RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

ORGANIC FARMING EDITION $1.50 OCTOBER 25, 2001/OCT./NOV. ISSUE

INSIDE

Tests Abound for Determining GMO Levels in Crops

Reprinted from AgAnswers, The Ohio State University and Purdue University, http://www.aganswers.net, Oct. 9, 2001.

Farmers who grow non-genetically modified organism (GMO) crops for specialty markets can utilize a variety of tests to ensure that their crops are GMO-free. A number of tests measure levels of herbicide and insect tolerance in such crops as corn and soybeans. "These tests are commonly used by grain elevators, crop consultants and others when they check grain before it's sent off to market," said Peter Thomison, Ohio State University agronomist. The tests can determine what percentage of a crop, if any, contains GMOs, allowing producers to compete in national and inter-national grain markets where non-GMO certification standards are strict.

Currently, the standard for GMO certification is set at zero tolerance, although several proposals have been developed to set the maximum allowable levels between 1 percent and 3 percent.

Japan recently introduced legislation that sets a zero tolerance for seed and food imports containing unapproved biotech material. StarLink corn is one such example. The Japanese legislation also requires food products containing less than 5 percent approved GMOs be labeled non-GMO products. The European Union (EU) also has proposed rules on the labeling of foods containing GMOs. EU rules would allow food and feed to contain up to 1 percent GMO material without being labeled a GMO product.

"I would imagine a grower would be in quite a bind if the contamination level of his crop exceeded that 1 percent or the tolerance level that is set by the end user. He'd have to sell his corn or soybeans at the conventional market," Thomison said. "This is something that organic producers are concerned about. They want to make sure their end users are willing to take their products, and these tests will help them achieve that."

The most common types of GMO tests used include herbicide bioassays, enzyme-linked immunosorbent assay - or ELISA - and the polymerase chain reaction (PCR) method.

Herbicide bioassays are used to detect GMO herbicide-resistant traits in Roundup Ready and Liberty Link soybeans. The test involves placing seeds in a germination medium containing diluted solution with the herbicide, or directly spraying the seeds with the herbicide. Seeds that develop normally test positive for the GMO herbicide trait, while

SEE GMO TESTS ON PAGE 2

GMO Tests page 1

those that die or do not develop normally are considered GMO-free. The assay is inexpensive - $20-$30 - but test results can take up to a week.

ELISA tests detect the presence of a specific protein that the GMO DNA produces in a plant. Several versions of ELISA exist, including the "strip test" or "dipstick" procedure that uses lateral flow strips and delivers results in 2-5 minutes, and the "plate test" that uses color intensity to determine what percentage of the grain is GMO material.

The PCR method is more accurate than ELISA, in that it measures exactly where the GMO is present on the DNA gene sequence. The PCR method is highly sensitive but can take up to three days to com-plete. PCRs cost between $75 and $300 per sample.

"A typical procedure for a food-grade corn or soybean producer, for example, might be for him to test samples or ask a certifying association to come out and monitor his field throughout the season," Thomison said.

"The association would then certify his field as non-GMO and finalize the procedure by taking samples of grain from the field and checking it in their lab. The grower would then present that certification to the end user, who would probably turn around and retest the product again."

The tests are designed to identify traits of different GMO "events," such as Bt corn or Roundup Ready or Liberty Link herbicide-resistant soybeans, Thomison said. End users would subject a farmer's grain to a battery of tests based on the types of crops grown in Ohio and how prevalent the GMO events would be, he said. Presently, six GMO events exist. A new GMO event, rootworm Bt, is expected to be released to the market next year.

"While there is a sizable number of farmers who want GMO crops, there are also a number who don't want them either," Thomison said. "Some farmers don't want GMO crops because they have reservations about possible risk to human health and adverse effects to the environment. Others are somewhat indifferent to the GMO issue and are trying to take advantage of the market that is there. The industry hopes that the furor of GMO products will die down when the public sees there are no negative issues resulting from the use of GMO products."

