UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

The effects of winter spinach planting dates are apparent with this 'Platypus' spinach: left plant was seeded Oct 10 and right plant was seeded Oct 26. Photo: G. Higgins

Crop conditions

In preparation for 2 or more feet of snow coming this weekend and next week, the last of harvest bins left in the fields are getting picked up and stored away. We are reprinting the old but good article in this issue on how to prevent damage to your greenhouses ahead of this storm. Growers are in and out of their high tunnels, covering and uncovering their greens during this cold snap (which we used to just refer to as winter). In our new high tunnel at our research farm in South Deerfield, we are growing 15 newer varieties of spinach with relatively high resistance to spinach downy mildew. Our plants are still small, but another farmer is trialing some of the same varieties in their tunnel this winter. Of the varieties this farmer is trialing, the variety 'Bufflehead' (pictured right) was clearly the fastest growing and most vigorous variety and had a relatively sweet flavor. 'Bufflehead' is an Asian-type spinach which has a slightly paler green color, but was almost 6" tall, while other varieties were smaller; Platypus – 4", Dromadary, Fresno, and Meerkat – 3", Amador, Apache, Aztec, Coati, Virgo, and Woodpecker – 2" or less. All these varieties were planted on October 10 and are notably larger than the ones planted at UMass on October 26. Keep in mind that some of these varieties (like 'Woodpecker') are meant for field production and are slower growing in cold temperatures.

'Bufflehead' spinach from a grower's small variety trial. Photo: K. Campbell-Nelson

As you plan for the 2019 season and think about supplies and materials to order, check out the article on bins, buckets, baskets, totes. For those of you who grow many different crops and are looking for pesticides that can be used on several different crop groups, check out these tables made by one of our New England Vegetable Management Guide editors, Genevieve Higgins:

- Disease Control Products for Multiple Crops
- Insect Control Products for Multiple Crops
- OMRI-Approved Disease Control Products for Multiple Crops
- OMRI-Approved Insect Control Products for Multiple Crops

There is lots of excellent programming coming up this winter! See the Events section of this issue for programs from the UMass Vegetable Program, New England Vegetable and Berry Growers Association (NEVBGA), and Massachusetts Department of Agricultural Resources (MDAR). We hope to see you at some workshops, trainings, or events this winter. We always appreciate your continued support of our programs and events. Look out for a fundraising call next week, and a chance to give us your feedback in our semi-annual survey.

Pest alerts

Spinach downy mildew (caused by *Peronospora farinosa* f. sp. *spinaciae*) has been found in one high tunnel in Hampshire Co. on 'Red Kitten' and 'Corvair'. 'Space' was also planted in the tunnel but was unaffected. There are many different races of spinach downy mildew, and different spinach varieties are resistant to different races. Races 12, 14, 15 have been the common strains in the Northeast most recently, but we can also have multiple strains present at one time or novel strains that do not match any of the described strains. Samples have been sent out to determine the race of this isolate. For more information on spinach downy mildew in the Northeast, please see this article by Meg McGrath of the Long Island Horticultural Research and Extension Center: Spinach Downy Mildew: Update and Managing Recommendations.

Lettuce downy mildew (caused by *Bremia lactucae*) has been found in another high tunnel in Hampshire Co., on 'Mirlo', 'Ruby Sky', and Osborne varieties 3sx1536 and 3sx1524. 'Skyphos', 'Panisse', 'Muir', and 'Oscarde' lettuce in the same tunnels were unaffected. Keep an eye out for downy mildew on both lettuce and spinach, and let us know if you have them on your farm (umassvegetable@umext.umass.edu, 413-577-3976). There are many different races of both of these diseases and we'd like to identify which races we have present in Massachusetts to give growers better advice regarding resistant varieties.

Alternaria on pakchoy, and **cercospora on chard and spinach** have also been seen in Hampshire Co. and reported in Norfolk Co. Remove diseased material from high tunnels and greenhouses to prevent the buildup of inoculum, and take actions to minimize leaf wetness.

