

April
2017

Northeast Hops News

Northeast Hops News is brought to you each month by Steve Miller, Hops Specialist and Sarah Ficken, Hops Program Assistant, Madison County Cooperative Extension. Steve researches, writes, and finds articles that would be useful and interesting to the hops community. If you have questions regarding content or would like to contribute to this newsletter, please contact Steve Miller at sgm6@cornell.edu Sarah Ficken at sjs299@cornell.edu or Jackie Dickerson at jjd44@cornell.edu.

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Fertilizing Commercial Hop Fields in New York (Getting this right is critical for success)

by steve miller

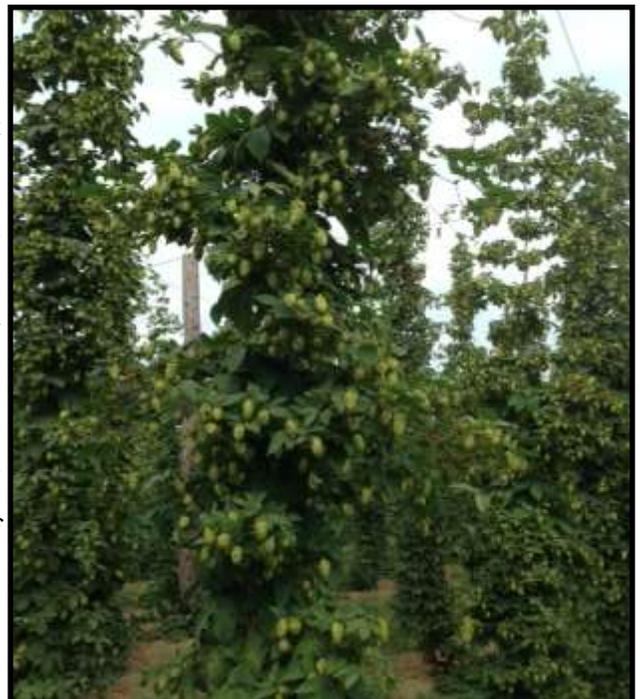
Fertilizing hops is a very complicated subject and you will find that as years go on you will develop more detailed practices based on your farm's soils, climate, and varieties. Hops are heavy feeders. Every grower would love to have a cookbook on exactly what fertilizer to add at exactly the right time. Keep good records of what you do each year and you will develop what is right for your farm. Keep in mind that growers in the Pacific Northwest have been growing hops on the same farms for several generations and this experiential information is their greatest farm asset. It should be yours as well.

Success should start with a thorough evaluation of the site for drainage, air flow, and access to water for irrigation. Next obtain soil maps of the fields. These will have contours outlining the different soils by name. Definitions for these names, such as Cazenovia or Lima, are outlined describing characteristics that will help you determine the limits and potential for that field. Chapter 3 of the Cornell Integrated Hops production Guide has a more detailed discussion on soils and fertility.

A soil test is next on the list. In New York we suggest you send your soil samples to DairyOne/AgroOne because we are trying to build up baseline information on this crop. Go online to obtain a box and print out the "F" form for hops and fruit. Enter the soil name on the form. Your test results will come back with some recommendations based on if you marked the box for hops establishment or for maintenance of an already established field.

You should adjust the pH to 6.5 to 6.8 or so. Soil organic matter is very beneficial to most crops, hops included, so everything you can do to start with 3% or more will help hold moisture and provide nutrients and maintain good soil structure. Each percent of soil organic matter will contribute about 20 pounds of nitrogen per acre as it decomposes.

