April 10, 1980

Prepared by Extension Vegetable Crops Specialists

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TO: COUNTY EXTENSION DIRECTORS AND AGENTS (VEGETABLE AND HORTICULTURE) AND OTHERS INTERESTED IN VEGETABLE CROPS IN FLORIDA

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VEGETARIAN NEWSLETTER 80-4

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I. NOTE OF INTEREST

A. Vegetable Field Day at Belle Glade - Last Announcement

Plans are being finalized for another Vegetable Field Day according to Dr. Joe Good, Director and the Committee Chairman, Dr. Subramanya of the Agricultural Research and Education Center, Belle Glade. A final program of topics to be discussed at the field day will be issued later. In the meantime, place the following information on your calendar and make plans now to attend.

DATE: Thursday, May 8, 1980
TIME: 8:30 am (Registration)
PLACE: Agricultural Research and Education Center, Belle Glade, Florida (Montelaro)

II. COMMERCIAL VEGETABLE PRODUCTION

A. Developments in Starting Vegetable Crops - Sowing of Pegerminated Seed

During the 1970's English researchers improved upon an old practice, sowing of pegerminated seed. One of the major drawbacks to this practice was the problem of drilling the seed without damaging the emerged radicle (root). This has been overcome by use of gels that suspend the seed in a fluid media which then can be pumped (drilled) from a planter into the soil.

The advantages of this technique to vegetable growers are numerous. Firstly, seeds are germinated under more or less ideal conditions. This means that if they are sown under adverse environmental conditions of unfavorable temperature, lack of light, mild water stress, etc., they will still emerge from the soil since they are already germinated. Thus, problems of seed dormancy are overcome. Secondly, emergence under all conditions is more rapid and uniform leading to earlier peak harvests. Thirdly, water usage at planting time may be reduced since the seed is already imbibed and the radicle has emerged. This can be especially important with subsurface and drip irrigation systems. Lastly, additives such as fungicides, insecticides or nutrients may be incorporated with gel, giving the new seedling extra protection during early growth stages.

Any newly adapted system is not without its problems. In this case, separation of non-germinated seeds from the germinated seeds can be a problem. Furthermore, seed separation and subsequent singulation during planting have not been adequately achieved. Storage of pegerminated seed can also pose some problems with certain types of seed. Specialized planting equipment and supplies are costly and require considerable expertise to manage. These problems are being researched to find effective solutions at the present time.

The system works quite simply, even on a large production scale. The procedure consists of: 1) pegerminating or "chitting" a quantity of seed at a specific temperature to radicle lengths of specified length, 2) mixing seed with gel and 3) planting.

Seeds are usually germinted in aerated water, at room temperature (21°C) in the light or dark, depending on the requirements of the seed. Equipment for doing this can range from elaborate and costly set-ups to 'homemade' effective and inexpensive systems.
An example of the latter would be a plastic pail filled with water and aerated by a $15 aquarium pump and bubbler. The length of time that germination will take depends upon the temperature and species in question. Once pregerminated the seed must not be allowed to dry out. For best results the seed should be planted immediately, but it can be stored if conditions become unfavorable for planting. Most seeds can be stored for only a few days. The seeds can be placed on moist paper or cloth during storage and held at a temperature of about 5°C (41°F).

The gel must be mixed with water before the seeds can be added. For best results the gel should be added slowly, as the water is being added to a container of predetermined volume. Seeds should not be stored in gel because of an inadequate supply of oxygen.

The seed, once suspended in the gel, can then be planted by a variety of equipment including a planter which adds the gel to plug-mix and plants through plastic mulch. At the present time, none of the equipment developed can singulate each seed at planting.

Anyone wanting a list of manufacturers of fluid-drilling equipment may obtain one from our office.

(Cantliffe and Montelaro)

NOTE: This is the last of three articles on seed germination to be presented this season. The first and second were published in the May, 1979 and the March, 1980 issues of this newsletter. Dr. D.J. Cantliffe is an Associate Professor in our department doing research in seed physiology.

B. Transportation Costs and Changing Patterns in Vegetable Production and Marketing

Spiralling transportation costs are definitely going to change future production and marketing patterns for many vegetables, according to people in the know. What these changes will be is anybody's guess at the present time.

The opposite situation existed three or four decades ago with the development of extensive transportation systems using plentiful and inexpensive fuel. Many of the "market garden" operations located near population centers gave way to large, sophisticated units thousands of miles away where production was more efficient. California captured the processed tomato and fresh lettuce markets. Similarly, Florida and Mexico produce most of the warm season crops consumed in the north during winter and early spring.

