The New Face of New York Berry Growers: Insights From the 2007 NYS Berry Growers Survey

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If you ask Californians what a berry farm looks like you will probably get descriptions of endless acres of plasticulture continuously being harvested and replanted. Floridians would probably direct you to Plant City where their strawberry industry is concentrated. But what sort of image does a New Yorker conjure up when they think of a berry farm? It depends on who you ask. If you ask shoppers at a NYC Green Market you will probably be told about the committted farmer that comes from the Hudson Valley to bring them fruit, perhaps a bit uncertain of what the farm actually looks like. The family in central NY is impossible. Biologicals could, however, be used in combination with streptomycin to reduce the population of susceptible bacteria to build a tolerance to streptomycin over the course of the growing season. In New York the most effective way to combat resistance development is to limit the number of unnecessary streptomycin sprays each season. **Control strategies to delay resistance of fire blight to streptomycin.**

To be effective, streptomycin must make direct contact with the fire blight bacteria. Bloom is the only period in which the fire blight bacteria are vulnerable to streptomycin. Aside from open blossoms, E. amylovora is unable to survive on the plant surface, therefore application of streptomycin other than at bloom is a misuse of time and money. There is some evidence that streptomycin applied after a severe hailstorm can reduce levels of trama blight, but this is only recommended if a moderate level of fire blight is already present in the orchard. There is no evidence that streptomycin is effective against the other phases of fire blight, shoot blight or rootstock blight. Excessive application of streptomycin increases the odds of selecting for a resistant bacterial population. This practice will also expose harmless orchard bacteria to unnecessary antibiotics increasing the likelihood of resistance gene transfer. There is evidence that New York is that orchards in the northeast historically used fewer antibiotic sprays during the growing season. Reduced application of streptomycin would lessen the selection pressure on resistant strains. In California, where streptomycin-resistant fire blight bacteria were first identified in 1971, streptomycin was applied 10 to 14 times a year, compared with current guidelines recommending one to three applications. In California, growers were also applying lower rates of streptomycin. Lower rates may have allowed bacteria to build a tolerance to streptomycin over the course of the growing season. In New York the most effective method to combat resistance development is to limit the number of unnecessary streptomycin sprays each season. **Control strategies to delay resistance of fire blight to streptomycin.**

The second part of the study involved a short one-on-one interview with researcher Rebecca Harbut. The interview included questions about the grower’s farming background and how they had acquired information about production practices over the course of their experience as a grower. Interviews were tape recorded in order to ensure accurate recording of responses. All responses were kept confidential; and results do not allow identification of participants. The survey results will allow a better understanding of the NY berry industry and its needs including ways to improve communication between growers and researchers. In addition, results from the development of management practices identified in the survey were to be implemented in small on-farm demonstration trials so that growers might observe the potential of these practices found to be the most successful. Mini-series of articles detailing the identified best management practices are being prepared for New York Berry News and will appear in the December 2008 (currants and gooseberries), January (blueberries), February (raspberries and blackberries) and March (strawberries) 2009 issues.

**NY Berry Growers Survey**

What sort of picture do we get if we ask a berry farmer to describe the typical NY berry farm? To answer this we undertook a two-year NYFVI funded project to help promote berry production efficiency in NY. The project is aimed at: 1) developing a clearer picture of New York berry growers, including what and how much they grow and to whom they are selling their produce, 2) improving communication between berry growers and researchers in NYS and 3) identifying best management practices for improving berry production efficiency and sharing those with new and existing growers. The first part of the study involved a survey sent out to four hundred and five growers across the state. Self-identified berry farmers were members of the New York Berry Growers’ Association or local Cooperative Extension offices, or those listed as berry producers with the Northeastern Organic Farmers Association of NY. Those with e-mail addresses were encouraged to complete the survey on line. Respondents without e-mail were contacted by regular mail and encouraged to fill out and mail back the 25-page survey. The survey took approximately 20-30 minutes to complete. A final survey question asked if growers would be willing to participate in a follow-up interview. As an incentive to encourage participation respondents were entered in a drawing to win either a complete set of NRAES Production Guides for small fruit (strawberries, raspberries and blackberries, highbush blueberries), or print copies of “2008 Pest Management Guidelines for Berry Crops” or “Greenhouse Raspberries and Blackberries.”

