrot production in the winter in northern Florida. Our idea was to investigate the yield and quality potential for winter fresh market carrots. Jeff Brecht has agreed to analyze the roots for carotenoid and sugar concentrations.

Three plantings were made in mid November, December, and January of 'Choctaw' (imperator type) and 'Scarlet Nantes' (Nantes type). Carrots were seeded in twin rows on 24-inch-wide beds on four-foot centers and thinned to one inch between plants when one inch tall.

Nitrogen and potassium fertilization effects were investigated using rates of N and K$_2$O ranging from zero to 200 lb per acre in 50-lb increments. N or K$_2$O was applied at 20 lb per acre at planting and the remainder was applied in three sidedressings banded in the center of the bed. All carrots in the N test received 150 lb K$_2$O per acre and all carrots in the K test received 150 lb N per acre.

Carrots were dug, washed, topped, and graded. Figure one summarizes the responses of carrots to N fertilization. We will present the results of the K tests later. Figure one has the results of the first two plantings, the third one is yet to be harvested. Carrot yield responded dramatically to N fertilization, but yield leveled off after 100 lb N per acre. Results clearly show that our new recommendation of 150 lb N per acre is ample N for mineral soil carrot production and that N rates higher do not increase yield, but may even reduce yield.

N FERTILIZATION OF CARROTS ON MINERAL SOIL

![Graph showing yield response to N fertilization](image)

(Hochmuth, Vegetarian 95-05)

During the 1992-93 crop year, 12,300 acres of summer squash were harvested in Florida. Average yields were 276 bushels/acre, total production was about 3.4 million bushels which sold for $9.20 per bushel amassing a total crop value of just over $31 million. About a third of the crop was grown in Dade County, but central Florida accounted for about 25% of the acreage.

This trial was arranged to evaluate performance of some yellow straightneck and crookneck hybrids and some zucchini hybrids which were developed at the Central Florida Research and Education Center with commercial hybrid summer squash varieties at Bradenton and Leesburg.

The Eau Gallie fine sand was prepared in early March 1994 by incorporation of 0-1.2-0 lb N-P2O5-K2O per 100 linear bed feet (lbf). Beds were formed and fumigated with methylbromide:chloropicrin, 67:33 at 2.3 lb/lbf Banded fertilizer was applied in shallow grooves on the bed shoulders at 2.7-0-3.8 lb N-P2O5-K2O/100 lbf after the beds were pressed and before the black polyethylene mulch was applied. The total fertilizer applied was equivalent to 130-60-182 lb N-P2O5-K2O/A. The final beds were 32 in. wide and 8 in. high, and were spaced on 9 ft centers with four beds between seepage irrigation/drainage ditches which were on 41-ft centers.

In Leesburg, Apopka fine sand was prepared in February by incorporation of 0.8-1.1-1.1 lb N-P2O5-K2O per 100 linear bed feet (lbf). Beds were formed, black polyethylene mulch, and drip tubing were applied in one operation. Emitters were spaced 12 in. apart on the drip tubing. The final beds were 24 in. wide and 8 in. high and were spaced on 10 ft centers. The total fertilizer applied, including

that supplied through the drip irrigation system, was equivalent to 140-80-160 lb N-P2O5-K2O/A. Drip irrigation was supplied as needed based on soil tensiometer readings.

Squash seeds of 21 entries were planted in holes punched in the polyethylene mulch at 2.5 ft in-row spacing on 4 March at Leesburg and 18 March at Bradenton. The plots were 12.5-ft long, had five plants each, and were replicated four times in a randomized, complete block design. Weed control in row middles was by cultivation and application of paraquat. Pesticides were applied as needed for control of silverleaf whitefly (endosulfan and esfenvalerate), and aphids (endosulfan).

Squash were harvested 9 times between 15 April and 5 May at Leesburg and 11 times between 22 April and 16 May at Bradenton. Marketable fruit (U.S. No. 1 or better) according to U.S. grades were separated from culls and counted and weighed.

