Vegetable Crops Update

1. March 1, 1991
2. May 1, 1991
4. JULY 1991, PG. 14
5. Sep 1991 pg 13

Vegetable Crops News Tips
March 1, 1991

Market

A nationwide telephones survey of fruit nurseries revealed that fruit growers are
continuing a trend strongly evidenced in the 80s: selecting varieties based on
potential market, rather than on just production considerations. Growers are
actively looking for marketing opportunities as they choose varieties. While they
still demand cultivars that yield well, ease of production is not the top consideration.
There is an increasing willingness to put extra effort into producing a particular crop
or variety if it will fill a profitable marketing niche.


A new breeder of consumer promises to change the way produce is grown,
marketed and sold in this decade, Consider:
- Nutrition and health considerations are main reasons for eating more fresh
produce. The number of people buying fresh produce items for specific health
reasons continues to climb.
- Convenience is growing in importance as an influence in purchasing.
- Specialty produce and fresh herbs are gaining more interest, with awareness,
availability and purchases growing steadily.
- Food safety’s high prominence remains and consumers are asking for the same
quality with less chemical use.

The survey results are based on a sampling of 1,390 US households.

America’s appetite for fresh fruits and vegetables keeps right on growing- as does
the availability of new varieties of fresh produce. Americans ate 102 pounds of fresh
vegetables per capita in 1989, up from 72 lbs in 1970, says Bill O’Neil, spokesman for
the Packer, a trade publication. In 1970, Americans ate 79.5 lbs of fresh fruit apiece,
compared with 96.5 lbs in 1989, a figure growers expect will double by the year
2000.... Canadians eat 500 lbs of fresh produce per capita per year. The figure for
Western Europe is 600 lbs., and Asians eat some 700 lbs of fresh produce annually,
according to Mr. O’Neil.
Convenience is still a top priority, with 48% of households favouring quick foods,
in a survey reported by Judy Riggs of Vance Publishing. For those consumers there
will be greater availability of pre-cut, pre-trimmed, pre-diced fruits and vegetables
such as sticks of carrots and celery, sliced mushrooms, flowerets of broccoli and
cauliflower, slices of melon, chunks of fruit, and sliced pineapple in a bag.
What shoppers look for when shopping for fresh produce is indicated in the 2,000-household survey reported by Ms. Riggs of Vance Publishing. Shoppers consider six major topics when choosing fresh items, she explains: taste, flavor, freshness, ripeness, appearance, and condition. “Price is important, but not at the loss of quality,” she added.

Chemicals

* Section 18 exemptions have been granted by EPA to the California Dept. of Food and Ag for the use of 1) methyl bromide to control nematodes on a maximum of 30,000 acres of carrots, and 2) fosetyl-Al (Aliette) on a maximum of 115,000 acres of head and leaf lettuce to control downy mildew. Check with CDFA for specifics. AVG. Jan 1991.

  A dark cloud has appeared over the bright future of the microbial insecticide Bacillus thuringiensis (Bt). A team of scientists from the University of Hawaii-Manoa have reported the first case of Bt resistance in field populations of diamond moth. Populations repeatedly treated with Bt in cabbage and watercress fields have shown 20-40 times the resistance to Bt than that of less exposed strains of the moth. The university team’s finding is especially significant in light of the extensive work many companies are conducting to modify or transfer Bt into plants or broaden its range of controlled insects.

  Farmers again increased their use of conservation tillage in 1990. The Conservation Technology Information Center reports that use of all types of conservation tillage was on the rise, with more than 73 million acres of no-till, and mulch till in the US. No till is now used on 16.9 million acres- or 6% of total US planted acres, while ridge-till is being used on more than 3 million acres. Both tillage systems showed substantial increases over 1989. The most common conservation practice is mulch-till with 53.3 million or 19% of total planted acres.

  Cotton growers may soon be planting a crop that fends off insects on its own, thanks to work by Monsanto and USDA. Researchers have successfully inserted a gene from the natural bacterium Bacillus thuringiensis (Bt) into cotton test plants enabling the plants to produce a protein which is toxic to many caterpillar species. In field trials in 6 cotton states this summer, only 4% of the genetically improved cotton showed insect damage- compared to 31% of the untreated cotton. Commercialization of the super cotton is expected in the mid-1990s.

  A number of noteworthy environmental bills, other than the 1990 farm bill, were enacted in the wanning moments of the 101st Congress. These include the following:
  a) The Clean Air Act, which applies tighter pollution control standards to a variety of industries and begins to deal with the acid precipitation problem.
  b) An environmental education provision that establishes an office of education within the EPA and authorizes a grant program.
  c) Global Change Research Act- which establishes a research program to assess the cumulative effects of human activity on the environment.

Production

* Root knot nematode can be controlled by introduction of spores of *Pasteuria penetrans*, an obligate pathogen of the nematodes, report G.R. Stirling and associates at the Queensland Dept. of Primary Industries, Indooroopilly, and the Univ. of Queensland, St. Lucia, Australia. At concentrations of $10^5$ and $2.5 \times 10^5$ spores per gram of soil, approximately 20 and 50 spores, respectively, become attached to a nematode (Nematologica 36:246-252).

* Increased susceptibility of lettuce to infectious corky root is due to nitrate and not ammonia N, report A.H.C. van Bruggen and P.R. Brown of the UC, Davis and A. Greathead of Coop. Ext., Salinas, CA. Reduced concentrations of both ammonia and nitrate N, however, contribute to control of infectious as well as noninfectious corky root (JASHS 115:762-770, 1990).

