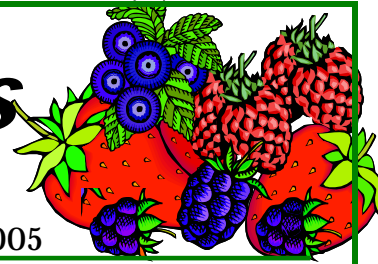




New York Berry News

CORNELL UNIVERSITY



Volume 04, Number 1

January 14, 2005

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UPCOMING MEETINGS

January 17-19, 2005. *New York State Farmers' Direct Marketing Association Conference*, Wyndham Hotel, Syracuse, New York. Sponsored by NYSFDMA, Farmers' Market Federation of New York, New York Small Scale Food Processors Association, and Cornell Cooperative Extension. **For information**, call the NYSFDMA office at (315) 475-1101.

January 20 -21, 2005. *Managing the Hispanic Workforce*, Embassy Suites, Syracuse, New York. Co-sponsored by Cornell University PRO-DAIRY and Penn State Dairy Alliance for agricultural and horticultural business managers who employ Hispanic workers or who are considering it. Agricultural professionals who work with agricultural and horticultural employers will also benefit from attending.
<http://www.ansci.cornell.edu/prodairy/hrm/hispanic/index.html>

January 28-30, 2005. *Organic Farming and Gardening Conference, Organic Community: Diversity from Soil to Plate*, Syracuse, New York. Conference brochure and registration information at <http://nofany.org/events/2005conference/nofanyconfbrochure.pdf>. Call 607-652-6632 or office@nofany.org for more information

February 1-3, 2005. *Mid-Atlantic Fruit and Vegetable Convention*, in Hershey, Pennsylvania. **For more information e-mail:** <mailto:shap@cvn.net>.

February 10-12, 2005. *North American Farmers' Direct Marketing Conference and Trade Show*, Boston Park Plaza Hotel, Boston, Massachusetts. **Go to:** <http://www.nafdma.com> or e-mail info@nafdma.com or call 413-529-0386.

February 14-17, 2005. *Empire State Fruit and Vegetable Expo*, On Center, Syracuse, New York. **Call:** 315-687-5734 or e-mail mailto:nysvga@twcny.rr.com

February 16-19, 2005. *North American Berry Conference- a joint conference with the North American Bramble Growers Association*, in Nashville, Tennessee. **For more information:** http://www.nasga.org/meetings/2005/berry_conference/announcement.htm

As we approach our 3rd anniversary as an on-line small fruit newsletter in March 2002, we decided to take a look back in terms of readership and distribution. You will be interested to see the results of our web page statistics analysis on you and your fellow NYBN readers in the feature article by Cathy Heidenreich and Juliet Carroll. Looking for a family vacation spot this winter? Consider attending the North American Berry Growers Conference in Nashville, Tennessee as a possible alternative. Nashville is full of fun for everyone and experts agree that it is one of America's best travel values. Two of our news briefs provide more information on this affordable family/farm opportunity.

We have two research reports this month on small fruit pests: a study on two-spotted spider mites in perennial strawberries by Greg English-Loeb and Steve Hesler, and an update on studies being done on strawberry sap beetle by Rebecca Loughner. Also featured is a *Smart Marketing* article by Judith Barry summarizing a recent marketing training session with Al Rose entitled "Marketing Orientation-A Producer's View". I am sure you will find this a very interesting and thought-provoking article in terms of your personal agribusiness marketing strategy.

HIGHLIGHTS OF THE 2005 NORTH AMERICAN BERRY CONFERENCE-COMBINING THE POWER OF TWO TOP BERRY ORGANIZATIONS



The annual North American Berry Conference has a reputation for bringing together the world's leading small production berry growers and marketers with top researchers and cutting edge professionals. But in February 2005, the Conference promises to be even bigger and better.

The North American Strawberry Growers Association and the North American Bramble Growers Association have combined forces to make the 2005 North American Berry Conference the premier industry event. We're bringing you the most noteworthy and respected experts in the industry. This is the place to get the answers to your tough questions and obtain the kind of up-t-date information needed by growers to insure their operations thrive.

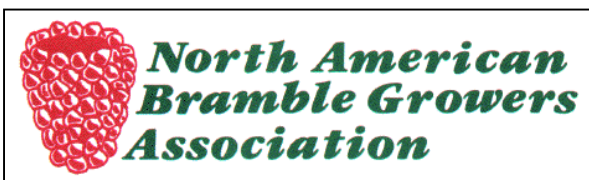
The program includes something for every interest and every stage of grower experience:

- Dozens of grower presentations
- An array of industry updates
- Leading edge reports on organics
- Plasticulture and tunnel culture
- Pest, disease, and frost researchers
- Marketing topics ranging from festivals to free promotions
- Value added ideas and tips
- The latest information on the health benefits of berries!

In addition to sessions of general interest, there are specialized tracks where topics are focused on issues like strawberry and bramble production, the harvest, and business development. You'll find lots of networking time has been included because often those "down" times are some of the most productive moments of a Conference. The preliminary program may be viewed at: http://www.nasga.org/meetings/2005/berry_conference/reg_brochure.htm - Preliminary

Topping it off will be a tour on Saturday that offers so much that you will think of it as a "must", not an option. Stops include:

- Bradley's Kountry Acres, a 200-acre family farm near Cottontown, TN, with blackberries, strawberries on matted row and plastic, greenhouse production, and farm market crops sold direct and wholesale
- A hearty buffet luncheon
- Valley Home Farm in Wartrace, TN, and its 1853 southern mansion. The farm has strawberries on plastic and an extensive fall market plus an impressive use of value added marketing.
- The famed Jack Daniel's Distillery in Lynchburg, TN.



In Nashville you will find "big-city amenities, but small town flavor and lower prices than you would pay in New York or Chicago." With affordable prices, Nashville boasts over 40 different attractions- some of which are free. Covering the spectrum from the Civil War to Faith Hill's dress to a priceless Picasso and Warhol, there's something for everyone in Music City. Why our Conference city's airport is even

officially known as Berry Field Nashville! Registration forms and information for the Berry conference are on-line at: http://www.nasga.org/meetings/2005/berry_conference/regForm.pdf

(Reprinted from: NASGA News, Winter 2004)

CABRIO REGISTERED FOR USE ON BERRIES IN NEW YORK STATE

Cathy Heidenreich, Research Support Specialist, Plant Pathology, NYSAES, Geneva.

On December 22, 2004 the NY DEC approved Cabrio EG for use on berries and cherries, with supplemental labeling for use on pome fruits, under condition that no product be applied via aerial application methods. Cabrio EG contains the new active ingredient pyraclostrobin ((carbamic acid, [2-[[[1-(4-chlorophenyl)-1H-pyrazol-3-yl] oxy] methylphenyl] methoxy-, methyl ester), which has not been previously registered in NY. Pyraclostrobin is a new

broad spectrum foliar fungicide in the strobilurin chemical class and is labeled for control of numerous fungal diseases on many different crops with use anticipated on virtually all major crops grown in New York State (Cabrio EG, Insignia, Headline).

Cabrio EG contains 20% pyraclostrobin and is labeled for control or suppression of fungal diseases within the following crop groups: Berries, Bulb, Cucurbit fruiting, Root vegetables and Cherries. Supplemental New York State labeling was also approved for use on Pome fruits, Brassica head, stem and leafy greens, Leafy vegetables and Tuber vegetables. Applications of 8 to 16 ounces Cabrio product per acre or 0.1-0.2 lbs ai/acre, are made on 7 to 14-day intervals using ground or irrigation equipment. The maximum number of applications per season range from 3 to 6, depending on the crop. Maximum seasonal application rates equal 0.6 to 1.2 lbs ai/acres, also depending on the crop. To limit the potential for development of resistance, the numbers of sequential and total seasonal applications are limited. Only one application of Cabrio may be made in the presence of Downy mildew and Late Blight, or any disease of cucurbits, before alternating to a fungicide with a different mode of action. Otherwise, 2 applications may be made before an alternate mode of action is used. The seasonal limits on the number of applications stated above are resistance management limits, as opposed to active ingredient poundage limits.

For more information and/or NY label go to: <http://pmep.cce.cornell.edu/pims/current/>

SPECIALTY CROP COMPETITIVENESS ACT SIGNED INTO LAW

(Editor's note: This article is a reprint of a special bulletin issued by the North American Strawberry Growers Association, 23 December 2004)

On December 23, 2004, President George Bush signed into law the Specialty Crop Competitiveness Act of 2004, legislation designed to boost the marketing of highly nutritious fruits, vegetables, and other specialty crops to American consumers and international markets. Speakers at the 2005 North American Berry Conference, February 16-19, will address some of the hot issues covered by this legislation. Topics include the methyl bromide phase-out, pest and disease control, and support for marketing efforts.