Bins, buckets, baskets & totes

--Written by Andrew Chamberlin & Chris Callahan, UVM Extension, Agricultural Engineering. All photos by Andrew Chamberlin.

So you're starting to farm or scaling up your production. You hear talk about food safety, and cleanability. You are checking out what other farms are doing and are looking for harvest crates and storage bins.

You probably noticed lots of people use many different things. Some use 5-gallon pails, milk crates, muck buckets, some use totes found at the box stores, yet others use what seem to be specific, grey, flip top totes. Does it matter what you use? Not really, but you should have some sort of method to the madness on your farm to help minimize contamination, reduce mix-ups and wasted time. Consistency is key to organization and efficiency.

We commonly hear "Ok, I like this style of totes/bins/crates, where do I find them?" Well hopefully, this article will have a few suggestions to point you in the right direction with **user reviews, distributor information, comparison chart, and pictures of features.**

Things to consider when selecting the right containers for your farm:

- **What crops** are you going to be moving or storing?
- Do you want **drain holes** or a solid bottom?
- Should you have **vented sides** (e.g. for cooling) or is it more important to retain humidity?
- How easy is the container to **clean**?
- Is the material **durable** (especially when cleaned and sanitized regularly)
- Can you easily **label** the container?
- Are the containers **sturdy and rigid**?
- Does the container provide **light blocking** and UV resistance?
- Can the container be stacked? Think about how **stacking** can support more efficient use in a cooler, on a hand truck, or in your delivery vehicle.
- Can the container be nested? **Nesting** can save space when storing empty containers

Many diversified farms have a variety of containers to best handle individual crops.

- Can you purchase different **colors**? Some growers find value in having the ability to differentiate field totes from storage totes. You also want to dedicate cull buckets from harvest buckets to ensure clean produce.
- Is the container **ergonomic**—is it easy to pick up? Does it have handles? Is it properly sized for the product you're harvesting?

Growers on the Vermont Vegetable and Berry Growers Listserv were posed the question: "What are people's preferred harvest bins and preferred source for those bins? I am also specifically interested in bins used for picking and storing the following crops (probably more than one bin type total): tomatoes, cucumbers, summer squash, greens and roots (with or without greens)."

Some user responses are as follows:

1. We pick all of our large and plum tomatoes into the yellow harvest totes […] They are super durable, we toss them out of trucks into the field and they have lasted 4 years so far. They nest and stack, which is a huge plus for storage. Also can fit them on a pallet so it is easy to move them around. Easy to clean and overall a great item. Summer squash, zucchini and cucumbers would be great in the yellow totes as well; they have handles on each side so it makes it easy to move them around. For greens, either the red harvest tote, which nests and stacks with the yellow making it a huge space saver, or the green harvest tote. […] They are available from Brookdale Fruit Farm: http://www.brookdalefruitfarm.com.
2. Buckhorn! Best crates and some of our original ones used almost weekly from 1995 are still used. They have a list of discounted ones, and they manufacture many sizes. There is a $5000 minimum order to get great pricing (about $10 per bin) or you can order through a distributor with smaller quantities. We get different colors, sizes and styles for market, storage and diff weights of crops. We use the lidded 21x15x12 for most everything for markets. We tip to drain them (stack on edge) for the lettuce. We do not want holes in them, though I know others drill holes. They would be too messy in our thoughts. We also use the 9" and double hinged ones, but are looking to get straight wall ones with no lids for tomatoes, strawberries, etc.
3. Macro Plastic. Most of mine are the 34FV. I have some shorter. They are the industry standard really. Light, durable, washable, incredibly stackable. Pricewise, they get pricy when you have to get them shipped.
4. At [our farm], we still have many used "fish boxes." [Also referred to as "fish totes"] They are excellent plastic boxes for harvest. Volume is about 1/10 of a yard (19″ by 31″ by 12″) They stack or nest. Price is $5 to $6.50 each, depending on volume. We also have many used red plastic berry boxes (13.5″ by 19″ by 4.5") Price is $4 to $5.50 each, depending on volume. They stack or nest. They are commonly used for harvesting berries. We use them for harvesting tomatoes.