Plants were rated from 1 (least resistant) to 5 (most resistant) for powdery mildew on 11 May at Bradenton. The designation of individual ratings was 1 = 75-100% of the main stem covered with powdery mildew colonies, 2 = 50-75% covered, 3 = 25-50%, 4 = 1-25%, and 5 = 0 powdery mildew.

In Leesburg, plants were rated powdery mildew and virus resistance on a scale of 1, least resistant, to 5, more resistant. Virus in the fruit was based on the percentage of fruit, culled due to virus infection.

Bradenton. The most resistant lines to powdery mildew within each squash type were: straightneck - D42-2 x E34, D43-1 x E34, 'Early Prolific', and 'Multipik'; crookneck - E40-7 x E43, E39-1 x E42, 'Tara', 'Bandit' and 'Supersett'; and zucchini - D34-3 x D33 and D36-7 x D33. A high level of powdery mildew resistance was not always associated with high yields.
Within the straightneck types, the early yields ranged from 108 bu/acre for 'Precious' to 269 bu/acre for D43-1 x E34. Total yields ranged from 308 bu/acre for 'Precious' to 661 bu/acre for 'Multipik'. Three other entries had yields similar to those of 'Multipik'. In the crookneck types, early yields ranged from 70 bu/acre for 'Tara' to 280 bu/acre for 'Medallion'. Total yields ranged from 340 bu/acre for 'Tara' to 640 bu/acre for 'Medallion'. Six other entries had yields similar to those of 'Medallion'. In the zucchini type, early yields ranged from 44 bu/acre for D36-7 x D33 to 214 bu/acre for 'Zucchini Elite'. Total yields varied from 58 bu/acre for D36-7 x D33 to 407 bu/acre for 'Zucchini Elite'. Three other entries were similar in yield to 'Zucchini Elite'. Yields obtained in this trial can be compared with a 1988-89 to 1992-93 state average yield of 313 bu/acre. Accordingly, 18 of the 21 entries exceeded the five-year state average yield. Yields of a yellow summer squash trial at this location in 1993 ranged from 532 to 811 bu/acre.

Two of the experimental yellow straightneck hybrids - D43-1 x E34 and D42-2 x E34 and one of the experimental zucchini hybrids - D36-7 x D33 bore fruit that were too short and too broad in diameter (data not shown) to be commercially acceptable. The other experimental hybrids bore fruit that was horticulturally acceptable.

Leesburg. Powdery mildew did not appear until late in the growing season. In straightneck squash, the open pollinated variety, 'Early Prolific Straightneck', appeared to be more susceptible to powdery mildew than the hybrid varieties. In the crooknecks, E40-7 X E43 had no powdery mildew. In the zucchini types, all entries had good resistance except 'Elite' and D34-3 X D33.

Virus was severe during this season and all of the entries were susceptible. In the yellow squash, virus infection in the fruit ranged from 17% to 39%. Zucchini fruit were less affected by virus. In summer squash total yield ranged from 150 bu/acre to 301 bu/acre. Differences among the yellow squash entries were generally not significant which may have been the result of severe virus infection. It appeared that the three entries from Leesburg and 'Precious' might have better yield than the other straightneck entries. 'Tara', 'Dixie', and the entries from Leesburg had lower yield than the other crookneck entries. D36-7 X D33, 'Ambassador', and 'Elite' generally had better yields than 'Seasons', 'Viceroy', and D34-3 X D33.

Entries with high levels of powdery mildew resistance at both locations were D42-2 X E34, E40-7 X E43, and D36-7 X D33. Yields were considerably higher at Bradenton than at Leesburg, probably because of the severe virus infestation at Leesburg. Also, perhaps because of the virus infestation, there was little agreement in performance of the entries at the two locations.

(Maynard and Elmstrom, Vegetarian 95-05)

C. Less Is More.

A few days difference in timing can make a world of difference in price, therefore grower philosophy on harvesting is usually "the earlier the better". Re-examining the results from one of our tomato "soap" phytotoxicity studies in the early '90's, we noted something of interest ... pesticide applications can delay tomato fruit maturity!

