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SHORTS:

Drought Resources: The U.S. Department of Agriculture’s Natural Resources Conservation Service (NRCS) is offering information and programs to help Massachusetts farmers make their operations more resilient in the face of future drought. Widespread drought conditions during the 2016 growing season have affected farms across Massachusetts, resulting in the USDA designating eleven Bay State counties and three contiguous counties as primary natural disaster areas. This designation made available low interest emergency loans through the USDA’s Farm Service Agency (FSA). A Drought Resources web page with drought-mitigating tips has been created on the NRCS Massachusetts website. Financial help for implementing conservation practices may be available through the federal Environmental Quality Incentives Program (EQIP) or the Agricultural Management Assistance (AMA) program, both authorized under the 2014 Farm Bill.

Conservation Stewardship Program Applications Available - USDA Natural Resources Conservation Service will accept and process applications for enrollment in the Conservation Stewardship Program (CSP) beginning in November, with sign-up running through February 3, 2017. Producers can expect to see nearly double the enhancements and conservation practices offered previously. The program also has new methods and software for evaluating applications. Read more at: www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/releases/
A Message from the National Agricultural Statistics Service – 2017 Census of Agriculture

Dear Massachusetts Farmer,

The U.S. Department of Agriculture’s National Agricultural Statistics Service (NASS) is preparing the mail list for the 2017 Census of Agriculture. The Census of Agriculture is the leading source of facts and figures about American agriculture. Conducted every five years, the Census provides a detailed picture of U.S. farms and ranches and the people who operate them. It is the only source of uniform, comprehensive agricultural data for every state and county in the United States.

I am asking for your help to make the 2017 Census of Agriculture as accurate as possible. A major challenge is having a list of farmers that is as complete as possible, especially with so many new farmers. If you have never received a Census of Agriculture or survey questionnaire from NASS then we may not have you on our farm list. Please take a couple minutes and provide NASS your contact information at https://www.agcounts.usda.gov/cgi-bin/counts/.

Even if you do not think of yourself as a farmer or rancher, your operation is a farm if it meets the Census of Agriculture definition – an operation that sold or normally would have sold $1,000 or more of agricultural products in a year. If you own or rent agricultural land, grow vegetables, grow horticultural or floricultural products, have fruit or nut trees, cattle, horses, poultry, hogs, bees, aquaculture products, or consider yourself a farmer or rancher, we need to hear from you.

All individual information provided to NASS is confidential and only used for statistical purposes. In accordance with the Confidential Information Protection provisions of Title V, Subtitle A, Public Law 107-347 and other applicable Federal laws, your responses will be kept confidential and will not be disclosed in identifiable form to anyone other than employees or agents. By law, every employee and agent has taken an oath and is subject to a jail term, a fine, or both if he or she willfully discloses ANY identifiable information about you or your operation.

If you have previously received a Census of Agriculture or survey questionnaire from NASS then you will be receiving you 2017 Census of Agriculture questionnaire in late December 2017 or January 2018. Your cooperation is appreciated.

Sincerely,

Gary R. Keough, State Statistician
USDA National Agricultural Statistics Service
Field Operations | New England Field Office
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STRAWBERRY

Growing Raspberries and Strawberries in Containers
Kathy Demchak, Penn State Extension

Periodically growers have asked for information on growing strawberries and raspberries in containers. Thanks to our Specialty Crop Research Initiative (SCRI) high tunnel project, we can share some experiences on what worked for us this past year or so.

We started using a containerized system in our high tunnels because soil variability at Penn State’s high tunnel research site was an issue. The high tunnels had been used to grow many different crops over the past 17 years and so over time, the nutrient levels in each tunnel became quite variable. This was a problem for our research, as we are testing different plastic coverings for the tunnels and we wanted to make sure we were correctly attributing any effects to the plastics, not to differences in the soil in each tunnel.

In 2015-16, we compared 4 different media types and 2 different fertilization regimes for growing day-neutral strawberries. In this experiment, we tried the type of bag used for coir gro-slabs, these are white-on-black plastic
“sleeves” that lie horizontally on the ground and, when filled with media, are only 4 to 5 inches high.

The media we compared were:
- coir
- Metromix 360
- a mix that was a 2:1 ratio of peat:perlite

**Results**

We found that since the sleeves are not very deep, it helped to have a well-drained mix, because there wasn’t much room for error when it came to over-watering. Top growth and root growth were best in the 2:1 peat:perlite mix, and the root growth was truly amazing as just extracting the plants from the bags to take measurements was a challenge because they were so packed with new roots. The flip side was that bags with the 2:1 peat:perlite mix were the first to dry out, and while part of this effect was due to a lower water-holding capacity, the large root systems could have been pulling out a lot of water.

We also compared fertilizer mixed into the media to a constant feed of a complete soluble fertilizer at 100 ppm N. When we mixed the fertilizer in, we used an older recipe which wasn’t the best option! Because our water is from a well and is really high in pH and bicarbonates, we opted for an 18-18-18 complete soluble fertilizer made for this situation (Peters® Excel pHLow™), which dropped the water pH from 7.6 to 6.6. It should be pointed out that we did not add any lime to the media because we figured we’d get plenty of that from our water. Fertilizer in the mix resulted in much more plant variability than the constant-feed treatment, and plants being watered with the soluble fertilizer grew larger regardless of the type of media used.