Hops start growing very early in the Spring, put on height for the first 6-8 weeks and then really bulk up with leaves and cones for the next 6 weeks. A ready source of nitrogen (N) is a must to get them going. Organic sources are great but they do not provide much nitrogen until later in June. Mature hop plants will need 150-200 #s of actual N per Acre for the season. Newly planted baby hops require about 75#s of N per acre. Because we have relatively cool soils in the Spring we need to use a nitrogen source that the plants can take up



A well fed first year hop plant. Steve Miller

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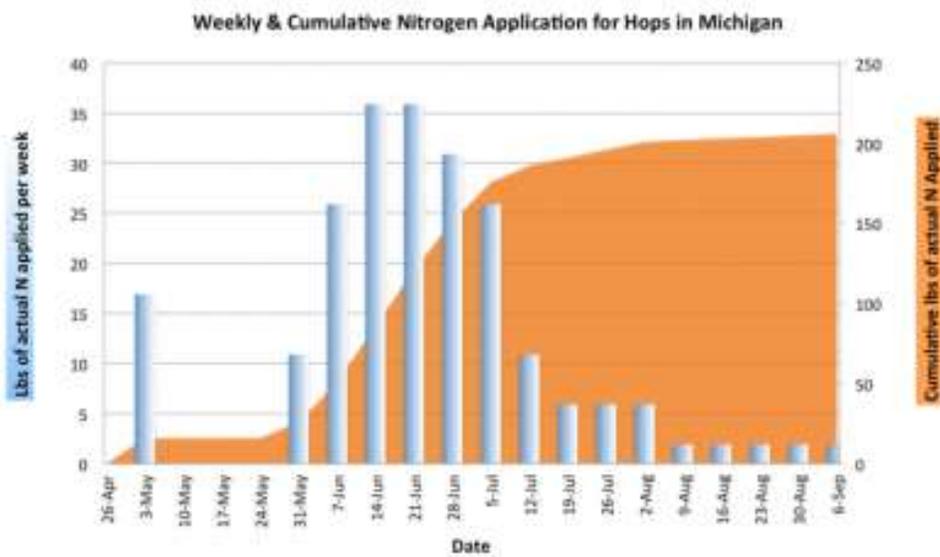
readily.

This brings up the question of nitrogen sources from legumes. It is true that legumes fix nitrogen from the atmosphere and store it in the roots of the plant, i.e. peas, clover, etc. This nitrogen does not become available to other plants until the legume is killed and starts to decompose. A well-established legume that is plowed under may release 50 pounds of nitrogen the first year into the soil, and some additional the second year. Consult with your local agronomist or web sources to see how much might be realized from different legume species. As stated earlier, this Nitrogen is not available until soils warm up and even then only slowly over time.

Growers should plan to use a variety of fertilizer methods to keep hops healthy and growing. In the northeast growers are having success with putting down about half of the nitrogen requirement as granular, with the rest through the drip and possibly some with foliar feeding. Foliar feeding should not be taken lightly. It is easy to burn the plants. Water quality such as excessive minerals may impact not only foliar feeding but also pesticide efficacy. Growers may want to experiment with small plots before using this technique in the whole yard. In New York, rainfall can be excessive in the Spring and many granular sources of Nitrogen can leach out of reach of the plant roots, especially on very well drained soils. For this reason some growers are relying less on spring granular applications and instead are putting more fertilizer through the drip.

The following techniques and materials are often used by hop growers out west and some growers here have used them with great success. Smaller scale growers may find it difficult to find materials and apply them. Also, there are other sources of nitrogen and you may find some work best for you. Urea is a commonly used form of nitrogen fertilizer that has pluses and minuses. First of all, it is relatively inexpensive and readily available. It is very soluble in water however and can volatilize into the atmosphere readily on a hot day. Therefore urea (46% N) should be applied right before a light rain or gently incorporated into the soil to prevent losses. Another option is to use a slow release form of urea such as ESN 46% (environmentally smart nitrogen). These are coated with a polymer that reacts to water and soil temperature to gradually release over about 80 days. Use about 100 pounds of this material per acre (46 pounds of actual N) banded or spread over the hop row in early May (timing depends on where you are in the state and when the soils warm up above 40 F). In addition, if your soil test results show that phosphorous is required, you could use up to 50 pounds of MAP 11-52-0 (mono ammonium phosphate, the phosphate number may vary somewhat) and incorporate it into the soil. Hops do not need very much phosphorous and it persists in the soil, so this material is not something to use every year. These may be applied together. Follow the soil test recommendations for the amount of potash needed and apply this too as a broadcast or band with the other materials. Sul-Po-Mag 0-0-22 may be a good option especially if your pH is too high.