Recalling the test, we transplanted tomatoes in early fall 1992 in Immokalee. We subjected these plants, once weekly, to individual applications of either liquid detergent at one of two rates or a conventional
insecticide tankmix (2 products) in rotation with an additional insecticide product. A preventative fungicide program (once or twice weekly depending on disease pressure) and BT's were applied to all plants.

The treatments were applied for a period of 11 weeks before harvests were begun. The industry standard, "5% color", was used as the harvest criteria. Harvested fruit were separated into reds and greens and graded by size and number. "Reds" were considered any fruit of category 2 or greater.

Both the soap treatments and the conventional insecticide spray influenced tomato maturity and extra-large size production at first harvest, compared to the plants that did not receive insecticides (Table 1). Untreated plants produced more extra large red fruit and more total red fruit at first harvest than soap at 0.25% or 1.0%, and the conventional insecticide program. Greater quantities of red fruit on the unsprayed plants suggested that they had reached maturity sooner than sprayed plants.

Table 1. Effect of detergents and conventional insecticides on 'Sunny' tomato fruit maturity at first harvest in Fall 1992.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Red Fruit Yield (lbs/plant)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extra large</td>
</tr>
<tr>
<td>No Insecticide Applied</td>
<td>4.87 a</td>
</tr>
<tr>
<td>Detergent @ 0.25%</td>
<td>1.28 b</td>
</tr>
<tr>
<td>Detergent @ 1.0%</td>
<td>2.29 b</td>
</tr>
<tr>
<td>Conventional Insecticides*</td>
<td>1.79 b</td>
</tr>
</tbody>
</table>

* This program included a tankmix (2 conventional products) in rotation with another conventional product as a once-weekly spray.

Do our results represent a real impact of spray programs on maturity? More tests must be run, however, if this relatively "low-input" program can influence maturity so greatly, think what some grower programs must be doing!

We don't suggest suspending all pesticide applications of course. This test was conducted under relatively low pest conditions. Yet our results should emphasize the need for an as needed program based on scouting and stimulate thinking about more sustainable approaches to crop production.

We have further studies planned for the coming fall to test the hypothesis of "spray and delay" so we will keep you posted. But from what we've seen so far the old adage seems to hold true ... less is more!

(Vavrina & Stansly, Vegetarian 95-05)
D. Recent Innovations in Strawberry Cooling and Handling.

Part 2. Sensitivity to Bruises

Field packing is the primary method employed in commercial production areas in the U.S., having been adopted to reduce mechanical injury by minimizing handling steps. Although bruising was reduced, field packing has limited flexibility for producing and marketing value-added specialty packs such as the clamshell package or selecting extra-large fruits with attached stems. The main drawback is that the entire quality control program depends on the ability and motivation of the pickers to perform many tasks in the field, ranging from determination of ripeness stage and fruit quality to removal of diseased fruits, harvest, placement in the package and delivery to a field wagon. All of these operations must be performed by each picker without bruising the fruit while maintaining a consistently high quality level under strenuous conditions. In order to be able to meet the growing demand of specialty packs, strawberry handling must be modified to permit more uniform grading without increasing mechanical injury.

Since losses of strawberries at the retail level have been correlated with mechanical injury, we determined the relationships between fruit temperature and susceptibility to compression and impact bruising. Compression bruising occurs over time due to pressure from static weight bearing down on the fruit, during handling and shipping. Impact bruising develops following the occurrence of a sudden force such as a drop.

We found that compression and impact forces had opposite effects on bruise incidence when strawberries were at ambient (24°C) or low (1°C) temperatures. When tested at ambient temperature, strawberries were more resistant to impacts, while at the lower temperature, the fruits were more resistant to compression.

