RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

VEGETABLE CROPS EDITION $1.50 JULY 28, 2004

INSIDE

Innovations in Fresh-Cut Produce Technology, Part II: Modified Atmosphere Packaging

Lou Cooperhouse, Director, Rutgers Food Innovation Center

Modified atmosphere packaged products occur in almost every aisle of the supermarket today, and fresh-cut produce represents the fastest growing segment in which this technology is being applied. This promising technology greatly improves the potential marketability of value-added produce, but it must be utilized in combination with other barriers and employed as part of a comprehensive HACCP (Hazard Analysis Critical Control Point) food safety system.

Rapid Growth of MAP in the Fresh-Cut Marketplace

Billions of packages of refrigerated, frozen and shelf stable foods are sold worldwide every year that are packaged with modified atmosphere packaging (MAP). This array of food products includes potato chips and other snack foods; ready-for-display fresh meats; hot dogs and other processed meats; pizza dough and other bread and bakery products; and items as diverse as coffee and cheese. Although the application of MAP in the fresh-cut produce category was virtually non-existent some 15-20 years ago, it has been estimated that over one billion packages of MAP fresh-cut produce products have been sold to date.

The initial application for MAP in the value-added produce segment was the foodservice market, in which pre-cut lettuce was sold to salad bars and to the quick service restaurant industry. This was followed by prepackaged iceberg lettuce salads that were developed for the retail market, which subsequently evolved to include a wide variety of lettuces, cabbages, carrots and other vegetables. Meat ingredients, such as precooked pieces of chicken and ham, have recently started to appear in salads too, either in a separate MAP pouch or actually integrated into the salad. As a result, salads which have become quite popular in restaurants, such as Chicken Caesar salad, Chef Salad, and Cobb Salad, are now appearing for the first time in the retail marketplace. Cut fruit, such as honeydew and pineapple, and cut vegetables, such as baby carrots and broccoli, are rapidly growing markets as well.

Process Overview

In the modified atmosphere packaging process, product is packaged in an atmosphere that is different from that of air. Air normally contains 78.08 percent nitrogen, 20.96 percent oxygen, and 0.03 percent carbon

SEE MAP ON PAGE 2

MAP from page 1

dioxide. Modified-atmosphere packaging is a process in which the composition of gases in a package of known permeability is altered after the food is filled, but before the package is sealed. Frequently, MAP is a two-stage process. It begins when a vacuum is first pulled on the product so that as much oxygen can be removed from the system as possible. This is then followed by a "backflush" of nitrogen and/or carbon dioxide and/or other gases.

Variations of the MAP process exist, including controlled atmosphere packaging and vacuum packaging. Controlled atmosphere packaging (CAP), common in respiring produce packaging or distribution, is a process in which the concentrations of oxygen, carbon dioxide, and sometimes ethylene are monitored and regulated. MAP therefore differs from CAP, as CAP is an active system that continuously maintains the desired atmosphere within a package throughout the shelf life of a product. CAP uses agents to bind or scavenge oxygen or a sachet containing compounds to emit a gas. The CAP practice is essentially the packaging of a product in a modified atmosphere followed by the subsequent maintenance of that atmosphere.

Vacuum packaging is a form of MAP in that it reduces the amount of air from a package yet doesn't replace that diluted air with a predetermined mixture of a new gas. Nevertheless, even though the ratio of gases in the air that is left may be the same as that which occurs in the normal atmosphere, the *quantity* of available oxygen is dramatically reduced, which results in shelf life extension. Vacuum packaging is also regarded as a form of modified atmosphere packaging in the sense that elevated levels (10–20 percent) of carbon dioxide are sometimes produced within vacuum packages by microorganisms as they consume residual oxygen.