Along with this, apply 100 pounds of a liquid CAN 17 (calcium ammonia nitrate) through the drip. This will get some readily available N to the roots and includes some calcium to help maintain the pH. It does not have to be applied on the same day as the other materials and can be done as weather permits. It is important to remember that by the time hop plants are 12 ft the apical bud has differentiated the cells to develop the rest of the plant. By the time the plant is at 16 ft the plant has developed all of their potential buds for side arms and hop flowers internally. This is why spring fertility practices are so critical for a successful yield. A plant that is too weak by late June is not going to produce as it should. The following chart from Michigan shows how much Nitrogen is needed by mature hop plants over the course of the growing season.



Graph by Rob Serrine — Michigan State University Extension

Fertigation through the drip should continue through the growing season until the cones reach about 1/2 to 3/4 their full size for that variety. Many growers use UAN 32 (also known as UN32) urea ammonia nitrate through the drip. In early June use about 30 gallons/A (mixed in with 3000 gals of water through an injector) each time you irrigate. By late June reduce this to

10 gals/A each time. Another material that may be used is CN9 which is a solution of calcium nitrate that has 9% nitrogen. In Yakima, hops are fertilized at a lesser concentration most every time they are irrigated, that is on a daily basis. This is often more difficult to do here because we do receive much greater rainfall. Excessive rain can also have an impact on how much nitrogen is available to the plants with the more soluble sources being prone to leaching beyond the root zone.



Hops also require sulphur, zinc, and boron, magnesium, and calcium as well as other micro nutrients. These nutrients should be applied when soil test results indicate they are in short supply. New York soils are often low in sulfur especially as sulfur emissions have been greatly reduced from power plants in the mid-west. If the soil test indicates it, you may want to add some granular sulfur each spring. If Boron is low then use about a pound of Boron per acre in your granular fertilizer mix as well. Boron is toxic to plants so do not over do this! Many growers out west use foliar sprays of zinc, starting when the plants are 1/2 to 3/4 of the way to the wire. These should be stopped before bloom. Consult the manufacturer's label for rates.

What about other soil health amendments. Some growers are experimenting with various materials like worm castings, spent mushroom soils and others that aide the plant in taking up nutrients. There are many organic based materials that can have a positive effect on nutrient uptake and my suggestion is to speak with growers who have used them and see what kind of results they have had.

2016 Cornell Hops Conference DVDs

Did you miss the 2016 Cornell Hops Conference held at Morrisville State College on Saturday, December 3? Not to worry, you can still see and hear all of the presentations, from the comfort of your own home or office.

DVDs from the 2016 Cornell Hops Conference will be available at the end of February. If you are interested in receiving a conference DVD, please fill in the information below and return it to:

Cornell Cooperative Extension of Madison County
 Attn: Hops DVD
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 Morrisville, NY 13048

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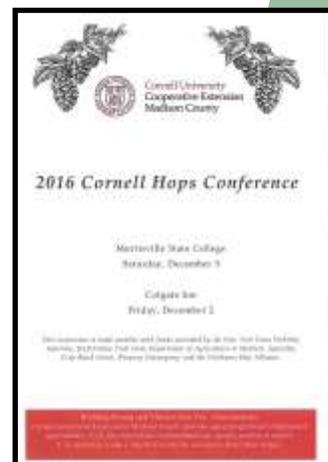
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Crowning, Pruning, and Training

The Art of Growing Hops

By Steve Miller (Previously printed in the May 2015 issue, with updates)

Hops are easy to grow. At least that is what everyone says. But to obtain good yields, maintain excellent quality, and fully utilize your harvesting and drying facilities, it is not easy at all. Growers in the emerging production areas of the East and Midwest are learning this every year. Kevin Riel, a hop grower from the Yakima Valley spent an extremely valuable day with growers in New York. Kevin said there is a scientific side of growing hops, and an art side. Crowning, pruning, and training are the later, and so important to the success of the crop. These three cultural practices are used by growers in the Pacific Northwest to manage weeds, rejuvenate the plants, manage diseases, set the internal clock for harvest date and increase yield.

