Vegetarian 90-05

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I. NOTES OF INTEREST

A. Calendar.

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 9, 1990. Urban Gardening Harvest Fair. 10:00 AM - 2:00 PM. Duval County Extension office, Jacksonville. (Contact Jim Stephens).

June 11-15, 1990. 4-H Horticulture Institute, Camp Ocala. (Contact Bob Black, Environmental Horticulture Dept).


B. Vegetable Field Day.

A mini-field day will be conducted at the North Florida Research and Education Center, Quincy on Tuesday, June 12, 1990. Registration for program will start at 12:45 p.m. Dr. Phillip Dukes, Research Pathologist with the USDA Vegetable Breeding Laboratory, Charleston, S.C. will be speaking on new southern pea and sweet potato varieties that have been released from the USDA program at Charleston. The program will also include a seedless watermelon trial (30 varieties), a standard watermelon trial (20 varieties) and a tomato variety trial. Also of interest will be an insecticide screening trial for thrips and a tomato spotted wilt virus mapping study.

Interested persons can contact Stephen Olson at NFREC Quincy at 904/627-9236 for more information.

II. COMMERCIAL VEGETABLES

A. Geminivirus Subcommittee (GVS) II.

Over thirty scientists representing IFAS statewide, the USDA, DPI, and private enterprise assembled in Bradenton on May 2 for the second meeting of the GVS (Vegetarian 90-03). The following is a brief account of what transpired.

Subcommittee coordinator, Dr. George Agrios, first asked the group to report on the present situation. The group agreed that generally whitefly populations have been low this spring (probably due to the Christmas freeze) and subsequently the incidence of geminivirus has been low also. Dr. Charles Melinger (Glades Crop Care) mentioned that the geminivirus found in Homestead was attributed to virus reservoirs that survived the freeze. He added that whitefly populations are presently increasing statewide and that geminivirus will certainly be with us again this fall.

Dr. Jim Price (Bradenton) commented that whiteflies imported on poinsettia cuttings from California may add new germplasm to our whitefly bank. Dr. Phil Stansly (Immokalee) indicated that the economics of the tomato market may lead to early abandonment of tomato fields. This practice will result in severe geminivirus incidence this fall if the plants are not quickly and properly disposed.

Dr. Ernest Hiebert (Gainesville) has not identified geminivirus in weed samples sent to him for testing with the DNA probe, so an alternate host for the virus still eludes researchers. However, he has found that one of the viruses in our complex can be mechanically transmitted to Nicotiana edwardsonii (a tobacco species). This should facilitate separation of the complex.

The discussion then turned to ongoing work and future plans. Dr. Jay Scott (Bradenton) has begun screening for tomato resistance to the geminivirus(es). Drs. Gary Simone and Bob McGovern
(Immokalee) will begin a statewide survey of tomato virus incidence and dynamics. Dr. Schuster (Bradenton) has been working with eggplant and okra as whitefly trap crops, and with Dr. Jim Kring (Bradenton) will continue work with colored mulches particularly yellow which attracts the whitefly, but it's surface temperature can kill the fly.

University personnel have submitted grant proposals to the federal government, the state legislature, and BARD (Bilateral Agricultural and Development program with Israel) to ask for funding to assist in research on geminivirus problems in vegetables. The USDA has been encouraging commodity groups to lobby the federal legislature for funding also.

The CVS further adopted the Tomato Spotted Wilt Virus (TSWV) as a committee project. Melinger said that TSWV has been present in north Florida since 1986 causing vegetable crop losses of between 0.5 - 5% annually, but has not moved deeper into Florida. Dr. Joe Funderburk (Quincy) has been working with thrips and TSWV for several years (see Vegetarian 90-04) and appears to be a good source of information. Dr. Tom Kucharek (Gainesville) has begun a survey of the incidence and dynamics of TSWV and will be working in cooperation with Alabama and Georgia to produce a fact sheet on TSWV. A southern region information exchange group is forming to address TSWV and geminivirus. Jay Scott indicated that Peto Seed Co. in cooperation with the University of Hawaii has developed TSWV resistant breeding lines in tomato and this material may be forthcoming more rapidly than geminivirus resistant material.

(Vavrina, Vegetarian 90-05)

B. Crop Pollination Pointers.

Vegetables require large amounts of pollen to result in optimum seed set and fruit size and shape. The pollen is produced in the male organs of the flowers, the anthers and transferred to a part of the female organ, the stigma. Pollen grains "germinate" and a pollen tube helps deposit the male gametes in the ovary where they can fertilize the female gametes. Fertilization results in seed development and stimulates the fruit (ovary) to develop.