Optimal gas mixtures vary widely in produce commodities, dependant on their respiratory requirements. Potatoes, radishes, and tomatoes are generally considered low respirers while asparagus, broccoli, and mushrooms are considered heavy respirers. Once commodities are cut and handled, product deterioration accelerates as the respiration rate is increased, the tissue becomes more susceptible to oxidative discoloration, and microbial growth is enhanced. It is critical to match the oxygen transmission rate (OTR) of the packaging material with the respiration rate of the product. Nitrogen is used as a sterile filler gas to dilute the concentration of carbon dioxide and oxygen in the package, thereby reducing the onset of oxidation and helping to ensure package stability. Carbon dioxide has bacteriostatic and fungistatic properties and its effectiveness is probably due to its ability to penetrate the cellular membrane. The gas selectively inhibits the growth of Gram negative bacteria, such as pseudomonads and other related psychrotrophs, which otherwise grow rapidly and produce off-odors and off-flavor. Lactic acid bacteria, such as *streptococci* and *lactobacilli*, are less affected by elevated levels of CO_2. Accordingly, the predominating microorganisms found in products stored in modified atmospheres consist of these organisms, which develop more slowly than pseudomonads and related Gram negative bacteria.

Over the past few years, a number of packers of fresh prepared green vegetables in the United Kingdom have begun experimenting with oxygen levels that are between 70 and 100%. This "oxygen shock" treatment of superatmospheric oxygen levels has been found to be very effective in inhibiting enzymatic discoloration, preventing anaerobic fermentation reactions, and inhibiting aerobic and anaerobic microbial growth since the optimal oxygen level for growth (21% for aerobes, 0-2% for anaerobes) is surpassed. As with most MAP gases, superatmospheric O_2 has varied effects depending on the commodity, and further research will be required to understand the application of this technique in the fresh-cut produce industry.

Safety Concerns

Modified atmosphere packaging may be a technology chosen to help a fresh-cut processor achieve a much longer shelf life, however it is not by any means a "magic bullet" that will individually provide for product safety and shelf-life extension. Clearly, raw material control and superior agricultural practices are critical to the successful development of value-added produce products. Variety, source, season, initial maturity, processing maturity, slicing and cutting equipment, chemical or other treatments and dips, packaging environment, shipping, and handling all affect the sensory acceptability and attainable shelf life of fresh-cut produce…and impact product safety. Temperature management from "farm to fork" is critical.

Because MAP results in a dramatic change in the *time* it takes for product to spoil, and the *type* of bacteria that will cause this spoilage, it creates significant additional risk as well. This is due to a number of factors such as extremely low oxygen levels, lack of bacterial competition, prolonged shelf life, and potential for temperature abuse…conditions which can favor the growth of pathogenic organisms, which are otherwise quite fastidious and less likely to grow.

MAP and other forms of reduced oxygen packaging minimize the activities of spoilage organisms that normally give warning about potentially unsafe conditions. Concerns about modified atmosphere packaging are well founded because of the potential for growth of anaerobic or facultative anaerobic bacteria, such as *Clostridia*, which could cause food poisoning *before* food spoilage was organoleptically detectable. Reduced oxygen packaging contributes to the potential of botulism (caused by *Clostridium botulinum*) and other pathogens by providing greater time and opportunity for outgrowth.

The Food and Drug Administration (FDA) of the U.S. Department of Health and Human Services has been working with the Institute of Food Technologists (IFT) and

See Safety Concerns on page 3

Pest Notes

Gerald M. Ghidiu, Ph.D., Specialist in Vegetable Entomology

General: Grasshopper populations are building up in various field and vegetable crops, such as leafy greens, peppers, sweet corn, eggplant, and others. These pests often move into vegetable fields and feed on the leaves, creating large jagged holes in the foliage of many crops. A variety of pest management materials are available that are labeled for grasshopper control, including Capture, Fury, Mustang/Mustang Max, Penncap-M, Sevin, and Warrior. Consult label for each specific crop to determine registration status of the different pesticides.

