Vegetarian 92-1  
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I. NOTES OF INTEREST

A. Vegetable Crops Calendar.
March 5-6, 1992. Postharvest Horticulture Institute. University Centre Hotel, Gainesville. (Contact Steve Sargent).
March 9-12, 1992. Harvest and Postharvest Handling of Horticultural Crops. Tour of Central and South Florida. (Contact Steve Sargent).

B. New Publications.

II. COMMERCIAL VEGETABLES

The American Society for Horticultural Science is publishing a new journal (starting out as a quarterly) dealing with horticultural research. The new journal has a goal of supplying timely discussions of recent research and general topics of immediate use to horticulturists. The information will be in a more useful format than most other scientific journals. Each issue will have a "theme" such as "water management" and will contain articles from most commodity and discipline areas. Commercial advertising is also a part of this new journal. I have a few copies of the first issue, some of which already have been mailed to potential subscribers around the state. If you (or someone you know) might like to receive a copy, please call me.
(Hochmuth, Vegetarian 92-01)

B. Varieties for Spring and Fall Production.
It is generally thought that vegetable crop yields are higher from a spring than a fall crop in Florida. To test this idea, the average yield of the same tomato entries, that were included in spring and fall IFAS trials was calculated. Trials at Bradenton and Ft. Pierce from 1986-90, Quincy from 1988-90, and Immokalee in 1986, 1989, and 1990 were included. Overall average yields in the spring were 2108 cartons/A, whereas fall yields were 1497 cartons/A.

In like manner, average pepper yields were calculated from Immokalee data in 1986 and from Bradenton data in 1989 and 1990. Spring yields averaged 1370 cartons/A, whereas fall yields were only 742 cartons/A.

For the most part, the difference in spring and fall tomato and pepper yields can be attributed to better growing conditions in the spring and higher disease pressure, especially bacterial spot, in the fall season.

'Sunny' tomato has been the standard variety and was included in all of the tomato trials. The overall average yield for 'Sunny' was 2223 cartons/A in the spring and 1473 cartons/A in the fall. Likewise, 'Early Calwonder' has been a standard pepper variety. Overall average yields in the spring were 1220 cartons/A, whereas only 598 cartons/A were produced in the fall.

Were there any exceptions to the general trend of higher spring than fall yields? Yes. Average yields of all tomato varieties included in both spring and fall trials were higher in the fall trial in 1986 at Immokalee and at Ft. Pierce in 1988, 1989, and 1990.
Tomato Varieties That Produced High Fall Yields in Some IFAS Trials. 1986-1990.

<table>
<thead>
<tr>
<th>Variety</th>
<th>No. of Trials Entered</th>
<th>Spring yields &gt; Fall yields</th>
<th>Overall Average Spring Yields</th>
<th>Overall Average Fall Yields</th>
<th>Yield for Trials When Average Fall Yields &gt; Spring Yields</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bingo</td>
<td>2</td>
<td>2</td>
<td>2407</td>
<td>2511</td>
<td>2407 / 2511</td>
</tr>
<tr>
<td>Duke</td>
<td>8</td>
<td>4</td>
<td>1876</td>
<td>1470</td>
<td>1442 / 1860</td>
</tr>
<tr>
<td>FTE 12</td>
<td>8</td>
<td>3</td>
<td>1986</td>
<td>1262</td>
<td>1251 / 1860</td>
</tr>
<tr>
<td>Solar Set</td>
<td>9</td>
<td>2</td>
<td>1956</td>
<td>1721</td>
<td>1618 / 2632</td>
</tr>
<tr>
<td>Sunny</td>
<td>14</td>
<td>3</td>
<td>2223</td>
<td>1473</td>
<td>1446 / 2219</td>
</tr>
</tbody>
</table>

Trials were not conducted to take advantage of 'Solar Set' heat setting characteristic which enhances early, but not necessarily total yields.

Although the general tendency is for lower yields from fall than from spring plantings, the foregoing examples illustrate that there are specific exceptions. Certain varieties like 'Bingo' and 'Duke' performed relatively well in fall IFAS trials. This points to the possibility of identifying and/or developing varieties especially for fall plantings in Florida. However, much more work is required before this can be done with a high degree of accuracy.