We newcomers to hop farming often lump the Pacific Northwest into a non-diverse, monolith of hop production, but there are significant differences in soils, historical variation in the cultivars grown and certainly climate differences between Oregon, Washington and Idaho. Growers build their own equipment and learn what works best on their ranch. We often read about what practices are carried out in these long established production areas, but we may not fully understand the why, how, and when of what is done.

Let's tackle these in chronological order. Crowning is the first and is done during the dormant season of late winter to early spring. Remember these production areas have much less snow and rain than we do in the east, and their winters are quite a bit milder. It is usually easy for them to get into the fields in March (mud season here). There are differences between Willamette and Yakima regions and even between growers in how they approach their practices and what equipment they use.

In Oregon, growers often crown more aggressively, deeper into the soil, exposing more of the crown. They will often use a fungicide soon after crowing to knock back downy mildew potential. Because they are crowing so deep, up to a few inches, they will hill up soil over the plants in the summer. This too helps reduce downy mildew grow and invigorate root and shoot production.

The equipment they use might be a single, side mounted flat blade or a set of two opposing round, cutting blade that cut horizontally into the soil. For obvious reason, crowning is done before stringing.

Some growers in the Yakima Valley use an overgrown weed whacking type device that only scuffs shallowly into the soil. Downy mildew is not as much of a problem there, and hilling is used mostly to rejuvenate aging yards and to encourage rhizome production for propagation.

One and even two year plantings are generally not crowned and should not be in eastern production where vigor and growing season are less than in the Pacific Northwest. Since crowning is done during the dormant season, growers can do the entire field as weather permits. If downy mildew is not an issue yet in the yard, weaker varieties may not be crowned at all.

Pruning is the next step. In this practice, emerging hop shoots are mowed, cut, burned or desiccated chemically about 3 to 4 weeks before you expect to train that variety up the strings. How do you know when that should be? That really is where the art comes in again. Experienced growers will often say, I do it then, because grand dad did it that way. Keep in mind that PNW hop ranches are multigenerational and some varieties like Cluster have been grown for 40 or 50 years. I'll say it here and again later, keep good records of everything you do with the crop. This will be your most valuable tool to make your farm productive. Keep track of the weather, as well.

This year in New York we had a long winter and late spring. Do you remember when your Cascade emerged last year,



Photo Courtesy of Kevin Riel, Double R Farms

and when you pruned them, harvested, and if the yield was good or not. The great majority of yards in the east are less than four years in the ground.

Pruning sets the clock for when you want to train each particular variety. When the plants reemerge, the shoots will be even aged so the harvest too will be even aged (and with good records) somewhat predictable. Here are a few concepts to keep in mind related to deciding when to prune. Weaker varieties should be pruned first and secondly, extra-vigorous “bull shoots” will produce lower yields and should be removed. These shoots grow so fast that they have very long internodes, meaning the space between sets of leaves. This results in fewer branches, and therefore, fewer hops.

In general, aroma varieties are weaker growers than high alpha types. Also these more vigorous types tend to emerge earlier. Cascade, Fuggle, Willamette, Liberty, Perle and many others should be pruned early. Out West that may mean late March or early April. The shoots are usually one to one and a half feet tall at this stage. Where you are, the date is going to be different. For fast growers like Galena and C,T,Z this might be as late as early May in Yakima. Given that hops are now being grown from North Carolina to Canada, you can see that no one is going to be able to say for example that “Willamette should be pruned the first week of May, and Cascade a week later”. Even on your own farm you may find that you have too many varieties maturing at the same time so you may want to prune and in turn train a portion of some varieties a week apart to help spread out the harvest.

Training is the final step for planning harvest dates. To maximize yield, we use a “V” trellis with two strings per hill. Only coconut coir or paper twine should be used. Baling twine will stretch when wet. This will cause the vines to slump and may result in breakage at the soil line from wind movement. Baling twine will also clog up mechanical harvesters, so don’t use it! First year plants need only one string per hill. This is a good time to cut out those bull shoots as mentioned before. Similar to pruning, slower varieties are trained first so they will get all the time they need to mature. Train healthy shoots with medium vigor. How many shoots per string? Typically 2 strings with 2 bines per string for vigorous varieties and 2 strings with 3 or 4 bines for varieties like Cascade, Willamette, etc.

