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Note:

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I. NOTES OF INTEREST

A. Vegetable Crops Calendar

1. Nov. 29, 1984. Annual Allied Industry Workshop. 9:30 a.m. - 3:30 p.m. Manatee County Extension Office, 1303 17th St. - Palmetto, FL. Person in charge: Dr. Phyllis Gilreath (813) 722-4524.


3. February 6, 1985 - Strawberry Field Day. - 2:00 p.m. to 5:00 p.m. Dover AREC (Hillsborough County) Dover, FL.

II. PESTICIDE UPDATE

1. Section 18 for Permethrin on Watercress.
   A section 18 specific exemption has been granted for the use of permethrin (Ambush) for the control of diamondback moth on watercress. A maximum of 156 acres of watercress in Seminole County may be treated.

2. Section 18 for Dyrene on Watercress.
   A section 18 specific exemption has been granted for the use of Dyrene (anilazine) for the control of cercospora leaf spot on Watercress.
   A maximum of 130 acres of watercress in Seminole County may be treated.

3. Section 18 denied for Oxamyl on SNAPBEANS.
   A request for a section 18 for use of oxamyl for the control of nematodes on snapbeans was not forwarded to EPA.
   The denial was based among other things on this being the fifth year for this use as an emergency exemption and minimal activity towards registration for this use.
   (Stall - Veg. 84-11)

III. COMMERCIAL VEGETABLES

A. Row Covers for Commercial Vegetable Culture

   Description- Row covers are structures used to protect plants in one continuous tunnel with the objective of enhancing crop growth and
Fig. 1. The California two-sheet perforated poly row cover closed using the clothespins.

Fig. 2. The two-sheet system opened for ventilation.

Fig. 3. The single-sheet slitted clear poly row cover.

Fig. 4. The non-woven (spunbonded) row cover (used without hoops). Insert showing swatch of cover material.
yield through moderation of the microenvironment. Most of the row covers presently in commercial use are constructed from clear polyethylene supported by wire hoops.

The first successful commercial-scale use of poly covers was made in San Diego County in California in 1958 but only recently has the use of row covers for commercial vegetable production rapidly expanded. Traditionally, row covers have been used in spring to increase earliness of vegetables. However, new types of row cover materials allow the extension of the vegetable season further into the fall and winter.

Present-day row cover technology traces back to research during the 1950's in Kentucky by E. M. Emmert and to C. A. Shadbolt, O. D. McCoy and B. J. Hall in California in the late 1950's and early 1960's; widespread use of row covers did not occur until recently following research in New England by O. S. Wells and J. B. Loy. Their research showed that row covers can be used economically on many vegetables particularly the cucurbit crops.

Types of covers- There are basically two types of row covers for commercial use: clear polyethylene and spunbonded or non-woven polyester and polypropylene. The clear poly covers allow early vegetable planting resulting in 2-3 weeks earliness and in many cases, increased total yields over non covered crops. The non-woven materials increase earliness and total yield for many crops, but also are effective in extending the harvest season in the fall or winter.

The clear poly can be vented or unvented. The unvented covers require manual opening to control heat build-up on sunny days. The vented poly covers consist of a loose fabric material. Similar to interfacing in the textile industry, and therefore are self-ventilating. Only minor reductions in light levels (10%-20%) have been reported for these covers and this has not been enough to affect crop growth.

Installation- The poly covers require physical support which is generally achieved through the use of wire hoops. The non-woven material is light weight (0.6 ounces per square yard) and can be laid loosely on the plants with no support hoops.

The installation of row covers varies as to type of cover and geographic region. The California system for cucumbers employs 2 sheets of 36 inch wide, 1.5 mil. perforated clear Poly supported by 9-guage wire hoops (Fig. 1.). The wire (70 inches in length) is formed in an oval shape so that approximately 30 inches of soil is covered. The hoops are placed 5-7 feet apart and placed deep enough in the soil to make a cover that is 15-16 inches tall. Wooden stakes, 1 inch by 1 inch by 28 inches are driven into the ground at 10-15 foot intervals. Wire (16 guage) is stapled to the top of the stakes and the two sheets of poly are clipped together at the wire with clothespins. The other edge of each poly sheet is buried in the soil at the base of the hoop.