Specifically, the legislation:

- Authorizes \$44.5 million for block grants to state departments of agriculture specifically to promote the marketing of specialty crop products.
- Invest \$5 million annually in research into methyl bromide alternatives
- Authorizes \$2 million yearly to carry out the Technical Assistance for the Specialty Crop Program
- Establishes an annual \$1 million pest and disease response fund account within the US treasury.

Additionally, the legislation establishes specialty crop research as a high priority for the USDA's research and extension activities and authorizes \$1.5 million per year for the maintenance of the Agricultural Marketing Service inspection training center in Fredericksburg, Va. The legislation also promotes specialty crop clean air benefits, produce quality improvement, new crop protection tools and integrated pest management, efforts to control foreign and invasive pests and diseases, and national specialty crop development initiative programs. Funding is authorized through fiscal year 2009.

Specialty crops are defined as fruits and vegetables, tree nuts, dried fruits, and nursery crops. NASGA members are part of this production that constitutes at least half of the US gross agriculture receipts, contributes nearly \$60 billion to the US economy, and provides 60% of America's daily nutritional requirements. The strawberry and bramble growers at the 2005 Berry conference in Nashville will comprise one of the premier gatherings of berry growers in North America.

The measures included in the bill are designed to make American specialty crops more competitive in a global marketplace. Unlike the nation's major grain producers, US specialty crops growers have received very little federal financial support.

According to The Vegetable Grower News, "Final passage of the Act culminates four years of efforts by agricultural associations across the industry since deliberations began on the last Farm Bill. Since that time, Congress has passed 3 laws that significantly enhance the strength of the fresh produce industry- the Farm Security and Rural Investment Act of 2002, the Child Nutrition and WIC Reauthorization Act of 2004, and now the Specialty Crops Competitiveness Act of 2004.

For more information on topics and speakers at the North American Berry Conference go to: <http://www.nasga.org/>

IT'S TIME TO REGISTER FOR NABGA'S CONFERENCE IN FEBRUARY, 2005

Debby Wechler, Executive Secretary, North American Bramble Growers Association

The plans are made, the schedule is mostly set, the staff is busy, and registrations forms are available on line at: http://www.nasga.org/meetings/2005/berry_conference/regForm.pdf. NABGA's annual conference for 2005 is the North American Berry Conference, being held in cooperation with our sister organization, The North American Strawberry Grower's Association (NASGA), in Nashville, Tennessee, February 16-19.

Bramble-specific sessions start at 2:00 pm on Thursday, Feb. 17 and continue through 5:00 pm on Friday, Feb.18

Interested in extending your season? Go to **Bramble Season Extension**, led by Marvin Pritts, Cornell University, and followed immediately by **Tunnels North of the Mason-Dixon Line**, with Kathy Demchak, Penn State University, on Thursday afternoon. Concurrent sessions include growers and past NABGA president Sam Erwin discussing **Mechanical Harvesting: The East Coast Experience**.

Just getting started or want a refresher course on what you never learned but should have? **ABC's of Growing Blackberries and Raspberries** is a double-length session on Friday Morning. It will be led by Marvin Pritts of Cornell with David Lockwood, U. of Tennessee providing a southeastern perspective and Tom Walters of Sakuma Nursery providing a nurseryman's practical advice on getting started as well as a Northwestern perspective. Or, in a concurrent session, retired Extension specialist and bramble/strawberry grower Charlie O'Dell will help you Learn the Lingo- and the concepts behind important production terms. Also scheduled is a session on Bramble Tours for Summer, led by Pierson Geyer of Westmoreland Berry Farm

The **NABGA Annual Meeting** is just before lunch on Friday. It will be followed by sessions on **Trellis and Pruning Operations**, led by John Strang, of University of Kentucky, **Let's Drink to Blackberries**, led by grower and NABGA VP Ervin Lineberger, and a wrap-up Bramble Update on research, Varieties and Pest Controls. For more schedule details, see the registration form.

These bramble-specific sessions are only part of what is going on. All general sessions and many of the concurrent breakout sessions will be on interest to NABGA members, with a variety of sessions on berry harvesting and marketing. From working with the NC Strawberry Association, I know quite a few of the speakers: I guarantee you will enjoy hearing Gretchen and Dan Copeland talk about their diversified consumer-oriented Texas farm, grower Karma Lee's experiences holding low risk, community-based festivals, and Cal Schiemann's successes with promotions and advertising. If you raise strawberries as well as brambles, try to bring a second person from your farm, or you'll be pulled apart by the choices! And that's not to mention the trade show, the farm tour, and the numerous informal opportunities to make connections, learn from each other, and restore your energy for the coming year.

NABGA's executive Council and Research Foundation will also meet in association with the Conference. Our annual fundraiser, A Taste of the Berry Fields, will be held on Thursday evening, February 17, to raise funds for bramble research. It's a chance for everyone to sample – and celebrate – berry products of all kinds in a fun social setting, to “open your ideas to new opportunities for berry marketing and open your taste buds to berry delights”.

Please donate Products for this event. We need preserves, juice, wines, salsas, breads, candies, etc. that you make with fruit from your farm. Of course we want Black berry and raspberry products, but strawberry or other berry products are welcome as well. Depending on what is received, we will choose specific types of products for comment and judging. If you sell your products, you may find some potential buyers, so be sure to bring brochures or business cards.

Debby Wechler may be contacted at: North American Bramble Growers Association (NABGA)
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Pittsboro, NC 27312
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Website: www.nabga.com

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NEW YORK BERRY NEWSLETTER-WEB PAGE READERSHIP SUMMARY 2002-2004

Catherine Heidenreich, Research Support Specialist, Department of Plant Pathology, NYSAES and Juliet Carroll, Fruit IPM Coordinator

From its first issue in March of 2002, the **New York Berry News** (NYBN) initiated by Bill Turechek, has released a total of 33 issues. Issues are released on a monthly basis and are immediately available for electronic viewing or download at: <http://www.nysaes.cornell.edu/pp/extension/tfabp/newslett.shtml>.

The NYBN newsletter was initially advertised through grower meetings and e-mail contacts. Currently, it is distributed via email (as a url) to 58 "subscribers" including staff of the New York Berry Growers Association, The California Strawberry Commission, Ontario Ministry of Agriculture and Food, USDA, Cooperative Extension, and Land Grant Universities. Its membership includes private consultants, industry personnel, growers, research faculty, and extension educators. Articles published in NYBN are picked up and published in other extension newsletters and it is linked to from other websites.

New York Berry News articles cover a wide variety of small fruit management topics: crop and varietal selection, planting establishment and maintenance, soil fertility, irrigation, weed management, integrated pest management of diseases and insects, vertebrate management; food safety, harvest, handling, transport, post-harvest storage, and marketing.

Information featured in a monthly issue includes calendar events, news releases, research reports, informational articles, pesticide updates, and weather data relevant to small fruit production in New York State. Another important feature of this publication is high-resolution digital images accompanying articles. Beginning in October 2004, Cathy Heidenreich, interim editor, made available on-line current **New York Berry News** issues in both high and low resolution formats to facilitate downloading by dialup.

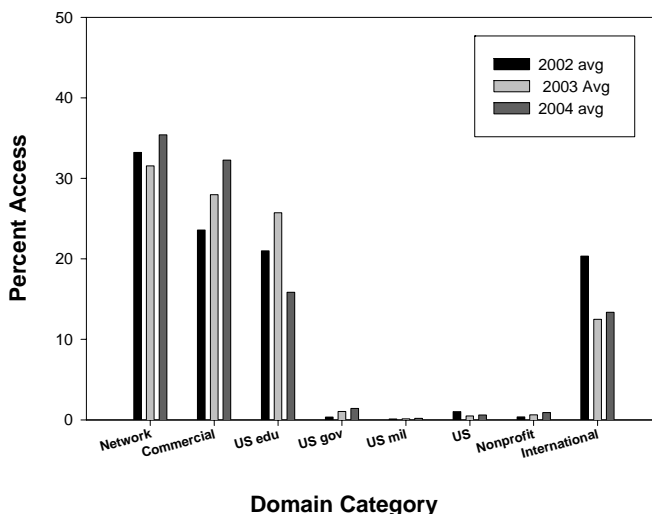
Primarily Cornell faculty and staff prepare articles. However, in its brief history of 33 issues, the NYBN has successfully attracted 76 contributing authors including horticulturalists, extension personnel, plant pathologists, entomologists, IPM'ers, Ag. economists, journalists, nutritionists, food scientists, entrepreneurs and conservationists. Supplemental articles are incorporated as appropriate from other accredited sources such as grower publications, news releases, or Cooperative Extension personnel from surrounding states.