Less than 5 percent of the corn grown in Ohio is genetically modified, while nearly 70 percent of the soybeans are Roundup Ready.

Ohio State's Crop Observation and Recommendation Network (C.O.R.N.) newsletter contains a list of labs that test crops for GMOs. The newsletter is available online at http://corn.osu.edu/archive/2001/sep/01-31.html#linkc.

Submitted by Dan Kluchinski, Mercer County Agricultural Agent. ❑

Preventing Damage from an Early Frost

Stephen Reiners, Associate Professor in Horticultural Sciences, Cornell University

Reprinted from Long Island Fruit & Vegetable Update, No. 27, Sept. 7, 2001.

An early frost can have disastrous results. There are two types of frost, advective or radiation. Advective frosts occur when a cold front sweeps into an area. Winds are typically gusty, clouds may occur and the thickness of the cold air layer may reach more than a mile high. One seldom sees the first frost of the season under these conditions. The first frost is typically a radiation frost. These occur under a clear sky and calm winds. Typically an inversion layer develops. The term inversion means that atmospheric conditions are inverse or opposite to normal daytime conditions when air temperature decreases with height. In an inversion, cold air collects near the ground while warmer air lies above this trapped cold layer.

Typically, we may have 3 – 5 weeks of good weather following a frost but the crops have already been damaged or killed. Rather than just talking about the weather, there are several things that growers can do to minimize the effects of the first radiation frost. These include:

Watch the Calendar and the Forecast

Know when the average first frost will be in your area. This is the date by which a frost will occur 50% of the time. In looking over weather records in upstate New York over the past 50 years, it seems that this date is coming later each decade (although the date of the last spring frost has not changed much). Keep a careful eye on the weather forecast too. Air with a low humidity will not hold as much heat as more humid air and will cool quickly at night.

Beware the Full Moon?

People have always associated the full moon with an increased chance of frost, the belief being that the moon reflects heat from the sun to the earth's upper atmosphere. This heat effect, though small, is at a maximum near the time of full moon. The heat evaporates as a light haze or thin cloud formations. Clearing the sky in that way, heat radiates from the surface of the earth and frost is more likely. However, in reviewing weather records of four locations in the Northeast for the last 100 years, a full moon did not increase the chance of a frost. It was just as likely to occur when no moon was present as when the moon was full!

Harvest Early

A crop like tomatoes is very sensitive to frost. If you have no way to protect plants, you may want to harvest

See Early Frost on page 3

EARLY FROST FROM PAGE 2

all fruit that are in the mature green state of ripening. Fruit harvested at this stage will still ripen, albeit not with the same flavor as fruit harvested with some color. Since you will need to store the fruit, wash in a chlorine bath. Dry and place in boxes in a warm, dark location with some air movement. Tomatoes do not need light to ripen, in fact, light will slow ripening. Store where the temperature does not go below 55°F. Lower temperatures will cause the fruit to be poorly flavored.

Use the Soil

Your soil serves as a heat reservoir. As it may take a while in the spring for a soil to warm, it also takes time in the fall for it to cool. A loose, cultivated field insulates the soil and prevents heat movement from the soil to the air (and around the plants). This results in frost. A more compacted soil, typical of a field near the end of the season, will lose heat more quickly to the air, protecting the plants from frost. The bottom line - do not cultivate when a frost threatens.

Irrigate Before the Frost

A moist soil can hold 4 times more heat than a dry soil. It will also conduct heat to the soil surface faster than a dry soil, aiding in frost prevention. In a study performed years ago, the air temperature above a wet soil was 5°F higher than that above a dry soil and the difference was maintained until 6 am the next morning.

Row Covers

The use of a floating row cover can give you 2°F to 5°F protection. The covers can be laid right over the crop and no support other than the plants is needed. They come in varying lengths and widths, depending on your need. The cost can be high as the material will cost $500 - $700 per acre. You will also need additional labor to help you get the covers on the crop. The best time to apply would be in the late afternoon after the wind has died down. Remove the next morning. If you are careful and avoid ripping the covers you should be able to use the covers over several nights and even next year.