Cucurbits: Spider mite populations were starting to build up in cucurbits, but recent heavy rainfalls may reduce these populations. Monitor fields after these storms to determine pest status, and if the population persists, consider spot treating the areas of high infestations. Recommendations are to treat if 50% of the terminal leaves are infested at this time. If the populations are low, or just starting to increase, use Capture or Danitol. If the populations are high or rapidly increasing with damage starting to appear, use a miticide such as AgriMek or Kelthane. The recommendation book suggests that the use of dimethoate for **leafminer** control will also control spider mites, but reports from New Jersey as well as Delaware suggest that dimethoate is variable in its effectiveness against mites.

Corn (sweet): Grasshopper populations are increasing in corn fields throughout the state. Generally not a problem unless the population is high, grasshoppers can be controlled using either Capture, Fury, Mustang, Penncap-M, Sevin, or Warrior. Monitor fields to determine if the population is high enough to cause significant damage to the foliage, depending on crop stage.

Late-planted sweet corn fields at RAREC have relatively high populations of **fall armyworm** in the plant whorls. If more than 15% of the whorls are infested (with any of the worm pests), treatments are recommended. For whorl sprays, direct sprays over the plants using high volume, high pressure to ensure that the material is forced down into the whorl, where the pests are feeding. Application during the early morning hours, when dew is present on the leaves, will assist in getting the spray material into the heart of the whorl. Use Avaunt, Baythroid, Capture, Fury, Mustang Max, Lannate, Larvin, or Warrior for effective fall armyworm control.

Pepper (Bell): High population levels of **grasshoppers** are feeding on the leaves of pepper plants, creating large jagged holes in the foliage. These pests do not feed on the fruit, but can reduce the plant canopy, leaving the fruit exposed to sunburn. There are no thresholds for grasshopper populations in peppers, but if they are present in high numbers , select a material such as a pyrethroid (Asana, permethrin, Warrior) for early **corn borer** control, which will also control grasshoppers.

Leafminers have been causing significant damage in several pepper fields. Small mines in the leaves are so numerous that leaves dry up and fall off the plant. If leafminers are a problem, and damage is increasing, use AgriMek, permethrin (Ambush, Pounce), SpinTor, Trigard, or Vydate for effective control. Thorough cover-age of the leaf surface will assist in control of this pest.

Monitor closely for **beet armyworm** in pepper fields. Virginia reports high numbers of this pest are being trapped in various beet armyworm traps, and larvae are appearing in many different crops. Wind currents (storm fronts) bring this pest into New Jersey each year, and we have seen many storm fronts pass through recently (the most recent storm front came up along the coast, which is ideal for beet armyworm invasions of New Jersey). Look for groups of small larvae feeding on the leaves of the upper 1/3 of pepper plants, with damage appearing as small leaf skeletonizers, especially to the smaller leaves on the very top of the plant. As larvae become larger, they migrate to other parts of the plant and invade the fruit. Best management tactics include controlling this pest while it is still small and a leaf feeder, using a material such as Avaunt, Confirm, Intrepid, Lannate, Proclaim, or SpinTor. **Note:** pyrethroid insecticides have generally been ineffective against this pest, even when larvae are still small.

Also in peppers, if pyrethroids are used for a **European corn borer** management program, remember to rotate class of insecticides to prevent overuse of pyrethroids, which will likely result in a sudden increase in **aphid** populations. Alternative insecticides (different classes other than pyrethroid class) include Confirm, Intrepid, Lannate, or SpinTor. ❑

Safety Concerns from page 2

published a report entitled "Analysis and Evaluation of Preventive Control Measures for the Control and Reduction/Elimination of Microbial Hazards on Fresh and Fresh-Cut Produce". In this study, it is noted that the potential for growth of pathogens is quite significant in the fresh-cut produce industry. The FDA/IFT report recommends that the elimination or significant inhibition of spoilage microorganisms should not be practiced, as their interaction with pathogens may play an integral role in product safety. This report further recommends that the initial percentage of O_2 in a modified atmosphere for fruits and vegetables for both safety and quality fall between 1 and 5%.