May 1991 (Sent May 1, 1991)

Resources:

* **Vegetable Production Training Manual.** 1990, 447 pg, $35. This book was written by researchers of the Asian Vegetable Research and Development Center (AVRDC) in Taiwan. The book is intended as a guide for the vegetable training course for developing country specialists offered at AVRDC. It is also designed as a resource book for extensionists and vocational ag teachers. The first chapters provide excellent background information on crop ecology and plant growth. The following chapters give information on cultivar trials, seed production, crop, soil, and water management, pest control, mechanization, postharvest technology and economics of vegetable production. The book is in general (with a few exceptions) very well written, well organized, and has informative tables and illustrations with a focus on tropical vegetable crop production. Send orders to: Information Center, IRRI, P.O. Box 933, Manila, Philippines.

The **American Journal of Alternative Agriculture** is a scientific journal which provides current research reports in the area of sustainable or "organic" agriculture. The last issue of 1990 had articles on economic incentives of green manure rotations, a review of organic viticulture farms in Germany, cultural and mechanical control of soybeans and corn, ground water contamination, and a commentary column on research on rotations. This issue also includes book reviews on intercropping and alternative pest control practices, and a list of resources (videos, literature, etc.) in the area
of sustainable agriculture. Subscriptions are $20 for individuals for 4 quarterly issues. For information contact the Institute of Alternative Agriculture at 92000 Edmonson Road, Suite 117, Greenbelt, MD 20770, (301) 441-8777.

The 1991 Organic Supplier Directory. Published by the Ohio Ecological Food Farm Association, cross-indexes by suppliers and products national and Ohio businesses. Copies are $25, and are available from the Ohio Ecological Food and Farm Association at 65 Plymouth St., Plymouth, OH 44865.

Upcoming events

August 9-11. National Organic Farmers Association. 17th Annual Summer Conference and Celebration will be held at Hampshire College in Amherst, MA. Contact Julie Rawson, RFD 2, Sheldon Road, Barre, MA 01005; (508) 355-2853.

Research News

Cultivar releases:

- **Tomato**: AVRDC’s ASVEG No. 5 is moderately heat tolerant, resistant to tomato mosaic virus and moderately resistant to bacterial wilt. It bears fruits with light green shoulder and has an average weight of 103 grams.

- **Tomato**: The Brazilian Agricultural Research Institution released ‘C-38-D’ and ‘Compacto’ to tomato growers in the humid tropical flatlands of the Amazon. These cultivars have bacterial wilt resistance, good fruit texture, color and flavor, and suitable marketable size.

- **Soybean**: The Philippine Seed board released ‘BPI-Sy6’ a narrow-leafed variety, high yielding, and resistant to viruses (Centerpoint Vol 9, Feb. 1991).

- **Strawberries**: new day neutral varieties.

Recently introduced day neutral strawberry varieties are allowing growers in California to stretch the strawberry production season. Day-neutral varieties do not depend on daylength, and are less dependent on cold treatments at the nursery stage for fruit production. Because Hawaii does not experience cold winters nor great variations in daylength, the new day neutral varieties may produce successfully under our conditions. The newer day-neutral varieties include Irvine, Selva, Seascape and Muir. Growers in California have found that day-neutral varieties may have specific cultural requirements that differ from the more traditional
cultivars, and are working to develop the appropriate cultural practices that fit each crop.

The Irvine is a large-size, high-flavor variety, but appears to be a tricky cultivar to grow, and considered of secondary quality to Chandler, the standard cultivar in Southern California. The Irvine prefers temperatures between 55 and 75 degrees and it is susceptible to water salinity and other cultural factors. However, with proper management ‘Irvine’ produces heavily and during a longer season. (The Packer, March 2, 1991).

Bed spacing for strawberries
In California strawberries are normally grown on beds 68 inches with 4 rows of strawberries grown per bed. Beds are separated by deep furrows, where pickers move along the row to pick berries from both sides. Some growers, however, are experimenting with narrower beds of 42 or even as low as 38 inches and some are happy with the results that have been obtained from the narrower beds.

The wider beds offer a greater space for the plants to grow resulting in earlier fruit production, which is a plus when earlier production is desired. On the other hand, the narrower beds allow the pickers to move faster along the row because of the lighter fruit set production per plant, resulting in a faster and more efficient harvest operation. In addition, the narrower beds take less soil to be moved to dig them and may provide better aeration for root growth (B. Blanchard Chess, The Packer. March 2, 1991).

Uniform plant stands to promote early growth, may provide an early competitive advantage to compete against weeds, and ougrow pest damage
Achieving adequate and uniform plant stands is an efficient way to promote early plant growth, allowing the plant to better compete against weeds in the early stages of crop growth and to outgrow poor environmental conditions such as unusually high soil moisture, or strong winds. Early and vigorous crop growth may also better prepare the plant to withstand higher pest pressures by outgrowing plant defoliation caused by insects or through disease losses. In many cases vegetable crops overcompensate for an earlier reduction in growth caused by pests, and turn out to produce a profitable crop by harvest time. The ability to outgrow plant pests by an increase in foliage production is what plant scientists call “compensatory growth.” As a grower, therefore, you should design your planting operation to achieve adequate plant stands, and early plant growth. This can be accomplished by obtaining high quality seed, with thorough soil preparation, proper plant spacing, and with starter fertilizers to promote early growth.
Germination percentage is affected by the genetics of the crop (the germination percentage of its parent lines) and by environmental conditions (for example too much or too little water, and temperature). By being aware of the genetic potential of the crop, and responses to the environment, the grower can make modifications in the planting practices, to maximize the possibility of obtaining proper plant stands. When a particular crop has an inherent poor germination percentage, direct-seeded crops have to be planted at higher densities to compensate for the poor germination rates. On the other hand, crops with a high germination percentage need to be planted at the correct spacing, to prevent having to go back to the field after planting and thin-out your crop to the proper spacing. It is therefore important, that growers be familiar with the germination percentage of the crops they are working with, and how the germination is affected by the environment. The germination percentage, experimental germination rates, and days to germinate as affected by soil temperature are presented in Table 1 for some important vegetable crops. This work was conducted recently by Dr. Gerald Wilcox and Charles Pfeiffer from Purdue University in Indiana. Notice that warm adapted plants like eggplants and watermelon do not germinate well with cooler soil temperatures of 62 degrees, while peas and spinach, two cold adapted plants are not affected by the cooler soil temperatures.