NYBN Usage Data

Although the "subscriber" list is small, subscribers are encouraged to forward the URL to others who are interested in receiving the newsletter, serving as a multiplier. Because the **New York Berry News** is published on the web, it is freely accessible to anyone who wishes to read it. Web statistics showed an increase of 75% in the number of distinct hosts served the NYBN web index from 2003 to 2004 (1,804 to 3,139) and an increase of 30% for the monthly issues web pages (1,823 to 2,368). The number of successful requests for NYBN monthly issues rose 60% from 2003 to 2004 (10,290 to 16,432).

Of the people accessing the **New York Berry News** domain from 2002 to 2004, 35.4% were .net (individuals, growers, etc.), 32.3% were .com (industry, business etc.), 15.9% were .edu (research, extension, education, etc.), .0.6% were .us (within the United States), 13.4% were international (primarily from Canada, but including 106 countries), 1.6% were .gov/.mil (US government), 0.9% were .org (non-profit organizations); ranked 1, 2, 3, 7, 4, 6, and 5, respectively (Figure 1). Clearly those accessing the NYBN domain include nontraditional audiences.

Figure 1: Domains Accessing NYBN Individual Issues by Category



New York Berry News is accessed through the Tree Fruit and Berry Pathology Website (TFABP), located within the Department of Plant Pathology on the NYSAES home page. An analog form interface program is available on the server to track usage information. Using this program we have compiled information regarding NYBN usage. "Hosts" describes the number of distinct URLs (computers) that have accessed the indicated site. Successful requests ("hits") describe the total number of requests, regardless of source, for information on a particular page. Both data for the **New York Berry News** "home page" (index page) where individual issues are accessed, and data for the individual issues themselves (monthly PDF files) have been plotted below.

New York Berry News Home Page

Figures 2 and 3 plot data for distinct computer hosts served and successful requests ("hits") for the NYBN home page, years 2002 to 2004. Figure 2 shows yearly totals for hosts and requests. Figure 3 shows monthly averages of hosts and requests. Yearly totals for hosts and requests have increased annually over the 3-year period by 36% and 52%, respectively. Monthly averages for hosts and requests have increased by 44% and 62%, respectively.

Figure 2: NYBN Homepage Usage Statistics Yearly Totals 2002-2004

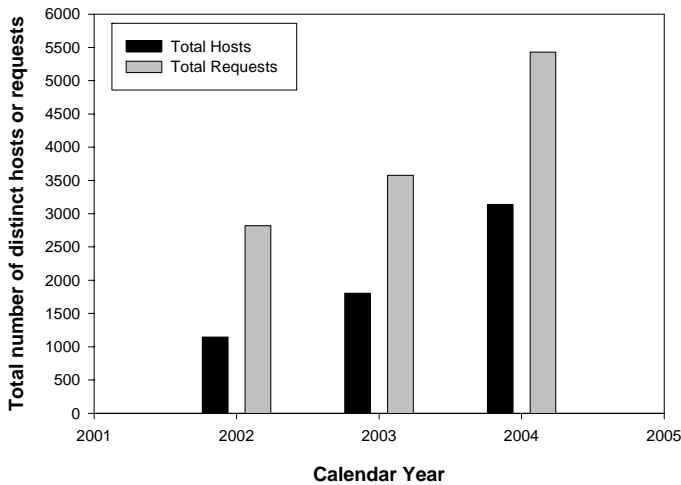
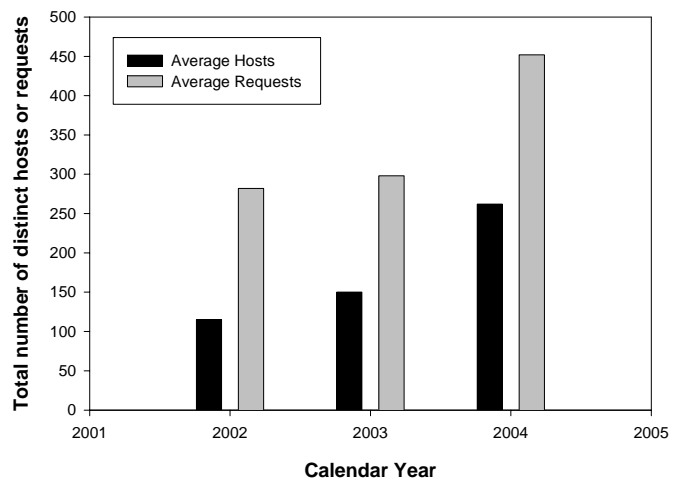


Figure 3: NYBN Homepage Usage Statistics Monthly Averages 2002-2004



Monthly usage for the NYBN home page appears in Figures 4 and 5. While access appeared relatively stable across all 12 months for 2002 and 2003, increased activity during the 2004 growing season was evident. Distinct hosts served (Figure 4) more than doubled from 2002 to 2004. "Hits" (Figure 5) have increased from 20% to 50% on a monthly basis since the first year of availability.

Figure 4: Homepage Monthly Usage Statistics- Hosts

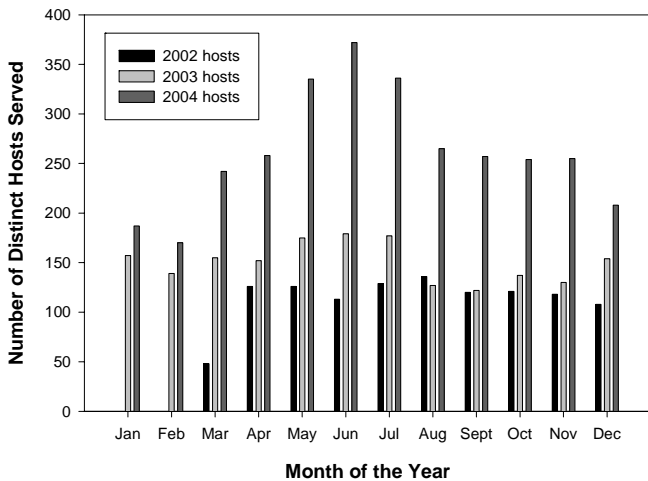
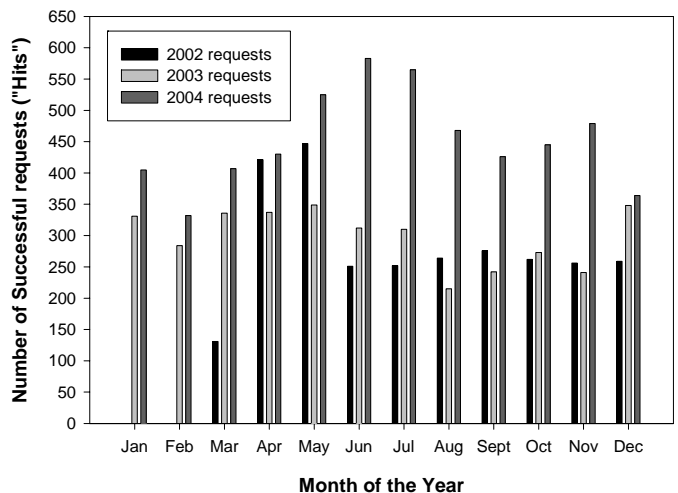


Figure 5: Homepage Monthly Usage Statistics-Requests



New York Berry News Individual Issues

Figures 6 and 7 plot data for distinct computer hosts served and successful requests ("hits") for NYBN individual issues, years 2002 to 2004. Figure 6 shows yearly totals for all issues of the hosts and requests. Figure 7 shows monthly averages for hosts and requests. Both hosts and requests for individual issues have increased by approximately 30% annually from

2002 to 2004. Note that hosts as well as requests for the month of release are twice the 58-member email “subscribers” indicating a substantial impact of web browsers and email multipliers. We also found that individual issues continue to be accessed in subsequent years with significant frequency (data not shown).

