New York Berry News

CORNELL UNIVERSITY

Volume 06, Number 2 February 28, 2007

What's Inside

Our apologies for the lateness of this month's issue! Delays seemed to be the order of the day this month as record snow falls and blustery weather made travel difficult. For those of you unable to make it to the Empire Expo due to the weather, we have included in this issue summaries for a portion of the berry session talks. Hope you will be able to join us again next year at the Expo, weather permitting, of course!

Take a moment to seriously read the lead news brief on the FDA conducting Produce Safety Hearings and the editorial that follows. The farm you save may be your own!

CURRANT EVENTS

For the first time since NYBN began in March 2002, there are no events to report! Enjoy these instead...

Tongue Twister:
How many berries could a bare berry carry?

Joke:
A sheriff walks into a saloon and shouts for everyone's attention. "Has any of you hombres heah seen Brown Paper Barry?" he asks.

"What's he look like?" asks one shoddy-looking cowboy.

"Wall, I'll tell yuh", replies the Sheriff, "he wears a brown paper hat, a brown paper waistcoat, a brown paper shirt, brown paper boots, brown paper pants, and a brown paper jacket."

"So what's he wanted fer?" asks the same cowboy.

"Rustlin'."

Riddle:
Two women and two doctors walk into an ice cream parlor. They each order an ice cream cone. When their ice creams come, there is only 1 strawberry, 1 chocolate and 1 vanilla. How come they didn't complain?

Brain teaser:
Fresh Fruit Find: Naomi and her mom spent $11.00 and purchased 31 pieces of fruit for the family. They bought at least one piece of each kind of fruit so that they would have an assortment. The amount they spent on each kind of fruit was a multiple of $0.50. They spent the most on pears. The cost of all the oranges was the same as the cost for all the lemons. They bought just one pineapple because it would serve the whole family. It cost half as much as all the pears. They spent the same amount on grapefruit as on apples, but got one more grapefruit than apples. **How many pieces of each kind of fruit did they buy?**

(Solutions on the last page)

FDA TO CONDUCT PRODUCE SAFETY HEARINGS

The U.S. Food and Drug Administration (FDA) announced on February 27 that it would conduct two public hearings concerning the safety of fresh produce. The first hearing will take place on March 20 in California. The second hearing will be on April 13 in College Park, Maryland. FDA will share information about recent outbreaks of food borne illness associated with microbial contamination of fresh produce and "solicit comments, data, and other scientific information about current agricultural and manufacturing practices used to produce, harvest, pack, cool, process, and transport fresh produce; risk factors for contamination of fresh produce associated with these practices; and possible measures by FDA to enhance the safety of fresh produce."

FDA is responsible for ensuring the safety of all domestic and imported fresh and fresh-cut fruits and vegetables consumed in the United States. For these hearings, it raises several issues and seeks answers to ten specific questions. These are (in abbreviated form):

1. At each stage in the supply form, what are the risks or practices that can lead to contamination?
2. How can or should current practices be changed to reduce the risks?
3. What current practices (e.g. GAPs- Good Agricultural Practices) reduce these risks?
4. Is sampling of produce or inputs currently done?
5. What new Federal actions are needed, if any, to assure produce safety?
6. To what account should we take into account the wide variation with the fresh produce industry (in size or type of operation, nature of commodity, practices used, vulnerability to contamination, etc.)?
7. What types of records and other information are or would be most useful in facilitating traceback efforts?
8. Are written food safety plans/assessments/ training/record keeping useful? To what extent are they in place?
9. How should adherence to GAPs or any new guidance's be measured?
10. How would any proposed new Federal measures affect small business such as roadside stands, farm gate operations, farmers markets or other small businesses involved in direct sales?

Data reported to the U.S. Centers for Disease Control indicate that between 1973 and 1997 reported outbreaks of food borne illness in the U. S. associated with fresh produce increased in absolute numbers and as a proportion of all reported food borne outbreaks.

Unpublished data compiled by FDA indicate that from 1996 to 2006 there were approximately 72 reported outbreaks of food borne illness associated with approximately 20 fresh produce commodities. Of these, 12 outbreaks were associated with tomatoes, 11 with melons, and 24 with leafy greens such as lettuce and spinach.

These outbreaks involved a number of pathogens, including E. coli O157:H7 and Salmonella species, and both domestic and imported produce.

FDA believes that recommended GAPs, when implemented, can be effective in reducing the risk of microbial contamination of fresh produce. "However, the fact that outbreaks of food borne illness associated with fresh produce continue to occur supports a close examination of the extent to which these measures have been implemented; whether, if implemented properly, they have been effective; and what additional or different interventions might be appropriate to reduce the risk of future outbreaks."

(Reprinted from: The Strawberry Grower, North Carolina Strawberry Growers Association Newsletter, Vol. 13 No 3, March 2007; For those of you who may not be aware of this group, their contact information is as follows: NC Strawberry Association, 1138 Rock Rest Rd., Pittsboro, NC 27312, phone: 919-542-3687, fax: 919-542-4037, email: ncstrawberry@mindspring.com, website: http://www.ncstrawberry.com/.)

ARE WE DOING OUR PART TO ENSURE THE SAFETY OF OUR BERRIES?

Cathy Heidenreich, Small Fruit Extension Support Specialist, Department of Horticulture, Cornell University's College of Agriculture and Life Sciences, Ithaca, NY 14853

"Food Safety Begins on the Farm - We're Doing Our Part, Are You?" This adaptation of the GAPS (Good Agricultural Practices) program slogan might be the title of a promotional piece on food safety which you tuck into every purchase from your farm stand or PYO. It might include a brief discussion of the risks of food-borne illnesses, what you do every day on your farm to minimize these risks and ensure customer safety, and how the customer can become a partner in this process by washing hands before and after handling produce on the farm and after using restroom facilities, as well as properly washing, handling, and storing produce at home.

Coming up with just such a slogan and promotional piece were the first things I thought of while attending the Ontario Fruit and Vegetable convention last week where a large portion of the berry session was devoted to food safety. How would I protect the consumers of my dream berry farm/operation from food –borne illnesses? What else would it take besides a slogan and a brochure?

In the wake of recent events on the west coast of the US, the first speaker, Ben Chapman, from the University of Guelph, really brought the point home. The title of his talk was "Learning from Produce Outbreaks: Creating a Culture of Food Safety in the Berry Industry". The first fact he shared was that the local farmer is one of the people most trusted by produce consumers, according to national surveys in Canada and the US. Are we worthy of that trust? Are we doing our part in creating and maintaining a culture of food safety? Let's do more than just hope our consumers don't find that trust misplaced. If we each do our part, creating a culture of food safety can soon be a reality for the New York Berry industry.

Chapman indicated it's not a case of "if", but "when" we have an outbreak. The potential for berries, like all other commodities, is the same...all it takes is *one* reported incident. Here are some of the questions he addressed to the audience:

- Does our berry industry have a proactive plan in place?
- Are we ready now to do IMMEDIATE crisis intervention as an industry when this occurs?
- Do we have an industry spokesman for food safety?
- Are we ready to run Google Ads or make Wikipedia entries to report on situations or incidents from the industry perspective including what's being done to further reduce risks?
- Are we as an industry consistently involved in interventions to reduce risks, like investing in food safety research, building strong industry groups, addressing gaps in science, encouraging members to actively engage in food safety evaluation and planning, underwriting food safety education, developing promotional pieces like the one suggested above that could be distributed by our berry industry and personalized for our local growers?

Let's take it another step closer to home. What if a reported incident occurred on my dream farm? What would my response be? Would I be able to say with assurance (and verify with documentation) that I was doing my part? How about you? Have you done a food safety self assessment? Do you have a food safety plan in place? It's time now to step up to the plate and just do it!

Resources are available to assist you with this process through the Good Agricultural Practices Program, located at: http://www.gaps.cornell.edu/.

Finally, let's find wisdom in Ben Chapman's closing remarks "Don't make the customer the last line of defense...don't charge more for food safety, its one of the costs of doing business...this is a farm to fork issue...create a culture of food safety."

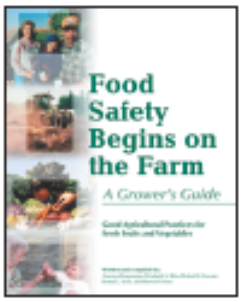
Resources

Food Safety Begins on the Farm: A Grower's Guide

A. Rangarajan, E.A. Bihn, R.B. Gravani, D.L. Scott, and M.P. Pritts © 2000

This 28-page color booklet provides an overview of good agricultural practices that can be implemented on farms and in packinghouses as well as background information on food borne illnesses related to produce consumption.

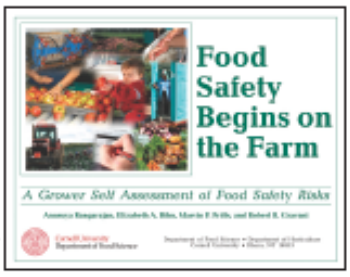
Available in English or Spanish.