This is also a great time to watch for downy mildew spikes. These should be cut out whenever they are found. Bring a bucket and remove them from the field.

Hops shoots are quite brittle and sometimes the growing point will be broken off. Two shoots will arise from the node closest to the break. Early in the growing process its best just to train a new shoot to the string. If this happens further up the plant you should allow the two shoots to grow a foot or so and then train one of them to the string to take over the growing point.

Crowning, Pruning, and training are extremely important practices in hops production. Understanding how each variety responds to these is key for success in managing the crop. For a list of average maturity order for hop varieties refer to the February newsletter. The best tool you have is to keep detailed records, and refer back to them each year.

For Northeastern Growers:

- Don’t crown 1 and 2 year old plants
- Crown weaker varieties, mostly aroma, first
- Prune when shoots are about 1 to 1 ½ feet tall
- Pruning timing sets the schedule for training and harvesting for each variety
- Train weaker varieties first
- Train 2 to 3 shoots of medium vigor to each string
- Use only coir or paper twine
- Cut out “bull” shoots and downy mildew spikes
- Keep detailed records to use for future crop tasks

We are looking for photos of hops and hopyards to feature in future newsletters and in the Northeast Hop Alliance website. If you have photos that you would like to share, please send them to Sarah at sjs299@cornell.edu along with a caption and who to credit the photo to.



What's Hopping: Musings from the UVM Hopyard!

Six-Year Study Shows Hop Insect Patterns

Excited for the 2017 growing season? We are...and so are the bugs!

We recently published our final [Organic Hop Variety Trial Report](#) that includes 6 years of data on disease, weed, and insect pest populations found in our hopyard, as well as yield and quality performance of more than 20 hop varieties we evaluated.

Our research showed seasonal patterns of the three major arthropod pests of hops found in the Northeast:

- Two-Spotted Spider Mites (TSSM),
- Potato Leafhoppers (PLH), and
- Hop Aphids (HA).

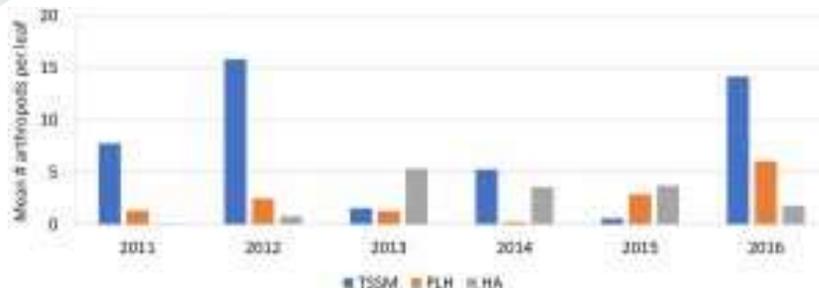
We also looked at beneficial insects, including the Spider-Mite Destroyer and its habits.

We found that the incidence of each pest varies widely by year, based on weather conditions. For example, TSSM populations responded to the warm and dry conditions we experienced in 2012 and 2016, while HA populations tended to favor cool and moist conditions.

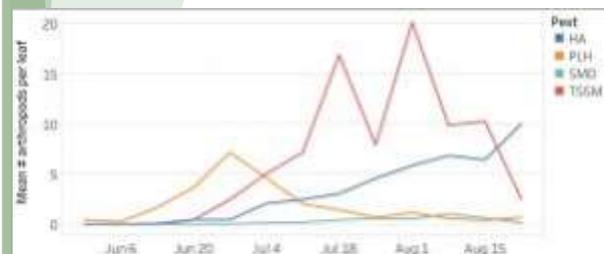
PLH seemed to get a big boost out of a warm winter. Because they migrate from the south each season, warmer winters allow PLH to over-winter further north, shortening their journey to Vermont in the spring and early summer.