Irrigate During the Potential Frost

Strawberry growers often irrigate their crop on a potentially frosty spring night to protect the crop. Typically, sprinklers are mounted above the crop canopy. As the water freezes, heat is released, 80 calories for each gram of water that freezes. As long as ice is being formed, heat will be released. Often the crop is coated with ice by morning. In fact, this is a major disadvantage as the weight of the ice will cause branches to break and plants to lodge. Also, if the irrigation rate is not high enough, you may actually cause more frost damage than if you did not irrigate. That's because if the one gram of water evaporates rather than freezes, it takes 600 calories of heat with it, cooling the environment around the plant. Compared to the 80 calories released on freezing, 7.5 times more water must be applied to provide a net heating effect. Since wind will speed evaporation, wind speeds greater than 5 MPH will make irrigation for frost protection ineffective. And once started, you cannot stop irrigating until the next morning when the sun is on the crop and the ice loosens.

Chemical Sprays

Buyer beware! Many materials will claim to provide frost protection using a variety of techniques. No commercially available product seems to be able to stand up to a replicated, scientific test. There will be some people claiming to have miracle products this fall but use them with caution. Do not put your trust in these materials.

Heaters

This has traditionally been used in some areas but the high cost of fuel makes it somewhat prohibitive. They are also more effective in orchards with tree fruit than for vegetables. They can burn propane, natural gas or oil. They are most useful when there is an inversion. The heaters break down the inversion and mix the warmer air with the cooler. Most of the protection from heaters is due to this with only a slight effect from radiated heat from the heaters.

Wind Machines

These are more often seen in orchards, similar to heaters but they could provide protection for vegetables. Like heaters, they work best when there is an inversion and warm air from above is mixed with the cold air at the surface. Typically, the fans have a diameter of about 16 feet and are mounted on a 30-foot steel tower. The engine to power the fan is usually 85 to 100 hp. The cost of installation is similar to heaters but they use only about 10% of the energy that heaters do. A single wind machine can protect 5 to 10 relatively flat acres.

Be prepared for an early frost. Use more costly methods of frost protection on your most profitable crops. By protecting your crop from that first frost, you may add weeks to your growing season.

Submitted by Wes Kline, Cumberland County Agricultural Agent. ❑

Field Cleanup for Pest Management

Kristian Holmstrom and Sarah Walker, Program Associates in Vegetable IPM

Don't forget to clean up your fields as soon as possible when harvests are completed. The practice of field sanitation, whereby crop residues are promptly and thoroughly destroyed and incorporated into the soil, is an important and basic pest management strategy. The prompt destruction of the crop will help eliminate overwintering insect populations as well as reduce the disease inoculum that can survive on infected plant tissue. For example, **European corn borers** overwinter as larvae in the stalks and stubble of corn left in the field, so make sure to thoroughly chop up and incorporate the plant material into the soil. For **black rot** infections of cole crops, and **bacterial diseases** of tomatoes, peppers, and cucurbit crops, make sure to completely incorporate the plant debris into the soil to facilitate decomposition of the plant material. Over the winter asparagus brush should be burned, or mowed and disked, to help destroy fungi like **rust** and **purple spot** that overwinter on the infected plant material. Consult the *2001 Commercial Vegetable Production Recommendations for New Jersey* manual for the crops you grow to make sure you are doing all you can in the area of field sanitation since what you do now can have a major impact on next year's crops. ❑

Test for Nematodes

Stephen A. Johnston, Specialist in Plant Pathology

Take soil samples from fields in the fall, and have them assayed for plant parasitic nematodes at the Rutgers Plant Diagnostic Lab (see page 5 for Lab information) in New Brunswick. If fields have tested with high levels of plant parasitic nematodes, consult your county agricultural agent or ag advisor for methods to reduce the population level low enough to avoid damage to next season's crops. ❑

Plastic Mulch Increases Soil Erosion, Runoff

Reprinted from Journal of Environmental Quality, Vol. 30, Sept. - Oct. 2001.