Food Safety Begins on the Farm: A Grower Self Assessment of Food Safety Risks

A. Rangarajan, E.A. Bihn, M.P. Pritts, and R.B. Gravani © 2003

The assessment is designed to guide growers through the process of identifying risks particular to their operation, developing appropriate solutions, implementing good agricultural practices and developing a farm food safety plan. This document has 21 sections allowing growers to evaluate many different parts of their operation including harvest sanitation, worker hygiene, wild animals, water use, farm biosecurity, and crisis management. Each section contains worksheets so that growers can document their progress and plan for GAPs implementation.



JOHANNS UNVEILS 2007 FARM BILL PROPOSALS

WASHINGTON, Jan. 31, 2007 - Agriculture Secretary Mike Johanns today unveiled the U.S. Department of Agriculture's 2007 farm bill proposals. The more than 65 proposals correspond to the 2002 farm bill titles with additional special focus areas, including specialty crops, beginning farmers and ranchers, and socially disadvantaged producers.

"We listened closely to producers and stakeholders all across the country and took a reform-minded and fiscally responsible approach to making farm policy more equitable, predictable and protected from challenge," said Johanns. "We started with the 2002 farm bill and propose to improve it by bolstering support for emerging priorities and focusing on a market-oriented approach."

USDA began preparations for the 2007 farm bill in 2005 by conducting 52 Farm Bill Forums across the country. More than 4,000 comments were recorded or collected during forums and via electronic and standard mail. These comments are summarized in 41 theme papers. USDA economists, led by Dr. Keith Collins, studied the comments and authored five analysis papers.

The proposals unveiled today represent the final phase of a nearly two year process. Each detailed proposal provides information about why a change is needed, the recommended solution, and relevant background information about the impacted program or policy.

Highlights of the proposals include (funding reflects ten year totals):

- Increase conservation funding by $7.8 billion, simplify and consolidate conservation programs, create a new Environmental Quality Incentives Program and a Regional Water Enhancement Program
- Provide $1.6 billion in new funding for renewable energy research, development and production, targeted for cellulosic ethanol, which will support $2.1 billion in guaranteed loans for cellulosic projects and includes $500 million for a bio-energy and bio-based product research initiative
- Target nearly $5 billion in funding to support specialty crop producers by increasing nutrition in food assistance programs, including school meals, through the purchase of fruits and vegetables, funding specialty crop research, fighting trade barriers and expanding export markets
- Provide $250 million to increase direct payments for beginning farmers and ranchers, reserve a percentage of conservation funds and provide more loan flexibility for down payment, land purchasing and farm operating loans
- Support socially disadvantaged farmers and ranchers by reserving a percentage of conservation assistance funds and providing more access to loans for down payments, land purchasing and farm operating
- Strengthen disaster relief by establishing a revenue-based counter-cyclical program, providing gap coverage in crop insurance, linking crop insurance participation to farm program participation, and creating a new emergency landscape restoration program
- Simplify and consolidate rural development programs while providing $1.6 billion in loans to rehabilitate all current Rural Critical Access Hospitals and $500 million in grants and loans for rural communities to decrease the backlog of rural infrastructure projects
- Dedicate nearly $400 million to trade efforts to expand exports, fight trade barriers, and increase involvement in world trade standard-setting bodies
- Simplify, modernize, and rename the Food Stamp Program to improve access for the working poor, better meet the needs of recipients and States, and strengthen program integrity

The Administration's 2007 farm bill proposals would spend approximately $10 billion less than the 2002 farm bill spent over the past five years (excluding ad-hoc disaster assistance), upholding the President's plan to eliminate the deficit in five years. These proposals would provide approximately $5 billion more than the projected spending if the 2002 farm bill were extended.

The proposals are available at www.usda.gov/farmbill. Also posted on USDA's website are the Farm Bill Forum transcripts, farm bill comments submitted by the public, theme papers summarizing the comments and USDA analysis papers.

Fact Sheet: A Commitment to Rural America

DEMOCRATS' SPENDING PLAN PRESERVES AGRICULTURAL RESEARCH FUNDS

Thursday 08 Feb 2007. Although a spending proposal in Congress would ax all earmarked projects for the remainder of this year, the plan unveiled this week would actually preserve for universities almost all of the $185-million set aside in last year's appropriations for agricultural-research earmarks. That and other details about the proposal, including its effect on National Institutes of Health grants and earmarks in other agencies, emerged on Tuesday.

As for the NIH, the plan's call for a 2-percent increase, to $28.9-billion, would help the agency expand the number of research-project grants awarded this year by nearly 10 percent, to roughly 10,000. That would reverse a decline in recent years.

Over all, higher-education officials were jubilant about the proposal, House Joint Resolution 20, unveiled by Congress's Democratic leadership on Monday (*The Chronicle*, January 30). The measure would increase spending for Pell Grants and scientific research for the rest of the 2007 fiscal year, which ends September 30. The House of Representatives is expected to approve the bill in a vote today and the Senate to do so in February.

But higher-education leaders were also bracing for the effect of the earmark moratorium. To pay for other priorities, appropriations-committee leaders raided some of the money set aside in 2006 for earmarks, the controversial, noncompetitive awards directed by members of Congress to universities and other constituents.

In the case of agricultural research, though, what the plan would take with one hand, it would give with the other.

The Democrats would remove $185-million in earmarks in the Department of Agriculture's Cooperative State Research, Education, and Extension Service. But, following sustained lobbying by land-grant universities, the appropriations committees agreed to keep that money within that agency in 2007, but to shift it to other, nonearmarked accounts. Over all, the service's budget would get no increase over 2006.

Most of the redistributed money would go to the service's Hatch Act program, which distributes funds to land-grant institutions according to a population-based formula. The Hatch program's budget would nearly double, to $322.6-million. Some of the shifted money, $9-million, would go to increasing to $190-million the budget for the National Research Initiative, the service's principal program of competitively awarded research grants.

However, some land-grant universities will be winners under this plan, while others will lose, said Ian L. Maw, vice president for food, agriculture and natural resources at the National Association of State Universities and Land-Grant Colleges. The losers will include institutions that got more money through earmarks in 2006 than from other department programs like the Hatch Act funds, he said.

"I think that it will be a tough row to hoe, but some of them will finds ways in their own budgets and using state money to keep these projects going" in 2007, he said.

(Source: Chronicle of Higher Education)

HONEY BEE DIE-OFF ALARMS BEEKEEPERS, CROP GROWERS AND RESEARCHERS

University Park, Pennsylvania (January 31, 2007)-- An alarming die-off of honey bees has beekeepers fighting for commercial survival and crop growers wondering whether bees will be available to pollinate their crops this spring and summer.

Researchers are scrambling to find answers to what's causing an affliction recently named Colony Collapse Disorder, which has decimated commercial beekeeping operations in Pennsylvania and across the country.

"During the last three months of 2006, we began to receive reports from commercial beekeepers of an alarming number of honey bee colonies dying in the eastern United States," says Maryann Frazier, apiculture extension associate in Penn State's College of Agricultural Sciences. "Since the beginning of the year, beekeepers from all over the country have been reporting unprecedented losses.

"This has become a highly significant yet poorly understood problem that threatens the pollination industry and the production of commercial honey in the United States," she says. "Because the number of managed honey bee colonies is less than half of what it was 25 years ago, states such as Pennsylvania can ill afford these heavy losses."

A working group of university faculty researchers, state regulatory officials, cooperative extension educators and industry representatives is working to identify the cause or causes of Colony Collapse Disorder and to develop management strategies and recommendations for beekeepers. Participating organizations include Penn State, the U.S. Department of Agriculture, the agriculture departments in Pennsylvania and Florida, and Bee Alert Technology Inc., a technology transfer company affiliated with the University of Montana.

"Preliminary work has identified several likely factors that could be causing or contributing to CCD," says Dennis vanEngelsdorp, acting state apiarist with the Pennsylvania Department of Agriculture. "Among them are mites and associated diseases, some unknown pathogenic disease and pesticide contamination or poisoning."

Initial studies of dying colonies revealed a large number of disease organisms present, with no one disease being identified as the culprit, vanEngelsdorp explains. Ongoing case studies and surveys of beekeepers experiencing CCD have found a few common management factors, but no common environmental agents or chemicals have been identified.

The beekeeping industry has been quick to respond to the crisis. The National Honey Board has pledged $13,000 of emergency funding to the CCD working group. Other organizations, such as the Florida State Beekeepers Association, are working with their membership to commit additional funds.

This latest loss of colonies could seriously affect the production of several important crops that rely on pollination services provided by commercial beekeepers.

"For instance, the state's $45 million apple crop -- the fourth largest in the country -- is completely dependent on insects for pollination, and 90 percent of that pollination comes from honey bees," Frazier says. "So the value of honey bee pollination to apples is about $40 million."

In total, honey bee pollination contributes about $55 million to the value of crops in the state. Besides apples, crops that depend at least in part on honey bee pollination include peaches, soybeans, pears, pumpkins, cucumbers, cherries, raspberries, blackberries and strawberries.

Frazier says to cope with a potential shortage of pollination services, growers should plan well ahead. "If growers have an existing contract or relationship with a beekeeper, they should contact that beekeeper as soon as possible to ascertain if the colonies they are counting on will be available," she advises. "If growers do not have an existing arrangement with a beekeeper but are counting on the availability of honey bees in spring, they should not delay but make contact with a beekeeper and arrange for pollination services now.