Table 1. Number of days required for germination for several vegetable crops when soil temperatures are 75 degrees or 62 degrees Farenheit.

<table>
<thead>
<tr>
<th>Crop germinate</th>
<th>Variety</th>
<th>% germination</th>
<th>Experiment</th>
<th>Days to germinate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>75 F</td>
<td>62 F</td>
</tr>
<tr>
<td>Beans</td>
<td>Tendercorp 60</td>
<td>88</td>
<td>60</td>
<td>6</td>
</tr>
<tr>
<td>Sweet corn</td>
<td>N.K. 199</td>
<td>88</td>
<td>90</td>
<td>5</td>
</tr>
<tr>
<td>Cucumber</td>
<td>Wisconsin SMR 92</td>
<td>18</td>
<td>92</td>
<td>90</td>
</tr>
<tr>
<td>Eggplant</td>
<td>Black Beauty 80</td>
<td>80</td>
<td>80</td>
<td>8</td>
</tr>
<tr>
<td>Peas</td>
<td>Frosty 92</td>
<td>92</td>
<td>92</td>
<td>9</td>
</tr>
<tr>
<td>Pepper</td>
<td>Cal Wonder 96</td>
<td>96</td>
<td>90</td>
<td>8</td>
</tr>
<tr>
<td>Radish</td>
<td>Early Scarlet Globe</td>
<td>96</td>
<td>90</td>
<td>2</td>
</tr>
<tr>
<td>Spinach</td>
<td>Dark Green Bloomsdale</td>
<td>90</td>
<td>80</td>
<td>8</td>
</tr>
<tr>
<td>Watermelon</td>
<td>Charleston Gray 88</td>
<td>88</td>
<td>80</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>
May 31, 1991

Vegetable Crops Update

Research News

Effect of cultural practices on plant pests and diseases

a) Crop rotation and monoculture affect the soil "receptivity" to take-all.

Cultural practices may be employed as an effective tool to help control plant diseases. For example, crop rotation is often employed to break the life cycles of important insect or disease pests. However, to design appropriate cultural control practices for a particular disease, there is a need to understand the biology of the pest and how the different stages in the life cycle of the pest are affected by varied environmental conditions. Much of this knowledge is in the hands of experienced growers who have carefully monitored their fields over the years and observed how different environmental conditions (droughts, rainy seasons, cold spells) affect particular pests in the field. The experienced grower has also found out through trial an error, which rotations have worked to control certain pests, and which rotations have failed. In many agricultural societies these type of knowledge has been passed along from generation to generation and from farmers to other farmers.

From a researcher’s standpoint, a great deal of experimental work needs to be carried to find out about a pest’s life cycle or its biology. This type of work needs to be carried out under different environmental conditions, because an insect or disease may behave differently depending on the area (habitat) where it has been bred and raised. P. Lucas and A. Sarniguet, two French researchers, recently conducted a study to find out about the effect of crop rotation on take-all (Gaeumannomyces graminis var. tritici), an important soil borne disease of wheat in France.

The main results of their study were:
1) The cropping systems were classified from “least susceptible” to “most susceptible” in the following order: wheat monoculture (least susceptible) < beet-wheat rotation < corn-wheat rotation < corn monoculture (most susceptible to the disease).
2) Nitrogen fertilization had an effect on the receptivity of the soil to take-all. Nitrogen fertilization with ammonium sulfate decreased the soil receptivity to take-all, when compared to calcium nitrate. Ammonium sulfate is therefore recommended to control take-all.
3) Other important soil physicochemical characteristics such as pH, NH₄/NO₃ ratio and manganese level did not have an effect on the disease as would have been expected.

The experiment showed that wheat monoculture soil was the least susceptible cropping system to take-all. If a rotation is to be practiced (to control other pests) the beet-wheat rotation would be preferred to the corn-wheat rotation. Other studies indicate that many factors may affect incidence of take-all in the soil such as soil nutrient status, and climatic conditions. A greater understanding of the pest’s biology and ecology (its relationship with the environment) will thus enable the grower to manipulate the cropping system in a way that will inhibit the incidence of high pest levels, and which will maximize crop yields and profits. (P. Lucas and A. Saringuet. Symbiosis. 9:51-57(1990).

b. Effect of crop rotation with sorghum to control cyst and root-knot nematodes in soybean.

An experiment was conducted in Alabama to study the effect of rotating sorghum on soybean yields. Sorghum was grown for two years in between soybean crops to reduce levels of root-knot (Meloidogyne arenaria) and cyst (Heterodera glycines, race 4) nematodes. The controls consisted of plots which had been under continuous soybeans. Half of the treatments received an application of aldicarb to evaluate its effect on nematode levels:

Effect of sorghum-soybean rotations on the yield of soybeans in fields infested with root-knot and cyst nematodes.

<table>
<thead>
<tr>
<th></th>
<th>continuous soybean¹ (monoculture) lbs/acre</th>
<th>sorghum-soybean¹ (rotation) lbs/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>(+) Aldicarb</td>
<td>1,241</td>
<td>2,195</td>
</tr>
<tr>
<td>(-) Aldicarb</td>
<td>1,007</td>
<td>2,023</td>
</tr>
</tbody>
</table>

¹ Mean of 7 soybean cultivars (Braxton, Centennial, Gordon, Kirby, Leflore, Ransom, Stonewall), all of which had similar results. The sorghum cultivar used was “Pioneer 8222.”

Rotation of sorghum with soybean increased yields an average of 85% compared to continuous soybean for each soybean cultivar which was tested. In addition, the number of nematode juveniles was lower in
sorghum-soybean rotations than in monoculture soybean by the end of the experiments. Aldicarb did not have a great effect on yields nor in number of nematode juveniles by the end of the experiments, but there were slight benefits with Aldicarb application at planting time as shown in the table. (R. Rodriguez-Kabana et al. Nematropica. 20:111-119(1990).