Transportation costs are apt to continue their upward trend for years to come. This indicates to many that major changes in vegetable production and distribution patterns are inevitable. Some predict that processing may move nearer to the big markets of high population centers.

Rising transportation costs can have a significant effect on vegetable production in Florida. We have always had a slight freight-cost advantage in the Eastern markets over Mexico. This difference may widen to Florida's advantage.

An interesting question is how Florida will fare in competition with California in the Eastern markets with the cool-season crops like lettuce, celery, cauliflower, and broccoli. Again, rising transportation costs may favor Florida growers. We feel
that there is opportunity for the production of additional crops that are not grown extensively at present. If nothing else, Florida and neighboring states offer a significant market. We have seen much interest in cauliflower production. Unofficially, cauliflower acreage is estimated to be about 2500 acres this year. Further increase is anticipated but growers would be well advised to do so with caution.

There are other vegetables which should receive careful consideration by Florida growers as potentially profitable. These include broccoli, sweet potatoes, baking potatoes, dried onion, green onions, garlic, fresh spinach and rutabaga. Certainly, some of these may prove not to be profitable. On the other hand, there are probably others that have not been listed. This is especially true of certain vegetables like honeydew melons which were not listed for the simple reason that suitable cultivars are not now available for Florida's climate.

In summary, rising transportation cost, in all probability, will have significant effects on vegetable production and distribution patterns in the future. Exactly what these changes may be cannot be determined accurately by anyone at the moment. From a competitive standpoint, they may offer some advantages over distant producing areas. No doubt, there will be many minuses, also. It will be an interesting period in which the astute vegetable grower will emerge with greater success than ever before.

(Montelaro)

III. HARVESTING AND HANDLING

A. Identifying Causes of Decay on Fruits and Vegetables

Decayed fruits and vegetables result in extensive marketing losses. Postharvest decay is commonly considered by itself as a cause of marketing losses. Such is rarely the case. Three factors are needed for decay to get established - the host fruit or vegetable, the pathogen (decay causing organism) and the proper environment that will enable the pathogen to infect the host. These seem so obvious that one might wonder why they are mentioned. The reason is that we don't adequately recognize their respective role in causing decay. We in Cooperative Extension can help fruit and vegetable shippers reduce decay-caused losses by helping them to understand these factors and their relationships.

Host fruits or vegetables may already be inoculated with a pathogen at time of harvest. Already infected produce always has a potential for being packed and shipped to market, whether the decay is not visible to the naked eye or whether it is so common that the chances are greatly reduced for culling all decaying produce in packing-house operations. Even a very small amount of inoculum can cause subsequent spread of decay to other produce units in field picking containers, in dump-tanks and on product contact surfaces in packinghouses (tables, conveyor belts, waxers, brushes, packing bins, etc.) in packed shipping containers, and in retail market displays.

When growers or shippers receive complaints about their products arriving at markets with extensive decay, one of the first things to do is to look for produce with visible decay in packed shipping containers before loading at the farm or the packing-house. If decayed products are readily detected, then more careful sorting to prevent packing decayed products will reduce the problem. If decayed products are not detected then we need to consider the pathogen and the environment.
Pathogens causing most common types of decay are everywhere around fruits and vegetables - in the soil, on plants, in ditch and pond water, on fruits and vegetables in the field, in picking containers, on surfaces of packinghouse equipment, in dump tank and hydrocooler water, in transportation equipment, and in wholesale and retail marketing channels, and even in our homes. However, most decay that causes marketing losses gets started in the field or in harvesting and packinghouse operations, and has the entire transportation, distribution, and marketing time to develop to harmful levels.

Environment: This is the variable and complex factor that enables most pathogens to cause losses. It is also a factor over which some decay control is possible. The environment includes ambient climatic conditions (dew or rain, temperature, sunlight, wind) from time of harvest through retailing; handling operations; physical facilities; sanitation (or lack of) measures used; and time. We in Cooperative Extension can best help the fruit and vegetable industry to reduce decay caused marketing losses by helping to improve the environmental factors involved.

1. Climatic conditions of free moisture from rain or dew helps pathogens to grow, spread, and to inoculate host products. In areas of relatively high dew points, such as Florida, growers often delay harvesting until surface dew on products has evaporated. When this is not practical it is necessary to dry products in packinghouse operations prior to packing. Both high and low ambient temperatures can damage surface cells (of products) enough to enable otherwise weak pathogens to invade products. High temperatures and prolonged exposure to direct sunlight (e.g. in top layers of picking containers, bins, or gondolas) can damage surface cells. Cold temperatures can cause chilling injury, which weakens surface cells and makes them vulnerable to even weak pathogens.