"However, beekeepers overwintering in the north may not know the status of their colonies until they are able to make early spring inspections," she adds. "This should occur in late February or early March but is dependent on weather conditions. Regardless, there is little doubt that honey bees are going to be in short supply this spring and possibly into the summer."

(For more information contact: Maryann Frazier, 814-865-4621, mxt15@psu.edu)

NEW YORK FARM NUMBERS DECREASE

February 2, 2007. The number of farms in New York dropped from 35,600 in 2005 to 35,000 in 2006, according to Stephen Ropel, Director of USDA's National Agricultural Statistics Service, New York Field Office.

The amount of land in farms decreased from 7.55 to 7.50 million acres, giving an average size farm of 214 acres in New York. There have also been shifts in the number by sales class. Large farms with sales over $100,000 decreased by 700. There were 5,700 farms in that class in 2006. The area of land operated by these farms was 3.70 million acres making the average size 649 acres per farm in2006.

Medium size farms, those having sales between $10,000 and $99,999, decreased 700 to total 10,700. The amount of land they operated was 2.05 million acres. There were 800 more small farms with sales between $1,000 and $9,999 in 2006, at 18,600.

The land in farms increased from the previous year to 1.75 million acres, giving an average farm size of 94 acres. There were 1,300 farms with sales of $500,000 or more operating
1.50 million acres in 2006.

NY BEGINNING FARMER PROJECT AWARDED NYFVI GRANT

The Small Farms Program, along with a Leadership Team of ten Cornell Cooperative Extension Educators, has been awarded a NY Farm Viability Grant to develop resources and networks to help aspiring farmers anywhere in NY get the assistance they need for start-up and long-term success. This includes creating a new website with downloadable information and structured learning modules, an educator-led online course, collaboration on regional trainings, packages of recommended curricula and training templates for Ag Educators, and one-on-one business planning assistance for serious new farmers.

Please contact Erica Frenay at ejf5@cornell.edu or 607-255-9911 if you have questions or would like to be involved in any way in this project.

FARM BUILDING INSPECTIONS BY TOWNS STARTED JANUARY 1, 2007

The New York Department of State recently issued new regulations governing the inspection of all non-residential buildings by town officials. Under these new regulations, which went into effect on January 1, 2007, all non-residential buildings, including farm buildings, will need to be inspected every three years for compliance with the property maintenance code and certain aspects of the fire safety code.

While historically farm buildings have been exempt from the building code, they have had to adhere to the property maintenance code and fire safety code provisions dealing with general safety methodologies and practices. Unfortunately, the recently revised versions of these codes were intended for non-residential buildings such as office buildings and do not recognize the unique nature of farm buildings. They therefore have a series of requirements that could prove to be quite costly to farmers. Beyond that there has been no clear guidance given to farmers about which aspects of the fire code they need to follow.

New York Farm Bureau has been actively engaged with the Department of State over the past few months to address this situation. While the Department has committed to addressing this issue, a formal solution will not be possible until after the regulations are in place. With that in mind, the Department is advising towns to NOT inspect farm buildings until after a formal solution has been reached.

If you are visited by a building inspector: Recognizing that not all towns may receive this position from the Department, we are advising farms to politely request that any building inspector intent on inspecting the farm first contact:

Cheryl Fischer, P.E. Assistant Director of Code Interpretations
New York State Department of State Code Enforcement and Administration
41 State Street, Suite 1130, Albany, NY 12231
Tel: 518-474-4073 FAX: 518-486-4487

Additionally, in order to protect your livestock, building inspectors should be adhering to appropriate biosecurity protocols when entering the farm. A list of Best Management Practices for farm visitors can be found on our website: www.nyfb.org Inspectors who have questions should again contact Cheryl Fischer.

Please be assured that New York Farm Bureau is committed to finding a solution to this issue and will keep you updated on the progress. If there are building inspectors that are not understanding of the unique position of agriculture, please let us know and the Department of State will discuss the issue with them.

HIGH TUNNEL SMALL FRUIT RESEARCH UPDATE

Kathy Demchak, Senior Extension Associate, Department of Horticulture, Penn State University

Research on small fruit crops in high tunnels was continued in 2006 at "Tunnel Town" at the Horticulture Research Farm at Rock Springs, PA. Most of the work this year was on strawberries, though there were a few interesting observations on other crops as well.

Strawberry plants were planted in the fall of 2005 and were harvested in the spring and early summer of 2006. Cultivars tested were the spring-bearers 'Chandler', 'Ventana', 'Araza' (it was supposed to be 'Albion', a day-neutral), and 'Carmine', and day-neutrals 'Seascape', NC 3-5 and NC 3-8. In a nutshell, we found that 'Chandler' was still the best June-bearer under these conditions, producing about 0.8 lb/plant. This was a relatively low yield for 'Chandler', but the plants got off to a bad start in the fall. I think the problem was due to high soluble salt levels at 3.85 mmhos/cm (not everyone's agreeing with me on this one). The good part was that we found that we could flush the salts to the area between the rows using about 10 days (2-3 days per week) of 8-hour per day trickle irrigation. The salt eventually appeared on the soil surface between the rows of plastic, and new leaves stopped having burned edges. From this point on, plants appeared to be very healthy, and yields were adjusted to a per-plant basis, since some plants had died or had been removed if very low in vigor. 'Ventana' produced about half the yield of 'Chandler', though berries were slightly larger. The harvest season for 'Ventana' ran about 5 days earlier than for 'Chandler'. 'Araza' and 'Carmine' had very low yields at 1/3 pound per plant or less, and both also produced smaller berries than either 'Chandler' or 'Ventana'.

The day-neutrals were harvested only for the spring crop, since the hot temperatures in the high tunnels would have likely brought them to a halt for a couple of months, and we didn't want to occupy an entire commercial-sized tunnel for a dozen small plots. All performed very well. The most pleasant discovery of the year was the performances of the day-neutral selections NC 3-5 and NC 3-8, which are from Jim Ballington's breeding program at NC State. Both produced nearly 1.5 pounds of fruit per plant, which lasted about a month longer into the summer than for the June-bearers. Yield of 'Seascape' was slightly lower, at 0.8 lb/plant. Fruit size on all of the day-neutrals was the same or slightly larger than for 'Chandler' (given for comparison purposes), and color, size, and flavor were excellent for all three of them.

The worst discovery in the high tunnel work this year was that sowbugs and earwigs apparently like strawberry fruit very well. It's likely that the mild winter temperatures in high tunnels are allowing their populations to survive the winters more easily than in the field.

The 'Autumn Britten' and 'Heritage' raspberries and 'Triple Crown' blackberries that were planted in 2000 are continuing to grow and produce, though we didn't collect yield data from them in 2006. We actually tried to dig out the blackberries in 2005. They had become infested with crown borers, and it seemed that the only way to get rid of the crown borers at that point was to dig out the crowns of the blackberry plants. So the crown borers are now gone, but the plants came back with a vengeance from the remaining root pieces, which now have formed a thick hedgerow. This is making me happy that 'Triple Crown' is a USDA cultivar, since if it had been patented; I suppose I could have been illegally propagating them by digging them out. You just never know...

(Reprinted from: The Penn State Vegetable and Small Fruit Gazette Vol. 11 No. 2, February 2007)

THE NEW CORNELL SOIL HEALTH TEST: PROTOCOLS AND INTERPRETATIONS

John Idowu, Harold van Es, Robert Schindelbeck, George Abawi, David Wolfe, Janice Thies, Beth Gugino, and Bianca Moebius, on behalf of the Cornell Soil Health Initiative Team

Soil health emphasizes the holistic approach to soil management, including the integration of physical, biological and chemical processes. In the past, an overemphasis on chemical soil management has resulted in a loss of the biological and physical "fertility" of the soil. Starting in spring 2007, we will be offering the new Cornell Soil Health Test, as a fee-for-service and will be discussed in more detail.

Soil health has recently captured the attention of farmers as soil degradation from intensive cultivation, mechanization, limited crop rotations, and lack of organic matter additions have reduced yield potential. This has often led to increased soil compaction, erosion, greater disease and pest problems, and reduced crop productivity. Though soil degradation is visible on many farms, a systematic approach to characterize soil health, which transcends the conventional soil nutrient analysis, was not yet available.

Soil health deals with both inherent and dynamic soil quality. The former relates to the natural (genetic) characteristics of the soil (e.g., texture), which are the result of soil-forming factors. They are generally represented in soil surveys and generally cannot easily be changed. On the other hand, the dynamic soil quality component is readily affected by management practices and relates to the levels of compaction, biological functioning, root proliferation, etc. The dynamic component is of most interest to growers because good management allows the soil to come to its full potential. The inherent and dynamic soil quality components do interact however, as some soil types are much more susceptible to degradation and unforgiving of poor management than others.