Fresh-market tomatoes are often grown in raised beds covered with plastic (polyethylene) mulch. Because 50 to 75% of the field is covered with an impervious plastic surface, there will be an increase in the quantity of runoff produced during rain events. A study by Rice et al. reports a significant increase in surface runoff volume, soil erosion with runoff, and the quantity if pesticides measured in runoff from vegetable plots with plastic mulch compared with plots with hairy vetch. Results suggest that fresh-market vegetable production with plastic mulch may have a more harmful impact on the environment than production with the vegetative mulch.

P.J. Rice, Runoff Loss of Pesticides and Soil: A Comparison between Vegetative Mulch and Plastic Mulch in Vegetable Production Systems. J. Environ. Qual. 30: 1808-1821.

Submitted by Joseph Heckman, Specialist in Soil Fertility. ❑

Will Soil Survive Copper Pesticides?

Reprinted from Journal of Environmental Quality, Vol. 30, Sept. - Oct. 2001.

Copper (Cu) sprays are widely used agriculturally to control plant diseases and are acceptable in organic agriculture, partly because Cu is a natural product with relatively low mammalian toxicity. A study by Epstein and Bassein estimated the amount of Cu that loaded into soil in fields where multiple pesticide applications are made each year. Because Cu tends to accumulate in the topsoil, and many soil microorganisms that are essential for long-term soil function are harmed by Cu, the authors question whether current use of Cu is a sustainable practice in some fruit and nut orchards that are heavily treated.

L. Epstein, Pesticide Applications of Copper on Perennial Crops in California, 1993 to 1998. J. Environ. Qual. 30: 1844-1847.

Submitted by Joseph Heckman, Specialist in Soil Fertility. ❑

Future of Our Food and Farms Summit

The 3rd Annual Future of Our Food and Farms Summit is on Nov. 29 and 30, 2001 at the Renaissance Philadelphia Hotel Airport in Philadelphia, PA.

Network with farmers, faith-based food providers, legislators and government officials, educators, agribusiness representatives, food wholesalers and retailers, food bank representatives, nutritionists, extension agents, and youth from the Mid-Atlantic region.

The Mid-Atlantic region has a wealth of resources - including some of the richest agricultural soils in the world. It has a diversity of residents - from urban populations - including Philadelphia, PA - to large rural populations including the Amish community in Lancaster, PA.

Competing uses for its vast resources have important implications for our future food system. As federal programs and policies are increasingly shifted to states, local governments and the nonprofit sector to implement — it is important that farmers, consumers, industry, government and nonprofits collaborate.

The Summit is creating a place where these interests can come together to share ideas about problems and solutions affecting the farm and food system in the region. Our intent is to develop and promote recommendations that will guide the formation of farming and food policy in the Mid-Atlantic region, and set the stage to influence future federal, state and local government policies.

Some highlights: Four Secretaries of Agriculture from Pennsylvania, Delaware, Maryland and New Jersey will keynote the opening session. (The US Secretary, Anne Veneman, has been invited). A pre-Summit Hunger Congress, put together by the Food Resources Alliance (FRA), with invited state and federal legislators, will highlight evolving public policies impacting hunger in our region. JoAnn Connelly President of the Greater Philadelphia Food Bank will moderate this session. Thursday's dinner will be a feast of locally grown foods, put together by some of the region's top chefs, including Jill Horn, Delilah Winder, Jack McDavid, and Kevin von Klaus. Finally, with this year's Summit, we are initiating an annual award to be given to the person, organization, or business that has done the most to benefit the Mid-Atlantic food and farming system.

We will disseminate policy recommendations that grow out of discussions at the Summit to leaders in the farm and food system throughout the Mid-Atlantic region.

At the Summit you will hear from experts and your peers about how the region's food system works today - and where it is going - and how we can help to shape it for the future. Learn about inner-city supermarkets, minority entrepreneurs, genetically modified food (GMO's), women in agriculture, rotational grazing, youth involvement in agriculture, marketing to today's health conscious consumers, cooperatives, ethnic produce -and much, much more!