In 2016-17, we opted for deeper containers that would provide a wider margin for error when watering. We used 1-gallon grow-bags for strawberries, and 3-gallon grow-bags for raspberries. Results of work in Florida and Arizona showed that growing strawberries in deeper containers worked better than using more shallow ones. The only difference was a couple of inches. In 1-gallon grow-bags, the media was 6 to 7 inches deep, but it was enough of a difference to make watering easier. Both the strawberries and raspberries grew extremely well overall.

In 2016-17, we also tried a different fertilizer made for water high in bicarbonates (Plant Marvel 20-7-20), and that worked well, too. We may eventually end up acidifying our water, but for the time-being just using fertilizers made for high-bicarbonate water worked. What is important is to make sure that the fertilizer is dissolved completely, and also that a precipitate isn’t forming after the fertilizer solution stands for a while. In the past, when we tried more commonly-used soluble fertilizers, precipitates were forming, as there was often a fine white powder in the bottom of the container. At the time, we had thought this was calcium phosphate, but we were also having deficiencies of iron and zinc, so possibly other complexes were also forming as well.

**Conclusions**

So, as a recap, what worked for both raspberries and strawberries was a 2:1 peat:perlite mix; with the plants receiving either of the 2 complete fertilizers (18-18-18 or 20-7-10, both made for an irrigation source that is high in bicarbonates) at 100 ppm N. Strawberries in 1-gallon grow-bags, and raspberries in 3-gallon grow-bags worked well.

In future months this winter, we’ll provide updates on other parts of the project as we get the data entered and analyzed.

For more information on the project, and on growing berries in protected culture, please visit the TunnelBerries web site.

(Source: Penn State Vegetable & Small Fruit Update. Nov. 2, 2016)

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**RASPBERRIES/BLACKBERRIES**

**Growing Raspberries in Tunnels and Greenhouses: basic concepts**

Adam Dale, University of Guelph

Cultivation of raspberries in tunnels and greenhouses is increasing world-wide as it offers the advantages of early production and improved fruit quality. Probably the largest advantage is that many of the fungal diseases are reduced or eliminated, particularly the fruit rots so that the shelf-life of the fruit is significantly expanded. However, to understand how to grow raspberries under tunnels or in greenhouses successfully, the grower needs to understand the biology of the plant, and know something about the systems used in field production of raspberries. Here, in the first of two articles, I will explain the structure of a raspberry plant and discuss various aspects of flower initiation and dormancy as they relate to protected cultivation. In the second article, I will discuss such concepts as cane quality, cane density, within-plant competition, and trellising as they relate to 'long cane' production.

**Structure and Architecture of the Plant**

The raspberry plant has biennial canes which grow in the first year and produce lateral fruiting shoots in the second year. The first-year cane grows slowly in the spring, rapidly during the summer and slows down in the fall.
This gives the typical cane: short internodes at the base and at the tip, with long ones in the middle. In regions with hot summers, growth in summer slows and gives more short internodes in the middle of the cane.

New canes are produced from buds at the base of existing canes or from adventitious buds on the roots. As the roots grow out from the plant new root buds develop further away from the original plant. This means that as the plant ages, many new shoots will be produced over a large surface area.

In the fruiting year, the lateral branches develop from the tip of the cane downward and often the nodes near the base of the cane do not develop. Typically, the lateral branches near the top of the cane are short, have fewer, small fruits which are spaced evenly along them. In the middle of the cane, the lateral branches are long, have more, larger fruits which are found towards the tip of the branch. The basal lateral branches tend to be intermediate between those at the top and those in the middle of the cane.

The presentation of the fruit depends on where the cane is tipped. If a cane is tipped near the top it will have many short lateral branches with few, small fruits and the larger fruit will be near the base of the cane. If the cane is tipped in the middle, it will have few long lateral branches with many large fruits and the large fruit will be presented near the top of the cane.

This fruited structure can be altered if the within-plant competition between the first year and fruited canes is altered. When the competition from the first year canes is removed, only the lower lateral branches become longer and have extra fruits. Those at the tip are unaffected.

**Flower Bud Initiation**

Summer-bearing raspberries will initiate flowers under various combinations of low temperatures and short days. Research has shown that, on average, flowers will initiate at 10EC in 16hr days and 12.8EC in 9hr days. This will vary depending on the fruited season; early-fruiting varieties will initiate at higher temperatures than late-season varieties. About one week of suitable temperature/day-length combinations are needed to initiate flower buds. The buds at the top of the cane initiate flowers first and then the process moves towards the base of the cane.

When flower bud initiation occurs in a particular site will depend on the environmental condition at that location and the varieties grown. Usually this in the fall, but it may not occur until the spring. For example, at my research station in Simcoe, Ontario (42E 45' N) raspberries initiate during September. In 1998, the variety, Tulameen, had initiated flowers by 16 September. In one experiment the same varieties were examined in Invergowrie, Scotland (56E 30' N) and Abbotsford B.C. (49E 0' N) in 1987. At Invergowrie, the variety, Glen Clova, all the buds on the canes were floral by 23 August and in Abbotsford by 27 September. However, in Meeker, all the buds were floral at Invergowrie by 27 September, but in Abbotsford, only the buds at the top of the canes had initiated by 5 October. The lower buds did not become floral until March 1988.

**Dormancy**

Raspberry canes become dormant under similar conditions to those that cause flower buds to be initiated. Researchers have been more interested in the conditions that allow the plants to break dormancy as different varieties react very differently. Indeed, it is possible to induce the lateral buds on the cane to grow before they become dormant. I have found that five weeks below 7EC is sufficient to break dormancy in Tulameen.