The Cornell Soil Health Team (an interdisciplinary group of research faculty and staff, county extension educators, and growers) have been working together over the past several years to address these soil degradation issues in New York and the Northeast region and to identify a cost-effective set of laboratory measurements that can be made on a soil sample to assess/characterize its soil health (similar to soil nutrient analysis). Thanks in part to funding from USDA NE-SARE, the Northern New York Agricultural Development Program, and USDA-Hatch, the Cornell Soil Health Team evaluated 41 potential soil health physical, chemical and biological measurements on over 1500 soil samples collected from both research and grower fields under a variety of conventional and organic management practices and soil types. The accomplished goal was to identify a subset of these measurements, now called the Cornell Soil Health Test that can be used to evaluate and integrate these different processes and function for the purpose of improving soil health.

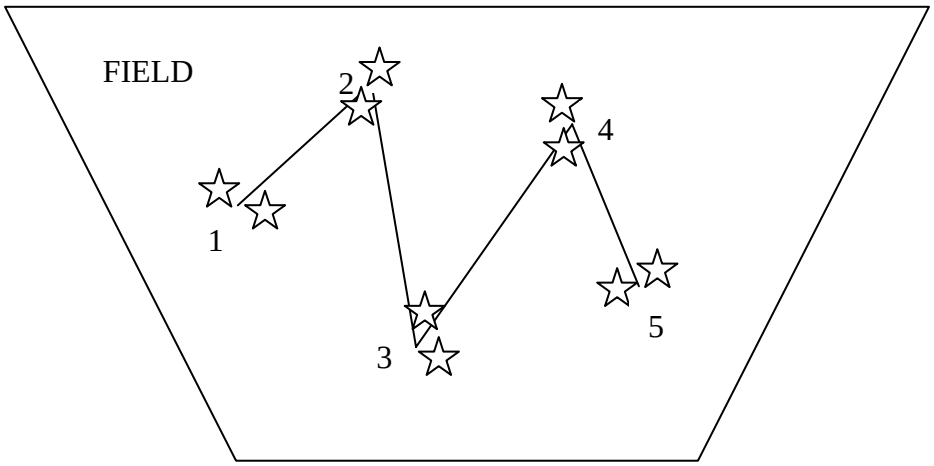
Table 1. Indicators of physical, biological and chemical health of soil and their respective soil processes.

Soil Health Assessment Indicator	Soil Functional Processes
Physical Indicators	
Aggregate Stability	aeration, infiltration, shallow rooting, crusting
Available Water Capacity	water retention
Surface Hardness	rooting, water transmission
Subsurface Hardness	rooting at depth
Biological Indicators	
Organic Matter Content	energy/C storage, water and nutrient retention
Active Carbon Content	organic material to support biological functions
Potentially Mineralizable Nitrogen (PMN)	N supply capacity, N leaching potential
Root Health Rating	soil-borne pest pressure
Chemical Indicators	
pH	toxicity, nutrient availability
Extractable Phosphorus	P availability, environmental loss potential
Extractable Potassium	K availability
Minor Element Contents (4)	micronutrient availability, element imbalances

The new test includes four physical, four biological, and seven chemical indicators (Table 1). The chemical analysis is part of the standard test as performed by the Cornell Nutrient Analysis Laboratory. The physical and biological indicators were selected based on their relevance to soil processes, ease of sampling and cost of analysis. The use of the conventional chemical test has become a routine for growers and consultants, and field sampling for the new soil health test is quite similar, using disturbed soil samples. Presently, the Cornell soil health test requires that sampling be done in the spring (mid-April through mid-June) when the soil moisture is at about field capacity and the soil's biological activity is ramping up after the winter.

The test is ideally based on a representative portion of a field that can be assumed to be reasonably homogeneous. Sections with different soil types or management history or differing slopes may be sampled separately. Also, avoid taking samples from low spots or the headlands unless you want to specifically know the soil health of these a-typical areas. In such cases, sample them separately from the rest of the field.

The soil sampling equipment is quite basic (buckets, spade, bags, etc.), but additional penetrometer measurements are required. We recommend a basic analog dial penetrometer that is sold for less than $250 (please contact your local extension educator). We suggest a so-called "nested" sampling approach where five locations in the field are visited using a "W" pattern (Figure 1). At each location two soil samples are obtained and two penetrometer measurements are made (at least 15 feet apart). All vegetation and residue cover should be removed from the soil surface, and soil is subsequently sampled to 6 inches depth. The 10 soil samples are mixed in a bucket and a composited sub-sample (approx. 1.5 quarts) is put into a zip-loc plastic bag. For penetrometer measurements, the maximum resistances are recorded for the 0-6 inches and 6-18 inches depth and entered on the submission form. As with the standard soil test, additional information needs to be entered on the standardized sample submission form to allow for interpretation of the test results. Samples should be kept cool and out of the sun until shipping.



☆ Sampling location: take 0-6” sample with a trowel or shovel and maximum penetrometer readings at 0-6” and 6-18”

Figure 1. Layout of field sampling for soil health assessment.

The results of the soil health measurements are presented in a visually enhanced format in the Cornell Soil Health Test Report (Figure 2). It is color coded and optimized for growers to identify areas to target their management efforts. The Cornell Soil Health Test Report (Figure 2) consists of:

- Grower and field information section
- List of soil health measurements
- Values of soil health measurements
- Rating of each measurement on a scale of 1 to 10, scores less than 3 are color coded red, scores greater than or equals 3 but less than 7 are colored yellow and scores greater than or equals 7 are colored green.
- List of constraints when an indicator rating is in the red (low), highlighting the soil processes affected by the low score of the indicator.
- Percentile rating of the indicator value in the database of soil health measurements in New York State.
- Overall soil quality score (out of 100)

The information learned from this test can initially serve as a baseline assessment of the sampled field (or section of field). Subsequent sampling and analysis of the soil collected from the same field (or section of field) can be used to determine the impact of newly implemented or changes in soil management practices (e.g. use of rye grain cover crops, incorporation of organic amendments, etc.) made to improve soil health or specially to address the potential soil heath constraints identified by the soil health test report. The effect of soil management practices are often somewhat site specific and can depend on the soil type and constraints within the production system so on-farm comparisons between soil management practices may also be beneficial and aided by using the new soil health test. Soil health testing may be particularly important when making field renovation decisions between planting perennial berry crops. It should be noted that thus far, test report interpretation has focused primarily on vegetable and field crop production systems but we are looking to expand our dataset and report interpretation to include perennial fruit production systems.

The new Cornell Soil Health Test is now available, starting spring 2007, at a cost of $45 per sample. Through the subsidy funding of the New York Farm Viability Institute, we will be able to process a limited number of samples from NY growers at $20 per sample. Priority will be given to samples collected from vegetable, field and forage crop fields as stated in the project objectives. We are implementing training efforts to familiarize consultants and farmers with the test, and suggest that interested farmers contact their extension educator or crop advisor for further information about the test and for more information about participation and necessary requirements to participate in the 2007 subsidy program.

For more information on the Cornell Soil Health Test, please check our website at SOILHEALTH.CALS.CORNELL.EDU

Editor's Note: Berry growers, if you are interested in learning more about the 2007 soil health program, please contact Cathy Heidenreich, mcm4@cornell.edu, 315-787-2367 for more details.

CORNELL SOIL HEALTH TEST REPORT

GROWER AND FIELD INFORMATION

	INDICATORS	VALUE	RATING	CONSTRAINT	PERCENTILE RATING*
PHYSICAL	Aggregate Stability (%)	12.4	1.0	aeration, infiltration, rooting	
	Available Water Capacity (m/m)	0.19	4.0		
	Surface Hardness (psi)	49	10.0		
	Subsurface Hardness (psi)	96	10.0		
BIOLOGICAL	Organic Matter (%)	1.9	1.0	energy storage, C sequestration, water retention	
	Active Carbon (ppm)	524	1.0	soil biological activity	
	Potentially Mineralizable Nitrogen (µgN/gdwsoil/week)	12.8	10.0		
	Root Health Rating (1-9)	1.7	10.0		
CHEMICAL	pH (see CNAL Report)	5.7	3.0		
	Extractable Phosphorus (see CNAL Report)	14.4	10.0		
	Extractable Potassium (see CNAL Report)	111	10.0		
	Minor Elements (see CNAL Report)		10.0		
	OVERALL QUALITY SCORE (OUT OF 100)		MEDIUM		66.7

*50th Percentile → BETTER

Ratings on this report are based on generalized crop production standards for New York. For crop specific nutrient interpretation and recommendation, see the attached chemical test report.

Figure 2. A specimen copy of the Cornell Soil Health Test Report.

CLIMATE CHANGE AND STRAWBERRY PRODUCTION IN THE NORTHEAST

Rebecca Harbut, Department of Horticulture, Cornell University's College of Agriculture and Life Sciences, Ithaca, NY 14853

On a global scale, atmospheric temperatures have risen 1.3°F (0.74°C) during the last century and are predicted to increase another 2.0 to 11.5 °F (1.1 to 6.4 °C) by 2100 (Intergovernmental Panel on Climate Change). In the United States, over the last century, the average temperatures have risen 1°F (0.6°C) and precipitation has increased by 5-10%, primarily due to an increase in heavy rainfall events. Although these global and national figures represent a trend, the actual impact in any specific region varies significantly, it is therefore important to pay attention to trends in a specific region in order to determine potential impacts on agriculture.