Figure 6: NYBN Individual Issue Usage Statistics
Yearly Totals 2002-2004

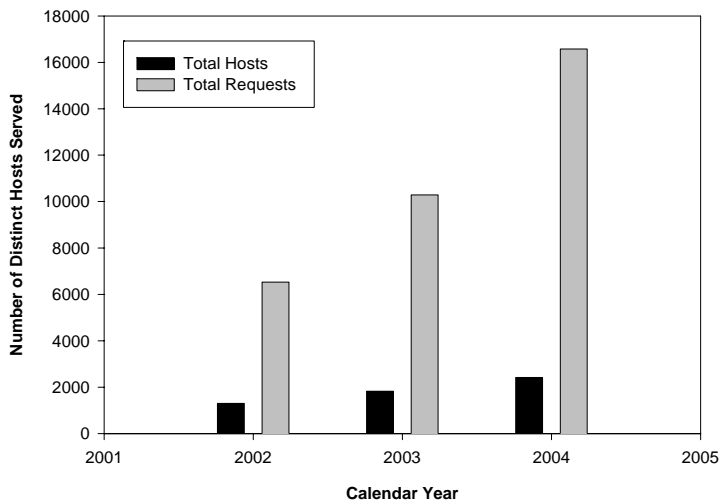
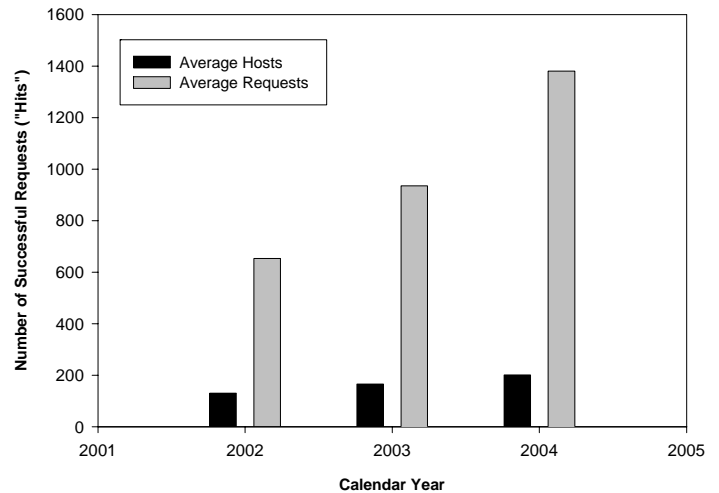


Figure 7: Individual Issue Annual Usage Statistics
Monthly Averages 2002-2004



Monthly usage for the NYBN individual issues appears in Figures 8 and 9, showing the number of hosts and requests, respectively, for each monthly issue of 2002, 2003, and 2004. Hosts for individual issues more than doubled from 2002 to 2004. Requests for individual issues have increased 20 to 50% on a monthly basis since the first year of release, with the exception of August to December issues.

Figure 8: NYBN Individual issue Monthly Usage Statistics-Hosts

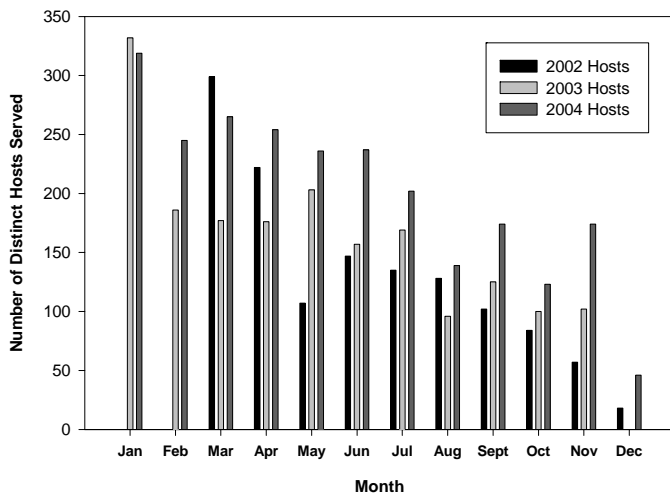
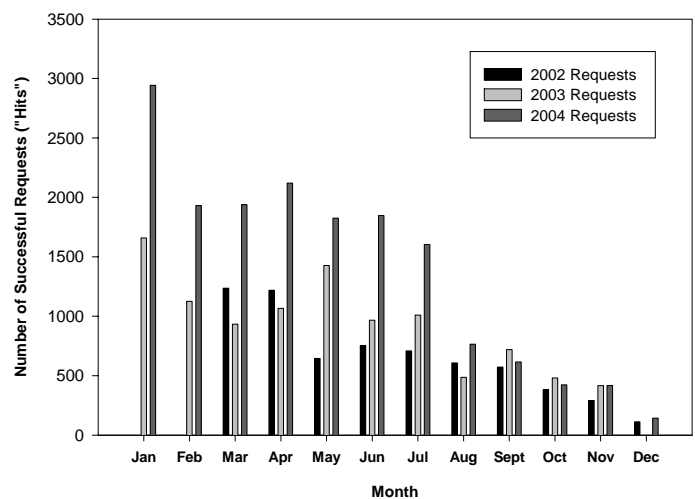


Figure 9: NYBN Individual issue Monthly Usage Statistics-Requests



Future Direction:

The disappearance of human resources in extension, coupled with shrinking budgets heightens the need to provide timely delivery of research and extension information in a non-traditional, web-based format so that it is freely accessible to agricultural audiences on a regional and global scale. This information then becomes available on demand to growers and extension multiplier audiences in the public and private sectors. The *New York Berry News* fills a gap in the Northeastern regional berry extension publications, successfully integrating several disciplines to report on topics of importance to small fruit crops. It also serves as an important venue for alerting growers to emerging pests and timely small fruit plant protection updates.

Cornell Small Fruit Extension staff will continue the *New York Berry News* as a bridge between ongoing research and Extension programs in the Northeastern Region and the agricultural community. Plans are underway to continue production and on-line publication the *New York Berry News* for calendar year 2005. During that time we will take steps to increase readership, expand the URL email “subscription” list, and identify sustainable sources of ongoing support for the NYBN.

Send comments on this article and on the New York Berry News to Cathy Heidenreich at mcm4@nysaes.cornell.edu

ECONOMIC IMPACT OF THE TWO-SPOTTED SPIDER MITES (*TETRANYCHUS URTICAE*) ON STRAWBERRIES GROWN AS A PERENNIAL

Greg English-Loeb and Steve Hesler. Department of Entomology, New York State Agricultural Experiment Station, Cornell University, Geneva, NY.

Currently, an economic threshold of 5 mites per leaf has been recommended for perennial strawberries grown in New York; however, it is not clear if this threshold is valid during the establishment year. Moreover, the threshold of 5 mites per leaf may be conservative for established plantings during the vegetative growth stage (mid-summer to fall). Our current research suggests that June-bearing strawberries are very tolerant of mite damage during the establishment year. We could not detect an impact on yield when infestation reached 10 mites per leaf and we suspect that thresholds could be raised to at least that number before treatment is warranted. Similarly, established plantings can likely tolerate 20 mites per leaf during late summer without reducing yield the next season.

Two-spotted spider mites (TSSM), *Tetranychus urticae*, can be a serious pest of strawberries. This appears to be especially true in regions where strawberries are grown in an annual production system as is used in California (Strand 1994). In fact, research over the past 20 years has concentrated on the impact of TSSM on strawberry grown as an annual (Sances et al. 1982, Gimenez-Ferrer et al. 1994, Walsh et al. 1998), while information on the impact of spider mites on strawberry grown as a perennial has received little recent attention. Currently, an economic threshold of 5 mites per leaf has been recommended for perennial strawberries grown in New York (Kovach et al. 1993), although this estimate is based mostly on anecdotal observations rather than manipulative experiments. It is unclear whether this threshold should vary with the year of planting or the time of season. For this project we assessed the impact of *T. urticae* on strawberries grown using a perennial production system, the system predominantly used in the Northeast.



The majority of strawberries that are grown in the Northeast are June-bearing varieties. These cultivars undergo different developmental processes depending on whether day lengths are getting longer or shorter (Pritts and Handley 1998). Thus, as day lengths shorten (summer and fall) plants initiate flower buds and produce vegetative runners. The following spring, when days are lengthening, plants flower and fruit mature. Mite feeding at these different developmental periods may have different effects on subsequent yield. Age of the planting may also influence the impact of spider mite damage. In particular, first year plants, due to their smaller size, may be less tolerant of spider mite injury than older plants. Moreover, the matted row system typically used in the Northeast relies on vigorous growth the first year, with the production of an abundance of runners in the fall in order to maximize yields in the second growing season. Mite injury may reduce growth and runnering. The purpose of this three-year project was to develop baseline data on the impact of TSSM on June-bearing strawberries grown in New York, data that can be used to refine economic thresholds. This report focuses on results from the third year in which we evaluated the impact of previous injury on yield. Our objectives were:

1. To assess the impact of *T. urticae* on perennial strawberry during the first year of establishment.
2. To assess the impact of *T. urticae* on established perennial strawberry as a function of time of season.

Methods

A new planting of June-bearing strawberries was established in late May 2001 at the New York State Experiment Station in Geneva, New York. The planting consisted of 30 rows approximately 22 meters in length with four-foot spacing between rows using three rows of the cultivar 'Honeoye' followed by three rows of the cultivar 'Jewel' across the planting. This plot was used to assess impact of TSSM damage on established strawberries. During 2001 plants showed some symptoms of *Verticillium* wilt. A second plot was planted in May 2002 using two additional cultivars that have greater resistance or tolerance to *Verticillium* wilt ('Earliglow' and 'Cavendish'). This plot was used to assess the impact of TSSM damage during the establishment year on yield the subsequent season.