(Maynard, Vegetarian 92-01)

C. Response of Eggplant to Potassium (Yield and Leaf-Tissue-K).

Over the past few years, we have been attempting to evaluate responses of several vegetables to K. Little research has been done on K with vegetables in Florida. One such study was done in the spring of 1991 at the Suwannee Valley Agricultural Research and Education Center near Live Oak, FL by George and Bob Hochmuth, Ed Hanlon, and Michael Donley. The soil used for this study had a prefertilization Mehlich-I index for K of 21 ppm (on the lower extreme of "low" on our current calibration). Therefore, the soil was not expected to contribute significantly to the crop requirement for K. Our current recommendation for K in this situation would be 160 lb K₂O per acre (7260 linear bed feet) according to circular 806 "Commercial Vegetable Crop Nutrient Requirements".

We used the cultivar "Classic" planted on plastic mulched beds on 5 ft centers (8712 linear bed feet of crop per acre). Transplants were spaced at 18 inches in the row and were staked like tomatoes. Beds were 24 inches across the top. The crop was irrigated by drip irrigation to maintain a tensiometer reading of -12 centibars at the 6 to 8 inch depth in the bed between two plants.

Fertilizer treatments were 0, 50, 100, 150, 200 and 250 lb K₂O per acre calculated based on 8712 linear bed feet in an acre. For beds on six-ft centers (7260 LBF per acre), these rates would have been 0, 42, 83, 125, 167 and 167 lb K₂O per acre. Fertilizer was broadcast and rototilled into the bed.

Transplants were set on March 14, 1991 and were harvested 5 times beginning 29 May, 1991. Most recently matured leaves and petioles were sampled 5 times and analyzed for N and K in the whole dried leaf and in the petiole sap.

 Marketable yield increased almost 50% as K rate was increased from 0 to 100 lb K₂O per acre (Table 1). There was a significant quadratic response to K. Fitting a quadratic equation to the yield data yielded a maximum at 145 lb K₂O per acre (120 lb per acre on 7260 LBF). Fitting a "linear-plateau" function (a more biologically realistic approach) yielded a critical K₂O rate of 100 lb K₂O per acre (about 80 lb K₂O per 7260 LBF). Total
yields reached 1500 33-lb bushels per acre (8712 LBF of crop).

Leaf-K analyses showed that plants at the 0 lb treatment were below the 3.5% K critical level for plants at early fruiting (30 Apr.). Since yields leveled off at 100 lb K$_2$O per acre (8712 LBF), whole-leaf K values for this treatment through the season in Table 1 could be taken as near critical values for seasonal monitoring. Normally producing eggplants start out at 4.6% K and decrease to 2.7 to 3.0% after the last of five harvests. Petiole sap K concentrations (Table 1) were highly correlated with whole-leaf K.

Based on this data, it appears that our current recommendations of K for eggplant are more than enough for a five-harvest season or perhaps other multiple harvest seasons yielding up to 1500 bushels. The data indicates that even reducing K$_2$O rates to 120 lb per acre (7260 LBF) would not result in yield sacrifices. This is because yield leveled off at 100 lb K$_2$O per acre (80 lb K$_2$O per acre = 7260 LBF) by the linear plateau statistical method.

For those interested, 120 lbs nitrogen per acre (= 8712 LBF) were applied. The whole-leaf-N and petiole sap Nitrate-N values for the 100 and 150 K$_2$O rates are presented in Table 2.

Table 1. Effects of K rate on K concentration of most-recently-matured leaves and petiole sap of eggplant, spring 1991, Live Oak, FL.

<table>
<thead>
<tr>
<th>K$_2$O rate (lb/A)</th>
<th>Yield (33-lb bu/A)</th>
<th>Whole-leaf K (%)</th>
<th>Petiole sap K (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>935</td>
<td>3.7</td>
<td>3800</td>
</tr>
<tr>
<td>50</td>
<td>1140</td>
<td>4.3</td>
<td>4300</td>
</tr>
<tr>
<td>100</td>
<td>1390</td>
<td>4.6</td>
<td>4800</td>
</tr>
<tr>
<td>150</td>
<td>1500</td>
<td>4.7</td>
<td>4800</td>
</tr>
<tr>
<td>200</td>
<td>1360</td>
<td>4.8</td>
<td>4900</td>
</tr>
<tr>
<td>250</td>
<td>1300</td>
<td>4.9</td>
<td>4900</td>
</tr>
</tbody>
</table>

Signif. L**O**

Planted 14 Mar. Critical K at 30 Apr. = 3.5%
Mehlich-1-K = 21 ppm (low).

