BEST MANAGEMENT PRACTICES FOR SMALL FRUIT: - 
STRAWBERRY SURVEY SAID...

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This is the fourth and final article in a series detailing results of a NYS Berry Grower Survey conducted November 2007, as part of the 2007-2009 NYFVI Berry Production Efficiency Project. Survey participants were asked to identify management practices giving them the best production efficiency for various small fruit crops. Best management practices information collected from 89 growers across 37 NYS counties was tabulated, summarized, and then shared through this series. Currants and gooseberries were highlighted in the December 2008 issue. Blueberries were the crop for discussion in January’s issue; brambles (raspberries and blackberries) in the February issue. This final article discusses strawberries.

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Planting Establishment
The successful establishment of a strawberry planting depends on pre-planning. Choosing the appropriate site and understanding the history of that site will help potential growers avoid long-term problems with poor drainage and soil borne diseases. Access to high-quality water for irrigation and frost protection is also a must. Land with slopes greater than 5% are erodible and difficult to manage. Sites with a 3-5% north or east facing slope tend to have the least problems with spring frost damage and winter injury. Growers surveyed mentioned the importance of using cover crops prior to planting to reduce weed problems and improve soil tilth. The lack of this type of pre-planning and site consideration was mentioned as being a significant factor in failure by one strawberry grower.

When questioned about techniques that worked well during planting, 36% of growers recommended planting dormant plants early in the spring compared to 6% of growers that recommended using plug plants. Due to the variation in potential planting times, suggested calendar dates range from Mid-April to mid-May. Those using plugs were planting in late May to mid-June.

Twenty-one percent of growers said that drip and/or overhead irrigation were extremely important for a successful installation and one grower mentioned that frequent watering during the entire 1st season was very important. One grower surveyed was dipping dormant plants in a Hydro-Gel solution that coats the roots to encourage water absorption and discourage root desiccation. Three growers mentioned the importance of setting the plants at the appropriate depth and allowing enough room to accommodate the long root system. This can be a challenge when first setting up a transplanter.

The majority of growers surveyed favored the traditional matted row, but 18% of growers were happy with growing strawberries on plastic mulch. The mulch must be laid using a mulch laying implement. Mulch layers stretch the mulch tight around a raised bed or on the ground and the edge of the mulch is covered with soil. This insures that the mulch will stay in place during the growing season. A grower accurately noted that laying the mulch after planting is not a practical approach.

Some other plant establishment “tips” from growers include adding kelp or soluble starter fertilizer at planting. Whether from an organic or inorganic source, it has not been definitively shown that adding N at planting significantly improves plant vigor and yield.

Weed Management
Growers responded to the topic of weed management in greater numbers than in any other category of the survey. Seventy-two growers had input about what worked well and what didn’t work when managing strawberry weeds. Forty-nine percent of the growers used herbicides in one form or another to help control weeds and thought that this approach worked well, but 24% of responses said that certain herbicide treatments did not work. The registered herbicides were fairly well represented between pre-emergent and post-emergent materials. Happily, there are several more herbicides available now than in 2007 when the survey was done. Fourteen percent of responders said 2,4-D applied in late fall did a good job controlling broadleaf weeds.

Seven percent of responders indicated that well-timed cultivation, heavy mulching and black plastic provided an adequate amount of weed control, but 9% of the growers reported that relying on cultivation did not work well for them. Shallow cultivation is recommended on a weekly basis after the renovation process.
One grower is using the soil fumigant Vapam in the fall to reduce the risk of soil diseases and weed problems. A second grower has moved to an annual production system due to the weed problem.

An integrated approach to weed management is the most effective way to manage weeds in a perennial system. Rotations, hand weeding, mulching, hoeing and cultivation are necessary supplements to chemical weed control. Pre-plant preparation, which was mentioned by just one grower, should be an integral part of all berry farmers weed management plans.

Production Systems
Just less than 50% of the berry farmers surveyed indicated that the matted row production system was their preferred production system. Six percent of the growers surveyed said that plasticulture systems worked well, but 15% listed plasticulture as a production system that worked poorly. The only other production system that was specifically mentioned was the ribbon row from one grower that did not like the system.

The big advantage to a matted row system is that the initial establishment cost is low, due to the lower density of plants. Despite the initial economy, the labor invested in keeping this low density planting weed free during the first season can be quite high. Additionally the matted row system may result in a very dense planting that is hard to pick from and may be more pest prone. This is especially true if the rows are not aggressively narrowed at renovation, a fact echoed by several growers.