A similar system is used for tomatoes except that 6-foot stakes are placed at 3-foot intervals with 2 wires attached at the 20-inch height. Hoops are placed at 3-foot intervals. With the 2-sheet system, manual venting is employed by rolling the plastic back as needed and clipping it to the hoops (Fig. 2.). The covers are manually closed during night and cool periods.

Because of the labor cost involved in venting the 2-sheet
system a search was begun for a single-sheet, self-ventilating cover. Research in New Hampshire showed that slitted 1.1 or 1.5 mil. clear poly ground mulch could be used as a cover. The commonly used 3-foot wide clear poly ground mulch was widened to 5 feet for use as a cover. (Fig. 3.).

The single sheet can be slitted using two rows of slits down the length of the cover. The slits are 5 inches long and .75 inch apart. Perforated poly can also be used as long as the holes are large enough to allow adequate heat escape.

The single sheet poly can easily be installed with a mulch laying machine which has been modified to support the roll of cover above the pre-installed hoops. The hoops are made of 9 guage wire cut in 63 inch lengths and formed in an oval to cover approximately 30 inches of bed. The hoops are planted at 4-5 foot intervals and the cover applied over the hoops with the edges of the poly sheet buried at the base of the hoops. The height of the cover depends on the clearance of the machines used to install the poly. Recently a machine was developed which will install the hoops mechanically and apply the poly cover in one operation.

The non woven covers can be applied without hoops because of their light weight (Fig. 4.). Like the poly covers they can be applied with a mulch laying machine with minor alterations to assure the cover is laid loosely over the row. This usually involves the addition of a wheel or shaft in the center of the machine over which the cover flows as it is being applied. The wheel or shaft raises the center of the cover material while the edges are being buried and causes the material to be laid with some slack instead of taut. In general, the cover is not affected by the wind and usually no rubbing damage occurs to the plants except for possibly some of the leafy vegetables such as spinach.

Timing- One of the most critical factors in the successful use of row covers is the timing of application and removal. Both poly and non woven materials provided a certain degree of frost protection. The frost protection is greater when the covers are used without poly ground mulch and is likewise greater in the fall season than in the spring season. The slitted poly covers provide 1-2 °F protection while the non woven covers can give up to 7°F protection. However, the major benefit of the covers is not only in frost protection but in their overall growth enhancing character. Therefore, time of application is an important factor in realizing the maximum benefit. Likewise, time of removal is important because some crops such as tomatoes and peppers cannot tolerate the extremely high temperatures that might develop in the covers if they are left on the crop too long. Care must be practiced to ensure that the covers (especially the nonwoven) used on bee-pollinated crops are removed when blossoming is initiated.

Improper timing of application and removal probably is a large factor in some of the conflicting reports on yield advantages from row covers. With the advent of new row cover materials such as the non-woven materials and the pigmented plastics, growers will be better able to tailor the row cover material to the crop, time of season and specific prevailing environmental conditions.

Costs- Studies done in Illinois by J. Gerber on muskmelons compared the cost of materials labor and machinery operation to
install black polymulch, slitted poly covers alone and mulch plus cover. In 1982 the cost for black poly mulch application was approximately $230.00 per acre compared to $680.00 for the row cover alone. The combination of mulch and cover therefore is slightly over $900.00 per acre. This research showed that melons would have to sell for only 22.3 cents each to break even on the mulch plus cover system and 11.5 cents for the mulch alone system. Although the mulch plus cover system seems less cost-effective than the mulch alone, higher yields and higher prices for the extra early melons from the covers make it an attractive system.

Weed and pest control- Very little work has been done on pesticide use with installed row covers. In general, insect and disease control has not been a problem because the covers are removed at about the same time that spraying commences. Weed control, however, is a problem when the covers are used without black poly mulch. The covers not only enhance crop development, but also speed up weed growth. In a muskmelon test, chemicals presently labeled for weed control failed to control weeds under plastic covers. Rates of application and phyto-toxicity from volatile chemicals are questions that need to be answered. Presently, the use of black poly mulch in conjunction with row covers is the best option in terms of crop growth enhancement and weed control.