Although the varieties react differently it is possible to devise a model to predict when dormancy is complete. With the help of Dr. Derek Jennings, we have been able to devise such a model for raspberries. In this model, Tulameen requires 520 chilling hours for dormancy to be completed and high temperatures can reverse the chilling effect. Once there has been one hour below 8EC, each hour is calculated depending on the minimum temperature as follows: >13EC = -1, 11.1-13EC = -0.5, 8.1-11EC = 0, 5.7-8EC =0.5 and <5.6EC = 1.

Once dormancy has been completed, there is a period where continued chilling has a vernalization effect. Although no additional lateral branches will be produced, this additional chilling decreases the time it takes for fruit to be produced. In one experiment, Tulameen plants chilled for 5 weeks took about 95 days to produce fruit and while those that were chilled for 8 weeks took 82 days to produce fruit.

In conclusion, for someone to grow a good crop of raspberries they need to understand the basic biology of the raspberry plant as this enables them to make good decisions regarding the plant husbandry. Here I have explained the basic concepts needed to understand the plant. In the next newsletter, I will explain the concepts needed to develop a good crop. (Source: Ontario Berry Grower, March 2016)

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**Growing Raspberries in Tunnels and Greenhouses; maximizing yield**

Adam Dale, University of Guelph

To understand how to grow raspberries under tunnels or in greenhouses successfully, the grower needs to understand the biology of the plant, and know something about the systems used in field production of raspberries.
In part 1 of this series, I explained the structure of a raspberry plant and discussed various aspects of flower initiation and dormancy as they relate to protected cultivation. Here, in the second part, I will discuss such concepts as cane quality, cane density, within-plant competition, and trellising as they relate to 'long cane' production.

**Cane Density**
When the effect of cane number on yield is considered, the general trend is that yield per length of row increases until there are about 12-17 fruiting canes per metre. It then plateaus, and as the cane number increases, the yield will be higher on an area basis. In Ontario, depending on the type of cultivation, the farm machinery used, raspberries can be planted as close as 1.8 m., although 2.4-2.7 m is usual. Inside tunnels and greenhouses, closer spacing between the rows can be used.

**Within-plant Competition**
Within-plant competition can be altered by controlling the number of young canes that grow. There are three ways to control young cane growth and influence yields: an annual system, annual with cane vigour control, and biennial. In the annual system the young canes grow each year to fruit the following year. In the annual system with cane vigour control, the first flush of young canes is removed each year and a second flush is allowed to grow. In the biennial system, the fruiting phase is separated from cane growth. In the first year of the two year cycle only new canes are allowed to grow, in the second only fruiting canes are allowed to grow.

When the three systems are compared, there is a relationship between the vigour of the young canes and the yield of the fruiting canes; the more vigorous the first year cane, the lower the yield of the fruiting cane. The annual system gives rise to tall first year canes and the fruiting canes only give moderate yield. In the annual system with cane vigour control, first year canes are moderately tall and the fruiting canes can give between 120-150% of the yields of the annual system. The biennial system has no first year canes in the fruiting year and the fruiting canes can give between 150-250% of the yields of the annual system.

In the annual system with cane vigour control and the biennial system, first year canes are removed when they are between 10-20 cm high. For cane vigour control only the first flush of cane is killed, while in the biennial system the canes may have to be removed three or four times until the harvest season.

**Trellising**
With the raspberries in narrow rows and the new cane growth carefully controlled, the canes will need to be trellised to support the heavy crop. Trellising also increases picker satisfaction and efficiency, increases yields as more of the berries will be picked, and allows a lower disease pressure as the canopy will be more open. However, effort is needed to build the system which gives the grower a larger up-front cost. There are three ways to trellis raspberries; the conventional upright system, a "V" or "T-"bar" system, where the fruiting canes are supported at an angle, and the new Stiles system, which bends the cane into the row and moves them into the correct position at flowering.

The conventional system holds the raspberry canes in a single upright row and makes picking considerably easier than if nothing is done. It allows narrow row spacing to be used but the young cane grows outside the fruiting canes. This type of system is the only one that can be used for machine harvesting of the crop at the moment. One possible method is to place 1.5m high posts, about 10m apart and hold the fruiting canes in a single line with two wires held together at about 50 cm from the ground. The fruiting canes are then tied singly or in bundles of 2 or 3 to a single wire about 1.3m from the ground.

In the "V" system, the canes are separated to form two rows which are between 0.6-0.9m apart at their tips. This allows pickers to reach the fruit very easily, particularly as the young cane grows up between the fruiting canes. The yields from this system are higher per row than the conventional system, but the rows need to be spaced further apart. One possible method is to place posts at the same distance apart as in the conventional method and a horizontal bar 0.6-0.9m long is attached to the post to make a "T" bar configuration. Single wires are then placed on the end of each arm and the canes tied to these wires.

In the Stiles system, designed by Dr. Herb Stiles, VPI & SU, Virginia, the fruiting canes are supported on a swing trellis. This trellis is placed so that initially the fruiting cane is bent at about 45 cm by an off-set wire on one side of the row with the tip of the cane held equally off-set on the other side of the row. The fruiting laterals then grow towards the light onto one side of the cane. At flowering, when the lateral position has been set, the trellis is moved so that the fruiting cane becomes upright. This then presents all the fruit to one side of the row. In this system,
the young cane will grow away from the fruiting canes towards the light. This system has many advantages as all the fruit is presented on one side unobstructed by the new canes.