For some vegetables, snap beans, peppers, and tomatoes, these processes of pollination and fertilization take place in the same flower because both male and female organs are present in the same flower. Vibration action, (caused by wind) serves to move the pollen from the anthers to the stigma.

Other vegetables, such as sweet corn, squash, watermelon, cucumbers, and muskmelons have the male and female organs separated in different flowers, usually on the same plant. This separation of sexual organs requires that some agent (pollen vector) move the pollen from the male flower to the female flower. For corn, wind is the vector. Insects function as the vector for the other cucurbit crops and honey bees are the most efficient of these vectors.

Fruit set, shape, and size in these cucurbit crops depends on efficient bee activity in the field. Often this means moving bee hives into the field to ensure adequate pollination. The following are a few pointers to help get the most out of an investment in honey bee hives.

1. Secure an adequate amount of hives. Cucurbit crops require about 10 bee visits to each flower to ensure adequate pollination. Each seed in a melon or cucumber comes from a separate pollination. Since the shape and size of these fruits is related to the number of properly developed seeds, one can see that the amount of pollen delivered to a female flower is important.

Depending on source of information, the number of bee hives needed to achieve these high numbers of flower visits will differ. This is because size and population of hives will vary from supplier to supplier. In addition, there is a good possibility that no one really
knows for sure how many hives are required. Probably a better rule-of-thumb would be to base the number of hives on the number of flowers present in a field. Recommendations from some sources call for one bee for every 100 flowers in the field. Under this system, the number of hives could be increased as the availability of pollen and nectar increase. Honey bees do not pollinate for fun (maybe they do) but the pollination results from the bee's activities in gathering food (pollen and nectar).

If a muskmelon crop had about 4000 plants per acre and the number of flowers varied from 5 per plant early in the season to 80 later, then the minimum number of bees needed would range from 200 to 3200. In most situations, these requirements could be more than handled by one hive of 30,000 bees per acre. One hive per two acres should more than adequately fill the need for pollination of cucurbit crops. This assumes that a large proportion of this hive is available for pollination and that there are not other more attractive flowers in the vicinity.

2. Care of the bees. Bees hired for pollination should be placed where the hives do not receive direct sun light all day. Along field edges or under scattered trees would be good. Growers should be sure that water is available nearby. Sometimes it would be a good idea to place troughs of water nearby. Place some type of floating object in the trough for bees to drink from.

Growers need to remember that pesticides used for insect control in the field may be also deadly to bees. It is extremely important to schedule insecticide applications when bees are not active in the field. For melons, the flowers remain open from sun-up to sun-down. Therefore insecticide applications must be scheduled outside of the daylight hours. Some insecticides highly toxic to bees are listed below. Some of these chemicals might be toxic to bees even one day after chemical application. Growers need to check the bee toxicity level of the insecticide to be used on a crop.

### SOME INSECTICIDES HIGHLY TOXIC TO BEES

- carbaryl  
- diazinon  
- aldicarb  
- mevinphos  
- permethrin  
- fenvalerate  
- resmethrin  
- parathion  
- acephate  
- methomyl  
- methamidophos  
- malathion  
- carbofuran  
- naled  
- dimethoate

3. Pollination contract. It is a good idea to use a written agreement between the grower and bee supplier. This agreement should spell out what each party is responsible for. Some items to include in the contract are:

1. Names of parties and date of agreement.
2. Length of term of the agreement.
3. Number and size of hives to be delivered. Condition of the hives.
4. Date of delivery and removal.
5. Responsibilities of the bee supplier in caring for the hives (inspection, supering, honey removal, etc.).
6. Responsibilities of the grower. (Permit access to hives by beekeeper, insecticide use, water, etc.). Grower and beekeeper should review insecticide programs together.
7. Financial arrangements.
8. Arbitration arrangements in case controversy arises.

Use of honeybees for crop pollination is a sound grower practice and it can help secure high yields of high quality fruits. Lack of bees could be one explanation for a grower's poor fruit set at certain periods of the early season. Use of bees however requires planning
and care so that neither the beekeeper nor the grower gets stung by an unfortunate circumstance. Hopefully some of the above pointers will help.

(Hochmuth, Vegetarian 90-05)

C. Pumpkin Production for the Fall Holidays.

Pumpkins are popular in the fall months for Halloween jack-o-lanterns and for decorative purposes through Thanksgiving. Florida does not produce enough pumpkins to satisfy internal demand so pumpkins are shipped into the state, primarily from the Midwest.

Pumpkin production has not been extensive in Florida because of very high disease pressure and insect populations in summer and early fall. However, improved fungicides have been developed for downy mildew and powdery mildew that provide excellent control with good and timely spray coverage. Insecticidal control of pickleworm and virus-vectoring aphids is also essential.