Table 2. Leaf and sap nitrogen values for the 100 and 150 lb K$_2$O per acre treatments, eggplant, spring 1991, Live Oak, FL.

<table>
<thead>
<tr>
<th>K$_2$O rate (lb/A)</th>
<th>30 Apr</th>
<th>23 May</th>
<th>7 June</th>
<th>18 June</th>
<th>2 July</th>
<th>Leaf-N (%)</th>
<th>Sap NO$_3$-N (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>5.4</td>
<td>5.0</td>
<td>4.4</td>
<td>4.1</td>
<td>3.4</td>
<td></td>
<td>1000</td>
</tr>
<tr>
<td>150</td>
<td>5.4</td>
<td>5.1</td>
<td>4.7</td>
<td>3.9</td>
<td>3.2</td>
<td></td>
<td>150</td>
</tr>
</tbody>
</table>

Critical % N in whole leaf on 30 Apr. = 4.2 to 5.0%.

(Hochmuth, Vegetarian 92-01)
D. **Florida Seedsmen and Garden Supply Association/IFAS Seed Seminar.**

**Holiday Inn West - Gainesville**

Registration Fee: $10.00

February 12

Moderator: C. S. Vavrina, SWFREC, Immokalee.

1:20 Opening Remarks: Rick Anderson, FSGSA President.

1:30 **Seed Enhancements, Priming, & Coating Technology:** Zeb James, East Coast Sales Rep., Incotec, Arapahoe, NC.

2:00 **Seed Production - The Industry Viewpoint:** Bob Heisey, Associate Director, Solanaceous Crops, Asgrow, San Juan Bautista, CA.

2:30 **Seed Production - The Breeders Viewpoint:** Bryant Long, V.P. Product Development, Abbott & Cobb, West Palm Beach.

COFFEE BREAK

3:15 **What Does the Transplant Producer Want from the Seed Company?** Hugh Poole, Vegetable Division Manager, Speedling, Sun City.

3:45 **Greenhouse Vegetable Growers-Industry Assessment:** Bob Hochmuth, Multi-county Extension Agent, Live Oak.

4:15 **Transplants vs. Direct Seeding:** Ken Shuler, Palm Beach County Extension, Delray Beach.

6:00 Hospitality Hour

7:00 Banquet

"Business, Not as Usual" Jacob Vos, Executive Director, Worldwide Vegetables - Asgrow, A perspective on industry challenges of the '90s.

February 13

Moderator: C. S. Vavrina, SWFREC, Immokalee.

8:00 **Plant Genetic Engineering & Legislative Concerns:** Stephen Muench, Manager, Government Affairs, Monsanto, St. Louis, MO.

8:30 **Cover Crops for South Florida:** C. Chambliss, Agronomy Dept., University of Florida, Gainesville.

9:00 **Future Studies in Bahiagrasses:** S. West, USDA, Plant Physiologist, University of Florida, Gainesville.

COFFEE BREAK

9:45 **Are University Variety Trials Valuable?** Panel Discussion:

- Terry Howe-GCREC, Bradenton
- Don Maynard-GCREC, Bradenton
- Ted Winsberg-Green Cay Farms, Boynton Beach
- D. C. McClure-West Coast Tomato, Inc. Palmetto
- Tom Williams, Rogers NK, Naples

10:45 **Should Variety Trials Be Funded?** Panel Discussion

- Terry Howe-GCREC, Bradenton
- Don Maynard-GCREC, Bradenton
- Leonard Douglas-Asgrow, Lake City
- Rick Anderson-Peto Seed, Deltona
- Jonathan Stevenson-Rogers N-K, Naples

E. **Handling and Shipping Vegetable Transplants.**

Vegetable transplants grown in Florida can be successfully shipped over long distances when handled properly. Yields have been positively correlated with seedling vigor at time of transplanting, and vigor begins with healthy plants at the greenhouse which are handled and shipped at the optimal age for the particular crop. The primary factors which reduce transplant vigor during handling and shipping are mechanical injury, environmental conditions, and length of storage prior to transplanting.