However, for someone to grow a good crop of raspberries they need to understand the basic biology of the raspberry plant as this enables them to make good decisions regarding the plant husbandry. Also, careful attention to management factors such as trellising is required so that the plantings in tunnels and greenhouses are easily accessible for pickers to harvest the crop. In this and the first article, I have explained some of the basic biology of the raspberry and some of the standard cane management procedures. These, together with good plant and harvest management can make the raspberry a highly profitable crop in tunnels and greenhouses. (Source: Ontario Berry Grower, March 2016)

Conclusions
We can learn how best to maximise yield in tunnels and greenhouses from research and growers experiences with field production of raspberries. So in tunnels and greenhouses, I have the following recommendations: keep the canes in the rows in a band no wider than 30cm, with at the most 1.8m between the rows; leave 7.5-9m of fruiting cane per m2 of land are; control the vigour of the primocanes by removing the first flush when they are 10cm tall; trellis the canes and consider the Stiles trellis.

BLUEBERRY

Winter Moth

Winter moth moths will be emerging from the soil from late November through December. Throughout Rhode Island you may see small gray moths attracted to porch lights in large numbers and clouds of moths in headlights, especially on warm evenings. These are all male moths – females have tiny wings and cannot fly. Females emerge from the ground and climb up nearby tree trunks where they mate and lay eggs. In early spring, newly hatched caterpillars crawl into swelling buds and begin feeding.

Trying to control male winter moths is useless and pesticide sprays aren’t known to be effective controlling female winter moths. Many people are interested in using tree wraps to capture female moths as they climb up trees. Tree banding will probably be most successful in yards with very few trees, no woods nearby, and a small to moderate-sized winter moth population.

Figure 1: Tunnel picture

Winter Moth & Gypsy Moth – Fall 2016
Heather Faubert, University of Rhode Island

BugBarrier set up on tree trunk by mid-November.
Last year I set up two tree wraps on one tree trunk. The lower tree wrap caught 207 female winter moths and the tree wrap higher in the tree caught 138 female winter moths. So at least 138 female moths got past the first barrier and an unknown number of moths got past the second barrier. This year I’ll set up 3 or more bands on one tree trunk.

Where there is a large population of winter moths, dead moths can completely cover the sticky surface and then female moths can easily walk over dead moths. Be sure to check traps frequently and remove moths if necessary.

When a female moth encounters a tree wrap she tends to lay many eggs right below the tree band. For this reason, tree trunks with must be sprayed with a dormant oil from the tree wrap down to the ground next March or April, before winter moth egg hatch, to kill eggs on the trunk.

Gypsy moth

Gypsy moth caterpillars defoliated thousands of acres in RI in 2016 and are poised to do it again in 2017. Right now, gypsy moths are present as eggmasses on tree trunks, branches and many structures. These eggmasses will hatch in early May and caterpillars will feed through June. Hopefully we will have normal spring weather (not droughty!) and most gypsy moth caterpillars will die of the two diseases that usually control gypsy moth populations. The problem is, the fungal and viral diseases do not start spreading until gypsy moth caterpillars are half-grown, and most diseased caterpillars don’t die until they are full-grown – after they have consumed a lot of foliage.

After leaf drop and before eggs hatch in early May, eggmasses can be scraped off or sprayed with 1-3% horticultural oil. (Oil should not be applied when temperatures are predicted to be below 40 degrees within the next 24 hours.) This seems like a difficult (or perhaps impossible) task given there are so many eggmasses and so many are high in trees. Still, many people are looking for something they can do to reduce gypsy moth numbers.

Gypsy moth eggmasses in October and empty pupal cases. (Source: URI Caterpillar Update, Oct. 28, 2016)

Click on link to see a [video about setting up BugBarrier](#)
**GRAPE**

**Why is my Vineyard Floor Blue?**

*Tim Weigle, NYSIPM, Cornell University*

Why was my vineyard floor blue?

A question the extension team has been hearing frequently is “Why were there so many grapes on the ground this year at harvest?” Some of the culprits that have been mentioned have been Phomopsis fruit infections, grape berry moth and powdery mildew. Another answer is the berries just got to the point where they were ready to come off the vine. The answer to this question is going to vary from vineyard to vineyard as well as from area to area within vineyards. To get the answer to what happened in a specific vineyard block will take some detective work. Combine all the information you have to get a handle on what you can do next year to limit the recurrence of the problem.

Some questions to ask;

- **Does the vineyard have a history of grape berry moth damage?** While we did not see severe levels of grape berry moth during the July and August, we did see grape berry moth egg-laying continue into the harvest period. Document areas where grape berry moth damage is suspected and give it special attention next year either through additional scouting and insecticide applications (if scouting shows them necessary) or by scheduling those areas to be among the first to be harvested.

- **Were rachis infections of powdery mildew present?** We did see more powdery mildew rachis infections this year than we had expected and there have been reports of crop loss due to these infections. If you did not scout your vineyards to determine the level of disease after bloom, at least look at your spray records to determine if the appropriate timing, intervals and materials were used.

- **Were there infection periods for Phomopsis during the critical prebloom to immediate post bloom period?** Phomopsis fruit infections occur at, or shortly after, the bloom period and then remain latent in the berry until just before harvest as the fruit matures. The berries then turn a light-brown color, small black dots (pycnidia) appear on the surface and the berry shrivels (these late season infections can be easily mistaken for black rot). We had a very dry year this year so I would look at the level of overwintering inoculum for diseases as well as the frequency of infection periods for those diseases. A great tool to help determine if weather conditions favored Phomopsis fruit infections is the grape infection events log found on the Network for Environment and Weather Applications (NEWA) website [http://newa.cornell.edu](http://newa.cornell.edu). This tool allows you to access infection periods for Phomopsis and black rot for a specific station found on NEWA.