The use of Antitranspirants to increase yields in transplanted bell peppers. Commercial growers and researchers have long talked about the use of antitranspirants for use in their plants. The main purpose of antitranspirants would be to improve the water status of the plant during periods when water is lacking due to droughts or in between irrigations. Antitranspirants would thus help the plant to save water, when the soil water reserves have already been depleted during extended periods of drought (remember California?). However, most studies to date on the use of antitranspirants indicate that yields are actually reduced when antitranspirants are used. Yields are affected because as fewer water leaves the plant, also fewer carbon dioxide enters the plant (remember that more than 90% of the plant’s dry weight is carbon, all of which comes from the atmosphere).

Peter Nitzsche and colleagues in New Jersey, however, recently tested the use of antitranspirants on bell pepper seedlings at the time of transplanting. Seedlings often undergo a “transplant shock,” a large part of this shock being attributable to the water stress suffered by the seedlings in the field when the fragile root system hasn’t fully developed. Dr. Nitzche thus wanted to improve the water status of the plant to eliminate the “transplant shock.” The table below shows the effect of applying antitranspirants just before transplanting on leaf area, % leaf abscission and yield of bell peppers.

<table>
<thead>
<tr>
<th>Antitranspirant applied</th>
<th>Leaf area/seedling 51 d after transplant (cm²)</th>
<th>Leaf abscission (%)</th>
<th>Fruit yield (lbs/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>1195</td>
<td>76</td>
<td>2,678</td>
</tr>
<tr>
<td>Yes</td>
<td>1788b</td>
<td>53</td>
<td>3,214</td>
</tr>
<tr>
<td>Significance</td>
<td>*</td>
<td>*</td>
<td>NS</td>
</tr>
</tbody>
</table>

Their study shows that when the proper antitranspirant formulation is used (a wax emulsion and a surfactant antitranspirant formulation), the water status of the plant is improved after transplanting, which lead to improved growth, lower leaf drop (which results from water stress), and a
tendency toward higher yields. The yields were higher but showed no statistical significance because of high experimental errors.

The technology has to be further improved, to develop antitranspirants that are not phytotoxic and needs to be adapted to specific local conditions. The technology will also be useful only in areas that suffer from extensive droughts and lack irrigation, or in operations where transplanted seedlings are not irrigated immediately after transplanting. (Peter Nitzsche et al. Journal of the American Society for Horticultural Science, May 1991).

New asparagus breeding lines
The California Asparagus Seed and Transplants, Inc has three new promising asparagus breeding lines:

2) ‘Atlas’ (86-12). A dihybrid which resulted from UC 157 and a male from an Eastern line. Similar characteristics to ‘Apollo.’
3) ‘Grande’ (84-8). Also a dihybrid. Very vigorous with larger spear diamteter than the first two. Good spear quality.

These lines appear to have similar tolerance to Fusarium and Phytophtora as UC 157 F1, but their vigor and yields are greater. The seed of these lines has been found to be free of the Asparagus Latent Virus 2 through ELISA. Average yields over a 5 year period in California were (kg/Ha): Apollo, 4,590; Atlas, 4643; Grande, 5421; UC 157 F1, 3238. (CAST, 2815 Anza Ave. Davis, CA 95616).

News updates

Industry Associations in the mainland
Asparagus: California asparagus growers recently organized the California Asparagus Commission, after a state-wide grower referendum was passed. The goal of the new association is to increase domestic and export asparagus sales and to focus on product development, trade issues and research.

Funding for the Commission’s activities will originate from a 14-cent assessment per 30-pound crate collected from individual growers or shippers. (The Packer, March 9, 1991).

Onions: A new logo was introduced for the California sweet onions by the California Imperial Sweet Onion Commission. The logo will be used for promotion on bags, cartons and product stickers. The Commission certifies that the “Imperial Sweets” meet standards for grade, appearance, taste as determined by an independent panel, and that they are grown in the Imperial Valley of California (The Packer, April 6, 1991).
The Florida Fruit and Vegetable Association (FFVA) recently created a new department, the Communication and Education Division, with the purpose of promoting the state agriculture and to help create a greater understanding among the general public about the importance of the fruit and vegetable industry in the state’s overall economy (The Packer, April 6, 1991).

**Sweet potato white flies in Florida tomatoes**

The sweet potato white fly is coming strong again in the Immokalee area of Florida, resulting in a shortage of tomato supplies. Yields are expected to be down by 40 to 50 percent. Shipment of tomatoes are reported to be down 47% from last year, or 37.3 million pounds by early April 1991, compared to 71 million in April 1990. The shortage of supply is having an impact on tomato prices. The price of 25-lb cartons of loose, mature greens, 5 x 6s on April 9, 1991 were $20, compared to prices of $4-5 for the same period a year ago (The Packer, April 13, 1991).

**Increase in air-shipment of specialty products**

Distributors and retailers are making greater use of air-shipments to deliver to their consumers premium specialty products according to a recent article in The Packer. For example, King Kullen Grocery Co. Inc., in New York City typically flies 30 to 40 items from California on a regular basis. RLB Food Distributors, from New Jersey are bringing to the North East 15 to 20 flights per week of specialty products. The New York market also brings air-shipments from Europe, Israel, and Central America, among others. Buyers are increasingly interested and looking for new products that may captivate the appetite of their customers. Among the specialties being shipped by air are included dried jackfruit, kabocha squash, kim chee, berries, minitature vegetables, snow peas, clementines, holland peppers, radicchio, belgian endive, tomatoes, sharon fruit, and fresh herbs (The Packer, March 30, 1991).