"How do you like your new bins?" "OMG. [long pause] I'd take 100!" (Decade Plastics, MACXAce is shown)

"Fish baskets" work great for washing greens, in addition to harvest.

Harvest crates, also called lugs or bulb crates.

Available in a variety of colors and sizes.

Macrobins - from harvest through winter storage.

These durable, plastic lugs are easy to clean.

Some farms like to use all the same harvest containers to keep things simple.

Buckhorn flip top totes or "round trip totes" work great for delivering to farmers markets or CSA pick-ups.

Square, round, whichever you choose! This is a Monte Package display.

Where to Purchase Harvest Totes and Bins

Vendor Direct

- Buckhorn (Milford, OH)
- Decade Products (Grand Rapids, MI)
- Macroplastics (Flippin, AZ)
- Thunderbird Plastics (Savannah, GA)

Distributors and product suppliers

- Belle Terre Irrigation (Sodus NY)
- Brookdale Fruit Farm (Hollis, NH)
- Bulk Container Express (Cincinnati, OH)
- Bryan Bins (Gonzales, CA)
- Dubois Agrinovation (Quebec, CDN)
- Glacier Valley (Baraboo, WI)
- Global Industrial (Port Washington, NY)
- Grow Organic (Grass Valley, CA)
- Monte Package Company (Riverside, MI)
- Nolts Produce Supply (Leola, PA)
- OESCO (Conway, MA)
- Uline (Pleasant Prairie, WI)
- Reusable Transport Packaging (St. Petersburg, FL)
- Tranpak (Fresno, CA)

Editor's note – The Agricultural Engineering Team at University of Vermont Extension—Chris Callahan and Andy Chamberlin—maintain a fantastic blog about technology and equipment relevant to farmers, including information on post-harvest improvements and meeting new food safety requirements. You can read all of their posts and subscribe to the blog and connect on social media here: http://go.uvm.edu/ageng.

REDUCING STORM DAMAGE TO YOUR GREENHOUSES

-- Written by John W. Bartok, Jr., Extension Professor Emeritus and Agricultural Engineer, NRME Department, University of Connecticut

Nature seems to be getting more violent in recent years with frequent earthquakes, increased numbers of hurricanes and record breaking snowstorms. Insurance damage claims have increased considerably. The International Building Code has revised upward its wind and snow loading requirements for some areas of the U.S.

Each year there are reports of greenhouses that have been damaged by weather and natural events. Greenhouse design is different than conventional farm buildings in that the structural profile has to be small to allow maximum light to reach the plants. Most farm buildings are over designed to handle severe weather conditions.

Damage to greenhouses can include racking of the frame, bending of the hoops, broken glass or torn plastic and uplifted foundation posts. Preparation ahead of time can minimize the damage.

Wind loading

Wind forces that act on a greenhouse are influenced by numerous factors including the basics wind speed, building orientation, exposure, height and shape of doors or vents that may be open. The wind passing over a greenhouse creates a positive pressure on the windward side and a negative pressure on the leeward side. These can combine to create a force that wants to collapse or overturn the building. An 80 mph wind can produce a pressure of 16 pounds per square foot (psf). For example, the 10' by 100' sidewall of a gutter-connected greenhouse would have to resist a 16,000 pound force.

Wind can also create a force similar to an aircraft wing that wants to lift the greenhouse off the ground. An 80 mph wind blowing perpendicular to the side of a 28' x 100' hoophouse can create a lifting force of 220 pounds per foot of length or 22,000 pounds of uplift on the whole structure. When you consider the total weight of materials and equipment in the greenhouse is about 6000 pounds, the foundation must have a withdrawl resistance of about 300 pounds each. This is why building inspectors frequently require that the posts be surrounded by concrete.