To access the grape infections events log, go to the NEWA homepage and use the drop down menu under Pest Forecasts in the blue bar near the top of the screen. Choose Grape Forecast Models from the menu. You will be directed to a page where you can choose the disease or insect you want (select Grape Diseases from the menu), the state the station is located in, the weather station name (if you do not know the name you can choose the station using the map on the right hand side by clicking on the raindrop/leaf icon for your station) and the date of interest. Once you hit the calculate button you will be taken to the Grape Disease Infection Events page for the station location you selected. Scroll down the page to the area below the Disease Management section where you will find a yellow box with the text *Show grape infection events log*. Click on that button and you will see all the infection events for Phomopsis and Black rot for the year up to the date of interest you selected. Looking at the 2016 season, bud break was May 10 and Concord bloom at CLEREL was recorded on June 12. I used June 25, 2016 as my date of interest as that would include the period from bud break to approximately two weeks after bloom. I checked the infection events log for the Portland site and found that there was only one infection event for Phomopsis during this time period on June 4 as seen in the figure below. Notice that three other infection events were recorded but they were all prior to bud break so they should not be considered. The timing of the June 4 infection event was 8 days prior to bloom so did not really hit the sweet spot for fruit infection of bloom to shortly after bloom. Rain events were spotty this year so I also checked Sheridan where the grape infection events log showed Phomopsis infections on June 4, 6 and 16. Check NEWA for infection information from the station nearest you to get the information that can help identify, or eliminate, whether or not disease could have played a big role in crop loss in your vineyard this year.
Finally, look at what the Brix readings were at harvest in the vineyards where you saw crop on the ground. If Brix levels were well above average for a block, it may be that the vine was just ready to be done and some of the stronger winds we had this fall helped to remove the berries from the vine.

**Take home message:** There are a number of reasons why a vineyard block lost some of its crop to the ground this year. Doing some homework to determine the exact cause will help in adjusting your vineyard IPM strategy for next year. *(Source: Lake Erie Regional Grape Program Update. Nov. 10, 2016)*

**POLLINATOR CORNER**

**10 Things To Think About Before Establishing Pollinator Habitat**

*Ben Phillips and Meghan Milbrath, Michigan State Univ.*

*[Editors Note: This article is from Michigan State but still contains excellent resources and information useful for New England conditions]*

Looking to establish habitat for pollinators? There are many state, county, city and private programs available to help you do so. While these programs are designed to help, it is easy to be overwhelmed by all the options or get bogged down by all the acronyms, restrictions and paperwork they require. At [Michigan State University Extension](http://www.msu.edu), our aim is to help Michigan homeowners, farmers and land managers take advantage of resources and programs so that you can smoothly turn your good intentions into pollinator-friendly landscapes.

To help interested people visualize how different native flowering plant species may look and perform in a pollinator planting, MSU is hosting a [Supporting Beneficial Insects with Flowering Plants](http://www.msu.edu) workshop Aug. 2, 10 a.m. to 2 p.m., at the [Clarksville Research Center](http://www.msu.edu), 9302 Portland Rd, Clarksville, MI 48815. More than 55 species will be on display that have undergone testing for their attractiveness to beneficial insects, including pollinators. A line-up of speakers will inform participants on the establishment and maintenance of plantings. For more information, an agenda and to register, go to: [Supporting Beneficial Insects with Flowering Plants](http://www.msu.edu).

The following 10 tips will help serve you when considering the many options available for establishing pollinator habitat.
1. You don’t have to keep bees to help bees
Honey bees, which are from Europe, get a lot of (deserved!) attention, and many people think that bee keeping is the best way to help pollinators. However, in Michigan, we have over 400 species of native bees, plus moths, butterflies, ants, flies, etc., who aid in pollination. One of the biggest problems facing all pollinators is habitat loss, and restoring habitat helps honey bees as well as our native pollinators. Acquiring the skillset required for successful beekeeping requires a long-term commitment. However, anyone can put in and maintain a pollinator habitat. Why focus on the needs of just one, when you can help them all equally with flowering plants?

2. Determine your goals
Do you want your lawn to support pollinators, a ditch bank or an entire field? Is this for you personally as a beekeeper (i.e., nectar forage), farmer (e.g., organic matter accumulation, compaction alleviation, filtration or erosion control), business’ public image (e.g., parking lots and corporate lawns), or for the greater good (e.g., school, library or other public area)? Each of these approaches will open and close different doors for attaining financial support for establishment.

- Farmer. Programs supported by the USDA Natural Resource Conservation Service (NRCS), county Conservation District and U.S. Fisheries and Wildlife Service (USFWS) offer incentives for farmers and owners of leased farms to take on conservation efforts. These include well-known programs, like the Conservation Reserve Program (CRP), but also lesser-known ones with smaller, county-specific or temporary financial support. In some cases, lands are required to have a recorded cropping history, and some programs operate through a bid-process or point system. Meeting with a person from one of these federal, state or county organizations is essential, as these programs can change depending on the Farm Bill and other conservation priorities. A good first step is to speak with field staff from Farm Service Agency and NRCS at your county USDA office, and work with your Conservation District biologist.