**Herbs in the News**

The Herb, Spice, and Medicinal Plant Digest, published by the University of Massachussets Department of Plant Sciences, provides quarterly news and research updates concerning herbs and its uses. The winter 1990 issue lists some of the pharmaceutical applications of some plants:
<table>
<thead>
<tr>
<th>Pharmaceutical application</th>
<th>Drug</th>
<th>Plant source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth control</td>
<td>Diosgenin</td>
<td>Yams</td>
</tr>
<tr>
<td>Breathing problems</td>
<td>Scopolamine</td>
<td>Mandrake, hengane</td>
</tr>
<tr>
<td>Cancer of lung, kidney</td>
<td>Etoposide</td>
<td>Mayapples</td>
</tr>
<tr>
<td>Headaches, arthritis</td>
<td>Aspirin</td>
<td>Meadowsweet</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>Reserpine</td>
<td>Indian snakeroot</td>
</tr>
<tr>
<td>Peptic ulcer</td>
<td>Carbenoxalone</td>
<td>Licorice flower</td>
</tr>
</tbody>
</table>

(The Herb, Spice, and Medicinal Plant Digest, Winter 1990, vol 8(4)).

The Winter 1990 issue of the Digest includes an article on herbs and volatile oils, a list of recent herb publications and upcoming events. Subscription cost for one year are $10 (8 plus 2 for postage). If you are interested in subscribing to the Herb Digest, contact Dr. L.E. Craker, Dept. of Plant and Soil Sciences, Stockbridge Hall, Univ. of Massachusetts, Amherst, MA 01003.

Up-coming events


I.S.H.S. Symposium on Specialty and Exotic Vegetable Crops, Miami, Florida. 15-19 March, 1992. Purpose: to bring together as much information as possible on production and management of both temperate and tropical
specialty vegetable crops. Request registration forms to: Office of Conferences, University of Florida, 551 IFAS, Gainesville, FL 32611-0551.

Produce quality in the Supermaket

Has the nutritional quality of perishables diminished by the time they reach the supermarket? Dr. Rodney Bushway and colleagues at the University of Maine in Orono evaluated eight vegetables from a supermarket and also from a roadside stand to find out if the vitamin C content (ascorbic acid) of these vegetables differed. While the roadside stand purchased produce had just been harvested the night before, the supermarket vegetables had been harvested 9 days before or longer.

As the table below shows only three out of the eight vegetables showed a decrease in vitamin C at the supermarket compared to the roadside stand. The vitamin C content of all the produce tested in the supermarket, however, was still high, and their consumption would contribute significantly to the recommended U.S. dietary needs of consumers. Other research has shown that some vegetables are more affected than others by handling and storage conditions. Vegetables that are more susceptible to quality loss due to handling should be treated more carefully. Overall, the study in Maine concludes that the eight vegetables tested are either not greatly affected by postharvest handling, or more likely, that “the handling and storage techniques have been greatly improved.”

Vitamin C content (mg/100g) of supermarket vs. roadside stand produce

<table>
<thead>
<tr>
<th>Produce</th>
<th>Supermarket</th>
<th>Roadside stand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes</td>
<td>20.3</td>
<td>32.6**</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>64.9</td>
<td>70.3**</td>
</tr>
<tr>
<td>Cabbage</td>
<td>50.7</td>
<td>46.7</td>
</tr>
<tr>
<td>Cantaloupe</td>
<td>33.7</td>
<td>28.8</td>
</tr>
<tr>
<td>Broccoli</td>
<td>98.5</td>
<td>93.8</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>11.5</td>
<td>13.7**</td>
</tr>
<tr>
<td>Spinach</td>
<td>46.1</td>
<td>45.8</td>
</tr>
<tr>
<td>Green Peppers</td>
<td>105.0</td>
<td>111.5</td>
</tr>
</tbody>
</table>

** Significant difference

Vesicular-Arbuscular Mycorrhiza (VAM) helps control Pythium in greenhouse cucumbers.

Root colonization by VAM fungi has been shown to improve the uptake of phosphorus in some plants. This may increase crop yields in phosphorus deficient soils because the VAM fungi improves the plant overall phosphorus uptake efficiency.

Several studies conducted in the 1980s also showed that root colonization by VAM fungi can decrease plant diseases by fungal root pathogens. In some cases a reduced disease incidence was observed.
only after the VAM fungi had been established in the root system. In other cases, however, reduced damage also occurred when both the disease and the VAM fungi were established concurrently.

A study conducted with greenhouse cucumbers in Denmark, showed that simultaneous inoculation of the vesicular-arbuscular mycorrhizal (VAM) fungi *Glomus* spp. with the root pathogen *Pythium ultimum* resulted in a reduced disease incidence. The protective mechanism provided by the VAM fungi is unknown but two possible mechanisms have been suggested: 1) Production of inhibitory metabolites in the host plant (cucumber) as a response to VAM initiation; and 2) Direct inhibition of the pathogen by compounds liberated from the VAM spores or mycelium (Rosendahl and Rosendahl. Symbiosis. 9,363(1990)).

The Grass Family not left behind. The yield and leaf area of several grasses and legume crops were increased by 10-35%, when the seeds were inoculated with the beneficial bacteria *Azospirillum brasilense*. The bacteria contributes to higher crop yields not only by fixing atmospheric nitrogen but also through other mechanisms which are not well understood. Hypothesis include: 1) Enhanced N uptake; 2) Production of phytohormones by bacteria which promote root growth and branching; 3) Improved water status (which may explain the delay in leaf senescence which has been observed) (Sarig et al., Symbiosis 9,235(1990)).

**Drip Irrigation in California**

The use of drip irrigation is spreading in the Salinas Valley of California, in response to the drought that growers have faced for the past several years. Typically used on strawberries, growers now are experimenting with lettuce, celery, broccoli, cauliflower, and mixed leaf and iceberg lettuce. In addition to improved water use efficiency the growers expect a reduction in the use of pesticides and fertilizers, less molds and mildew (The Packer, May 4, 1991).