According to the US Global Change Research Program, the northeastern region of the U.S. has seen average temperature increases of 4°F over the last century, which has resulted in a decrease in days between first and last snow on the ground by 7 days. Precipitation patterns have also changed with a 20% increase in precipitation over most of the region resulting in decreased land area experiencing drought.

According to the prediction models, the northeast has amongst the lowest predicted temperature increases for the next century. Most of the temperature increase is expected to be due to increased winter minimums; forecasted increases in winter minimum range from 5-9°F (3.5°C) by 2100. Perhaps the most significant impact of climate change in the northeast is expected to be due to continued increases in precipitation with increases up to 25% forecasted.

An assessment carried out on the impact of climate change on U.S. agriculture indicates that northern regions of the U.S. will primarily benefit from the climate changes due to increased winter minimum temperatures and CO_2 concentrations. However, this is dependant on adaptation of practices. While CO_2 concentrations may increase plant growth, it will also increase weed growth, and may have impacts on the efficacy of herbicides. For example, Lewis Ziska (USDA-ARS, Beltsville,MD) found that the efficacy of round-up against control of Canada Thistle grown under 750 ppm CO_2 (ambient ~380ppm) was significantly reduced, suggesting that this and other perennial weeds may become more difficult to control.

The increase in temperatures, can have a positive impact by reducing the amount of winter injury, however, it can also have an impact on insect emergence and migration patterns. Insect life cycles are tightly regulated by temperature and therefore a shift in temperature can change the emergence time, geographic distribution and range, the number of generations observed and the ability to overwinter. It will therefore be important for growers to have excellent monitoring programs in order to track insect populations in order to identify changes in population dynamics as well as allow early detection of new insects that may be introduced.

Increases in precipitation may allow for growers to rely less on irrigation; however the challenges of increased moisture are numerous. As several fungal pathogens favor wet, humid, warm conditions, an increase in fungal pressures may be expected. Curt Petzolt and Abby Seaman of the NY State IPM Program suggest that rainfall can also decrease the efficacy of fungicides by quickly washing off residue and requiring increased number of applications to control disease (more information on Climate and Farming website). As with insects, it will be essential to have excellent monitoring and record keeping practices in place in order to track and anticipate potential challenges. Increased moisture will not only have an impact on disease, but can also affect production practices and harvest schedules. Wet conditions during spring can delay planting, while intense rainfall during harvest can be devastating to the crop.

The ability to adapt to these changes in climate will be crucial for continued successful strawberry production. There are resources that are available to growers to develop a better understanding of possible implications of climate change in order to better anticipate potential challenges. Of particular interest to fruit growers in the northeast is the Pileus Project at Michigan State University and the Climate and Farming websites. Although some of the tools for growers on the Pileus website are still being developed, the site has excellent information about potential effects of climate change on fruit production. The combined efforts of growers, breeders and applied researchers will be necessary to identify emerging issues, develop new cultivars, and devise cultural practices that will allow the strawberry industry of the northeast to meet the challenges of a changing climate.

Resources on Climate Change:

1. *U.S. Global Climate Research Project:* www.usgcrp.gov
2. U.S. National Assessment of Climate Change: www.usgcrp.gov/usgcrp/nacc/default.htm
3. *Pileus Project (Michigan State University):* www.pileus.msu.edu
4. *Northeast Regional Climate Centre:* http://met-www.cit.cornell.edu

5. *Climate and Farming:*http://www.climateandfarming.org

REDUCING WEEDS IN BERRY CROPS

Leslie Huffman, Weed Management Specialist (Horticultural Crops) Ontario Ministry of Agriculture, Food and Rural Affairs, Harrow, Ontario.

Berry growers have many pest challenges growing their crops, and weeds are often at the top of the list. Whether you are producing berries organically, on plasticulture or conventionally, there are many things you can do to reduce weeds in your crops. Many of the suggestions below refer to strawberries but some of these ideas will also apply to raspberries, blueberries and other bushberries.

If we had the perfect herbicide – one application each spring, controlling the whole spectrum of weeds for the entire season, with no crop injury and no risk to the environment – we wouldn't even be talking about this. But we know that each of the herbicides we use has its limitations, and each treatment can fill one niche of our weed management program. Even the newer reduced risk herbicides in development do not offer the prospect of perfect weed control in berries – so we need to focus on an integrated weed management program – and an important aspect of integrated weed management (IWM) is reducing weeds in your fields.

Site Selection
Every grower knows which field has the lowest weed pressure. This is important for annual weeds like pig-weed and lambs-quarters, but especially important for perennial weeds like nut-sedge, ox-eye daisy, and toadflax, where we don't have good herbicide options. Some farms are limited by soil type in where they can rotate berries, or prefer using well-placed fields for retail or PYO visibility. If you have to return to fields with high weed pressure, it is important to focus efforts on cleaning up weeds before you plant. *(Note: Where there are problems, invest in clean-up before you plant to reduce headaches later!)*

Crop Rotation
The longer I am in business, the more respect I have for the benefits that can be achieved by a well-planned rotation, especially when planting perennial crops like berries. Berry growers have used long rotations to reduce disease, nematodes or insects, but a good rotation can also reduce weed pressure. Growing field corn can give you many options of effective herbicides to reduce weed populations in general *Note: lots of postemergence control options here).* Including a winter cereal can break the life cycle of many weeds, and also gives you the option of an inexpensive treatment like 2,4-D or Buctril to clean up broadleaf weeds like thistles or dandelions. Growing Round-up Ready crops like soybeans can reduce annual weed pressure from pig-weed, lambs-quarters and annual grasses, especially if 2 applications are used. And some cover crops can be used to suppress in general. Ensure that herbicide residues from previous crops will not harm berries though.

Preplant Cleanup
The year before planting berries should be focused on all the opportunities to reduce weeds. A spring burndown with glyphosate is a good start. Weed scouting, spot treatments *(Note: timing for these is often critical e.g. bindweed- should be done while flowering)*, and effective herbicides are very important in the preplant year. In the fall, glyphosate, amitole or 2,4-D applications can effectively reduce many perennials or winter annuals.

Stale Seedbed Technique
Consider setting your field up to plant as a stale seedbed, to plant without tillage. *(Note: Works best with sandy to sandy loamy soils, not clay based soils).* A cover crop like rye should be established early the previous summer or fall. Plant a higher seed population and fertilize enough to establish a thick and uniform cover crop stand. Once growth starts in the spring, a burndown gylphosate treatment should be applied. To cut through the killed cover crop, fluted coulters and heavier press wheels can be added to your transplanter. Ensure irrigation is used after planting to help transplants establish. Herbicides can be used in no-till plantings similar to tilled plantings *(Note: herbicides as usual).* Research trials in Ontario results in good stands with little weed emergence for several months *(Note: up to 15 weeks).*

Manage Field Edges
Many problem weeds in berries like thistles, dandelions and groundsel move in from field edges. Did you know that a weed growing in a small area of soil outside of your crop may produce 10 to 150X more seeds than a weed growing ion the crop canopy? Plan some time each month to either mow weeds before they flower and seed, or use directed flaming or burndown herbicide on all edges of fields. Ditches beside your fields may also be a source of weeds, but herbicide options are limited if water is present – physically removing weeds may be required. *(Note: Whatever you do, prevent seed shed!)*

Spot Treatments
Many weed problems start in patches, but once they spread through the field, you wish you had targeted the spot where they started. Invest in some equipment dedicated to spot treatments e.g. a good hand sprayer, a wick wiper, a hand flamer and a dripper *(Note: preferred/used most often by speaker, 10L, approx. $60),* and charge them so they are ready to go. Plan the time to walk your field in May, June, and the fall, as well as any time weed regrowth is ready for treatment. Most growers find satisfaction with spot treatments, stopping weeds dead in their tracks.

Chemical renovation
This technique has proven effective in Ontario where common groundsel became the predominant weed problem. After harvest, Gramoxone is directed between the rows to kill weeds in the mulched area, as well as to narrow rows. Shields should be mounted between each nozzle to prevent drift onto the crop row. After application, renovation is completed as usual; rows are mowed down, fertilizer applied, and herbicides applied, but no soil tillage is used. Chemical renovation will drastically change the weed spectrum, so be aware that perennial weeds may enjoy the undistured soil. Also, because no soil is thrown up on the crown, this system may not be suitable where crown heaving is a problem.

Clean Mulch
Avoid introducing problem weeds into your fields with your mulch. Whether you grow your own straw or purchase it, it is very important to use straw that is free of weed seeds and cereal grains. *(Note: Inspect fields before buying/harvesting esp. for Quackgrass; prevent weed seeds in storage)* Some growers have paid custom growers to apply hormone herbicides each spring on the cereal to control broadleaf weeds like dandelion and thistles. However, applying preharvest glyphosate on cereal where straw will be used for strawberry mulch is NOT recommended. We have had several incidents in Ontario and Quebec where glyphosate residues remained on the straw, and damaged strawberry plants as they grew through the mulch the next spring *(Note: weak, spindly growth)* .