We divided the 2002 planting into 25 plots (six rows [three Earliglow and three Cavendish] by 4.5 m) and assigned them to one of five treatments: 1) No spider mite damage; 2) Low level of mite damage during growth and sexual reproductive phase (June to August, 200, although plants were not allowed to mature fruit), 3) High level of mite damage during growth and sexual reproductive phase; 4) Low level of mite damage during vegetative reproductive phase (runnering, August through mid-October, 2002); 5) High level of mite damage during vegetative reproductive phase. Each treatment

was replicated five times for each cultivar. Miticide (Kelthane 35 WP at 3 lb/Ac rate in 50 to 100 gallons of water) was applied once at borders of each replicate plot (down edge rows) and a two-foot section between replicate plots (across rows) to maintain treatment integrity.

Approximately three weeks after planting (18 June 2002), TSSM were added to treatments two and three (early-season damage). Mites were obtained from a laboratory colony and reared on strawberry. Each plant of the center four rows of each plot assigned to treatment two (early season, low impact) was infested with from 10 to 20 large motile TSSM plus eggs. Similarly, each plant of the central four rows of plots assigned to treatment three (early season, high impact) was infested with 30 to 40 motile TSSM plus eggs. We treated control plots (treatment one) and plots assigned to late-season damage treatments (four and five) with a miticide (Kelthane 35WP, 2.5 lb/A, 75 gallons per A of water) on 11 July to kill TSSM. Control plots were again treated with Kelthane on 5 August 2002. All plots were treated with a pyrethroid insecticide (Asana [esfenvalerate]) at a rate of 1.5 to 7 fl. oz./A several times during the season to reduce populations of predatory mites.

Plants in our 2001 planting were kept mite free in 2001. At the start of the 2002 season we divided it into 25 plots (six rows [three Honeoye and three Jewel] by 4.5 m) which were assigned to one of five treatments: 1) No spider mite damage; 2) Low mite damage during vegetative reproductive phase (runnering, August through mid-October, 2002); 3) High mite damage during vegetative reproductive phase; 4) Low level of mite damage during growth and sexual reproductive phase (May-June 2003); and 5) High level of mite damage during growth and sexual reproductive phase. Each treatment was replicated five times for each cultivar. TSSM from our laboratory colonies were released on plants in the center four rows of plots assigned to late-season damage (treatments two and three) on 8 August, after regrowth of plants following renovation. Plots assigned to low mite damage (treatment two) received approximately 350 motile mites plus eggs while plots assigned to high mite damage (treatment three) received 700 motile mites plus eggs. We treated control plots (treatment 1) and plots assigned to early-damage in 2003 (treatments four and five) with a miticide (Kelthane 35WP, 2.5 lb/A, 75 gallons per A of water) on 22 August 2002 and 18 September 2002 to kill TSSM. All plots were treated with a pyrethroid insecticide (Asana [esfenvalerate]) at a rate of 7 fl. oz./A once during August to reduce populations of predatory mites. In the spring of 2003 TSSM from our laboratory colonies were released into plots assigned to receive a low or high level of mite damage during the growth and fruiting period (treatments four and five, respectively). Treatment four plots received approximately 600 motile mites plus eggs while treatment five plots received approximately 1,200 motile mites plus eggs on 27 May.

Mite populations in each planting were estimated approximately every week from 26 June through September in 2002 and in the established planting during June of 2003. Census data were used to estimate accumulated mite days for each cultivar in each plot during the season. Accumulated mite days provides a quantitative assessment of mite injury to plants and is determined by multiplying the number of days between two successive censuses by the average number of mites per leaflet between the same two successive censuses. Yield was assessed in 2003 in all plots of both plantings by collecting, counting and weighing ripe fruit from one meter sections systematically placed within each cultivar of each plot over about a three week period (until fruit was small and not marketable).

Results

Effects of Mite Abundance in the Establishment Year. We were successful in establishing TSSM in plots of our 2002 planting assigned to the early-season treatments, although accumulated mite days (AMD) were not as high as we had originally desired (Figure 1). AMD were generally low in control plots and plots assigned to the late-season treatments. Moreover, high impact plots had about 1.5 more AMD than low impact plots (Figure 1).

TSSM densities per leaf peaked between 16 July and 23 July with an average of 6.8 motile mites per leaf (SE = 1.5) on plants assigned to the high mite impact treatment and 4.3 motile mites per leaf (SE = 2.2) for plants assigned to low mite impact treatment. Our currently recommended economic threshold is 5 mites per leaf. AMD during the second half of the experiment was less than achieved during the first half and was similar among the four treatments infested with mites (Figure 2). Thus, AMD during the full season was somewhat greater for treatments two and three, that had mites for the entire season, compared to treatments four and five, that only had TSSM during the second half of the season (Figure 3). Peak mite densities in the second half of the season were about the same among treatments and all were below 3 mites per leaf.

The moderate densities of TSSM we achieved during the establishment year (2002) had no impact on either yield ($F_{4,36} = 0.165$, $P = 0.5$) nor weight per berry ($F_{4,36} = 0.36$, $P = 0.83$) in 2003. Yield did not differ between Earliglow and Cavendish ($F_{1,36} = 1.3$, $P = 0.25$), although weight per berry, not surprisingly, was almost twice as much for Cavendish compared to Earliglow (9.8 g/berry vs. 5.5 g/berry; $F_{1,36} = 134$, $P < 0.001$).

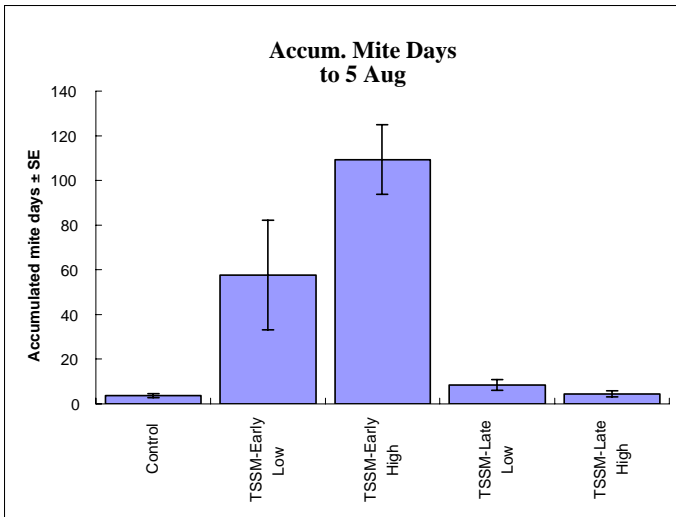


Figure 1. Accumulated mite days (\pm standard error) from 21 June to 5 August 2002 for strawberry plants assigned to different levels and timings of feeding injury from Two-spotted Spider Mite (TSSM).

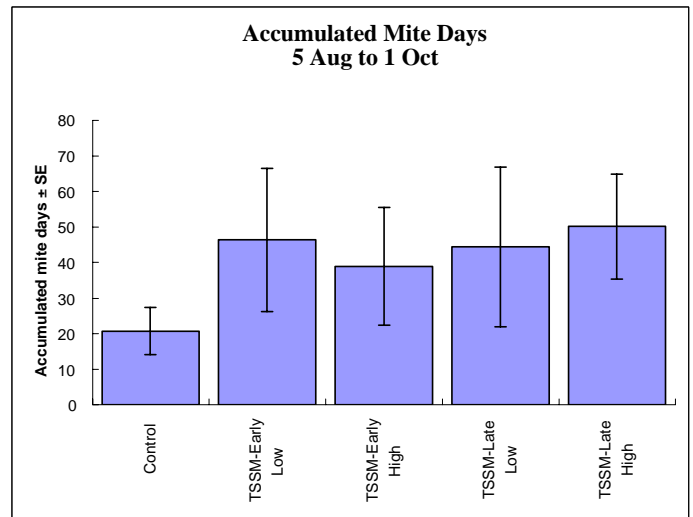


Figure 2. Accumulated mite days (\pm standard error) from 5 August to 1 October 2002 for strawberry plants assigned to different levels and timings of feeding injury by Two-spotted Spider Mite (TSSM).