**Desired Range of elements in the Irrigation Water**

<table>
<thead>
<tr>
<th>Element</th>
<th>Range (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO3-N</td>
<td>&lt;5</td>
</tr>
<tr>
<td>P</td>
<td>&lt;5</td>
</tr>
<tr>
<td>K</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Ca</td>
<td>&lt;120</td>
</tr>
<tr>
<td>Mg</td>
<td>&lt;24</td>
</tr>
<tr>
<td>SO4</td>
<td>&lt;204</td>
</tr>
<tr>
<td>Fe</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Mn</td>
<td>&lt;2</td>
</tr>
<tr>
<td>B</td>
<td>&lt;0.8</td>
</tr>
<tr>
<td>Zn</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Cu</td>
<td>&lt;0.2</td>
</tr>
<tr>
<td>Mo</td>
<td>&lt;0.02</td>
</tr>
</tbody>
</table>

Thrips control update from Florida

“The chemical controls now most effective against the pest are a tank mix of Vydate and Guthion. Dr. Charles Mellinger, technical director of Glades Crop Care, agricultural consultants in Jupiter, FL, emphasizes that for this insecticide control program to be successful, it must be applied perfectly. As the thrips live in the tiny, cracks and crevices of leaves and calyces, the spray will not be effective unless it is specifically directed to reach them. Mellinger recommends the use of moisture sensitive paper in and around the calyces and undersides of certain leaves to show whether the application is reaching these protected areas of the plant canopy.

“Guthion is registered for most vegetable crops, and Vydate for many. Vydate is not registered for snap beans” (Am. Veg. Grower. May 1991).

Watermelon Nutrition Tips

A typical watermelon is by weight, about 90% water and 10% sugar, with a 1- by 10-inch piece supplying: 152 calories; 77% of the recommended daily allowance (RDA) for vitamin C; 35% of the RDA for vitamin B-6; 26% of the RDA for vitamin B-1 (thiamin); 18% of the RDA for vitamin A; 560 mg of potassium and; no cholesterol, very little fat, and only 10 mg of sodium (Amer. Veg. Grower, May, 1991).

Hydroponics Production Tips

Nutrient concentration in a typical non-circulating hydroponic tank: N, 75 to 175 ppm; P, 15 to 65 ppm; K, 100 to 210 ppm; Ca, 150 to 210 ppm; Mg, 40 to 50 ppm; Fe, 3 ppm; Mn, 0.5 to 1.0 ppm; Cu, 0.02 to 0.2 ppm; Zn, 0.05 to 0.4 ppm; B, 0.5 ppm; and Mo, 0.01 to 0.1 ppm. (B. Kratky, Amer. Veg. Grower April, 1989).

Florida Cultivar Trials: Spinach and Broccoli


<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Leaf form</th>
<th>Growth habit</th>
<th>yield/Acre 25-lb bushel</th>
<th>Seed Source²</th>
</tr>
</thead>
<tbody>
<tr>
<td>#10</td>
<td>smooth</td>
<td>semi-erect</td>
<td>222a¹</td>
<td>A&amp;C</td>
</tr>
<tr>
<td>#19</td>
<td>smooth</td>
<td>semi-erect</td>
<td>201ab</td>
<td>A&amp;C</td>
</tr>
<tr>
<td>#30</td>
<td>smooth</td>
<td>upright</td>
<td>198abc</td>
<td>A&amp;C</td>
</tr>
<tr>
<td>Ambassador</td>
<td>savoy</td>
<td>upright</td>
<td>193a-d</td>
<td>A</td>
</tr>
<tr>
<td>Chinook II</td>
<td>Semi-savoy</td>
<td>semi-erect</td>
<td>190a-d</td>
<td>A&amp;C</td>
</tr>
<tr>
<td>Gladiator</td>
<td>Semi-savoy</td>
<td>semi-erect</td>
<td>184a-d</td>
<td>A</td>
</tr>
<tr>
<td>Grandstand</td>
<td>Savoy</td>
<td>prostate</td>
<td>182a-d</td>
<td>A</td>
</tr>
<tr>
<td>Hybrid 612</td>
<td>savoy</td>
<td>upright</td>
<td>181a-d</td>
<td>A&amp;C</td>
</tr>
<tr>
<td>Kent</td>
<td>savoy</td>
<td>semi-erect</td>
<td>171a-d</td>
<td>A</td>
</tr>
<tr>
<td>Marathon</td>
<td>savoy</td>
<td>upright</td>
<td>169b-d</td>
<td>A</td>
</tr>
<tr>
<td>Melody</td>
<td>savoy</td>
<td>prostate</td>
<td>167b-d</td>
<td>A&amp;C</td>
</tr>
<tr>
<td>Meridian</td>
<td>semi-savoy</td>
<td>prostate</td>
<td>163b-d</td>
<td>A</td>
</tr>
<tr>
<td>Seven R</td>
<td>semi-savoy</td>
<td>upright</td>
<td>156b-d</td>
<td>A</td>
</tr>
</tbody>
</table>
Broccoli cultivar yields from non-mulched Spring 1990 trials, Sanford, Florida (J.M. White, Vegetarian 91-1).

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Seed Source</th>
<th>25-lb crates per acre</th>
<th>Head wt (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMX 15014</td>
<td>Amsa</td>
<td>511</td>
<td>0.93</td>
</tr>
<tr>
<td>PSX 50785</td>
<td>Petoseed</td>
<td>479</td>
<td>0.74</td>
</tr>
<tr>
<td>Brigadier</td>
<td>Abbot &amp; Cobb</td>
<td>372</td>
<td>0.58</td>
</tr>
<tr>
<td>Everest</td>
<td>Northrup King</td>
<td>369</td>
<td>0.57</td>
</tr>
<tr>
<td>FMX 94</td>
<td>Ferry Morse</td>
<td>362</td>
<td>0.68</td>
</tr>
<tr>
<td>Brigadier</td>
<td>Agway</td>
<td>337</td>
<td>0.61</td>
</tr>
<tr>
<td>Commander</td>
<td>Northrup King</td>
<td>326</td>
<td>0.56</td>
</tr>
<tr>
<td>Green Valiant</td>
<td>Northrup King</td>
<td>237</td>
<td>0.74</td>
</tr>
</tbody>
</table>

1 Mean separation in columns by Duncans multiple range test, 5% level
2 A&C= Abbott & Cobb, A= Asgrow.

Upcoming events


Third International Symposium on Plant-Soil Interactions at low pH, 12-16 Sept., 1993. Brisbane, Queensland, Australia. Australian Convention and Travel Services Pty. Ltd., GPO Box 2200. Canberra ACT 2601, Australia. Phone 61-6-257-3299, Fax: 61-6-257-3256. Delegates will be able to gain an appreciation of the acid soil problems faced by farmers and research workers in Australia.