Specific crop responses- The cucurbit crops (muskmelon, cucumber, squash and watermelon) have responded the best to both types of row covers. Tomatoes and peppers have responded positively but seem to be more sensitive to high temperature in the covers making timely ventilation or cover removal critical. Other crops which have responded positively to row covers include lettuce, radish and beets. A portion of the positive response of crops like radish to row covers (particularly non woven) has been the protection from insects while the cover is in place.

An integrated system- That row covers alone produce positive yield responses is well documented. However, their fullest potential has been realized where covers are used as a part of an integrated growth intensifying program. Research indicates that this system should include black poly ground mulch. Likewise, drip irrigation is used in the system to ensure that adequate moisture is present under the covers to support the accelerated growth rate of the plants. The drip irrigation also facilitates the application of fertilizers to the plants while the covers are in place.

Future research- Although the row covers are evolving as part of an overall growth and yield enhancing system, there is much research needed to refine the components. Additional crops need to be studied for their adaptivity to the row cover system. New cover materials are being developed which will need field study. Research and weed control and fertility in the covers has only begun. Many large vegetable producing areas, Florida for example, are just beginning to evaluate the new row covers. The large vegetable states offer immense potential for row cover use.

In summary, the row cover area is one of the fastest growth areas in the agricultural plastic industry. It holds much potential for increasing vegetable production in order to meet specific marketing
strategies. If anyone has questions on this subject, please contact us.

(Hochmuth - Veg. 84-11)

B. Mulch and Row Covers on Muskmelons in Florida.

The use of row covers has been tried for one year in Gainesville. This was a 2 x 6 factorial experiment with no cover, clear slitted plastic tunnels, hot caps and three methods of non woven row covers used with and without plastic mulch. Muskmelons cv. 'Magnum 45' were direct seeded on March 15, 1984. One month later the row cover treatments were removed. This was prior to flowering.

There was a tremendous difference in the growth of all plants under the row covers. Although we were worried that the succulent plants would sunburn after removal of the row covers in bright sun, this did not occur. Harvest ran from June 5 to June 22 on the plots.

The results showed that there was no increase in total yield due to the use of row covers. There was, however, a significant increase in early yield when row covers were compared to hot caps and no cover.

The lack of increase in total yield but significant increase in early yield agrees with ongoing research in North Carolina and Georgia.

Overhead irrigation was used on the plots. Soil temperatures were taken during the growing period.

One aspect that was noted is that the soil will dry out much faster under the covers. Whether this is due to the higher soil and air temperature during the day or to increased respiration from the larger plants under the covers or to a combination of both is not known for sure. What is known is that the soil must be moist for the row covers to add any heat protection during cold periods. In other areas of the country, drip irrigation is the preferred method to keep the soil moist.

When we compared the use of plastic mulch in the experiment, it was found that the mulched plots had significantly more total yield than the non mulched plots. The mulched plots also had significantly higher early yields. The increase in yields on black plastic mulch has been shown before in Florida.

We are planning on repeating and expanding the experiment this coming spring. A recommendation for the use of row covers cannot be made on one season's work. The economics and timing of planting and cover removal must be worked out.

The use of plastic mulch, however, is recommended. The added expense for the mulch is recovered with higher earlier and total yields.

(Stall - Veg. 84-11)

IV. HOME GARDENING

A. Cloning Vegetables - 4-H Project With Scientific Appeal.

Want to give your 4-H horticulturists an idea for a bit more scientific challenge than the old backyard garden seems to provide?
Then turn them on to cloning vegetables. Cloning, also called tissue culture and in vitro culture, may be high technology, but it is not magical nor is it too complicated for your more aspiring, bright young 4-H'ers to understand and learn to demonstrate.

The technology of plant tissue culture has come a long way since the early days of the sixties when its methodology was being worked out. Today scientists at universities and in private laboratories everywhere are using it to produce test tube plants. Now, for 4-H members and high school students, there are kits available for home and classroom projects. Before we discuss these kits, let's take a quick look at what cloning is all about.