Visit our web site at http://www.foodfarm.org or for more information, contact: Meredith Stone at 215-568-0830 • Ext.10 or e-mail fmtrust@libertynet.org. ❑

Rutgers Plant Diagnostic Laboratory

The Plant Diagnostic Laboratory and Nematode Detection Service is a diagnostic service available to the residents of the State of New Jersey. The mission of the Plant Diagnostic Laboratory is to cooperate with Rutgers Cooperative Extension personnel to provide the residents of New Jersey with accurate and timely diagnoses of plant problems. There is a fee for this service.

The laboratory was established in 1991 on the Cook College campus of Rutgers, The State University of New Jersey.

- ❖ Diagnostic Services
- ❖ Disease and Insect Pest Diagnosis
- ❖ Plant and Weed Identification
- ❖ Insect Identification
- ❖ Nematode Assays
- ❖ Screening for Acremonium Endophytes
- ❖ Benzimidazole Fungicide Resistance Screening
- ❖ Other Services Available by Contract

Fees

All In-State Samples (except fine turf) ... $20
In-State Fine Turf $50
All Out-of-State Samples $75
Other Services Negotiable

For sample submission instructions and forms, visit our web site at: http://www.rce.rutgers.edu/plantdiagnosticlab/submissions.html

Forms may also be obtained from your local county Rutgers Cooperative Extension office or via fax request (732/932-1270). ❑

Rutgers Cooperative Extension - NJAES
U.S. DEPARTMENT OF AGRICULTURE
Rutgers -The State University of New Jersey

Plant & Pest Advisory
18 College Farm Road
Cook College
New Brunswick, N.J. 08901-8551

PLANT & PEST ADVISORY
ORGANIC EDITION CONTRIBUTORS

Rutgers Cooperative Extension Specialists
Stephen A. Garrison, Ph.D., Vegetable Crops
George Hamilton, Ph.D., Pest Management
Joseph R. Heckman, Ph.D., Soil Fertility
Bradley A. Majek, Ph.D., Weed Science
Jeremy Singer, Ph.D., Field and Forage Crops
RCE County Agricultural Agents and Program Associates
Atlantic, Richard W. VanVranken (609-625-0056)
Burlington, Raymond J. Samulis (609-265-5050)
Cape May, Russell Blair (609-465-5115)
Cumberland, Wesley Kline, Ph.D. (856-451-2800)
Gloucester, Michelle Infante-Casella (856-307-6450)
Hunterdon, Winfred P. Cowgill, Jr. (908-788-1338)
Martha Maletta, Horticultural Consultant
Mercer, Daniel Kluchinski (609-989-6830)
Middlesex, William T. Hlubik (732-745-3443)
Monmouth, Bill Sciarappa, Ph.D. (732-431-7260)
Morris, Peter J. Nitzsche (973-285-8300)
Salem, Peter R. Probasco (856-769-0090)
Warren, William H. Tietjen (908-475-6505)
Vegetable IPM Program (732-932-9802)
Joseph Ingerson-Mahar, Vegetable IPM Coordinator
Kristian E. Holmstrom, IPM Program Associate
Sarah Walker, IPM Program Associate
Newsletter Production
Jack Rabin, Associate Director for Farm Services, NJAES
Cindy Rovins, Crop Management Communications Editor

Rutgers Cooperative Extension (RCE) provides information and educational services to all people without regard to sex, race, color, national origin, disability, or age. RCE is an Equal Opportunity Employer.
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.
Use of Trade Names: No discrimination or endorsement is intended in the use of trade names in this publication. In some instances a compound may be sold under different trade names and may vary as to label clearances.
Reproduction of Articles: RCE invites reproduction of individual articles, source cited with complete article name, author name, followed by Rutgers Cooperative Extension, Plant & Pest Advisory Newsletter.

For back issues, visit our web site at: http://www.rce.rutgers.edu/pubs/plantandpestadvisory/index.html.