The Rutgers Food Innovation Center provides assistance to agricultural and food processing industries in the New Jersey region, and assists clients that are interested in developing value-added products. The Food Innovation Center provides its clients a full range of services that include business development, market development, product and process development, workforce development and training, regulations and manufacturing support, and quality assurance and food safety systems. For further information, please contact the Rutgers Food Innovation Center at 856-459-1125, visit their website at www.fire.rutgers.edu, or email Lou Cooperhouse at cooperhouse@aesop.rutgers.edu. ❑

Bacterial Diseases of Tomato

Andy Wyenandt, Ph.D., Post Doctoral Associate in Vegetable Pathology

Three important bacterial diseases of tomato are **Bacterial canker**, **spot** and **speck**. All three bacterial diseases have been identified over the past few weeks and can be difficult to control and spread easily in wet conditions. Symptoms of Bacterial canker on tomato foliage include an irregular, marginal leaf necrosis. Bacterial canker infections can occur during the tying process when tightened string causes wounds to stems and leaves. Fruit infected by Bacterial canker will develop 'bird's eye- spots' which appear as very small, raised, round-white spots on immature, green fruit. Bacterial canker can be spread very easily by splashing water, contaminated equipment, and by workers during harvest.

Symptoms of spot and speck include small water-soaked spots with a 'greasy' appearance on infected leaves. These lesions will expand and will often form yellow 'halos' at the margins. Lesions may spread and form large, irregular necrotic areas on leaves. On mature plants infections are most evident on older leaves.

Bacterial spot and speck will both *infect green fruit.* Bacterial spot development is favored by high moisture, relative humidity and warm temperatures (75 to 90 degrees) and bacterial speck is favored by cooler, moist conditions (65 to 75 degrees). Bacterial spot produces slightly raised water-soaked spots that with age become 'scabby' and are 1/4" in diameter. Bacterial speck produces much smaller lesions (1/16") that are black and slightly sunken.

Control of bacterial diseases begins with proper crop rotation (2-3 years without tomatoes or peppers) and in the greenhouse with clean seed and/or transplants and proper greenhouse sanitation. Culturally, avoid overhead irrigation and *do not work* in fields when plant surfaces are wet to minimize potential spread. *Avoid tying and harvesting when foliage is wet.* Control of bacterial diseases should begin in the greenhouse and carry into the field soon after transplanting by following proper cultural practices, regular scouting and following a weekly fungicide program. For more information on bacterial diseases of tomato please see the *2004 New Jersey Commercial Vegetable Production Recommendations Guide*. ❑

Vegetable Disease Update

Andy Wyenandt, Ph.D., Post Doctoral Associate in Vegetable Pathology, Wes Kline, Ph.D., Cumberland County Agricultural Agent and Michelle Infante-Casella, Gloucester County Agricultural Agent

✔ **Cucurbits – Powdery mildew –** *Powdery mildew has now been identified in southern and northern New Jersey on a variety of winter squash and pumpkin.* Powdery mildew typically occurs from mid-July until the end of the season. Powdery mildew can cause 100% defoliation very quickly if not controlled properly. The diagnostic characteristics of Powdery mildew are *pure white 'fuzzy' growth on both the upper and lower leaf surface, petioles and stems*. Symptoms typically begin on older, lower leaves and can develop and spread rapidly under dry, humid conditions.

Control of Powdery mildew begins with regular scouting for symptoms and weekly fungicide applications. Fungicide resistance management of the fungus which causes Powdery mildew is critical. Fungicides with a high risk for resistance development such as the strobilurins (Cabrio, Flint, Amistar, Quadris) should be rotated on a weekly basis with fungicides of a different chemistry (Chlorothalonil + Nova). Nova (myclobutanil) is also included as high-risk and should be tank mixed. Growers need to read and follow restrictions on labels carefully. For more information on control of Powdery mildew and other important diseases of cucurbits please see the *2004 New Jersey Commercial Vegetable Production Recommendations Guide*.