Although you have no control over the force or direction of severe winds, here are a few tips to help minimize storm damage:

- Check the area for loose objects. Anything that can be picked up and hurled through the glazing should be secured or moved indoors. Metal chimney (stove pipe) sections should be secured with sheet metal screws.
- Inspect for dry or weak tree limbs that could fall on the greenhouse.
- Close all openings including vents, louvers and doors. The effective force of the wind is doubled when it is allowed inside the building. The wind on the outside puts a pressure or lifting force on the structure. The wind inside tries to force the walls and roof off.
- On air inflated greenhouses, increase the inflation pressure slightly by opening the blower's intake valve. This will reduce the rippling effect. Check to see that the plastic is attached securely and that any holes are taped.
- Disconnect the arm to the motor on all ventilation - intake shutters and tape the shutters closed. Then turn on enough exhaust fans to create a vacuum in the greenhouse. This will suck the plastic tight against the frame.
- Windbreaks can reduce the wind speed and deflect it over the greenhouse. Conifer trees (hemlock, spruce, pine, etc.) in a double row located at least 50' upwind from the greenhouse can reduce the damaging effects of the wind. Wood or plastic storm fencing can be used as a temporary measure.

Snow loading

Snow that accumulates on a greenhouse can put significant weight on the structural members. Snow loads vary considerably from 0 along the southern coastline to more than 100 pounds per square foot in Northern Maine. Local building codes specify the design snow load.

Snow can be light and fluffy with a water equivalent of 12 inches of snow equal to 1inch of rain. It can also be wet and heavy with 3 inches equal to 1 inch of rain. Snow having a 1 inch rain water equivalent will load a greenhouse with 5.2 psf. This amounts to 6.5 tons on a 25' x 96' greenhouse.

The following are a few pointers to consider before the next snow season:

- The foundation piers or posts should be large enough to support the weight of the building including crop and equipment loads.
- All greenhouses should have diagonal bracing to keep it from racking from the weight of the snow or force of the wind.
- Collar ties and post connections should have adequate bolts or screws. This is a weak point in some greenhouse designs.
- Allow 10' to 12' between individual greenhouse for snow accumulation and to prevent sidewalls from being crushed in.
- When building new hoophouses, consider using a gothic design that sheds snow easier. In hoop shaped houses, install 2 inch x 4 inch posts under the ridge every 10' when heavy snow is predicted.
- The heating system should be large enough to maintain 60F to melt snow and ice. It takes 250 Btu/hr per square foot of glazing to melt a wet snow falling at a rate of 1 inch per hour. Heat should be turned on in the greenhouse or under the gutter several hours before the storm begins.
- The plastic should be tight and inflated to at least 0.25 inch water pressure. This can be checked with a monometer. Any cracked or broken glass should be replaced.
- Energy screens should be retracted to allow heat to the glazing.
- A standby generator should be available with adequate fuel for the duration of the storm to power heaters, fans and blowers.

Selection of greenhouses that meet the International Building Code and good construction techniques are important considerations when building new greenhouses. A little preparation before a storm can minimize damage from severe weather events.

Resources for storm preparation and response:

- Reducing Storm Damage to Your Greenhouses - UConn Greenhouse IPM.
- 10 Snow-Related Causes of Greenhouse Failure - Greenhouse Grower Magazine, 2013
- Snow Melting Tips - Greenhouse Management Magazine, 2015
- Preparing Your Greenhouse for a Hurricane - Skip Paul, Wishingstone Farm, Little Compton, RI, 2013
- Inspection of Storm Damaged Trees - UMass Extension, 2011
- Massachusetts Emergency Management
- Mass. Dept. of Agricultural Resources Farm Emergency Plan Template

Resources updated 1/19

NEWS: NEW ENGLAND GREENHOUSE FLORICULTURE GUIDE 2019-2020 EDITION NOW AVAILABLE

New England greenhouse growers have long relied on the *New England Greenhouse Floriculture Guide*, for its unbiased, detailed information about insect and mite management, disease prevention and management, weed control, and plant growth regulation. The Guide is updated every two years to ensure that it provides up-to-date information about crop management methods and products. The Guide edited by floriculture faculty and staff from the six New England State Universities, and is published by New England Floriculture, Inc.