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**Characteristics of NY State Berry Growers**

Eighty-nine growers responded from 37 counties across the state. Based on information gathered, most berry farmers considered a commercial berry farm to be fairly large (i.e. 15 acres or more), despite the fact that many of them had three acres or less. Many growers interviewed were concerned that their input would not be useful because they only have a small amount of acres in production or they grow several other crops besides berries. According to our study, one of the greatest misconceptions among growers is that a commercial berry farm has to be a certain size to be considered a legitimate berry farm. As one grower...
Fire Blight and Streptomycin: The Reality of Resistance

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This work supported in part by the New York Apple Research and Development Program

The start of the New York apple season is just around the corner. With bloom rapidly approaching, now is the perfect time to start thinking about control of fire blight. Fire blight, caused by the bacterium Erwinia amylovora, can lead to significant monetary losses in the form of reduced yield and tree death when initial disease outbreaks are not prevented. Fire blight is conventionally controlled by orchard sanitation and the application of the antibiotic streptomycin during bloom. When applied effectively, streptomycin kills the fire blight bacteria colonizing apple and pear blossoms, preventing infection. Streptomycin has been used to control fire blight for over 50 years with great success, but there is serious concern about the future of streptomycin use due to antibiotic resistance development by bacteria.

Fire blight resistance to streptomycin

Streptomycin-resistant strains of fire blight are not a new phenomenon. They were first identified in California pear orchards in the early 1970’s and have since been found in Washington, Oregon, Missouri, and most recently Michigan in the early 1990’s. In fact, streptomycin-resistant strains of fire blight have developed in nearly every country where streptomycin is applied. Currently the north-east growing region, including New York and Pennsylvania, remains the only major ‘pear fruit-producing region in the United States that has not developed streptomycin-resistant fire blight. Once resistance to streptomycin develops, and becomes established in an area, it is extremely stable in the environment. In California pear orchards, fire blight bacteria, which are resistant to streptomycin could still be found ten years after application of the antibiotic had ceased. For this reason it is imperative to safeguard the New York growing region against the development of streptomycin-resistant fire blight for as long as possible.

Streptomycin acts by interfering with the ability of E. amylovora to synthesize certain vital proteins, killing the bacterium. There are two ways resistance to streptomycin can develop. The most common type of resistance occurs through spontaneous mutation in the bacterial DNA, rendering the antibiotic harmless. These mutations are natural variants that occur randomly within the bacterial population, regardless of streptomycin application. Although resistance arises spontaneously, it is the continued use of that antibiotic that will select for the resistant bacteria. The more numerous the resistant bacteria, the more likely they will become permanently established in the environment. The selection of resistant bacteria is described in Figure 1, where a red dot represents a randomly occurring resistant bacterial cell living on a newly opened apple blossom, along with several susceptible bacterial cells. When streptomycin is applied, the majority of susceptible bacterial cells are killed immediately. No longer having to compete for resources the resistant bacterial cells are now free to multiply unchecked. The longer streptomycin is applied the more resistant bacteria will be selected in that particular orchard.

The second form of antibiotic resistance occurs when two different bacteria share genetic material, through a process known as bacterial conjugation or bacterial mating. Most bacteria contain small optional ‘packages’ of DNA known as plasmids, that are not necessary for the bacterium’s survival. These plasmids contain genes that give the bacteria a competitive advantage, for example antibiotic resistance genes. When bacteria experience stressful environmental conditions, such as the application of an antibiotic, they undergo bacterial mating and exchange plasmids. Plasmid exchange occurs when one bacterium creates a bridge connecting it to another bacterium. Plasmids can be passed through this bridge leading to the transfer of resistance genes. Plasmid exchange was found to be the cause of fire blight resistance in Michigan, which is the only state with this form of resistance. Although rarely associated with fire blight, plasmids containing streptomycin resistance genes are very common in the environment. At the Geneva Experiment Station, Dr. Tom Burr found these plasmids responsible for fire blight resistance in the Blister Spot bacterium, Pseudomonas syringae pv. papulans, in New York in the early 1990’s.