Plasticulture
Growing strawberries in plasticulture totally changes the weed problems. The black plastic mulch prevents weeds on the beds and between the plants, and tillage, flaming or mulching can control weeds between the beds. In plasticulture, common weeds like pigweed and lambs-quarters are rarely a problem. However, weeds can establish around the planting hole, especially winter annuals, so prevention is important. Hand pulling and wick wiping can be quick and effective to remove these weeds when they are small.

Banding Fertilizer
Weeds flourish under high soil fertility, so reducing their access to fertilizer can give your crop the advantage. Banding fertilizer at planting, at renovation, and again for the Labor Day nitrogen can reduce weed growth in other areas of the field. Equipment modifications like shielding will be required, but the fertilizer expense can be reduced.

Trickle Irrigation
Although common in raspberries and blueberries, strawberry growers have been reluctant to adopt trickle irrigation due to the large numbers of emitters and tubing required, and the need for sprinklers for from protection. However, where applicable, restricting water to only the crop area will reduce weeds between rows (well, not in a wet year like 2006, but under “normal” dry summer conditions).

Weed Scouting
Most IPM scouts are trained to look for insects and diseases, but additional scouting for weeds may pay dividends. Scouts need to learn to identify weeds at cotyledon or young stages, and should may each field showing weed locations and types. Unknown weeds should be collected and identified. Weed scouting and mapping can help identify sources of weeds (see field edges above), and over the years, can help when planning your weed management strategies by field.

I’ve talked about a dozen options to reduce weeds in fields, and I am sure there are more that have been useful to your operations. No single one of these will totally control your weed problems. However, using all applicable options, in addition to your herbicide, tillage or mulching treatments, will contribute to a more successful IWM system for your berry crops.

(Reprinted from: Proceedings 2007 Empire State Fruit and Vegetable Expo, pages 34-35. Editor's notes from talk included in italics where applicable)

FUNGICIDES FOR BERRY FRUIT: NEW AND CURRENT OPTIONS

Kerik D. Cox, Assistant Professor, Dept. of Plant Pathology, Cornell University, NYSAES, Geneva, NY 14456

Berry Fungicide Registration
Numerous fungicides from all major chemistry groups are registered for use on berry crops in New York. However, the number and type of registered fungicides is highly dependant on the economic value of the crop and the prevalence of disease problems. For example, strawberries are the most widely planted berry crop in New York (http://usda.mannlib.cornell.edu/MannUsda/homepage.do) and have more fungicides registered for disease control than other berry crops. Pristine WG, a new and potent fungicide, is registered for use against the more prevalent problem of strawberry leaf spot, but not for strawberry leaf scorch or leaf blight. These trends are the result of EPA regulations requiring substantial testing and fees (http://www.epa.gov/pesticides/regulating/registering/) for each crop-disease combination added to a fungicide's label. Consequently, registrants are simply unable to afford the process of registering their compounds for every crop-disease combination, but for the most part, they have registered all of their premiere fungicides for the most important New York berry disease concerns.

New fungicide registrations for berry disease control occur when fungicides labeled on other crops receive registrations for new berry crop-disease combinations. Cornell Cooperative Extension (CCE), along with grower commodity groups and private consultants, facilitate the registration process by working with chemical companies to identify the key disease concerns for which fungicide registrations are needed. Needs may result from emergence of new disease problems or as a result of fungicide resistance issues or discontinuation of old fungicide products. CCE and commodity groups can request that the registrant apply for the registration of new uses once EPA tolerances have been established for berry crop-fungicide chemistry combinations. This process can take some time as label changes must be registered with both the EPA and with the New York State Department of Environmental Conservation. In the interim, fungicide registration needs can be met temporarily by applying for FIFRA 2(ee) Recommendations and FIFRA Section 18 Emergency exemptions. FIFRA 2(ee) Recommendations are exemptions allowing limited deviation from the labeled use directions including application to non-target pests on labeled hosts, while Section 18 emergency exemptions allow the use of an unregistered pesticide to meet the short term needs of a commodity emergency. These two exemptions have been essential for meeting fungicide needs in New York, particularly on currants and blueberries.

Berry Fungicide Classification
Fungicides are classified by the EPA into one of three main categories: conventional, minimum-risk, and biopesticide. The Fungicide Resistance Action Committee (FRAC), an organization committed to prolonging the effectiveness of fungicides, classifies fungicides on the basis of chemistry and mode of action. The following section describes the three categories and the key fungicide chemistries labeled for berries in New York.

Conventional Pesticides
Multi-site inhibitors: Mode of Action (MOA): multi-site contact inhibition

Multi-site inhibitor fungicides are generally inexpensive, have good protectant activity, are low risk for resistance development due to non-specific modes of action, but have little or no post-infection activity.

Inorganic: FRAC Codes: M1, M2;
Fungicides in this group include copper and sulfur-based products. These fungicides are inorganic in that they contain no carbon, but confusion may arise as fungicides in this group are labeled for organic production, and hence may be vernacularly referred as organic fungicides. This group includes the copper hydroxide, copper salt, and copper sulfate products, and the liquid lime-sulfur and wettable sulfur products. These fungicides are widely labeled for diseases on all berry crops

Organic: FRAC Codes: M3, M4 M5;
Berry fungicides in this group include ziram and thiram (dithiocarbamates), captan (phthalimide), and chlorothalinil (chloronitrile). These have multi-site non-specific action and are at low risk for resistance, hence their persistence in the industry for several decades. Formulated products of these fungicides are widely labeled for diseases on all berry crops.

Single-site inhibitors
Single-site inhibitor fungicides are generally newer and therefore more expensive, have both protectant and post-infection activity, and have a propensity for resistance development due to highly specific modes of action.

Iprodione (dicarboximide); FRAC Code: 2; MOA: Lipid biosynthesis

These fungicides include generics of Iprodione and Rovral, which are primarily labeled for control of gray mold (*Botrytis* infections) on blueberries, brambles, and strawberries. They are high risk for resistance, especially in *Botrytis*.

Thiophanate-methyl (thiophanates); FRAC Code: 1; MOA: Cell division
These fungicides include generics of Topsin-M, which are only labeled for control of gray mold and a few foliar diseases of strawberries. They are effectively benzimidazoles in terms of chemistry, which are high risk for resistance development, especially in *Botrytis*.

Mefenoxam (phenylamides); FRAC Code: 4; MOA: RNA Synthesis
These are not true fungicides in a strict sense as they are only efficacious against straminipiles, a group of aquatic organisms that include Pythium and Phytophthora. Ridomil Gold is the only product labeled for berries and is used to manage Phytophthora diseases such as red stele and leather rot of strawberries and root rot of blueberries and brambles. This chemistry is also at high risk for resistance development.

Fludioxonil (phenylpyrroles) quinoxyfen (quinolines); FRAC Code: 12 &13; MOA: Cellular signal transduction; Cyprodinil, pyrimethanil (Anilinopyrimidines); FRAC Code: 9; MOA: Amino acid biosynthesis
Switch is a formulation of Fludioxonil and Cyprodinil labeled primarily for *Botrytis* diseases and anthracnose and mummyberry disease of blueberry. Scala is a formulation of pyrimethanil labeled for use on *Botrytis* fruit rot of strawberry. Recently, Quintec, a formulation of quinoxyfen, was labeled for use on strawberry powdery mildew. All of these fungicides have a propensity for resistance development.

Fenhexamid (Hydroxyanilides) & Myclobutanil, Fenbuconazole (Demethylation Inhibitors); FRAC Codes: 17 & 3; MOA: Sterol biosynthesis inhibition
Sterol biosynthesis inhibiting (SI) fungicides are considered to be fairly potent fungicides with good post-infection activity. Elevate (Fenhexamid) and Captevate (Fenhexamid and Captan) are labeled for numerous blueberry, strawberry, and bramble diseases, particularly anthracnose. Nova 40W (Myclobutanil) is the only demethylation inhibitor (DMI) currently labeled for berries and is labeled for foliar diseases of brambles and strawberry such as powdery mildew. There is also a new 2(ee) recommendation for use of Nova 40W on currants for white pine blister rust management. Indar (Fenbuconazole) and Orbit (Propiconazole), two potent DMIs, are currently being registered for use on some blueberry and strawberry diseases, but are unlikely to be registered in New York for the 2007 growing season. The SI fungicides have a propensity for resistance development, and some have a history of resistance problems in tree fruit.

Azoxystrobin & Pyraclostrobin (Quinone outside Inhibitors); FRAC Code: 11; MOA: Respiration inhibition
Quinone outside Inhibitors (QoI) (a.k.a. Strobulurins, Strobys) are newer fungicides and are considered slightly less potent than the SIs, but also have good post-infection activity. Abound (Azoxystrobin) was one of the first QoI fungicides available and is labeled for numerous berry diseases including powdery mildew and anthracnose. Cabrio EG (Pyraclostrobin), and Pristine WG {Pyraclostrobin & boscalid (Dicarboximides; FRAC Code 2)} are some of the newest QoI fungicides and are widely labeled for berry diseases in New York. In particular, Cabrio EG is specifically marketed for use on small fruits. Also, there is a new 2(ee) recommendation for the use of Cabrio EG on currants for management of white pine blister rust. Unfortunately, these fungicides also have a propensity for resistance development, but there are currently no reports of widespread control failures.