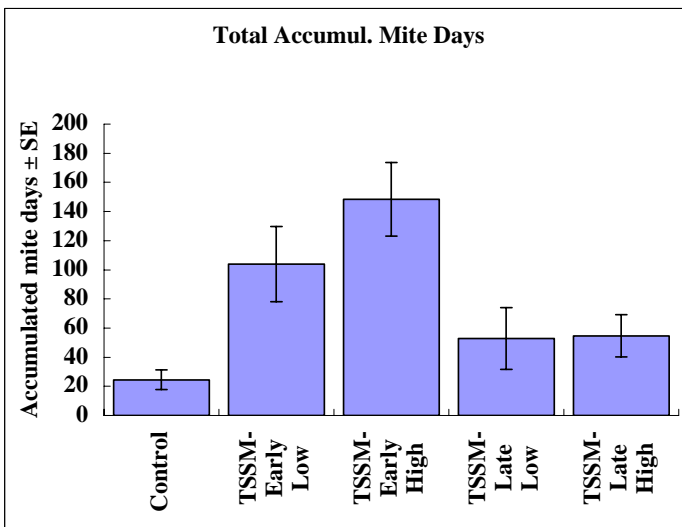


Figure 3. Accumulated mite days (\pm standard error) from 21 June to 1 October 2002 for strawberry plants assigned to different levels and timings of feeding injury by Two-spotted Spider Mite (TSSM).

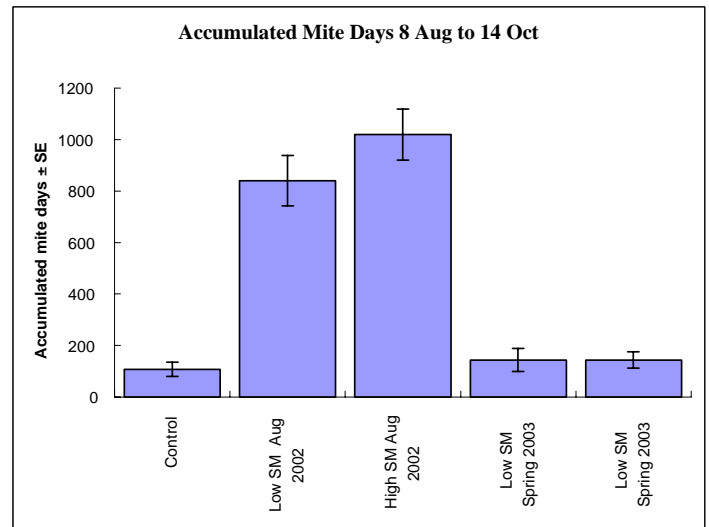
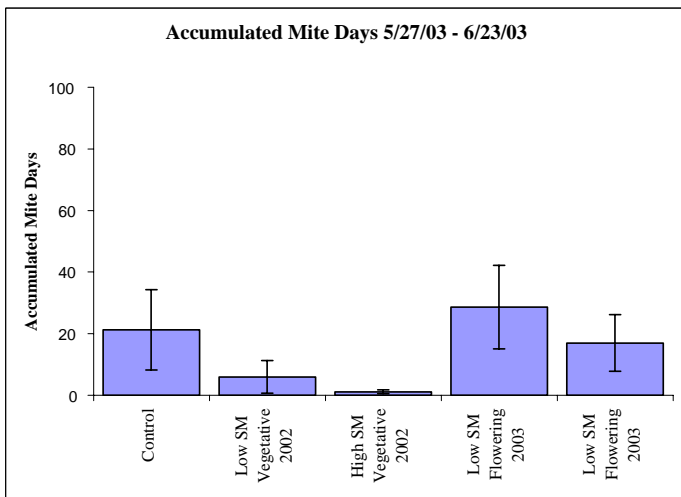


Figure 4. Accumulated mite days (\pm standard error) from 8 August to 14 October 2002 in plots of a second year planting of strawberries assigned to different levels and timings of injury from two-spotted spider mite (TSSM).

Effect of Mite Abundance on Established Strawberry Beds. As planned, abundance of TSSM in all plots in our 2001 planting was very low during the flowering and fruiting period of the 2002 season (data not shown). However, mites became quite abundant during the second half of the season in plots assigned to receive mites, reaching a maximum density of 63 motile mites per leaf on 9 September for the high-release plots, and 52 mites per leaf on 23 September for the low-release plots. AMD exceeded 1000 for the high-release plots and over 800 for the low-release plots (Figure 4). Toward the end of the season mite numbers in control plots and plots assigned to receive mites in the spring of 2003, began to build and reached maximum densities of around 6 motile mites per leaf before declining. AMD were below 150 in these plots.

In the spring of 2003 mite abundance was quite low in all plots despite the release of large number of laboratory-reared mites into plots at the end of May (Figure 5). Average peak densities remained below 2 mites per leaf for all treatments. There was no clear explanation for why mite numbers did not increase during this time period.

High accumulated mite densities in the fall of the proceeding year in an established strawberry planting had no impact on yield the next season nor did very low accumulated mite densities in the current year ($F_{4,36} = 0.73$ $P = 0.58$).



There was a significant difference between the two cultivars with Honeoye out producing Jewel in 2003 (3,854 g/2m for Honeoye and 2,645 g/2m for Jewel, $F_{1,36} = 14.6$, $P < 0.001$).

Similarly, we found no treatment effect on weight per berry ($F_{4,36} = 1.1$, $P = 0.38$) but berry weight for Jewel was slightly higher than Honeoye (9.3 g/berry for Jewel vs. 8.1 g/berry for Honeoye, $F_{1,36} = 15.0$, $P < 0.001$).

Figure 5. Accumulated mite days (\pm standard error) from 27 May to 23 June 2003 in plots of a third year planting of strawberries assigned to different levels and timings of injury from two-spotted spider mite (TSSM).

Discussion

Our objective for this project was to examine the impact of TSSM on yield parameters of June-bearing strawberries in the Northeast when damage accumulates during different growth periods. Specifically, we were interested in determining to what extent damage during the year of establishment negatively impacted yield the second year and to what extent damage during the vegetative period or damage during the flowering period negatively impacted yield of an established planting. We were only partially successful in accomplishing these objectives primarily because we had difficulty maintaining sufficiently high mite densities in some plots at certain times of the year. We were most successful at developing large populations and damage during the vegetative growth period of an established planting (Figure 4). Average peak densities greatly exceeded the current threshold of 5 mites per leaf, yet we could not detect an impact on yield the next season. This suggests that June-bearing strawberries are very tolerant of mite damage during the vegetative phase, at least for the two cultivars, (Honeoye and Jewel), we worked with in this project.

We were unsuccessful, however, in assessing the impact of TSSM during the flowering phase of an established planting (Figure 5). Mite numbers never really developed despite a large release in the spring. The 2003 growing season was cool and wet and this undoubtedly helped suppress populations, although other factors were probably important as well. Average peak densities were below current thresholds for all but a few plots where they briefly exceeded 5 mites per leaf. Thus, it is difficult to draw any definitive conclusions regarding the suitability of our current threshold based on our results. It is probably conservative for a healthy planting, but by how much is unclear.

We also had difficulty developing adequate mite populations during the establishment year, especially in the second part of the season. Part of the reason for the difficulty was that predatory mites colonized the field and reduced population growth. Several applications of a pyrethroid insecticide known to be very toxic to predatory mites were only marginally successful.

Summary

During the establishment year with June bearing strawberries we imposed average peak TSSM densities during the first part of the growing season that exceeded the common threshold of 5 mites per leaf, yet this did not translate into a yield reduction the following season. Thus, five mites per leaf is a conservative threshold for June-bearing strawberry during the establishment year. Given the fact that we could not detect a yield impact for several plots that exceeded 10 mites per leaf, we suspect that thresholds could be raised to at least 10 before treatment is warranted. For established strawberry plantings, our results indicated that plants could tolerate substantial mite feeding later in the summer without causing significant economic injury.

Acknowledgments

We would like to thank the North American Strawberry Growers' Association for partial financial support of this research. A number of technicians in our lab helped with maintaining plantings, data collection, etc. including Elizabeth Loomis, Carrie Loomis, Jessica Nyrop, Jason Nyrop, Sara Villani, Kevin Conley, Charles Moser, Charlotte Gillespi, Andrea Gillespi, Suzy Fishel, Jeff Ugine, and Lindsay Minns. We also would like to thank the farm crew at NYSAES who helped with planting and maintenance of our research plots.