Our research also tracked pest levels throughout each growing season. While overall pest numbers varied greatly from year to year, the populations for each pest usually peaked at the same time of the year. PLH tended to peak in late June, TSSM in the hot and dry periods of late July and early August, and HA populations peaked right around harvest through September. Not surprisingly, the population of Spider-Mite Destroyers (SMD), beneficial arthropods that prey on TSSM, followed TSSM population levels.

Through our study, we found that some hop varieties seem more susceptible to certain hop insect pests. For example, Liberty, Perle, Teamaker, and Crystal seemed particularly susceptible to TSSM. We observed that Mt. Hood, Liberty, Saaz, Newport, and Santiam were most susceptible to PLH damage. Conversely, Centennial was consistently among the most resistant to TSSM and PLH.



Mean number of Two-Spotted Spider Mites (TSSM), Potato Leafhoppers (LF), and Hop Aphids (HA) found per leaf by year, 2011-2016, Alburgh, VT.



Average number of Hop Aphids (HA), Potato Leafhoppers (PL), Spider-Mite Destroyers (SMD), and Two-Spotted Spider Mites found per leaf by date, 2011-

2017 Cornell Integrated Hops Production Guide is now available

Written by Cornell University specialists, this publication is designed to offer beginning and veteran hops producers practical information on growing and managing hops. Topics covered include site selection, nutrient management, use of cover crops, selecting varieties, and managing common hopyard pests. Also included is information on selecting, operating, and maintaining pesticide spray equipment.

Highlighted changes in the 2017 Hops Guidelines include:

- Expanded variety selection information – including guidance on maturity timing for hops grown in the Eastern US.
- Significantly updated powdery mildew management strategies.

The Cornell Guidelines are available as a print copy, online-only access, or a package that combines print and online access. The print edition of the 2017 Hops Guidelines costs \$31 plus shipping. Online-only access is \$31. A combination of a print copy and online access costs \$43.50 plus shipping costs for the printed book. You can get a free preview of the book at cro-pandpestguides.cce.cornell.edu.

Cornell Guidelines can be obtained through from the Cornell Store at Cornell University. To order from the Cornell Store, call (844) 688-7620 or order online at <http://store.cornell.edu/c-875-pmep-guidelines.aspx>.

56th Congress of the International Hop Growers Convention – 30 July to 3 August in Yakima!

Hop Growers of America will host the 2017 International Hop Congress in Yakima, WA this summer, welcoming over 250 international hop industry representatives for a the formal IHGC event and a number of related activities. The Registration Form is attached, providing an overview of Congress activities and other organized programs that will be held in conjunction with the event.

The Congress program will highlight **American Hop Culture** with exciting evening events:

Sunday, 30 July Welcome event at Bale Breaker Brewing Company - **American Country Western** night.

Monday, 31 July evening event at Perrault Farms – celebrating **Native American** culture.

Tuesday, 1 August evening event at **Congdon Castle** – formal **IHGC Banquet**.

Wednesday, 2 August evening event at Roy Farms Desserault Ranch – **Mexican Fiesta**.

Individual tickets may be purchased for these evening events, separate from the full Congress registration package.

IHGC meetings on Monday and Tuesday will include business sessions, research highlights and featured speakers, including Steve Dresler, Sierra Nevada Brewing Company.

On Wednesday, join us for the International Plant Protection Conference, hosted by the German Federal Ministry of Food and Plant Protection and the Association of German Hop Growers. An alternative program will feature tours in Toppenish, including the American Hop Museum, Yakama National Cultural Center Museum, and other sites.

A Pre-Congress Excursion during 28-30 July will feature tours, tastings and food selections at four Portland, Oregon area craft breweries, Willamette Valley hop growing and processing operations, and a trip through the Columbia Gorge National Scenic Area with a stop for lunch and a tour at Full Sail Brewing Company in Hood River, Oregon.



Classifieds:

Are you a grower looking to sell a piece of hops equipment? Do you provide harvesting or processing services to other growers? Are you looking for equipment or services? Is there a unique opportunity on your farm that you would like to share? If so, send in your information to Jackie (jjd44@cornell.edu) for inclusion in next month's newsletter.

For Sale

Hop picker for sale. Prototype hop picker for sale at Lagasse Works, Lyons, New York. Call and ask for Dan for details at 315-946-9202.