Mechanical injury occurs during removal of the plants from the tray. Traditionally, groups of 50 plants were bundled for shipping. About 20 years ago,
this practice was discontinued since excessive breakage of plant stems and leaves occurred. Currently, plants which are to be shipped over any distance are pulled from the tray and packed loosely in containers (wooden, wirebound crates or waxed, corrugated cartons); plants shipped within Florida are often directly shipped in trays. Injury can also occur when transplants are over-packed in the container. Containerized transplants left in trays under simulated handling conditions had better shoot and root development than those which were pulled and packed in cartons.

Environmental conditions during shipping can also reduce transplant vigor. Plants should be cooled to the lowest safe temperature prior to shipping and subsequently handled under refrigeration. Tests have determined that tomato transplants ('Walter') grown in cell trays could be stored up to 10 days at 10 to 13C (50 to 55F) and for 5 days or less at 5C (40F) with normal yields. Recent studies indicated that 'Sunny' transplants could be stored more than 2 days at 8 to 9C (46 to 48F) to delay shoot growth and premature flower initiation. Bare-rooted strawberry plants can be stored for 8 to 10 months in polyethylene bags at -1 to 0C (30 to 32F).

Packing plants too densely in the carton can reduce subsequent yields. Increasing the tomato transplant count from 1000 to 1250 per carton resulted in lower plant survival after shipping and 13% lower yields. The lower yields were attributed to poor air circulation within the plants - the densely packed plants were 4C (39F) warmer after transit than those packed at 1000 plants/carton. They also found increased decay on plants which were packed wet. As with any leafy organ, transplants can be injured by exposure to ethylene gas during storage and handling. Symptoms of exposure to ethylene include leaf abscission and senescence, and loss of chlorophyll (yellowing). Sources of ethylene contamination include exhaust from propane-powered forklifts during loading and unloading operations and shipping/storage with ethylene-producing crops such as tomato fruits.

When transplants are handled, ambient temperatures are often significantly higher than optimal shipping temperatures. This field heat must be removed prior to shipping, since refrigerated trailers do not have the refrigeration capacity to remove excess heat - the refrigeration units are designed to maintain a preset temperature. The potential exists to use high velocity, refrigerated air to rapidly precool containerized transplants in trays prior to shipping or packing in crates or cartons. Pulled transplants could also be forced-air precooled on pallets if loosely packed in cartons designed with adequate ventilation. Forced-air precooling could also reduce decay during shipping by drying the plants. Contact me for references relating to handling and shipping transplants.

(Sargent, Vegetarian 92-01)

III. VEGETABLE GARDENING

A. Effects of Organic Amendments and Cultivar on Southern Peas, Fall, 1991, Gainesville

In 1991, the second year of The Organic Gardening Research and Education Park at Gainesville, our Extension Demonstrations were devoted to Southern peas planted in the "grow-boxes". This article will summarize the resulting effects of the various treatments.

Each of the twelve boxes, measuring 5 feet by 10 feet, was divided in half, with one half receiving a high rate and the other half a low rate of soil amendment. Two cultivars, 'California Black-eye #5' and 'Pink-eye Purple-hull', were planted Sept. 6, 1991, and harvested Nov. 25, 1991. Plants were pulled Dec. 4 and the roots were rated for severity of root-knot nematode galling.