2. Handling operations: This includes both the operations and their quality. Every handling of a product has a potential for causing surface injury through which pathogens can invade and cause decay. Rough handling in each and all operations increases decay-caused marketing losses. Product handling steps in all operations should be kept to a minimum and conducted as carefully as possible to reduce the potential for injury related decay.

3. Sanitation: Field picking containers are generally dirty and are excellent sources of decay initiation. Picking containers should be thoroughly cleaned after each use.

Water used in receiving dump tanks, washing, rinsing, and hydrocooling is part of the environment that can influence product postharvest decay. The effect of dump tank water temperature on tomato decay incidence was thoroughly covered in the article by Showalter and Bartz in the October, 1979 issue of the Vegetarian.

All dump tanks and hydrocoolers should be emptied and thoroughly cleaned daily. The few hours required provides cheap insurance against potential marketing losses. Washing and rinsing showers should use only fresh water or adequately chlorinated water. Water in hydrocoolers is always recirculated and should be chlorinated sufficiently to control organisms in the water but not so excessively as to damage products being cooled. Damaged tissues are easily invaded by decay causing pathogens. All product contact surfaces on packinghouse equipment should be thoroughly cleaned prior to each season and periodically during the season, if possible. Cleaning of all facilities and surfaces can be done with a warm detergent solution applied with a high
pressure sprayer and followed by rinsing. These sanitation measures suggested may seem excessive, and even fanatic, to some readers. They require additional management, labor, and expense. However, they cost much less than the possible marketing losses (claims and adjustments) and loss of receiver confidence from decayed products.

4. Time is also part of the environment that can influence postharvest decay losses. All harvested products deteriorate with time, even under optimum handling and storage conditions, and will ultimately become susceptible to pathogens in their ambient environment. Long delays, long transit periods, and prolonged storage while awaiting for favorable product demand can only increase the risk from decay caused marketing losses.

(Kasmire)

IV. VEGETABLE GARDENING

A. Foiling Blight with Aluminum Foil

The disease known as southern blight is a sometimes serious pest of many vegetables in Florida vegetable gardens. It is caused by a soil-borne fungus, Sclerotium rolfsii, which invades stems at or near the soil line. The foliage symptoms of this warm-season disease consist of yellowing, defoliation, and usually sudden permanent wilt. On the stem, there is slight discoloration and water soaking near the soil line. Soon a collar of fan-like white fungal mycelium threads attached to the stem at the soil line and surrounding the stem one or two inches appears. The matted threads soon develop an abundance of distinctive, brown sclerotia about the size of mustard seeds. These sclerotia can later germinate and form fungal threads which live on organic material in the soil. On crops having pods or fruits touching the infected ground, similar rapid growth of the fungal threads and subsequent rotting occurs on these pods and fruits.

The problem becomes worse in older Florida gardens that have lots of organic material in the soil on which the fungus can thrive and spread. Control with chemicals has never been too successful, although terraclor 75% wettable powder in the transplant water has been suggested. Best control measures have been cultural, with rotation and deep plowing the most effective methods. Mulching, which provides a clean barrier between the infected soil and the pods or fruits of the plant, helps in preventing pod and fruit rot.

Georgia pathologist Johnny Dan Gay has come up with a simple home-remedy for preventing the fungus from invading the stems of tomatoes at the soil line. He utilized aluminum foil and found it to be almost 100% effective. For each tomato plant at transplanting time, he suggests wrapping a 4 inch by 6 inch piece of aluminum foil around the stem. Start at the top of the roots, and wrap upward so that the stem is wrapped two inches above the soil line and two inches below the soil line. After transplanting, be sure not to throw any soil up over the aluminum foil onto the unprotected stem. The soil thus becomes a physical barrier to prevent southern blight damage and injury from cut worms. Gardeners might wish to try this with other barerooted transplanted crops such as peppers and eggplants.

(Stephens)
B. Know Your Minor Vegetables - Chili Pepper

Early voyagers to the Americas, including Central America, Mexico, Peru, and Chile, found many forms of peppers, among them the hot ones. In Spain the hot peppers are called chili, from Chile, and in India peppers in general are called "chillies". In the U.S., only some of the hot peppers are called chili peppers.

Most of the varieties of pepper referred to as chili peppers belong to Capsicum annuum L. However, some varieties with "chili" included in their name are actually Capsicum frutescens L. Precise categorizations of this particular type of pepper is made even more difficult by the already highly difficult task of classification of all cultivated pepper varieties due to the great number, the transitory nature of some of them, and the constant creation of new ones due to hybridization. Forms sold or grown under one designation in one area of the county may not be the same as those grown elsewhere under the same name.