Streptomycin is the most effective antibiotic for control of fire blight on apple and is likely to remain as such; therefore it is imperative to identify cases of antibiotic resistance early before bacterial populations become established. Since 2001, we have screened fire blight samples for streptomycin resistance and have not found established resistant strains. However, the development of streptomycin-resistant fire blight in New York is more a question of when, not if. It is the responsibility of the agricultural community to make a concerted effort to prevent resistance by the judicious use of streptomycin in order to safeguard the valuable effectiveness of streptomycin for future use. ‘

Stated in their interview, “I only have two acres of berries, so I’m not sure how useful my information will be for you.” While this may be the case in some other production areas in the U.S., this is not the case in New York. The results of our survey found that there are more than 73% of NY berry growers who have six or less acres or with in berry production (Figure 1). Many of these farms grow multiple commodity crops including tree fruit, vegetables, flowers, herbs, cash crops, etc. Their area in berry production is small due in part to the diversity of their farm operation. For other operations, small-scale berry production provides supplemental income for those who have other non-farm regular or retirement income sources.

Additionally a telling piece of information about the berry industry is the years of production experience current growers have. As illustrated in Figure 2, there is an even spread of experience ranging from less than five years to more than 20 years, an indication of an industry that is healthy and growing. This diversity in experience is a wonderful opportunity for exchange of new ideas and tested methods. Moreover, the interest in berry production in NYS is growing rapidly. Another part of the NYFV1 project focuses on providing introductory workshops for first time berry growers interested in getting into the berry production business. Fourteen workshops, hosted by County CCE offices across the state in 2007-2008 had 500 people in attendance. The three-hour workshops discusses economics, marketing, labor, and production aspects of berry growing. Exit surveys of participants three months post workshop indicated many would be growers were not aware of the complex nature of berry crop production. A good portion of those decided not to pursue berry crop ventures. A smaller proportion of respondents indicated they are eagerly going forward with these new ventures; they felt better prepared to meet the challenges of berry crop production after attending the workshop.

What types of production systems are NYS berry growers using (Figure 3)? Although there is some variability, the majority of growers practice a no-spray or a low-spray program (90.8%). Survey results indicate 23.5% of growers utilize either a ‘No Spray’ or a Rigorous IPM Spray Program. 39.8% are using a ‘Low Spray’ program and 17.5% of growers are growing berries organically (certified or non-certified). This desire to grow the crops with as few chemical inputs as possible was also clear in the interviews. Some growers expressed a concern about their own exposure; “I don’t want to have to expose myself to more chemicals than I need to.” This grower’s main concern was not marketing but their desire to limit personal exposure. Many growers expressed that a top concern of their customers, particularly U-pick customers, is the amount of chemicals that are used on their fruit. One grower commented “…it is often one of the first questions that I get asked by customers...do you use chemicals?”

NEW YORK STATE HORTICULTURAL SOCIETY

NEW YORK FRUIT QUARTERLY . VOLUME 17 . NUMBER 1 . SPRING 2009

% of Respondents

Figure 3. Production systems used by New York berry growers. Note: some growers indicated they were using more than one type of production system - hence the 139% total for this pie chart.

Figure 1. Acres in berry production.

Figure 2. Years of experience growing berries.

Figure 4. Markets used by New York berry growers.

Figure 5. Advertising methods used by New York berry growers.
Results of evaluating marketing strategies demonstrate the close relationship berry growers have with their consumers. The survey showed that most growers market their crops directly to their consumers through PYO, farm stands, and farmers markets (Figure 4). Although 50% of growers do sell fresh fruit wholesale, this market only accounts for a small portion of their sales, with the exception of one grower who sells exclusively wholesale. This, coupled with consumer concerns about chemical inputs and their willingness to express these concerns to their local berry grower, is a great example of how the relationship between growers and consumers is built on trust and communication.

Because of the close relationship growers have with their customers and community, most rely on word of mouth as their primary form of advertising (Figure 5), which leaves plenty of opportunity for growers to ramp up their marketing plans. Signage is the second most utilized method of advertising, followed closely by newspapers. These forms of advertising are geared to reach local consumers. Don’t get the idea berry growers are behind the times in advertising however! New forms of advertising, such as websites, email, radio and television are becoming increasingly popular as they become affordable even for smaller operations.

Sources of Information for NYS Berry Growers

Communication, they say, is a two-way street. Another purpose of the survey was to examine what types of informational resources are important to growers and what the perceived credibility of those resources are (Figure 6). It goes without saying that high scores for importance mirrored (for the most part) high scores for credibility, with personal experience being number one, followed by extension educators, production guides, fellow growers (more personal experience) and newsletters. While electronic and conventional print resources came in for their fair share of importance, one-on-one and face-to-face interactions carried the day in terms of importance and credibility.