Two growers mentioned that they were using a slightly tighter spacing than the standard 18” within the row. These growers are planting at 12-15” within the row and leaving only 3’ between rows. This means the farmer will work hard at keeping the matted row narrow, but that effort may pay off as research has shown that more numerous narrow rows are more productive on a per acre basis than a planting with fewer wide rows. Despite this research, it does not appear that NYS berry growers are embracing the ribbon row system, which is a very high density system where within row spacing is 3-6” and between rows is 3’. Raised beds are recommended for this system. Plant density in a ribbon row system varies from 29,000-58,000 plants per acre compared to a traditional matted row system that has 7,260 plants per acre. Ribbon row systems are not deflowered during the first year so that running is suppressed. Fruit can be harvested during the first season, and this adds to the attraction of the high density system.

Seventeen percent of growers responding to this question mentioned cultivation practices that were important to the success of their production system. These growers were using cultivators with discs in order to toss a little soil over the top of the strawberry crowns. Others mentioned that cultivating while also sweeping runners into the matted row was an easy, labor efficient way to fill in the planting. Growers mentioned trickle irrigation as important to their success and strawberry rotations of 2-3 years were also recommended.

Methods that did not work for a few growers were the stale seed bed and rye planted between the rows. Research shows great promise for both of these herbicide reducing methods, but growers should manage no-till systems with great care. For more information about recent work with pre-plant techniques, visit the August 2008 NYBN at http://www.nysaes.cornell.edu/pp/extension/tfap/newslett/nybn78a.pdf.

Early season berry planting. Berries on plastic mulch.
Fertility
Strawberry nutrition and fertilization are important to the success of a strawberry planting, but they are not well understood. This was somewhat reflected in the variety of responses to the survey. The most commonly listed “misapplication” of nutrients was when early spring applications of nitrogen are mentioned. Twenty-two percent of responses mentioned that they applied some form of N in early spring. Studies have shown that this can result in an increase in gray mold and mites as well as a reduction in fruit quality. The best time to apply N to a bearing strawberry field is immediately after fruiting (during the renovation process in a matted row system). Nitrogen should be supplemented in late summer to maintain N availability throughout the fall.

Three growers mentioned that when preparing the site for planting, they incorporate manure based compost at a rate of 5-10 tons per acre. This practice is perfectly acceptable as long as the compost is not added any less than 90 days from harvest. This recommendation is part of the Good Agricultural Practice (GAP’s) guidelines. It is a mandatory rule for all growers seeking GAP’s certification and is strongly advised for any strawberry grower selling berries for fresh consumption. Compost and manure help improve soil structure as well as release N as the solid organic components decompose. Growers should realize that in most situations insufficient N is released from manure or compost to meet the total nutrient requirements of the strawberry plant.

A typical N fertilization regime is listed in NRAES-88, The Strawberry Production Guide. This standard program consists of 30# actual N per acre 4 weeks after planting followed by 40# actual N/acre in early September during the planting year. In Year 2 and thereafter (depending upon results from the foliar analysis) 70#/acre of actual N should be applied immediately after fruiting followed by 30#/acre in early September. It appears from the survey responses that most growers are getting close to the recommended amount of N, but timetables for the applications vary from the standard. As long as N is not being applied before fruiting, or too late in the season to be a help, slight differences in the application time shouldn’t be a problem.

CaNO₃ was the nitrogen source that 21% of respondents mentioned specifically. The N in CaNO₃ is readily available plus it does not volatilize and has a low salt index making it a nice material for new plantings. Urea was mentioned specifically by 2 growers and ammonium nitrate by one grower, although not every respondent specified the form of N that they were
Urea is the least expensive form of nitrogen available but it can volatilize which is why incorporation is recommended. Volatilized ammonia can blacken strawberry leaves.

Twenty-two percent of responding growers are fertilizing their strawberries either occasionally or entirely through a drip-irrigation system. Fertigation is an effective way of providing micronutrients to plants as the application is more uniform and less fertilizer is required. The amount of fertilizer to apply depends upon many factors, but a starting point would be 4#/acre/week, although growers should keep careful records and be prepared to alter this if necessary. One grower gave the following account of his fertigation plan: “We use liquid N and inject 6 #/ac beginning in mid-May and drop back to 2# N/ac at each irrigation during the planting year. During the fruiting year, we keep the rates up, and augment with a 20-20-20 water soluble fertilizer at 5#/ac rates.” This follows a general recommendation of 10#/acre/week of N between mid-July and mid-September of the fruiting year. With all fertigation materials, care should be taken as combinations of certain nutrients can form precipitates which can plug emitters.

Only 1 grower mentioned using foliar fertilizer treatments on occasion to augment N and Ca in his fertility plan. Using foliar fertilizer to augment, but not provide the basis of the nutrition for the planting, is a good way to proceed.