Tissue culture- cloning, or tissue culture, is a plant propagation technique for the regeneration of plants from cultured cells.

Purpose- Tissue culture offers many advantages to plant breeders, genetecists, seedsmen, and others working with plants in some of the following ways:

1. Reduces the amount of time needed to develop new varieties (cultivars).
2. New plant types (mutants) might result since chromosomal aberrations are not uncommon in callus - derived plants.
3. Produce disease free plants.
4. Aids in the manipulation of genetic information.
5. Allows biotech companies to multiply plants innumerable times, transfer the clones to fields for seed production, with the sale of the seeds the ultimate goal.

How cloning is done - The following is a very generalized outline of the procedures followed in the tissue culture of vegetables.

1. Select propagation material such as shoot tips of tomato, roots of carrot, or flower buds of broccoli.
2. Sterilize plant part, then dissect into tissue segments called explants.
3. Transfer to callus initiation medium. Note: Each medium contains various ingredients which differ according to plant parts selected and formula. Murashige and Skoog developed a medium which is used quite frequently by scientists. It includes such things as major and minor salts, sucrose, vitamins, agar, and various concentrations of growth hormones like IAA, BA, Z, and NAA.
4. Incubate at proper temperature, light, and humidity conditions while callus (undifferentiated cell development) forms. Usually takes about 7 days for callus to form).
5. Transfer to shoot development medium.
6. Incubate at proper conditions. Roots and shoots will develop usually in about 35 days from the initial placement in the medium.
7. Transfer tiny plantlets, now having roots and shoots, to the test tube. Note: some companies are using tiny capsules. An individual plant is enclosed in its own individual test tube or capsule.
8. Culture at proper conditions for growth of roots.
9. Transplant to soil medium and slowly acclimatize to new growing environment.
The Student Kits - Biological supply companies are now offering for sale plant tissue culture materials, sold separately, or as kits. Their purpose is for use by students for experimentation. Some kits include enough materials for one or two students (or 4-H'ers), while others are larger and have enough for 30 students. All kits come with instructions. Kits include the culture media along with tools and other supplies necessary to develop shoots and roots from a piece of tissue. Of course, each kit is specific for a particular vegetable or other plant.

Summary - A plant tissue culture project may be just the thing to stir the imaginative and inquisitive minds of your 4-H members looking for a more challenging opportunity in 4-H club work. Such a project is on the (pardon the expression) "cutting edge" of technology in the field of horticulture. Kits are available (contact me for information) and are not too expensive. Let's keep older youth in 4-H, and turn them on to new and more rewarding experiences in horticulture.

(Stephens - Veg 84-11)

B. Master Gardener Activities

A graduation ceremony and educational program for 60 Master Gardeners from Duval, St. Johns, Putnam, Clay and Flagler Counties was held in Fifield Hall on October 31. Assistant Dean Jim Brasher presented certificates after an inspirational talk to the MG's and agents. Dr. David Hall of the Botany Department presented a discussion and hands-on class on plant identification. The vegetable specimen garden tour led by Dr. Mike Lazin, answered many questions on varieties and production practices for the group. Dr. Bill Becker of Agriculture Engineering completed the program with a slide show and talk on safety.

On November 8, the current class of 15 MG's from Marion County attended a similar program at UF. After the Specimen Garden tour, Dr. Freddie Johnson (Entomology) presented a slide show on beneficial insects.

A slide show on the First Five Years of the Master Gardener Program was presented by Kathleen Delate in the Garden and Landscape Section at the Florida State Horticultural Society Meetings in Miami Beach on November 5, 1984.

Highlands County held an appreciation luncheon for Master Gardeners who had provided exceptional service in the county. Clarice Lott and Jim Stephens conducted the awards ceremony during which plaques were presented.

The first issue of the Florida Master Gardener newsletter, called the Voluntiller, is scheduled to go out this month. Only Master Gardeners and those associated with the program will be on the mailing list to receive the bi-monthly newsletter.

(Delate and Stephens - Veg. 84-11)