Chili constitutes one of the three main commercial types of hot-fleshed (pungent) peppers. The other two are cayenne and tabasco. The most popular chili varieties range from 3 to 7 inches long and have maximum diameters of 1 to 1 1/2 inch. Strains of Mexican chili, which have been grown in the southwestern U.S. for many years, are gradually being replaced by somewhat milder varieties with large smooth fruits easily peeled for canning. Other varieties of chili peppers range from cherry size to conical forms.

Some of the more common varieties of chili are as follows:

'Anaheim Chili' - Fruits about 7 inches long, 1 1/2 inches in diameter, slightly tapered, stem end usually without pronounced shoulder but often wrinkled or folded. Flavor mildly pungent as compared with other chili varieties. About 115 days to green mature and 150 days to red ripe. Also called 'California Chili'.

'College No. 9 Chili' - Fruits about 5 inches long, 1 3/4 inches in diameter, tapered and pointed, shoulders sloping and usually smooth. Less pungent than 'Mexican Chili', but slightly more pungent than 'Anaheim'. About same maturity period as for 'Anaheim'. Also called 'New Mexico 9'.

Mexican, or "Native" chili - Fruits about 3 inches by 1 1/2 inches, somewhat conical, tapering to a blunt point. Pods generally have a deep shoulder at the stem and are often furrowed and wrinkled. Most pungent of the large-fruited chilies.

Strains of Mexican chili are widely grown in the Southwest, particularly in central and northern New Mexico, where they are preferred for earliness.

'Chili No. 6' - Released by the New Mexico A.E.S. in 1950, this variety is reported to be superior in yield and pod shape to older native varieties, as are the other New Mexico releases.

Red Chili - Has 2 1/2 inch long, 1/2 inch diameter pods which are green, turning to red at maturity.

Other varieties of Chili - Chili Chiltepin, Chili Manzana, Chili Piquin. C. frutescens chili varieties: Rat chili, "common chili" and 'Christmas Bell'. The latter "Christmas Bell" was introduced from the Netherlands. It is a tall, thick-canopied green plant bearing large bell-blossom-ended, fluted fruits that are green turning to red. 'Christmas Bell' is fairly mild in pungency.
Growing Conditions - Chili peppers require about the same growing conditions as bell peppers in Florida. They are a warm season crop and require a fairly long warm growing season for top production. Plant in early spring after danger of frost in cold areas, and September - March in south Florida.

Start chili peppers from seeds or transplants. Most gardeners will have to direct seed since few transplants are available at the time needed. Best temperatures for seed germination are 70° to 85°F. Fruit set is hampered by cool night (below 60°F) which often occur in the winter season of south Florida.

Most gardeners will find that only a very few plants, perhaps one or two, are needed of each variety desired. These need to be spaced 12 to 18 inches apart. Should several rows be required, space them 30 to 36 inches apart (row center to row center). Planting two or three plants in a single hill is also acceptable.

Chili peppers are well adapted to growing in containers, for each plant is highly prolific, colorful, and generally attractive. Keep in mind, however, that the pods are very hot, resulting in possible danger for children with average curiosity. Therefore, hot peppers in containers should not be placed along patios, near doorways, or in other areas accessible to small children.

Keep the plants fertilized and watered as for the other vegetables in the garden. Chilis are not without their pest problems, but most gardeners will find spraying is not necessary.

Use - Due to their extreme pungency, chili pepper pods are not eaten by themselves but are used for flavoring other foods. They may be picked red ripe and dehydrated (dried), or picked green (or red) for fresh use (cooking or canning). Drying can be accomplished by sunlight or in one of the many home dehydrating units on the market. Also, they are quite often pickled. A mixture of chopped meat and beans, highly flavored with chili peppers, is called "chili con carne", meaning "chili with meat".

Nutritional Composition - Fresh Green Chili (1 medium): 43 calories; 86% water; 2% protein; 1.5% fat; 5.9% carbohydrates; 245 mg. Vitamin C; other vitamins and minerals. Fresh Red Chili (1 medium): 46 calories; 84% water; 2% protein; 2% fat; 5.8% carbohydrate; 240 mg. Vitamin C; other vitamins and minerals.

Seed Availability - Many of the U.S. seed company catalogs carry listings of the major varieties of chili peppers. Local seed display racks often provide a variety or two of chili pepper seeds.

(Stephens)