Minimum-risk pesticides
Minimum-risk pesticides are exempt from EPA and NY registration as they contain active and inert ingredients with low toxicity and low risk of ground contamination (http://www.epa.gov/oppbppd1/biopesticides/regtools/25b_list.htm). Since they are unregulated, these pesticides can be variable in their effects and should be used with caution.
JMS Stylet-Oil is similar to a minimum-risk pesticide in that the active ingredient, paraffinic oil (white mineral oil), is on the EPA's 4A list for permitted inert ingredients in minimum risk pesticides. JMS Stylet-Oil also comes in an organic-approved formulation and is registered in New York for use on powdery mildew of strawberries and *Ribes*, and white pine blister rust on *Ribes*.

Biopesticides
Biopesticides are pesticides derived from natural sources including animals, plants, bacteria and even mineral sources. These vary in type, cost, and efficacy depending on the product and disease treated. However, they are at low risk for resistance development, and are considered environmentally benign, which allows many of them to be labeled for use in organic production.

Bacillus-based biopesticides: Serenade (*Bacillus subtilis)* and Sonata (*Bacillus pumilis*) are formulated bacteria that prevent disease by production of anti-microbial metabolites. These products are registered for control of mummyberry disease, botrytis blights, powdery mildew and leaf rusts of blueberry, and powdery mildew of strawberry. However, their efficacy against these diseases has not been evaluated in New York.

Phosphorus acid products: This group contains phosphorous acid-based products such as Phostrol and Aliette WDG. These fungicides are converted to phosphite ions, which are responsible for boosting plant defenses and inhibiting fungi. These compounds are primarily registered for controlling Phytophythora diseases on blueberries, brambles and strawberries. However, ProPhyt is also registered against certain blueberry leaf spots including anthracnose, for which it is reported to be fairly effective.

Putting this Information Use

The FRAC classification scheme can be put to good use when designing a spray program for a given berry disease. The newer single-site inhibitor conventional fungicides all have a propensity for resistance, but are potent and have potential post-infection activity. To use this group of fungicides effectively in your spray programs, first cross reference the recommended fungicides for your disease and berry crop combination in the Cornell Pest Management Guidelines for Berry Crops with the FRAC code listing presented here or on their website. When choosing compounds for your spray program consider the following to minimize the propensity for the evolution of fungicide resistance in local berry pathogen populations: 1) Select or alternate with fungicides with different FRAC codes; 2) Never use two single-site inhibitor fungicides with same FRAC code in succession; 3) consider using compounds that have active ingredients from several FRAC code groupings (e.g. Captevate, Switch, Pristine).

(Reprinted from: Proceedings 2007 Empire State Fruit and Vegetable Expo, pages 36-38)

NEW HERBICIDES FOR PLANTING YEAR WEED CONTROL IN STRAWBERRIES

Chris Benedict, Research Support Specialist, and Robin Bellinder, Professor, Department of Horticulture, Cornell University's College of Agriculture and Life Sciences, Ithaca, NY 14853

In a recent survey, growers placed weeds as the highest of their concerns during the establishment year. Control in this year is essential to both minimize weed competition and to maximize yield in subsequent fruiting years. With few herbicides registered for strawberries in the planting year, reliance on costly hand-weeding can become a serious economic drain.

Field and greenhouse studies were initiated to determine crop tolerance to new herbicides. In the greenhouse, herbicides were applied using an Allen Track Sprayer (Midland, MI) at 25 GPA. In these trials, over 15 herbicides were evaluated postemergence(POST), pretransplant(PRETP), or for impact on runner development/rooting. Injury was observed PRETP with Reflex® (0.626 lb ai/A) and Dual Magnum® (1.3, 2.6 lb). Injury PSTTP was observed with Goal®/GoalTender® (0.5, 0.5 lb), Chateau® (0.03, 0.06 lb), Sandea® (0.092 lb), and in combinations of Dual Magnum (0.094 lb) + Chateau (0.03 lb) and KIH-485 (0.113 lb) + Goal (4F 0.375 lb). Runner injury, root development, and dry weight reduction were observed with Dual Magnum (1.3 lb) and KIH-485 (0.226 lb).

In a field trial, 'Earliglow' and 'Jewel' were utilized to evaluate ten products either PRETP or PSTTP. All applications were made using a CO_2 backpack sprayer set to deliver 34 GPA. GoalTender (0.375 lb) caused initial injury on 'Earliglow'. Other notable injury occurred in KIH-485 (0.226 lb PSTTP) and Chateau (0.03 lb PRETP). Runner production decreased with Chateau (0.03 lb PRETP), Grasp® (0.026 lb PSTTP), and V10142 (0.1 lb PSTTP) treatments. Of the products tested in both field and greenhouse trials, Prowl H_2O® (1.5 lb), Reflex (0.313 lb), and Spartan® (0.2 lb) show promise PRE-TP and Dual Magnum (1.3 lb) and Caparol® (2.0 lb) show promise PST-TP.

(Reprinted from: Proceedings 2007 Empire State Fruit and Vegetable Expo, page 39. More on strawberry herbicides from these authors in next month's issue.)

OVERVIEW OF THE BIOLOGY AND MANAGEMENT OF ROOT WEEVILS

Greg Loeb, Assoc. Professor of Entomology, Cornell University's, New York State Agricultural Experiment Station, Geneva, NY

I have three general goals or objectives I want to accomplish with this article. First, you should come away with a pretty good understanding of how to recognize root weevils that affect berry crops and their damage symptoms. Second, you should have a good sense of the life-cycle of root weevils that impact berry crops and their phenology (when different stages appear in your fields). And third, I hope you will have a general understanding of the different management alternatives.

Biology

Root weevils are beetles in the weevil family (snout beetles). Hence, the adults have elongated snouts and hard or leathery forewings. There are primarily three species of root weevils, all in the genus *Otiorhynchus*, which attack strawberries in the Northeast (Fig 1). They all look fairly similar, being brown or black in color with small indentations along the leathery outer wings, called elytra, but differ in size. Strawberry root weevil is the smallest at about 0.2 inches in length. Rough strawberry root weevil is a bit larger (0.3 inches) and black vine weevil is the largest (0.4 inches). The larvae all look about the same (Fig 2). They are white or cream colored and legless. The larvae feed on roots while the adults feed above ground on leaves.

Figure 1. Photo of adult strawberry root weevil. Source: NYSAES, Cornell University.

Figure 2. Photo of larval strawberry root weevil. Source: NYSAES, Cornell University.

The elytra (forewings) of *Otiorhynchus* root weevils are fused and hence, adults cannot fly. This becomes important for understanding some of the management options discussed below. The adults of the three species pupate in the spring and emerge during late May through June depending on species. Initially the adults feed on leaves, creating characteristic notches along leaf edges. This damage is not of economic importance. This pre-ovipositional stage, where they do not lay eggs, lasts from two weeks (strawberry root weevil) to maybe a month (black vine weevil). If control actions are going to be taken against the adult stage, this is the time to do it, before they start laying eggs. The egg laying period can last much of the summer. Eggs are laid at the base of the plant, hatch, and larvae enter the soil. They initial start feeding on smaller roots but move to larger roots or the base of the crown as the mature. Larvae overwinter in the soil and resume feeding in the spring before pupating (see figure 3 for life-cycle).

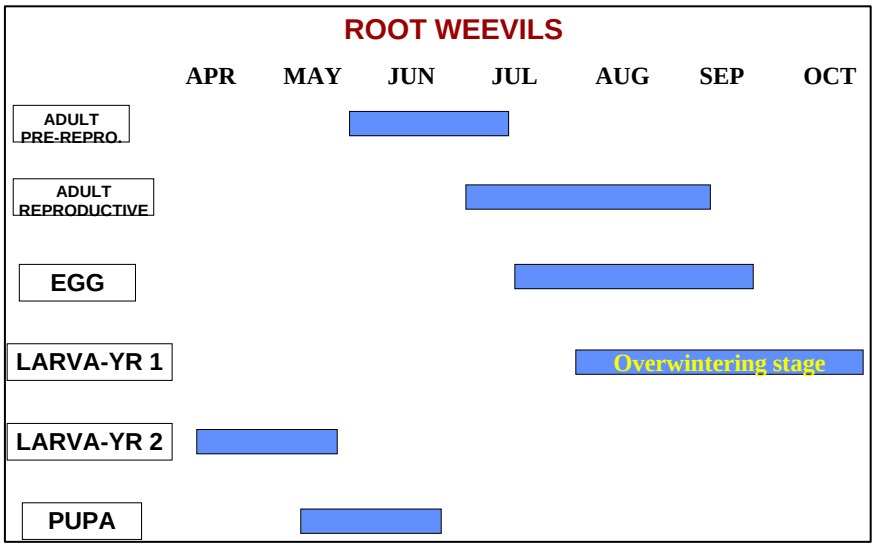


Figure 3. Diagram showing general life-cycle of *Otiorhynchus* root weevils.