Hawaii Herb Association, Third Annual Conference and Tour at the Airport Holiday Inn in Honolulu, August 9-10, 1991. Contact Alice Kadowaki at 988-6664.

Resources

The Journal of Production Agriculture. Offers the latest production-oriented information from a variety of agricultural fields (agronomy, soils, economics, forages, horticulture, animal science, weeds, insects, diseases). Subscription is $30 per year for 4 issues. Make payments to ASA Headquarters Office, Attn. JPA Subscriptions, 677 S. Segoa Rd., Madison, WI 53711-1086.
RESEARCH AND INDUSTRY NEWS

Organic Stores Target Upscale Markets

Affluent yuppies are the main customers of Mrs. Gooch's natural food stores, which retails organic produce in the Los Angeles area. Prices for these organically-grown produce are about 30 percent higher than for conventionally-grown fruits and vegetables. The store buys about 80 percent of its produce from grower-shippers, and the rest from wholesalers and small organic growers in the area. To maintain quality standards produce samples taken from spot checks are sent to Michaelson Labs. for chemical analysis of possible pesticide residues. The store sells both organically and conventionally grown produce and signs in the store describe the type of products which are available. These include:

![Organic Food Sales in the US](chart.png)
1. Organic agriculture: does not employ the use of synthetically compounded fertilizer, pesticides, or growth regulators.
2. Sustainable agriculture: features minimal use of synthetic additives and minimal reliance on nonrenewable resources. Produce grown pesticide-free in this category.
3. Quality conventional agriculture: May utilize any fertilizer and pesticides permitted by laws. We will not purchase any irradiated produce."


Hydroponics in Illinois

Hydroponic operations in Illinois have been successful by providing high quality products on a consistent basis year-round. The Archer Daniels Midland's Raingarden (ADM), a hydroponics greenhouse in Illinois has a weekly production of 100,000 heads of lettuce, 4,000 lbs of herbs, and 4,800 cucumbers. Other crops and specialties grown hydroponically in Illinois include spinach, seedless cucumber, alfalfa sprouts, bean sprouts and the following specialty sprouts: sunflower, radish, onion, clover, cabbage, lentil and garbanzo bean sprouts (The Packer, June 15, 1991).

Fresh Produce Promotion Campaigns in the Mainland

"Goodness grows in North Carolina ." More than a dozen grocery chains with nearly 1,000 stores have joined in a campaign to promote the state's food products. The campaign is sponsored by the North Carolina Dept. of Agriculture. "Virginia, a tradition of taste ." Food products were highlighted in grocery and specialty food stores throughout the state from June 19 to July 31. The promotion is designed to call attention to the harvest of summer produce as well as a variety of specialty foods.

Washington Apples . A test conducted by the Washington Apple Commission in 32 stores on the East and West Coasts showed that printing the Washington apple logo on one panel of their cartons can help boost sales. The commission has been urging shippers to use the Washington logo on boxes for some time, but response until now has been minimal (The Packer, June 22, 1991).

Women in Agriculture

The number of women interested in farming has increased considerably over the past recent years, according to the Census Bureau. In 1987 31% of bachelor degrees in agriculture were awarded to women compared to 4% in 1971. (Parade Magazine, July 21, 1991). An earlier survey from Florida found that farm women are now farming an average of 22 hr per week, as compared to 11 hr per week in the 1930s (Proc. Fl. St. Hort. Soc. 97:230(1984).

Smaller Packs demanded by Food Service Industry

Retailers would like to receive smaller packages for some of the produce they handle. Smaller packs helps retailers to keep in the shelves only that produce which is needed. Restaurants also prefer the smaller packages. Mann Packing Co. Inc., a Salinas, California shipper, recently introduced six-count packs of some leafy products including romaine, endive, celery, green leaf and red leaf lettuce, kale, escarole, green onions and parsley. The packages consist of small, corrugated containers measuring 12.75 in wide and 15.5 in deep. Distributor customers are required to purchase a master container which holds four six-count packs (The Packer, Aug. 3, 1991).
New Alternative Pest Controls

Root Diseases in California. Alternative controls for root diseases in cotton, tomato, and pepper have been found by Milton Schroth of the University of California at Berkley. Beneficial bacteria and fungi that are antagonists to root diseases are introduced in the soil through drip irrigation or incorporated in the soil through special developed granules. Populations of the beneficial micro-organisms remained high throughout the growing season, suppressing populations of root knot nematode and other root diseases (Alt. Agr. News, Aug. 1991).

Plant Antifungal Proteins
Researchers in Colorado may have found a new family of plant antifungal proteins. They initially identified zeatin in corn, a protein with potent activity against fungi. Follow-up work resulted in the discovery of "zeamatinlike" proteins in seeds from seven other plant species. Plants are known to produce a wide variety of proteins in response to viral, bacterial, or fungal attack. Better understanding of these chemicals may lead to breeding of plants with pest suppression abilities (Molec. PI-Microbe Interactions 4:315;1991).