Treatments in Gro-Box Demonstrations
A. Oak leaves
   1. Unshredded
2. Shredded
B. Multiple Organics
   (sheep, chicken, oak, rooster)
C. Chicken (fresh manure)
   1. Low (1#/s.f.)
   2. High (2#/s.f.)
D. Surtane (turkey manure)
   1. Low (5#/100 s.f.)
   2. High (13#/100 s.f.)
E. Yard Waste Compost
   1. Low (2#/s.f.)
   2. High (4#/s.f.)
F. Yard Waste & Fertrell
   1. Low (200#YWC & 4#F/100 s.f.)
   2. High (400#YWC & 4#F/100 s.f.)
G. Fertrell 3-2-3
   1. Low (8#/100 s.f.)
   2. High (16#/100 s.f.)
H. Check, Fallow
   (1st crop)
I. Check (previously cropped)
J. Red Rooster (Chicken manure)
   1. Low (12.5q/100 s.f.)
   2. High (1#/s.f.)
K. Crab Waste Compost
   1. Low (2#/s.f.)
   2. High (2#/s.f.)
L. Agraferm (dairy compost)
   1. Low (1#/s.f.)
   2. High (2#/s.f.)

Conditional Remarks
1. Since this was an observational trial (non-replicated, non-randomized) the data are subject to much error and must be interpreted cautiously. However, they do point to some interesting conclusions.
2. This crop of peas represents the 4th crop grown in the boxes since establishment in Spring, 1990. Treatments also were increased during the two-year period.
3. Harvest was once-over (all pods, green and dry, were picked Nov. 25, 1991).
4. Root-Knot (RK) damage was evaluated by pulling roots after harvest and rating the number of galls (range: severely infested - 5; no galls - 0).
5. Yield index was determined by giving the highest yield possible a rating of 5.0, and all other yields per plot a corresponding lower value.
6. Growth, vigor, and condition of the plants were visually assessed during mid-season and a value index determined (range: excellent - 5.0 to dead - 0).

Rootknot nematodes
As has been reported earlier, 'California Black-eye #5' appears to be moderately resistant to rootknot nematodes. Out of the 24 plots planted to Cal, only 3 plots (12%) showed any galls on 'California Black-eye #5'. Conversely, rootknot was prevalent in 16 of 24 (67%) plots of 'Pinkeye Purple-hull' peas.

As expected, the nematodes decreased yields. Both varieties were about equal in yield, except in boxes where nematodes (RK) were prevalent. In these instances, Cal out yielded PEPH, and PEPH gave biggest yields where the nematodes were not a factor (7 of the top 8 plots were PEPH).

Interestingly enough, there was no particular pattern to the kinds of soil treatments in relation to rootknot severity. The check boxes (2), which contained no organics, were heavily infested on the PEPH roots. However, the infestation was also great in the boxes (2) with large amounts of organic matter - oak leaves and multiple layers of organics (including oak leaves).

It was also noted that the six plots along the periphery of the garden were infested, while the six on the interior section were nematode-free.

Yield - Boxes which contained the commercial 3-2-3 organic fertilizer sold as Fertrell had the greatest yields. Box B (Fertrell alone) and Box F (Fertrell plus yard waste compost), yielded about 10 ounces of peas more per box than the next highest treatment (crab waste compost). Of the 10 highest yielding plots, 6 (60%) contained Fertrell as a component of the treatment.

Three plots yielded the largest amount of peas: Fertrell (low rate); Red
Rooster Chicken (high rate); and Fertrell plus yard waste compost (high rate).

Overall - when considering all three attributes, e.g. yield, growth and root knot resistance, the best plots in the trial were: Fertrell (low rate); Fertrell + yard waste compost (low rate); Red Rooster (high rate); Fertrell plus YWC (high rate); Fertrell (high); crab waste compost (low); and yard waste compost (low).

Poor results - Oak leaves, which had given good results with tomatoes in the spring, were associated with the worst performance rating with Southern peas. This was related to root knot nematodes, a poor stand, and low nutrition (deficient, stunted plants). Likewise, the application of excessively large amounts of organics, as in the multiple layers box, resulted in a poor performance by both varieties of peas (23% of the best boxes and half as much as the checks).

On the other hand, the peas in the check boxes containing no fertilizer or amendments grew and yielded a fair crop (60% of the best boxes).

Conclusions - 'Pinkeye Purple-hull' Southern peas remain an excellent choice for a fall crop grown the organic way. However, this variety is susceptible to root knot nematodes. Where this nematode is prevalent, one might consider 'California Blackeye #5' instead, for this variety is more resistant. One should be careful not to over-apply organic manures when growing this nitrogen fixing crop. Fortunately, several organic materials are readily available for a successful pea-patch.

(Stephens, Vegetarian 92-01)