✔ **Cucurbits – Downy Mildew –** Downy mildew continues in cucurbit plantings. *In some fields Downy mildew has caused 100% loss. Growers should take great precautions to keep Downy mildew under control.* If Downy mildew has been a problem in fields, growers should scout and continue on a weekly fungicide maintenance program. There are a number of fungicides labeled for control of Downy mildew and many will help control other important diseases in cucurbits. For information on control of Downy mildew and other important diseases of cucurbits please see the *2004 New Jersey Commercial Vegetable Production Recommendations Guide*.

✔ **Peppers, Cucurbits -Phytophthora blight** continues to be a problem in many pepper and cucurbit fields. To control the crown rot phase apply mefenoxam (1 pt Ridomil Gold 4E/A or 1 qt Ultra Flourish 2E/A) through the drip system. Additionally, the fruit rot phase will continue to be a problem, especially with the warm and moist weather conditions seen this week. Protect the upper portion of the plant with fixed copper sprays or Ridomil Gold Copper sprays. Make 3 to 4 applications at a 10-14 day intervals. See page F70 of the *2004 Commercial Vegetable Production Recommendations* for more details.

✔ **Late Blight Update –** *More cases of Late blight* have been identified in western and southeast Pennsylvania and southern New York on tomatoes and potatoes. Weather this week has brought long periods of cooler, wetter weather to the area ideal for Late blight development. *Growers should continue to scout their fields on a regular basis and continue preventative fungicide application programs.* If Late Blight is suspected in a tomato or potato field, contact Dr. Andy Wyenandt, at 856-455-3100 ext. 4144 or your local county agricultural agent. For more information on rates please see the *2004 New Jersey Commercial Vegetable Production Recommendations*. ❑

IPM Update

Kristian Holmstrom, Program Associate in Vegetable IPM

Sweet Corn

European corn borer (ECB) activity continues to increase throughout New Jersey. The highest catches are in the Mercer-Burlington County border, with other areas of higher activity in Atlantic, Cumberland, Salem and southern Warren Counties (see ECB map). The second ECB flight is underway throughout the state, and feeding is showing up in the southern counties. Continue to check all plantings weekly for the presence of ECB and other pest injury both in the tassels and on the leaves. If feeding exceeds 12% in a 50 plant sample, consider treating. As plantings progress to full tassel, it is still wise to treat for ECB if larvae are present. The highest average nightly **ECB** blacklight trap catches are:

Allentown	17	Cranbury	4	Phillipsburg	3
Centerton	5	Georgetown	4	Wall	3
Shirley	5	Elmer	3	Folsom	2
Beckett	4	Little York	3	Hammonton	2

Fall armyworm (FAW) feeding is present in whorl stage sweet corn plantings in all counties. In the northern counties, feeding percentages are increasing. Look for heavy "window-pane" type feeding on whorl and seedling corn. This feeding is caused by young FAW. As the larvae grow, the feeding becomes more ragged, with large holes and accumulations of droppings in the whorl. When FAW is present, thorough spray coverage is critical. Be sure to use as much water with the spray material as possible, and increase pressure to permit the insecticide to penetrate the layer of caterpillar droppings.

Corn earworm (CEW) catches are increasing slowly throughout New Jersey now, with more locations recording catches. The most consistent catches are presently in the coastal areas from eastern Monmouth County through Atlantic and south to Cape May, but moths are being captured all over the state (see CEW map). Catches are light north of Trenton, but enough to warrant a slight tightening of silk spray schedules. The current gradual rate of increase will probably continue until greater emergence to our south coincides with strong southerly air movement. When that happens, we could see significant CEW increases in New Jersey. North Carolina IPM is recording increasing catches (including some that are quite high), and Virginia Tech indicates that a large flight will get underway soon, based on numbers of CEW currently in the pupal stage there. Delaware IPM and Maryland Dept. of Ag. are recording light CEW catches in parts of those states. It is important to monitor local blacklight trap catches now, as CEW adults can increase quickly and will cause considerable injury to silking sweet corn. The shaded area on the CEW map (blue on the web) represents a population requiring a 5-6 day silk spray schedule and the crosshatched areas (green on the web) represent a 3-4 day silk spray schedule. The highest average nightly **CEW** blacklight trap catches are:

Wall	3	Matawan	2	Elm	1
Denville	2	Sykesville	2	Hammonton	1
Eldora	2	Beckett	1	Lawrenceville	1
Green Creek	2	Chapel Heights	1	Tabernacle	1

General Sweet Corn Spray Schedule

Silking Corn: North 6-7 days
Central 4-5 days
South 4-5 days

SEE IPM ON PAGE 6

Observations from the Field

Raymond J. Samulis, Burlington County Agricultural Agent

The resilience of farmers in New Jersey never ceases to amaze me. Within two days of receiving more than 13 inches of rain in central Burlington County, harvesting of sweet corn and other vegetables was going near full tilt with both mechanical and hand harvest.

Damage to crops will be significant, but despite the rain problems, decent quality remains. One lesson we learned is that farmers who maintained ditches, waterways, etc., were able to move large volumes of water off the fields in a relatively short amount of time. In the fields where ditches were not maintained, the water remained for days wreaking havoc on the crops by spreading water-borne fungi such as **phytopthora**. Channels of water that moved through fields of squash, pumpkins, cucumbers and tomatoes started the spread of phytopthora. Samples I took to the lab had an abundance of spores when observed under the microscope. Growers should make sure that beds are used and that the ends of the rows are not dammed up. I have seen cases where growers make excellent beds only to lose crops because the water still formed ponds at the end of the rows. While some fungicides are labeled for these diseases, remember, for the most part they are preventative, and must be applied early in the growing season. Once significant areas of rot occur, control will be futile.

Another lesson we learned from the floods is the importance and effect of adjoining farms to your own farm. In many cases, flooding resulted from the fact that the farm next door or somewhere up the watershed did not maintain ditches. Farmers have to work together, area wide, in order to keep large volumes of water moving.

Some growers are discing up areas of the fields where disease is bad to halt the spread to other parts of the field. Be careful though, because cultivation and soil movement can also spread disease. Some type of rotary tilling might be best to incorporate diseased crops and not move soil around too far.

The 13.8 inches of rain was labeled the "storm of the century", and our hope is to not see another storm like this for a very long time. ❑

IPM FROM PAGE 5

Recent wet weather favors **corn leaf rust**. Some varieties are susceptible to this pathogen. While scouting for insects, be sure to look at lower leaves for pustules on the surface. As pustules mature, they will burst, releasing reddish colored spores. If this disease is first found in the seedling or whorl stage, consider a fungicide application to limit spread on plants. Rust infections, if allowed to progress on susceptible varieties, can stress plants and reduce ear size.

Tomatoes

Be sure to check plantings for **two-spotted spider mite (TSSM)**. TSSM will cause a whitish pin-spot or "stipple" on the upper surface of infested leaves. They often start at field edges, or where tomatoes border eggplants (eggplants are a common host for TSSM). When scouting, be sure to check older leaves for the presence of TSSM colonies. Consider spot treating if they are found in specific locations in the field.

Brown stinkbugs have been increasing in blacklight traps recently, and adults continue to be found in tomato, pepper, and sweet corn plantings. These pests can cause significant injury to tomatoes; particularly when very dry conditions are prevalent. July is typically the month when adults enter irrigated tomato fields, mate and deposit eggs on the plants. Later in July adults and nymphs cause the large yellow spots on the fruit. Beneath these spots the fruit tissue is hard and pithy. If adults or nymph groups are found in the field, or fruit injury is increasing, consider treating to minimize damage.

Peppers

With **ECB** adult numbers increasing in the south, peppers will again need regular protectant insecticide treatments. On the ECB map, areas shaded in green (web version) or crosshatched (in the newsletter) indicate adult ECB populations that require weekly preventive sprays to minimize fruit injury. Monitor local ECB populations to determine when to begin regular preventive insecticide applications.