- Company. As an employee of a private business, you may be able to find Green Initiatives internally. Some organizations may be looking for ways to enhance their public perception through habitat restoration projects, and be willing to sink the cost of doing so, but are looking for someone to champion the project. In these cases, the resources that are most sought after are the tools and technical advice for completing the job. Often, businesses are more likely to fund a project if it is well thought out and supported. Consider asking local Master Gardeners and native plant chapters for help in installation and maintenance.

- Educator. Dedicated educators and those looking to do something for the public good can access a number of donation and grant opportunities. Multiple organizations offer Environmental Education grants for small amounts of money to purchase seeds and tools for establishing native grasses and flowers on school and community property. Private or public nature and land conservancies, Master Gardeners and garden clubs often collect seed to establish and expand their own plantings and for use in educational outreach. Cementing a relationship with employees from county Conservation Districts and seed companies can lead to donations of flowering trees and shrubs and seeds. When soliciting for donations, it is important to assure donors of the educational nature of your intentions, so make sure you include a plan for outreach/education.

- Public land manager (state game areas, conservancies, city managers, etc.). There are separate pots of money set aside for organizations that manage public land. The North American Wetlands Conservation Act (NAWCA) established funds for habitat development, and the Department of Natural Resources (DNR) Wildlife Habitat Grant Programs continually provide funding to land managers of publicly accessed hunting lands. Some of these habitat initiatives are also beneficial to pollinators. USFWS Wildlife Grants and Habitat Conservation Plans are also an option for agency partnerships.

- Private landowner. There are a few opportunities for funding if the acreage is large enough, even if the land has not been in agricultural production recently. The MDNR Private Lands Program (PLP) or the USFWS Partners for Wildlife Program (PWP) may fit your goals. Some NRCS programs may apply. Contact your local conservation district biologist and USDA office to start, and look at other projects in your area.

3. Think outside the box
Think about your ideas for where you might plant habitat – maybe you dreamed of turning an old field into a prairie – but also make a list of other areas you could use. Are there smaller plots, ditches, sections of lawn or drainways that could be improved? Maybe you can’t put in five acres of prairie, but you could add pollinator-friendly trees along your drive. Don’t limit your search to pollinator-specific projects. Some programs are designed for one thing, but can still benefit pollinators. For example, riparian restoration or wind break projects can be made into a pollinator project simply by adding the right flowering plants and trees. Restoration for other wildlife like birds or deer can also benefit pollinators. Don’t forget about partners like Pheasants Forever or the Audubon Society.
4. Examine your opportunities for funding
Here is a brief list of the programs where funding for habitat can be subsidized.
General information:
• Using Farm Bill Programs for Pollinator Conservation
• Financial Assistance for Developing Wildlife Habitat in Southern Michigan
NRCS programs:
• Conservation Stewardship Program (CSP)
• Environmental Quality Incentives Program (EQIP)
FSA programs:
• Agricultural Conservation Easement Program (ACEP)
• General and Continuous Conservation Reserve Program (CRP)
• Conservation Reserve Enhancement Program (CREP)
• State Acres For wildlife Enhancement (SAFE)
MDNR programs:
• Private Lands Program (PLP)
• Wildlife Habitat Grant Program (WHGP)
USFWS programs:
• Partners for Wildlife Program (PWP)
• State Wildlife Grants (SWG)
• North American Wetlands Conservation Act (NAWCA) Small grants program
• North American Wetlands Conservation Act (NAWCA) Standard grants program
Educational grant programs
• Wild Ones - Lorrie Otto Seeds for Education (SFE) grant

5. Don’t count on the internet for updated program information
The web is a good place to get ideas and see other successful projects, but don’t count on federal program websites to have the latest, up-to-date information. Program details and requirements change quickly, and websites generally update at a slower pace. The best resources are people – call organizations directly and make an appointment at your USDA office. Chances are, many more programs and resources are available than what are listed online. We may be used to an online world, but for getting information on pollinator resources in Michigan, a phone call or meeting with your USDA office and conservation district is often the best way to start.

6. Be prepared for paperwork
There is no such thing as a free lunch. Many programs that provide funding or resources have to report back how their money is spent. That means they need to document where their money is going. This is especially true of programs based on taxpayer dollars. Record everything you are doing, and be patient if you are asked to fill out documentation.

7. Think about the long term
Many projects have long-term commitments and also require scheduled maintenance. Make sure you are ready if you need to burn a prairie in five years or brush hog the ditches. There is a lot more to establishing habitat than just planting seeds. You may have to prepare the soil for a year or two in advance, replant or mow. While many habitats are hardy and self-sustaining, there is no such thing as labor-free restoration, so make sure you have a plan and can manage the long-term care. It is better to have a smaller project that is well-managed than a large planting that no longer functions.

8. Don’t be afraid to work with others
Maybe you don’t own property, or your property is already in prime pollinator habitat. Many organizations, neighbors and companies would be interested in having their land put into a pollinator habitat, but don’t have the time or resources to complete the process. Find a club, school, business, neighbor, library, nature center or park and see if you can work together with staff to create a pollinator habitat. Sometimes it just takes someone with the initiative and time to pull the project together.

9. Don’t be afraid of going alone
You don’t need to have an official pollinator habitat program to plant for pollinators. If you can’t find a good fit or are waiting to hear about funding, don’t let that stop you. Conservation Districts have tree sales every spring, offering many pollinator-friendly trees at reasonable prices. Many garden centers, botanical gardens and gardening groups have seed swaps and native plant sales, and pollinator-friendly seed mixes are becoming cheaper and more widely available.