Hop dryer system made up of a 1.2 million btu/hr propane heater, 100 boxes and 2 modified reefers. The dryer can process 8000 lb of hops per load in six hours and has been in service for 4 years. We also have a **complete chemical lab** capable of testing hop properties including alpha, beta and his. The equipment was bought new. All of the equipment is located in Old Mission, Michigan. My name is Ulf Nordin in Swampscott MA. If any interest please email us at ulfkdn@gmail.com or call/message at 781-589-3301.

2 Acre Hop Yard in its second year for sale in Erie County. Varieties include Cascade, Centennial, Crystal, Columbus, Zeus, and Hallentauer. Sandy Loam soils, pond for irrigation, professionally installed trellis, space for 8 additional acres. Additional land available. Contact shepherdhillhops@yahoo.com

A Black Locust Connection, located in Colrain, Massachusetts, has **black locust hop poles** for sale, \$55.00 per pole. For more information contact Blue Sky, at info@ablacklocustconnection.com or 413-624-3645.

Larch Hops Poles for Sale: 130 poles 24 ft. long to a 5 inch top diameter. Please call for pricing and transportation arrangements. Poles are located on a log landing 1 mile north of the exit 35 Rte. 86/17@ Howard, Steuben County East of Hornell West of Bath. Please contact Greg Fuerst @ 607-382-2062 Gregfuerst@yahoo.com

Hops Processing and Production Equipment for Sale: California Pellet Mill, Meadow Mills hammer mill, Packaging Aids Corp. vacuum sealer, Delmhorst moisture meter, Bine Implement harvester, pressure treated poles, trellis hardware & cable, 3 tractors, herbicide/ground drench sprayer, 4ft 3pt hitch mower, and more. Call, text or email Chris for complete list of items and prices. 585-260-0351 or chris.a.w81@gmail.com

Hop and Barley 3PT 100 Gallon Sprayer—After exhausting our search efforts trying to find the perfect sprayer for our hop yard and barley crop, we agreed that the only solution was to design our own. Units have collapsible 14' booms and a center horizontal

Upcoming Events and Webinars

April 29 and 30, 2017

TAP New York—Craft Beer and Food Festival

Hunter Mountain, New York

Visit tap-ny.com for more information

Cornell Small Farms Webinars

Did you miss our reduced tillage webinar series? Watch [the webinar recordings](#) for the latest research on reduced tillage for organic vegetable production. Learn about practices that fit your operation, from permanent beds, tarps, and mulches, to cover cropping, strip tillage, and cultivation tools.

Reduced Tillage on Permanent Beds

Permanent bed systems can help small farms improve soils and reduce tillage for a diversity of crops. Learn how farmers are adopting these systems and hear research results on how tillage, mulching and tarping practices can impact your weed control, labor use, and crop productivity. *Ryan Maher and Brian Caldwell - Cornell University, Mark Hutton - University of Maine*

Strip Tillage Tools and Practices

Adapting strip tillage for organic production requires careful crop planning. Learn the tools and equipment and what research is showing about integrating cover crops, managing residue, attracting beneficial insects, and controlling diseases and weeds. *Anu Rangarajan and Meg McGrath - Cornell University, Dan Brainard and Zsofia Szendrei - Michigan State University*

Cultivation for Reduced Tillage Systems

Cultivation of the in-row zone is challenging, especially in reduced tillage systems. Learn about innovative in-row cultivation techniques for managing weeds in reduced tillage crops. *Dan Brainard and Sam Hitchcock - Michigan State University, Eric Gallandt and Bryan Brown - University of Maine*

Questions about the Cornell Reduced Tillage Project? *Contact Ryan Maher, Cornell Small Farms Program, at rmm325@cornell.edu.*

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2014-51300-22244.

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Cornell Cooperative Extension

Madison County, New York

100 Eaton Street

Morrisville, NY 13408

(315)684-3001 ext 127

Steve Miller, NYS Hops Educator — Newsletter Editor

Sarah Ficken, Hops Program Assistant — Newsletter Production and Design

Jackie Dickerson, Hops Program Assistant—Newsletter Production and Design

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