The results from these studies indicate that postharvest strawberry quality may be significantly extended by adoption of a novel handling system with the following features. Strawberries would be harvested into reusable field flats during the cooler times of the day; this would provide greatest resistance to compression bruising during field handling to a central packing facility. There the fruits would be transferred to a specially built grading line via a chlorinated, hydrohandling system, then graded, hydrocooled in bulk or in containers, palletized and treated with modified atmosphere packaging for shipping. Strawberries should be cooled after sorting and grading since they are more resistant to impact bruises at ambient temperatures. Further tests are required to select appropriate handling components which would make such a system feasible.

(This article was condensed from a presentation made at 4th North American Strawberry Conference held in Orlando 15-17 February, 1995.)

(Sargent, Vegetarian 95-05)

III. VEGETABLE GARDENING

A. Vermicomposting.

This is the last of my three articles on earthworms and gardening to appear in this newsletter. The first two were
Vermitechnology (March, 95) and Vermigardening (April, 95). Much of the information for these articles has been provided by vermitechnologist Larry Martin who runs an earthworm farm in Orange Lake, Marion County, Florida. Those of you attending the Organic Gardening field day on May 25 at Gainesville will have an opportunity to meet Mr. Martin as he demonstrates the use of earthworms in gardening.

Vermicomposting is a natural biodecay process in which bacteria, fungi, and other micro-organisms in the soil break down organic material so that it may be consumed and further broken down by earthworms. It is somewhat like regular composting taken to a final stage of decomposition that yields a fertile organic soil called worm castings.

Bin construction

The ideal vermicompost bin size is 12 inches high, by 3 feet wide and 8 feet long. Actually, it may be of any width and length, but the height should never be more than 16 inches, which is rather low as compost bins go.

Use 2 x 12 pressure treated wood with ½ inch wire mesh attached to the bottom. The wire mesh is very important to prevent the intrusion of unwanted rodents. Moles, for example, are known to consume their weight in worms each day.

Entry from the bottom is not the only concern, as raccoons, armadillos, birds and other varmints (including pets) can be a problem from the top. For prevention, construct a hinged cover made of the same size mesh wire attached to a frame that may be latched.

Organic material

Most any thing growing in the yard is potential food for the earthworms (red worms), bacteria fungi, and other decomposers. As with all types of composting, a balanced ration of carbon to nitrogen in the content of organic materials is important. One easy way to obtain this needed balance is to provide two parts green material (nitrogen provider) to one part brown (carbon provider). A thorough mixing will help speed the decomposition process. Also, it is best to first chop up or shred the yardwaste before adding them to the bin and mixing.

Examples of nitrogen-rich materials are fresh grass clippings, plant trimmings, especially legumes, vegetable matter, and animal manures. Examples of carbon-rich materials: dry leaves, straw, yard waste compost, and small amounts of sawdust.

Preparing bin for the worms

Three to four days before introducing the worms to the pile, spread a layer (6 to 8 inches thick) of any combination of the organic ingredients just mentioned. To this you may add up to 25% of the total mixture as ground up newspaper or corrugate, as the worms love the glue in the mix. Water heavily for 3-4 days, then make sure the materials have “heated out” and cooled before adding the earthworms.

Adding the earthworms

The red worms (Eisenia fetida) are introduced by spreading them over the entire area of freshly watered organic matter in the bin in the early or mid-morning. The worms will crawl into the soil rapidly. You need about 200 earthworms per square foot of bed area.
Feeding

After settling down, the earthworms will feed on the bedding and will come to the surface for feed. Use only the nitrogenous materials as feed. Place it on the surface, except for kitchen scraps which should be placed down 3-4 inches and covered with bedding (eliminates rodents, flies and odors).

Moisture

Add water (between periods of rains) to provide adequate moisture for the surface-feeding worms. Moisten the surface without soaking the entire bed depth.

Temperature

It is best to locate the bin out of direct full sunlight (70°-80°F is good range).

Reproduction

Red worms double their number every 2 months. If the bin compost worms are not harvested, the worms leave in search of food and may enter your lawn or garden as well to benefit that area.

(Stephens, Vegetarian 95-05)

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