References

- Gimenez-Ferrer, R.M., W. A. Erb, B.L. Bishop, and J.C. Scheerens. 1994. Host-pest relationships between the two-spotted spider mite (Acari: Tetranychidae) and strawberry cultivars with differing levels of resistance. *J. Econ. Entomol.* 87:168-175.
- Kovach, J., W. Wilcox, A. Agnello, and M. Pritts. 1993. Strawberry IPM scouting procedures. *New York State Integrated Pest Management Program Number 203b*.
- Pritts, M. P., and D. T. Handley. 1998. *Strawberry production guide*. Northeast Region Agricultural Engineering Service Cooperative Extension, Ithaca, NY.
- Sances, F.V., N.C. Toscano, L.F. LaPre, E.R. Oatman, and M.W. Johnson. 1982. Spider mites can reduce strawberry yields. *California Agriculture* 36:15-16.
- Strand, L.L. 1994. Integrated pest management of strawberries. University of California Statewide Integrated Pest Management Project, *Division of Agriculture and Natural Resources Publication #3351*.
- Walsh, D.B., F.G. Zalom, and D.V. Shaw. 1998. Interaction of the two-spotted spider mite (Acari: Tetranychidae) with yield of day-neutral strawberries in California. *J. Econ. Entomol.* 91:678-685.

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STRAWBERRY SAP BEETLE: IDENTIFYING KEY AREAS FOR IMPROVING PEST MANAGEMENT

Rebecca L. Loughner, Dept. of Entomology, NYSAES, Cornell University, Geneva, NY 14456

The strawberry sap beetle (SSB) has emerged as the most significant insect pest in much of the Northeast. The small, brown adults are approximately 1/16 inch in length and appear in strawberry fields as the berries ripen. The adults and larvae prefer to feed on over-ripe fruit but will also damage marketable berries. Customers often report finding larvae after washing the berries at home. The beetles are widespread and present at all of 14 New York farms sampled in 2002, but seem to be a significant problem only in certain locations. Concern regarding SSB centers on the lack of effective control measures if the beetles become a problem at a farm.



Current recommendations for control include application of pyrethroids, field sanitation, and renovating promptly after harvest. Labeled pyrethroids (Brigade [bifenthrin] and Danitol [fenprothrin] in NY) have not provided sufficient control and are broad spectrum, potentially disrupting predatory mite populations that provide spider mite control. The beetles are not resistant to pyrethroids but rather tend to feed underneath fruit where they are unlikely to be contacted by insecticide.

The focus of our current work is improving SSB management through a better understanding of the beetle biology. This includes examining how cultural practices and habitat surrounding strawberry fields (wooded areas and alternate food sources) influence the size of the SSB population. The following summary of our recent sap beetle work discusses factors that may impact SSB pest management throughout the growing season.

Overwintering location

The beetles are known to overwinter as adults in wooded areas, but the extent to which they overwinter in fields of strawberry or other crops is unclear. In spring 2004, soil cores were collected from wooded areas and fields of several crops (apple, blueberry, cherry, peach, raspberry, and strawberry) at multiple farms. A total of 6 SSB was found in the 220 samples collected from wooded areas and no SSB were extracted from the 480 samples taken from fields of other crops. While the number of beetles found was rather small, early indications are that SSB overwinters primarily in wooded areas. More extensive sampling of a larger area will be conducted in 2005.

Colonization of strawberry fields

Adult SSB can be sampled in the field using traps baited with whole wheat bread dough. When these attractive traps are placed in the edges of wooded areas near strawberry fields and in the strawberry field itself, beetles are caught as much as 3 weeks earlier in traps placed in the woods. In early to mid-June in New York, SSB adults can be caught both in the woods and strawberry fields, indicating the beetles are both active and searching for a food source. Adults can be found on fruit as ripe strawberries become available. Activity of the beetles is influenced by temperature, with the number of SSB in traps decreasing when the minimum temperature is below about 60°F.

Cultural practices in strawberry

Production practices, including cultivar and time of renovation, may impact SSB choice of host and survival in a particular field. It has been suggested that accessibility of strawberry fruit to SSB may be reduced by growing cultivars that have more firm fruit or that tend to hold fruit up off the ground. Although we do not have any data on use of different cultivars, it is unlikely that growing a particular variety will sufficiently control sap beetles.

Development time for SSB from egg to adult is approximately 3 weeks, such that the first generation of adults is emerging about the time renovation is expected to take place. Some evidence exists that renovating early reduces the number of emerging SSB (Galen Dively, University of Maryland). A comparison of prompt and delayed renovation for potential to reduce number of emerging beetles in New York was conducted in a replicated research plot and two commercial strawberry fields in 2004. Cages with attractive bait were used to each cover approximately 1/3 m² area of strawberry field and trap emerging adults over a 5-week period. In all three locations, the number of SSB emerging was greater in the prompt renovation treatment. The reason for this is not clear and may be related to timing of beetle development or weather conditions. The experiment will be repeated in 2005.

Where do beetles go after strawberry harvest?

Adults emerging from the strawberry fields may 1) stay in the strawberry field to overwinter, 2) return to woods to overwinter, or 3) search for other sources of food. To help determine if beetles are remaining in the strawberry field or leaving for wooded areas, attractive traps were placed in 3 strawberry fields and associated wooded edges after renovation. Traps were placed in the field for 24 hours each week from mid-July to mid-September. The number of adults caught per trap peaked around mid-August. Mean number of SSB per trap was similar across the 3 strawberry fields, however the mean number varied with wooded edge. Despite the similar number of beetles emerging from strawberry fields, it seems the beetles may be more likely to move to certain wooded edges. SSB continued to be caught later in the woods than in the field, again suggesting the beetles are moving to wooded areas for overwintering.

Beetles emerging from strawberry fields potentially have enough time to produce a second generation of beetles if they are able to find an adequate food source. SSB is not considered to be an economically important pest in crops such as apples, raspberries, blackberries, blueberries, cherries, pumpkins, melons, and various vegetables, however SSB adults and sometimes larvae have been reported in these crops. If SSB emerging from strawberry fields move to these other crops to feed and reproduce, the numbers of beetles present to infest strawberries the following spring may increase. Addressing whether SSB presence in late season crops is a concern for SSB management in strawberry was conducted with two studies in combination: 1) a laboratory assay to evaluate SSB reproduction on potential alternate food crops and 2) a field study to quantify the number of SSB adults per unit area in various crops.

In the laboratory assay, 20 adult SSB were provided with one of the following food sources continuously: apple, blueberry, corn, cherry, raspberry, or strawberry. The larvae, pupae, and adults in each cage were counted after 5 weeks. Although reproduction was much lower on apple and corn, the beetles reproduced on all food sources. The beetles were also present in all crops sampled in the field. The ability of the beetles to reproduce on a wide variety of food sources and to find these sources in the field provides the opportunity for the beetle population to increase in size substantially in late summer. It is unclear, however, whether a late summer increase in SSB numbers results in a greater number of SSB surviving the winter.

New directions for controlling SSB

The strawberry sap beetle is a pest that is quite mobile on a farm scale, able to use a wide range of crops as a food source, exists in a system where changes to cultural practices would be difficult, and is not easily contacted by current insecticide application methods. The most promising option is development of a trap-and-kill technique where attractive traps could be deployed in the early spring immediately before strawberry ripening with the idea of reducing the number of beetles entering the strawberry fields. Sap beetles have a male-produced aggregation pheromone, which is attractive to both male and female SSB and could be included in a trap along with a food odor and insecticide. Traps for related beetle species are much more attractive when a food odor and pheromone are presented in combination, therefore current work in this area is focusing on identifying the chemical components of the SSB specific aggregation pheromone.

MARKETING ORIENTATION – A PRODUCER’S VIEW

Judith A. Barry, Extension Associate, Department of Applied Economics and Management, Cornell University

Albert Rose used to be “on the other side”. After completing his M.S research in direct marketing at Cornell University, moved to Chicago and was a buyer of potatoes for Frito Lay. He worked nationally and internationally (Canada) with producers to meet the specification of potatoes and the service required by Frito Lay. He did that for 4 years until the rat race chased him back to a different kind of lifestyle - farming.



In 2001, Al returned with his wife and children to the family farm in Phillipston, Massachusetts. He became the fourth generation of Roses to farm the land. Previously, the farm had produced apples that were mainly for the wholesale market. The focus of the business was on production and quality apples. Al’s father, Bill, began the transformation of the farm from a predominantly wholesale operation into an exclusively retail business. On his return to the farm, Al decided that he wanted to expand the farm’s focus to meet the needs and skill of his family and to position the business for the years to come. Red Apple Farm is now a popular get-away destination for the urban and suburban rat race that Al was once running in. They sell a farm experience with pick-your- own apples, pumpkins and a farm store. They have developed the farm to meet the 2 demands of local and not-so-local (the greater Boston area) consumers, and he believes that he has developed a better market orientation for the business.

At a recent marketing training session for Cornell Extension Educators, Rose shared some of his views and the lessons he had learned in working for both Frito Lay (in the buyer’s perspective) and Red Apple Farm (in the seller’s perspective) in producer marketing orientation. This article provides a brief review of some of the points he shared on that day.