10. Locate reputable seed, transplant and technical advice
There is no such thing as a one-size-fits-all pollinator planting. The best planting for you will depend on your soil type, drainage, sun, growing zone, size, budget, etc. Make sure you are well-informed and have the information to ensure your plants will thrive. More often than not, the same people who produce plants and collect seed for sale also know a lot about how to establish and grow them well. Don’t be afraid to ask seed and plant companies for advice and recommendations. Some Conservation Districts have rental tools for establishing grassland plants from seed, and all can direct you to someone to ask for advice. Below are a few links to resources.

Sources for seed/plants:
• Michigan Native Plant Producers Association
• Michigan Pheasants Forever seed sale list
• Alpha Nurseries
• Cardno Native Plant Nursery
• Earth Source Native Plant Nursery
• Spence Nursery

Sources for information:
Insect Exclusion Netting Trial Results

Dale Ila Riggs, NYSBGA President and owner/operator of The Berry Patch in Stephentown, NY.

This article excerpted and edited by Cara Fraver. A link to the full report can be found http://mysare.sare.org/sare_project/fne14-813/?page=final.

Prior to SWD, I raised blueberries and raspberries for 15 years without using pesticides. Preliminary results on one farm and small scale research plots in berries had shown that there was potential to use a very finely knitted mesh netting to exclude SWD from berry plantings as a means of pest management. Previous research had only looked at small scale plots and were not conducive to commercial operations where daily access for harvest and other maintenance operations is needed, while also ensuring worker comfort during harvest.

I set out to determine two things:

1. Can a knitted mesh netting effectively exclude SWD from a commercial blueberry planting, both in terms of using it under daily commercial activities vs. a small research plot, and in terms of economics? and;

2. Can an existing bird netting support system easily be modified to use as a support structure for exclusion netting?

2014:

Complete rows of our commercial blueberry planting were covered with 60 gram insect netting, 80 gram insect netting, and standard bird netting prior to fruit coloring. The two netting treatments had mesh covered double entry vestibules for a defined entrance into the planting. A very detailed description and pictures of how we modified the existing structure and attached the netting can be found in the full report at: http://mysare.sare.org/sare_project/fne14-813/?page=final. The uncovered control row was treated with 4 applications of pesticides. Fruit samples were collected weekly and held in rearing cups in a lab for three weeks to determine SWD infestation levels in the fruit. We removed the netting in October and stored it in UV resistant tarps for the winter.

The system worked extremely well. I found that 80 gram exclusion netting was highly effective at excluding SWD from my half acre planting while 60 gram netting was not effective. In 2014, with the 80 gram netting, at most, only 0.53 percent infestation occurred in a 10 week harvest season. Unsprayed berries without exclusion netting had as high as a 60% infestation level in one sampling period alone. Sprayed berries without exclusion netting had as high as a 20% infestation level in an individual sampling period. The netting held up through 3 severe thunderstorms and 2 hail storms and we refined our attachment system for large scale deployment of large pieces of netting.

2015 SWD Infestation Results

Control (red bars) received 5 pesticide applications, last application Aug. 17.
In 2015, we repeated the experiment with 80 gram netting only. We covered 7 rows with 80 gram netting and the same control row was covered with bird netting. We made several changes to the design for the better.

In 2015, samples were collected weekly from July 15th to August 15th. Commercial harvest ended on August 18th in 2015, a much shorter season than in 2014. Samples were again sent to Geneva for rearing. The control treatment was sprayed with insecticides 5 times in 2015, with the last application in late August. Netting was once again removed in October and stored out of the elements.

In both 2014 and 2015 we deployed temperature monitors in the control row and in the 80 gram netting rows. In 2015, we also measured relative humidity. Both years of temperature data indicate that the 80 gram netting sometimes has a slightly higher temperature during the day but it is not very much. The night temperatures were virtually the same. The relative humidity data show that relative humidity was slightly higher under the 80 gram netting than in the control. During the day, it could be a very small amount higher, but was not consistently higher. At night, it was consistently higher by about 4-6%.

The retail cost of the netting to cover the half acre of blueberries in this manner is $4600, including the custom sewing. When the netting is purchased from Berry Protection Solutions, who offers tiered pricing for multiple rolls, the cost works out to $0.135 per square foot. When amortized over 5 years, the cost of the netting is $657 per year. With proper care during the winter, Tek-Knit guarantees the netting against UV breakdown for five years. Based on my comparisons, this price compares favorably to the cost of bird netting. On my planting I used 1000 feet of wiggle wire along with some odds and ends that I had at the farm to use on the doorways, upright seams etc. Doors made of ripstop nylon with heavy duty zippers can be purchased for about $75 each. In the second year, two people were able to get all the netting up and wiggle-wire attachments complete in 1.5 days.

This system has worked extremely well. I went from losing 40% of my crop to SWD in 2012 to spraying 6 or 7 days a week in 2013 (25% of the planting each day) to once again growing pesticide free blueberries. Other growers can benefit just as much as I am. It can also be a great product for homeowners to use. Researchers from Rhode Island to Arkansas, Michigan, and Minnesota are trying the netting, and sometimes using a hoop support system similar to mine, in fall raspberries and blackberries. For me, the cost of the system can easily be recouped in one year when compared to losing 40% of my crop, or no longer being able to sell pesticide-free blueberries. Given that the 80 gram netting prevents SWD infestation; also protects the crop from birds, deer, hail, wind, and heavy rain; and costs less per square foot than many suppliers of bird netting charge, it is a worthwhile investment for me, and should be for other growers.