Pumpkins can be established by direct field seeding or with transplants in early to mid July, respectively. This schedule has consistently produced pumpkins for Halloween in Manatee County. Some adjustments in planting time may be necessary for other parts of the state or to allow for a longer marketing period.

Production on raised beds on 10 to 15 ft. centers provides drainage and space for extensive vine growth. In-row spacing of 2.5 ft. for miniature pumpkins and 5 ft. for other types should provide adequate space for growth.

Second-crop plantings on mulched beds following tomatoes or peppers provides some economics in production costs and is widely practical. Additional fertilizer, where needed, can be applied using the fertilizer injector wheel. The total nitrogen (N) crop nutrient requirement (CNR) of 120 lbs./acre can be injected in two or three applications. Potassium (K) requirements will be one-half to three-fourths of the CNR as determined by the original soil test; the remainder coming from residual K. Residual phosphorus (P) and micronutrients in the bed should be sufficient for the pumpkin crop.

For new plantings on mulched beds, 120 lb. N and P and K as determined from the soil test should be applied preplant. On unmulched beds, the P and micronutrients should be incorporated in the bed and the N and K applied in 40 lb. increments at planting and in two sidedressings before the vines cover the bed.

Pumpkin varieties should be selected based on established or anticipated demands. The varieties listed below by fruit size have performed well in central Florida trials.

Giant - 25 to 80 lbs.
  - Big Max - open pollinated
  - Big Moon - open pollinated (PVP)

Large - 10 to 30 lbs.
  - Connecticut Field - open pollinated
  - Howden - open pollinated (PVP)
  - Jackpot - hybrid

Medium - 5 to 10 lbs.
  - Autumn Gold - hybrid
  - Young’s Beauty - open pollinated

Small - 1 to 5 lbs.
  - Baby Pam - open pollinated
  - Little Lantern - open pollinated

Miniature - < 1 lb.
  - Munchkin - open pollinated
  - Jack-Be-Little - open pollinated
  - Sweetie Pie - open pollinated

Growers are advised that production of pumpkins in the summer and early fall requires stringent pest management practices, especially for foliar diseases. As with other vegetable crops, a market should be established before planting.

(Maynard, Vegetarian 90-05)
D. Maintaining Air Quality in Cold Storage Rooms—Part I—Concerns and Symptoms.

Management and supervisory personnel are continually concerned with providing a safe environment for their workers. Precautions must be taken to ensure that the air in cold storage rooms remains free from buildup of noxious gasses and contains sufficient oxygen. We have received reports of isolated instances in which workers have experienced headaches and dizziness after entering these areas. There are several potential causes for these symptoms.

Propane-powered forklifts are used in the majority of packinghouse operations. The engines combust fuel and oxygen to produce carbon dioxide, hydrocarbons (including ethylene) and, in the case of a poorly-tuned engine, carbon monoxide. In most packinghouse operations, forklifts are continually entering and exiting the cold rooms as pallets are loaded and unloaded. This constant movement generally provides adequate opportunity for fresh air to exchange with the air in the refrigerated area. However, if forklifts are operated for any length of time within the confined area of a cold room there is the possibility of accumulation of the exhaust gasses which might lead to the above symptoms in the employees working in that area. Symptoms of asphyxia are noticeable when the oxygen level drops from 21% in fresh air to 16%. Also, any accumulated levels of ethylene (as little as 1 part per million) can cause enhanced senescence and overall decrease in the shipping life of the stored crop. Symptoms of ethylene exposure include acceleration of ripening of fruits and loss of green color in leafy crops, as well as the development of russetting in lettuce and bitterness in carrots.

Crops continue to respire after harvest, taking up oxygen and giving off carbon dioxide. Ethylene is also given off, the rate dependent upon the crop. Respiration can occur at high rates for crops such as sweet corn, mushrooms, okra, peas, spinach and broccoli. For cases in which a well-sealed cold room is fully loaded with a high respiring crop and closed during off-peak hours, it is conceivable that the oxygen level in the room could be lowered enough to cause dizziness if entered prior to adequate ventilation. Precooling crops to recommended storage temperatures minimizes respiration.

Chlorine is an effective general disinfectant for dump tanks, hydrocoolers and cleaning packing line components and bulk bins. Care should be exercised to avoid prolonged contact with chlorine, since it can volatilize into gas. According to one safety data sheet, chlorine is detectable at 0.3 ppm and becomes intolerable at 2.6 to 41 ppm, depending upon the individual. The OSHA permissible exposure limit (PEL) is 1 ppm average exposure during an 8-hour period. Exposure limits of 3 ppm for 15 minutes are recommended. Symptoms of overexposure include severe irritation to eyes, nose and respiratory tract. Exposure to 35 to 51 ppm for one hour or a few breaths at 1000 ppm can be lethal.