No-till results in reduction of Nitrogen leaching

Conservation tillage practices are being promoted to reduce the 10 million metric tons of nutrients delivered annually to surface waters in the United States. The principal source of nutrient leaching losses are fertilizers, and to a lesser extent, animal urine. These nutrients are considered a major cause of eutrophication of surface waters. The figure below, indicates the reduction in nitrogen content of runoff waters in No-Till (NT) compared to Conventional Tillage (CT) operations. The figure also shows a reduction in total Nitrogen content in the runoff water when the nitrogen is subsurface applied compared to surface applied (Mostaghimi et al., Ag., Ecos. Environ. 36:13(1991).

<table>
<thead>
<tr>
<th>EFFECT OF NO-TILL (NT) AND CONVENTIONAL TILLAGE (CT) ON NITROGEN CONTENT OF RUNOFF-WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Graph showing reduction in nitrogen content in runoff water between No-Till and Conventional Tillage." /></td>
</tr>
</tbody>
</table>

[Graph showing reduction in nitrogen content in runoff water between No-Till and Conventional Tillage.](image)
UPCOMING EVENTS

International Irrigation Exposition and Technical Conference. Nov. 10-13, 1991. Convention Center, San Antonio, Texas. “More than 4,000 people are expected to visit more than 400 booths featuring the latest innovations in irrigation technology and equipment”. For information contact: Lisa Brownell-Pierce, The Irrigation Association, 1911 N. Fort Meyer Dr., Suite 1009, Arlington, VA 22209-1630; phone (703) 524-1200.


ISHS Symposium on Soil and Soiless Media Under Protected Cultivation in Mild Winter Climates. Cairo, Egypt. March 1-6, 1992. Contact: Dr. Ayman Abou-Hadid, Protected Cultivation Project. POB 296, Imbaba 12411, Giza, Egypt. Tel. (202) 360-3156, Fax (202) 71-2061.


Adaptation of vegetables and other food crops to temperature and water stress. Asian Vegetable Research and Development Center. 13-18 August, 1992, Taipei and Tainan. Contact: Dr. C. George Kuo, Convener, Program Committee, AVRDC, P.O.B. 42, Shanhua, Tainan 74199, Taiwan.

Hector Valenzuela, Ph.D.
Vegetable Crops Extension Specialist
Control of whiteflies in tomato greenhouses
Insecticides recommended for whitefly control on greenhouse grown tomatoes include: dichlorvos (DDVP, Vapona) fog or mist; Thiodan WP or EC; malathion WP or EC; and naled (Dibrom EC, fog). Optimum results are obtained between 70-80F with applications every second day. Applications may be necessary for 21 days to break the life cycle of the whitefly. Alternate insecticides to prevent development of resistance, and read the pesticide label and its precautionary statements before application (Joseph Harris, Vegetable Press, Sept. 91).

Convention Fever Trivia
Looking for something to do? More than 12,600 trade shows and conventions are held each year in the United States. These were held at over 300 convention centers around the country, and were attended by 13.5 million delegates and 5.5 million of their spouses. The average visitor spends an average of $900 on a typical trade show (Economist April 20, 1991).

Pesticide Registration- Cal-EPA
The recently created California's Environmental Protection Agency is taking action to ban 14 chemical ingredients of pesticides used in the state. These ingredients will be removed because manufacturers have not conducted health tests on them. Pending legislative action may require studies on about 200 ingredients used in California's pesticides to prevent removal of these products from the market (The Packer Aug. 24, 1991).

Veggies and Health Pointers
Part of the marketing efforts of the vegetable industry is increasing the awareness to the public of the great health benefits involved in vegetable consumption. Here are but just a few pointers: Celery may help to reduce blood pressure and cholesterol levels; Broccoli contains indole carbinol, a substance which may prevent the development of breast tumors; Broccoli also contains beta carotene, which may lower risks of lung, throat and bladder cancer; Sulfur compounds in garlic may reduce development of stomach cancer; Garlic may also contribute to lower blood pressure and to reduce blood clotting (The Packer, Sept. 7, 1991).
Opportunities for Direct Marketing to Restaurants

The market for gourmet stores, tourist resorts and restaurants is very limited. However direct sales to this market may be profitable for those highly specialized growers which can supply a consistent volume of high quality produce throughout the year. Small-growers have the ability of taking greater care of their product, and of producing and handling specialized products which are demanded by the upper-scale vegetable market. To succeed in this market the prospective grower should be familiar with the needs of chefs. Make appointments with chefs or produce buyers and take samples of the produce which you can supply.

Costs of Organic vs. Conventional Production

After the Alar scare with apples, organic pear production in the Pacific North West has increased to 4 million pounds for the 1991 season. Organic pears sold for about 40% more than conventional pears, but apparently these higher prices were necessary to offset the higher costs of organic production. According to a grower in Cashmere, Wash. "One of our growers farms both organically and conventionally, and his costs in the organic are practically double those in the conventional." The higher costs are due to the amount of work, and to the greater spraying frequency (of the less effective "natural" pesticides) (The Packer, Sept. 28, 1991).

Environmental Facts About Conventional Agriculture

◊ About 3 calories of fossil energy are used to produce one calorie of food.
◊ It requires 170 gallons of water to produce one pound of corn.
◊ One billion pounds of pesticides are applied annually in the US
◊ About $1.2 billion are spent annually to monitor wells and groundwater for pesticide contamination.
◊ About $18 billion are lost in fertilizer nutrients eroded with the soil.
◊ Since 1945, the use of synthetic insecticides has grown 10-fold while crop losses due to insects has nearly doubled.

RESOURCES AVAILABLE

Frieda's Newsletter. Exotic and specialty products newsletter published 6 times a year. Send $6 to Frieda's Finest, POB 58488, Los Angeles, CA 90058.

Hydroponic Society of America. $30 annual membership. Publications received by members: a directory of sources of equipment, a bi-monthly
newsletter, current conference proceedings. For information or for a list of available publications contact: HSA, POB 6067, Concord, California 94524.

UPCOMING EVENTS