Rose observed that many producers, understandably, have a production focus rather than a marketing mindset. “A marketing mindset is a difficult thing to develop. Marketing is intangible and difficult to quantify in contrast to production that is scientific and quantifiable. Marketing is touchy-feely.”

Rose added, “Farming is one of the few businesses where the majority of business managers start their careers in the family business and never leave it. The turnover of personnel, in contrast to other types of business, is slow. This leads to an ‘inside out’ perspective which, while good for excellent quality” he feels “is not conducive to developing marketing orientation”.

Rose felt his time with Frito Lay, off the farm, was a beneficial part of his marketing education for returning to the farm. “Leaving the farm provides business operators to have an outside- in perspective on the way they view the farm, which supports a marketing orientation.”

Rose made several points, which he believes have allowed him to be successful in making his business more market orientated:

1. “I ask myself ‘Why are you in business?’” He believes that success is correlated to the farm’s consumer orientation. “If we are in business to satisfy customers, we will be successful at marketing. If we are in business for other reasons, our business will struggle to be marketing orientated.”
2. “Marketing is the most important tool in my toolbox. This is the focus of my business.”
3. “I add value to any product that I can.” He thinks it is important to sustain a front-line focus on whom you are serving. An example Al gave was when he was 3 he went to a farmers’ market in Mexico with his brother. A lady in a tropical fruit stand allowed them to try the fruits, and every time a tiny drip of the juicy fruits started dribbling down their chins, the lady held out a napkin. They didn’t realize quite how effective the frontline strategy was until they walked away from the stall having bought several pounds of fresh fruit, without questioning the price and with pocketfuls of used napkins! The lady had made the tasting session such an enjoyable experience that Al and his brother had not considered the pricing.
4. “I sell products as opposed to inputs.” Al elaborated that he is not selling apples; he is selling a product with a perceived value. He gave an example of both frontline focus and selling an input with a perceived value when he was working with Frito Lay (a Pepsi company). He commented that it never went unnoticed when he and his colleagues walked on a potato farm that was selling to Frito Lay, and the first thing on display was a Pepsi vending machine for the employees. A minor detail that showed the farmer had a strong marketing orientation.
5. “I list both tangible and intangible goals and build an action plan.” One thing that supports their business in doing this is through their understanding of their customers. They survey customers through conversation and written survey and know where they come from, how they heard about the farm, if they have made repeat visits, why they come to the farm, what they want to buy, etc. It helps build goals for the business around their customers’ needs.

Al's final comment about developing their business to have a marketing orientation is that on a regular basis, they ask themselves three fundamental questions:

- i) What business are we in?
- ii) What business should we be in?
- iii) What business do we need to be in?

With a constantly changing market, these questions not only address the needs and wants that they are currently trying to satisfy, but they also address what needs and wants are developing with their customers, and how their business can best meet those needs and wants. Al believes that he is in business for one reason alone: "to satisfy consumers' ever-changing needs and wants (both tangible and intangible)". This, he believes, has enabled him to develop an effective marketing orientation for his business.

Thanks to Al Rose of Red Apple Farm in Phillipston, Massachusetts for reviewing this article.

(Reprinted from: [Smart Marketing](#), December 2004. "Smart Marketing" is a monthly marketing newsletter for extension publication in local newsletters and for placement in local media. It reviews the elements critical to successful marketing in the food and agricultural industry. Articles are written by faculty members in the Department of Applied Economics and Management at Cornell University.)

SMALL FRUIT REFERENCE LIBRARY REVIEWS

Cathy Heidenreich, Plant Pathology, NYSAES Cornell University, Geneva, NY

Here is the latest in a series on building your small fruit library. (See full article in the October 2004 issue of [NYBN](#)). Careful planning and selection of materials for your reference library can provide you with a broad knowledge base that is timely and in some respects, timeless.



This month we are focusing on Brambles. The book reviewed below is really a 2-for-1 value as it includes information on both Bramble diseases and pests in one volume.



Book Review: Compendium of Blackberry and Raspberry Diseases and Insects

The *Compendium of Blackberry and Raspberry Diseases and Insects* was published in 1991, by APS Press and was edited by M.A. Ellis, R.H. Converse, R.N. Williams, and B. Williamson. The publication also includes diseases of boysenberries, loganberries, tayberries, etc. The Compendium is 122 pages in length and contains 140 color photographs, index and glossary. Its purpose and use are best described in its preface:

"This compendium is designed as a practical reference for the identification, cause epidemiology, and control of diseases and insect pests of raspberry and blackberry and their hybrids...it is intended to serve as a source book for growers, crop advisors (from universities, agribusiness, and government), private consultants, students and plant pathologists worldwide who work with the *Rubus* cane fruit industries. It is written for those with limited training in plant pathology, entomology and horticulture, but it has sufficient detail to be of use to students and professionals alike. Each section was written by an active researcher or recognized expert on the subject."

Part 1: Diseases Caused by Biotic Factors; Cane and Foliar Diseases Caused by Fungi;

Anthracnose, Cane Blight, Midge Blight, Spur Blight, Cane Botrytis, Purple Blotch, Ascospora Dieback, Botryosphaeria Cane Canker of Blackberry, Rosette (Double Blossom), Downy Mildew, Powdery Mildew, Raspberry Leaf Spot, Septoria Leaf Spot of Blackberry, Sydowiella and Gnomonia Cane Cankers, Nectria Canker of Raspberry, Silver Leaf

Fruit and Flower Diseases Caused by Fungi; Botrytis Fruit Rot (Gray Mold) and Blossom Blight, Postharvest Soft Rot (Leak Disease), Minor Fruit Rots, Stamen Blight; Rust Diseases; Orange Rust, Cane and Leaf Rust, Yellow Rust, Late Leaf Rust, Blackberry Rust, Minor Rust Diseases

Root and Crown Diseases Caused by Fungi; Phytophthora Root Rot, Verticillium Wilt, Armillaria Root Rot, White Root Rot

Diseases Caused by Bacteria; Crown and Cane Gall, Fire Blight, Pseudomonas Blight, Leafy Gall, Hairy Root

Diseases Caused by Viruses and Viruslike Agents; Aphid-Transmitted Diseases; Raspberry Mosaic Disease Complex, Raspberry leaf Curl, Cucumber Mosaic, Raspberry Vein Chlorosis

Leafhopper-Transmitted Diseases; Rubus Stunt; Nematode-Transmitted Diseases; European Nepovirus Diseases, Tomato Ringspot

Pollen-Transmitted Diseases; Raspberry Bushy Dwarf

Viral Diseases with Unknown Methods of Natural Spread; Apple Mosaic, Blackberry Calico, Cherry Leaf Roll, Tobacco Streak, Wineberry Latent Virus, Other Viruses and Viruslike Agents

Nematode Parasites; Root-Lesion Nematodes, Dagger and Needle Nematodes, Other Nematodes

Part 2: Arthropod Pests

Insects That Damage Roots and Crowns; Raspberry Crown Borer, Root Weevils, Strawberry Crown Moth

Insects That Damage Fruit; Scarab Beetles, Japanese Beetle, Green June Beetle, Rose Chafer, Lygus Bugs, Raspberry Bud Moth, Picnic Beetles, Raspberry Fruitworms, Yellowjackets, Strawberry Bud Weevil (Clipper)

Insects and Mites That Damage Foliage; Spider Mites, Dryberry Mite (Raspberry Leaf and Bud Mite), Redberry Mite, Raspberry Aphids, Leaf Rollers, Climbing Cutworms, Blackberry Psyllid, Western Winter Moth, Raspberry Sawflies and Leaf Miners

Insects That Damage Canes; Rednecked Cane Borer, Raspberry Cane Maggot, Raspberry Cane Midge, Raspberry Cane Borer, Tree Crickets, Rose Scale, Stalk Borer

Insect Contaminants of Mechanically Harvested Fruit

Part 3: Disorders Caused by Abiotic Factors

Nutritional Disorders; Herbicide Injury; Preemergent Herbicides; Postemergent Herbicides; Translocatable Herbicides, Contact Herbicides, Volatile Herbicides; Correcting Herbicide Excesses; Environmental Stress; Temperature, Wind, Soil Moisture, Light, Solar Injury.

Part 4: Effects of Cultural Practice on Disease

Using Disease- and Insect-Resistant Cultivars Excluding and Reducing Pathogen Populations; Modifying Microclimate Within the Planting; Altering Production Practices to Prevent Plant Injury and Infections

Part 5: Development of Healthy Planting Material

Raspberry Certification Programs in North America; The Raspberry Certification Program in the United Kingdom; Nursery Production of Virus-Free Planting Material; International Exchange Regulations for Rubus Plant Material

This book is available from APS Press at: <http://www.shopapspress.org/41213.html>.

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?

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