Ammonia refrigerant systems should be routinely checked for leaks, since ammonia gas is also quite toxic. In the case of an ammonia leak, the gas can accumulate in the cold room or adjacent area. It has symptoms similar to chlorine gas but has a higher OSHA PEL of 50 ppm average during an 8-hour period.

The maintenance of air quality in and around packinghouse storage facilities is essential to the well-being of workers and produce. Next month means for avoiding build-up of contaminated air and procedures for removal in the case of an accident will be discussed.

(S. Sargent, Vegetarian 90-05 - Special thanks to D. Endicott, Industrial Hygienist, Environmental Health and Safety Division, University of Florida, for reviewing this article.)
III. PESTICIDE UPDATE

A. Poast (Sethoxydim) Label for Annual Grass Control in Dry Beans, Succulent Beans, Dry Peas, Succulent Peas.

The herbicide Poast has obtained a label for the control of certain annual grass species in beans and peas. The rates for control of weed species range from 1/2 pint to 2 pints material + 2 pints crop oil concentrate per acre depending on the species. For most grass weeds in Florida a rate of 1 pint Poast (0.1875 lb a.i.) plus 2 pints of a crop oil concentrate is recommended.

Poast may be used on beans including the Phaseolus genus (adzuki bean, field bean, kidney bean, lima bean, navy bean, pinto bean, mung bean etc.); Lupinus sp. (sweet lupine, white lupine); cowpeas - Vigna species (includes southern peas, black-eyed pea, broad bean); and other species including fava bean, chick pea (garbanzo bean), guar, and peas including garden pea, field pea, sugar pea.

(Bob Hochmuth, Vegetarian 90-05)

B. Knowing Herbicides Used Previous Year.

As land for long term rotations becomes less available, growers are forced to more intensively use the same land. We all know of the increased disease risk, however, one problem often overlooked is herbicide carryover from the previous year.

As grain and other agronomic crop producers include more vegetables into their rotational programs extreme caution must be used in selecting herbicides for each crop. Several new herbicides have recently been labelled for soybeans and small grains. Some of these materials have rotational restrictions for greater than 12 months for vegetables, many even restrict planting vegetables for 18 months.

There have been several instances this spring of damage to vegetables from herbicide residue from previous agronomic crops in north Florida.

Growers must read all herbicide labels carefully prior to use on a crop this year. Make sure the planned crop for the treated field next year is going to be OK. Make notes and keep good records on each field including the herbicide applied, rate applied and date applied.

Herbicides that have long waiting periods before vegetables can be safely grown include: Gemini, Scepter, Canopy, Atrazine, Pursuit, Command, Ally Classic, Gleam, Harmony, Squadron and Triscep. This list contains only a few of the popular herbicides and many more materials have specific recropping restrictions. As always read the label entirely to avoid future problems.

(Bob Hochmuth, Vegetarian 90-05)

IV. VEGETABLE GARDENING

A. Tomato Leaf Roll.

Always at this time of the year, as the peak of the spring gardening season approaches, Extension gets a lot of inquiries from gardeners about the mysterious curling of their tomato leaves.

With the usual dry soil conditions associated with early May throughout the state, we would expect to see some amount of leaf curl due to the drought. However, with such plants, wilting would also be noted, and with the addition of water through irrigation, the plants would tend to straighten back out.

Another fairly common cause of leaf curling in Florida gardens is the pseudocurly-top virus. It is reported (in Bulletin-731, Tomato Diseases in Florida) to be transmitted from weeds such as ragweed and nightshade to the tomato plant by treehoppers. It usually occurs on young plants in the fall season. The curling is described as an upward rolling and twisting of the leaflets exposing the undersides. The plant is brittle, yellow, and often purple-veined. The severely shriveled plants seldom set fruit after infection, and the plants never recover.
In most instances the leaf curling condition fits the description given for common leaf roll, a non-pathogenic disorder. It occurs regularly in gardens (and fields) all over the state particularly during the middle to the latter half of the growing season. This leaf roll hits the plant about the time of fruit set of the first and second clusters. The leaves begin to curl very rapidly. As the rolling progresses, the leaves take on a cylindrical shape and become brittle, stiff, and somewhat leathery. Plants generally are not stunted and are reported to produce fruits as usual.

The cause of this latter leaf roll condition is not fully known. It appears to be worse on heavily pruned plants and during periods of heavy rainfall. The condition also has been linked to ammoniated sources of nitrogen. There are no control measures to suggest. Since it is not known to be caused by virus or other pathogens, removal of the plants is not necessary.

(Stephens, Vegetarian 90-05)