Impact

Feeding damage to the roots causes economic injury resulting in reduced vigor and death, depending on the number of larvae feeding on the root system and the overall health of the plant. Older strawberry fields tend to have larger root weevil populations since it takes time for the fields to be colonized by the flightless adults and for populations to build. The exception would be when an infested field is replanted without insecticide treatment. A heavily infested strawberry field shows weak vegetative growth and patches devoid of strawberry plants (gaps). Sandy sites tend to be more prone to weevil damage but this is probably because these sites also are more prone to drought stress, which is aggravated by the root feeding. There are not good data on how many larvae per plant results in economic damage and it probably depends on the overall health and water status of the planting.

Monitoring

There are several methods for monitoring for adult root weevils in strawberry plantings. The most direct method is to go after dark with a flashlight and inspect for adults on foliage (adults active at night, not day). Perhaps a more practical method is to inspect, on a regular basis from late May through June, for the characteristic notching in leaves caused by adult feeding. You can also put out pit fall traps (plastic cups sunk into the ground with the cup lip even with the ground and partially filled with water plus detergent). A roofing shingle or other structure should be propped up over the trap to shelter it from rain. To monitor for larvae, excavate several strawberry crowns plus 3-4 inches of roots and soil with a trowel. In the spring the larvae are fairly large and easy to see. In summer the larvae are still quite small, but visible.

Management: Host Plant Resistance

There has not been a lot of research on this issue but there appears to be some evidence that different strawberry cultivars vary in their susceptibility to adult feeding. Richard Cowles, Connecticut Agricultural Experiment Station, gave adult black vine weevils a choice between leaves of the cultivar Honeoye and 20+ other cultivars in pair wise choice tests. Five cultivars were less preferred: Delmarvel, Idea, Lester, Primetime, and Seneca. Latestar, Tristar, and Marmolada were more preferred than Honeoye. The mechanisms for these preference differences are not well studied but the presence and amount of leaf hairs plays some role, as does nitrogen content. Although leaf feeding by adults is not economically important, variation in resistance could still be important for management since adult feeding is directly related to reproduction and larval densities. Cowles also tested for variation among these strawberry cultivars for resistance to larvae but did not find any significant differences. My suspicion is that some cultivars may be more tolerant to root feeding than others, although this has not been rigorously investigated.

Management: Cultural Practices

If sufficient land is available, rotating an infested field out of strawberry for a year or two is an effective cultural control method. New plantings should be placed 500 meters away from infested sites to minimize colonization by dispersing adult root weevils. If new plantings need to be located closer to infested sites, there is some evidence, based on research done in Ontario, Canada that a plastic barrier fence can be erected between the new and old planting to reduce rates of colonization of the new planting (see the article by Tolman et al. at [http://www.omafra.gov.on.ca/english/crops/hort/news/allontario/ao0306a2.htm]. A final idea for mitigating root weevil feeding damage on roots is to make sure the planting is well watered and maintained in good health. Of course, over watering can cause other problems related to root diseases.

Management: Biological Control

Although insect predators such as carabid beetles are known to feed on root weevil larvae, the best-developed method of biological control is the use of insect parasitic nematodes. Several studies have been conducted showing that the inundative release of large numbers (2.5 to 3 billion) of infective juvenile insect parasitic nematodes can reduce the density of root weevil larvae and damage. Two species in the genus *Heterorhabditis* have shown promise in our area: *H. bacteriophora* and *H. marelatus*. There are two times during the season that are good for releasing nematodes: spring as soil temperatures raise above 50 F and in the later summer or early fall. It's important for either release times that there is sufficient water via rain or irrigation to ensure the nematodes get moved into the root zone. There are a number of commercial sources for insect parasitic nematodes. See the web site on nematodes maintained by Ohio State University **[http://www2.oardc.ohio-state.edu/nematodes/nematode_suppliers.htm].** Integrated Biocontrol Systems (Greendale, IN, [www.goodbug-shop.com]) is one supplier I am aware of that carries both of these *Heterorhabditis* species. IPM laboratories in Locke, NY (315-497-2063) also supplies *Heterorhabditis bacteriophora* as well as other nematode species.

Management: Chemical Control

In the past growers targeted the larval stage for chemical control using the insecticide carbofuran. This was an effective means of control but this insecticide turns out to be quite toxic to waterfowl and has subsequently been banned for most uses. Our current approach, therefore, is to target the adult stage using one of two insecticides: bifenthrin (Brigade WSB) or malathion (e.g. Malathion 57 EC). The idea is to kill the adults during the pre-oviposition period before the females have a chance to lay eggs. The best way to time the application is to scout for adult feeding damage in June. About two weeks after the first sign of adult feeding would be appropriate, although the pre-ovipostion period varies depending on species from a couple weeks for strawberry root weevil to maybe a month for black vine weevil. Since the adults are nocturnal, an evening application may be more effective than a daytime application.

IR-4 PRGRAM UPDATE FOR BERRIES: BEING HEARD BY IR-4

E. Lurvey, Northeast Regional Field Coordinator IR-4 Project, Cornell University's New York State Agricultural Experiment Station, Geneva, NY

The mission of IR-4 is to support the registration of pest management tools for specialty crops such as fruits, vegetables and ornamental horticulture. Pest management tools include conventional pesticides as well as biological control agents (biopesticides). Berry –related products that have recently been completed by the IR-4 program are as follows:

Product	IR-4 Update
Esteem (pyriproxyfen) Strawberry tolerance Sept. 2005	• Labeled in bushberries, etc. • Ant bait, 1.5 to 2 lbs/A
Danitol (fenpropathrin) Tolerance Sept. 05	• Bushberries, etc. • Labeled - Except NY and CA • Toxic to aquatic organisms • Restricted use • Blueberry maggot, Cherry and Cranberry fruitworms, Jap. Beetle, Oblique banded leafroller
Admire, Provado (imidacloprid) Caneberry Tolerance August 2006	• Has been labeled in Bushberry and Strawberry • Aphid, Whitefly, Leafhopper, Caneborer • Uses will probably be similar to Bushberry

	• Admire – soil applied • Provado – foliar applications
Indar 75 WP (Fenbuconazole) Tolerance: Sept. 2006	• Bushberry - Mummyberry control • 2oz/A, 10 – 14 day interval • 30 day PHI • Max of 10 oz (5 apps) per year • Section 18 would be need for 2007
Quintec (Quinoxyfen) Tolerance: Sept. 2006	• Labeled on strawberries in New York • Powdery Mildew control • 4 – 6 fl. oz/A, 1 day PHI • Resistance management essential

The IR-4 research process is dependent on the active participation of growers, researchers, extension personnel, and other client groups. To initiate the IR-4 process, a Project Clearance Request Form (PCR) must be submitted, outlining the need (pest), solution (product), use (application rates and timings), efficacy, and crop safety. PCRs can only be submitted by clients without vested interests, e.g. product representatives. Submissions can be made on the IR-4 website (http://ir4.rutgers.edu/), or through Edith Lurvey, IR-4 Northeast Region Field Coordinator (RFC), or the appropriate IR-4 State Liaison Representative (Harvey Reissig in NY).

The PCR is the first step in the process to get the pest management uses on the IR-4 agenda for consideration. Only PCRs that have been agreed to by the product registrant will be eligible for consideration at the IR-4 Research Priority Setting Workshop in September.

Prior to the workshop, the IR-4 Northeast Region Field Coordinator solicits input on the important needs from growers and researchers in the region. Any project to be discussed in a given year must first be nominated. This entails going to the IR-4 website a month or so prior to the workshop and selecting chemical/crop uses from the researchable projects list. Notice of the nominations period will be sent out in August, through State Liaison Representative and anyone else on the NER contact list. If internet access is problematic, contact the RFC, or State Liaison Representative. Any project not nominated for three years in a row will be dropped from the IR-4 active list, and would need a new PCR to be reactivated. A call to Edith Lurvey (315-787-2308) is a good idea for projects of particular importance, as no project is given a high priority without a regional champion.

Priorities are as follows: A priorities will have research started in the following growing season: B priorities may be researched as funds allow; C priorities are kept on the researchable project list for future consideration.

Please note that the Northeast region solicits input on regional priorities prior to the workshop via email. Final selection of regional A priorities is made via a teleconference, if needed. If you would like to be added to the list serve for these calls for input, please contact the RFC, Edith Lurvey (ell10@cornell.edu),

Biopesticide projects are selected through a competitive grants process. The grant proposals are traditionally due November 15.

Answers from page 1:

Riddle: One of the women was a doctor!

Brain teaser:

Item	Number purchased	Cost
Pears	8	$4.00
Grapefruit	6	$1.50
Oranges	5	$1.00
Lemons	6	$1.00
Pineapples	1	$2.00
Apples	5	$1.50
Total	**31 pieces of fruit**	**$11.00**

Check out the NYSAES Tree Fruit and Berry Pathology web site at:
www.nysaes.cornell.edu/pp/extension/tfabp

Questions or Comments about the New York Berry News?

Send inquiries to:
Ms. Cathy Heidenreich
New York Berry News, Interim Editor
Department of Plant Pathology
New York State Agricultural Experiment Station
690 W. North Street
Geneva, NY 14456
OR *Email*: mcm4@cornell.edu