No new **cyclamen mite** infestations have been detected over the past week, but growers should be on the lookout for the symptoms it causes in peppers. Look for dramatic distortion of the youngest leaves on affected plants. This distortion resembles herbicide injury and is often accompanied by bud proliferation (10-20 or more buds in a cluster), and heavy scarring (russet) on fruit, stems and buds. A microscope must be used to actually see the mites. If proper magnification is available, remove several buds from affected areas and look for a clear to slightly white, elongated mite. Miticides that are used for **two-spotted spider mite (TSSM)** control will be effective against cyclamen mite.

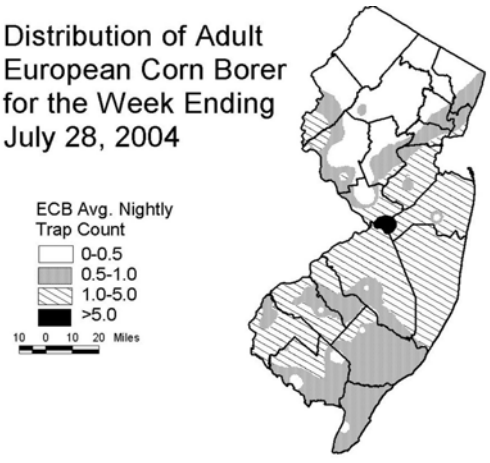
There are reports of **beet armyworm (BAW)** on a few southern New Jersey farms. This pest comes up from southern states and occasionally causes injury to peppers and tomatoes in our state. Look for foliar injury to the leaves near growing terminals. If this is found, look for small greenish caterpillars curled up in and around the buds. If allowed to linger on the plants, the worms will grow, becoming dark colored, and can cause significant injury to pepper fruit.

Pumpkins

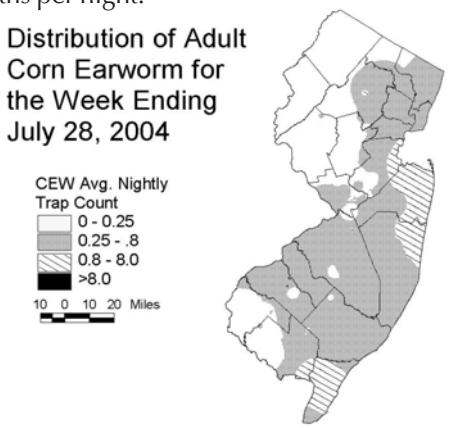
Cucurbit downy mildew (DM) is present on vine crops throughout the state. Growers should be on their regular protectant fungicide programs to limit damage from this disease as well as **powdery mildew (PM)**. If wet weather makes it impossible to maintain a regular 7-day program, it may be advisable to switch to a material that specifically targets the water molds with the next possible application. Materials like Ridomil Gold Bravo or Acrobat fall into this category (See the *2004 New Jersey Commercial Vegetable Recommendations Guide* for further selections). It is critical to check fields at least weekly for the presence of sharp yellow spots on the upper leaf surface. The veins will be yellow on the underside of the leaf. Shortly after these symptoms appear, dark colored spores will be produced along the sides of veins in infected tissue. This disease can rapidly defoliate fields, and should be treated quickly.

Snap Beans

With **ECB** adult activity increasing, particularly in southern New Jersey, it is important to monitor local catches and treat snap beans to prevent injury and contamination from ECB larvae. If local traps indicate ECB adult activity, treat beans in the bloom stage, and again when they reach the pin pod stage. After this, consider treating at weekly intervals if local traps average 2.5 moths per night.