Figure 6. Sources of Information – How important are they, how credible are they? Values indicate percent (%)

<table>
<thead>
<tr>
<th>Sources</th>
<th>% Response</th>
<th>% Importance</th>
<th>% Credibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension/educators</td>
<td>87</td>
<td>32</td>
<td>24</td>
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<tr>
<td>Production guides</td>
<td>45</td>
<td>33</td>
<td>42</td>
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<tr>
<td>Fellow growers</td>
<td>57</td>
<td>62</td>
<td>33</td>
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<td>Newsletters</td>
<td>50</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>Workshops/conferences</td>
<td>20</td>
<td>13</td>
<td>11</td>
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<tr>
<td>Field days</td>
<td>20</td>
<td>29</td>
<td>22</td>
</tr>
<tr>
<td>Private consultants</td>
<td>16</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>Trade magazines</td>
<td>14</td>
<td>22</td>
<td>15</td>
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</tbody>
</table>

Figure 7. Berry grower-researcher relationships

I am aware of the research objectives and projects relating to berry production occurring at research institutions in NYS.

My primary concerns relating to berry production are currently being addressed by research institutions in NYS.

I have collaborated with a berry crops researcher/extension personnel at least once during the past year.

Connection of NYS Berry Growers with Researchers

How well does communication flow from researcher/extension personnel to growers and back? Results from this section of the survey indicate that this is one of the few areas needing improvement (Figure 7). There is an apparent dichotomy between those...
who appear to be well connected to information and resources (strongly, slightly agree), and those who are not (neutral, not sure). This was also apparent in the interviews, when asked if growers felt they were informed about research most growers said yes, however, when some growers were asked to talk about research that is currently going on, few could give any specific details. Many growers had not had the opportunity to collaborate with researchers/educators during the previous year. In such trials during the 2008-2009 growing season. They also hosted twilight meetings for other growers to come and see first season results from the trials they participated in. This created great opportunity for first hand exchange of information and ideas between growers, and between growers and researchers.

Conclusions
Survey results indicate NY berry growers find satisfaction in their lifestyle and are optimistic about the future—both for the NY Berry industry and their own personal operations. In addition, they feel that their contributions are appreciated by their community (Figure 8). What does all this mean? Well, it means that even if you only have a couple acres, you are the next generation NYS berry grower and your thoughts matter! These results indicate that there is room for growers that approach berry production aggressively and focus on growing and marketing a high-quality product. NYS berry farmers are well positioned to take advantage of national marketing programs addressing health and nutrition concerns of consumers. Berry growers are members of a growing and ever changing berry industry, but they need to continue to make their voices heard. Don’t hesitate to be active in grower associations, attend meetings and voice your concerns to extension agents and researchers about what your needs are. There are different challenges that face the NYS berry industry compared to those facing berry growers in other states. Researchers will only know what your needs are if they hear from you. If we are not available to speak to directly, please feel free to leave a message!

To share concerns or research needs or to participate in an on-farm demonstration trial for 2009 please contact Cathy Heidenreich (mcm4@cornell.edu, 315-787-2367) or Laura McDermott (lgm4@cornell.edu, 518-746-2562).

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Rebecca Harbut is a Ph.D student with Dr. Pritts working on evaluation of NE USA strawberry breeding and the potential of wild strawberry species. She will finish her degree in 2009. Cathy Heidenreich and Laura McDermott serve as regional berry extension support specialists. Cathy covers Western NY and is based at NYSAES Geneva. Laura covers Eastern NY and is based at the Washington County CCE Office, Hudson Falls, NY. Dr. Marvin Pritts is professor and chair of the CALS Horticulture Department and project leader for the NYFVI berry production efficiency project.

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Figure 8. Reasons for optimism for NY Berry Growers.
NEW YORK BERRY GROWERS: THE NEXT GENERATION PHOTO ESSAY

One acre of brambles under high tunnel production, Orleans County.

Eco-weeder use in first year strawberries, Monroe County

Hydrostacker strawberries in Cayuga County

Plasticulture strawberry production, Oneida County

Modified boom sprayer for strawberries

Blueberries under bird netting, Chautauqua County

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