**Exclusion netting over hoops with vestibule on right**

**Future Recommendations and further research:**
- Add an "Attract and Kill" solution for possible incursions, in testing this season
- Adaptable for popular "Smart Net" bird netting system
- Potential cost sharing opportunity with NRCS
- Potential for success in fall raspberries
- Promote to a larger audience

Collaborators on this project include Dr. Greg Loeb, Stephen Hesler, and Laura McDermott. I appreciate the opportunity that SARE helped provide by partially funding this project. I believe it is exactly the type of innovative work that the farmer grant program was created for so that innovative work being done by farmers can help farmers nationwide. *(Source: New York Berry News, 2016 Issue 5 November, 2016)*

**Scientists Advise Integrating Insect, Resistance and Floral Resource Management in Weed Control Decision-Making**

A team of agricultural scientists at Cornell University have rethought how weed control tactics impact field crop agroecosystems, and present a new framework for weed management. The researchers advocate including weed costs and benefits into a holistic IPM approach that addresses weed resistance, impacts on nontarget plants and insects, and high costs for farmers.

The authors note that categorically labeling weeds as unwanted pests misses the benefits they offer. They examine a case study involving milkweed in transgenic corn fields. Milkweed is considered a weed to be...
controlled by herbicides, but also harbors aphids, insects that produce a nectar that feeds the beneficial parasitic wasp Trichogramma, a natural predator of the European corn borer. Milkweed also serves as breeding place, food source and harborage for the monarch butterfly, an important and endangered pollinator. They suggest that growers allow low levels of this "weed" in fields to support these beneficial organisms and reduce the need for herbicide applications, which in turn reduces costs.

Antonio DiTommaso, professor of soil and crop science at Cornell and lead author of the study, contends, "Production management rarely considers the benefits of weeds in agricultural ecosystems. Let's look at the big picture. If we open our eyes - even if it's a weed growing in the cornfield - we show it could be beneficial. Integrating weed benefits will become increasingly important, as pest management is likely to move from total reliance on herbicides and transgenic crop traits for control, because of increasing resistance of weeds to these products."

To read the full study, please visit the journal Weed Science, or read the article at Phys.org. (Source: IPM Voice. November 2016)

UPCOMING MEETINGS:

The North American Berry Conference is only a few days away!
Click here for more information and registration. - This conference in Grand Rapids, Michigan, December 4-6 is a joint conference of the North American Raspberry & Blackberry Association and the North American Strawberry Growers Association, in association with the the Great Lakes Expo, which offers a huge trade show and sessions on many other topics. It's a great opportunity. Special highlights include a track of sessions focusing on high tunnel production and the Great Lakes Expo, which offers a huge trade show and sessions on many other topics. It's a great opportunity. Special highlights include a track of sessions focusing on high tunnel production and our keynote presentation by a leading berry health scientist. There will lots of grower-to-grower information with grower spotlights, panel discussions, and roundtable discussions. Note that neither NARBA nor NASGA will be meeting in the northern or eastern U.S. again for several years. Register now!

December 1-2, 2016 – Massachusetts Farm Bureau Federation Annual Meeting. Boston Marriott Peabody. For more information go to: http://mfbf.net/Portals/0/pdf/Nov_FinalV2.pdf. Deadline to sign up for meals is Nov. 25.

December 3, 2016 – New England Vegetable & Berry Growers’ Association Winter Meeting. 9am – 4pm Holiday Inn, Portsmouth NH. Free for NEVBGA members, $20 for non-members. For more information see: https://ag.umass.edu/vegetable/events/new-england-vegetable-berry-growers-winter-meeting.

December 3, 2016 – Growing Crops in Low, High and Movable Tunnels. 10:30-1:30, 41 Club Rd. Windham, CT. Part of the CT New Farms and Farmers Program. For more information go to: http://newfarms.extension.uconn.edu/35.


December 6-8, 2016 – Great Lakes Fruit & Vegetable Expo. DeVos Place Convention Center and the Amway Grand Plaza Hotel, Grand Rapids, MI. For the full program and registration information, go to: http://www.glexpo.com/.

December 14, 2016 – Expand your Tunnel Vision: High Tunnel Production Conference. 9:30-4:00. Radisson Hotel, 700 Elm St. Manchester NH. $50 with lunch, $25 w/out lunch. For more information and to register, go to: https://extension.unh.edu/events/files/41693F1A-5056-A432-4F0701DA4AD4F35A.pdf.

December 15, 2016 – FDA Food Safety Modernization Act (FSMA) Information Session. 9:30am – 12:00pm Middlesex County Extension Center, Haddam CT. Free but pre-registration is required. Register by contacting Diane Hirsch at diane.hirsch@uconn.edu or calling 203-407-3163.

January 9, 2017 – CT Vegetable & Small Fruit Growers’ Conference. 8:00 AM, Maneeley’s Conference Center, South Windsor, CT. Contact: MacKenzie.White@uconn.edu, 860-875-3331.

January 11, 2017 – Greenhouse Management and Production for 2017. 9:30-3:30 Publick House, Sturbridge MA. Commercial growers of greenhouse crops are invited to learn about greenhouse management and production tips for the 2017 growing season. Topics will include managing light, temperature, relative humidity; irrigating greenhouse crops; greenhouse plant nutrition; and pest management. $45 For more information go to: https://ag.umass.edu/events/greenhouse-management-production-for-2017.

March 7-9, 2017 – Harvest New England Agricultural Marketing Conference & Trade Show. Sturbridge Host Hotel, Sturbridge MA. For more information go to: http://www.harvestnewengland.org/events/.