Data collected and processed by: Kris Holmstrom, Marilyn Hughes
Rutgers Cooperative Extension & Center for Remote Sensing



Data collected and processed by: Kris Holmstrom, Marilyn Hughes
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Vegetable and Specialty Crops Field Day & Heirloom Tomato Taste Testing

August 19, 2004, 5:00 – 8:00 p.m.
Rutgers Agricultural Research and Extension Center (RAREC)
121 Northville Road, Bridgeton, NJ

Agenda

5:00 – 6:30 p.m. Tomato tasting of round, grape, cherry, plum and heirloom tomatoes

6:30 – 7:30 p.m. Wagon tours for the following research plots: Variety trials (Heirloom and round tomatoes, standard and tofu soybeans, sweet corn), cultural practices (grape, cherry and heirloom tomatoes), insect management in peppers and sweet corn, phytophthora pepper research, minor use pesticide screen ing plots.

7:30 p.m. Question and answer session
New pesticides for insect management, *Gerry Ghidiu*
Disease control for fall vegetables, *Andy Wyenandt*
Pesticide Safety on the farm, *Wesley Kline*

Pesticide Recertification Credits – 1 credit in Core, 3 credits each in Category 1A, 10 and PP2.

For additional information contact Wes Kline, Cumberland County Agricultural Agent at 856/451-2800 or Bill Nicholson, Research Farm Director, RAREC at 856/455-3100.

Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged below normal, averaging 72 degrees north, 74 degrees central and 75 degrees south. Extremes were 91 degrees at Canoe Brook on the 23rd, and 58 degrees at Charlotteburg and Freehold on the 22nd and 26th. Weekly rainfall averaged 1.33 inches north, 0.79 inches central, and 0.15 inches south. The heaviest 24 hour total reported was 2.08 inches at Flemington on the 23rd to 24th. Estimated soil moisture, in percent of field capacity, this past week averaged 92 percent north, 73 percent central and 68 percent south. Four inch soil temperatures averaged 72 degrees north, 73 degrees central and 74 degrees south.

Weather Summary for the Week Ending 8 am Monday 7/26/04

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	.26	17.12	-1.75	88	60	74.	0	1682	248	74
CANOE BROOK	1.97	22.16	2.20	91	60	74.	-1	1830	408	94
CHARLOTTEBURG	1.56	22.38	2.25	86	58	71.	-2	1553	378	92
FLEMINGTON	2.08	27.13	7.82	89	59	72.	-2	1724	252	96
LONG VALLEY	1.30	19.80	-.87	84	60	70.	-3	1487	234	93
NEWTON	.80	18.75	.33	87	59	71.	-2	1577	294	92
FREEHOLD	.49	20.93	2.19	89	58	73.	-2	1867	285	79
LONG BRANCH	.01	18.19	-.44	85	65	74.	-1	1686	181	48
NEW BRUNSWICK	1.46	21.99	3.34	88	61	73.	-3	1830	161	96
TOMS RIVER	.16	21.08	1.93	88	63	75.	0	1921	409	42
TRENTON	1.84	18.94	1.13	88	64	74.	-3	1902	167	88
CAPE MAY COURT HOUSE	.12	16.58	.03	86	65	74.	-2	1830	219	48
DOWNSTOWN	.24	18.83	1.42	88	64	74.	-3	1977	230	65
GLASSBORO	.21	28.01	9.59	88	65	75.	-1	2096	373	64
HAMMONTON	.04	20.03	1.62	90	63	75.	-2	2045	324	54
POMONA	.02	16.65	.07	88	64	76.	0	1956	354	41
SEABROOK	.25	23.18	6.34	87	63	75.	-2	2194	440	66
SOUTH HARRISON	.64	22.71	4.09	87	65	75.	NA	2083	NA	NA

WES KLINE — GDD BASE 40 PINEY HOLLOW Last Week 222 (Ending 7/19/04) This Week 211 (Ending 7/26/04)

Rutgers Cooperative Extension - NJAES
U.S. DEPARTMENT OF AGRICULTURE
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Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The pesticide user is reponsible for proper use, storage and disposal, residues on crops, and damage caused by drift. For specific labels, special local-needs label 24(c) registration, or section 18 exemption, contact RCE in your County.

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