The new edition presents updates on available products and rates, and natural enemies for greenhouse use. We also updated the section of Best Management Practices to minimize the threat to bees and other pollinators.

The 2019-2020 edition of the Guide is now available for $40 per copy via the Northeast Greenhouse Conference website (www.negreenhouse.org).

Follow us on Instagram and Facebook @negreenhouse and look for our hashtag #negreenhouse on Twitter. For more information, contact Delaney Meeting & Event Management, Phone: 802-865-5202, info@delaneymeetingevent.com, http://www.negreenhouse.org.

Events

UMass Extension Vegetable Program Winter Workshop Series – Registration is now open!

Each workshop in this series will involve hands-on exercises, presentations, and discussions with Extension Educators, other experts, and farmers. Attendees will leave each workshop with practical plans in each subject, tailored to their individual farm. Hope to see you there!

These workshops are partially funded by the National Institute of Food and Agriculture and the U.S. Department of Agriculture.

Disease Biology & Management Workshop

When: Tuesday, February 12, 2019 – 10:00am to 3:00pm

Where: UMass Amherst, 270 Stockbridge Rd., Fernald Hall room 107, Amherst, MA 01002

Description: Learn to make better disease management decisions by understanding how different types of pathogens behave and the conditions that favor disease. We will review new diseases like spinach downy mildew, dig deeper into perennial diseases like Alternaria in brassicas, and cover other major disease outbreaks from 2018. We will take a tour of UMass Plant Diagnostic Lab and use a microscope to identify disease-causing organisms. Get all your questions answered and develop your own IPM plan for managing important diseases on your farm.

**4 pesticide recertification credits are available for this workshop.*

Registration: $30. Click here to register for this workshop online. Or, contact us at (413) 577-3976 to register by phone.

Insect Biology & Management Workshop

When: Tuesday, February 19, 2019 – 10:00am to 3:00pm

Where: UMass Amherst, 270 Stockbridge Rd., Fernald Hall room 107, Amherst, MA 01002

Description: Attendees of this workshop will:

- Learn about insect biology and use microscopy to understand how insect pests damage crops.
- Learn about insecticide modes of action, resistance issues in common New England pests, and how to avoid them, as well as ways to protect beneficial insects and pollinators.
- Get updated on recent research results in insect management in the Northeast.
- Leave class with a complete Integrated Pest Management plan for managing insects tailored to your farm.

**4 pesticide recertification credits are available for this workshop.*

Registration: $30. Click here to register for this workshop online. Or, contact us at (413) 577-3976 to register by phone.

More workshops in this series:

Soils Part 1. Soil Testing & Nutrient Management Planning

When: Tuesday, February 26, 2019 - 10am - 3pm

Where: UMass Amherst, 161 Holdsworth Way, Paige Laboratory, Amherst, MA 01002

Soils Part 2. Soil Health, Cover Cropping, and Nutrient Management Planning

When: Thursday, February 28, 2019 - 9am-2pm

Where: Brattleboro, VT

Funding Opportunities for Your Farm

When: Tuesday, March 5, 2019 - 10am - 3pm

Where: MA Division of Fisheries & Wildlife Headquarters, 1 Rabbit Hill Rd., Westborough, MA 01581

Food Safety Planning

When: Tuesday, March 12, 2019, 10am - 3pm

Where: MA Division of Fisheries & Wildlife Headquarters, 1 Rabbit Hill Rd., Westborough, MA 01581

Produce Safety Alliance Grower Training Series

Wondering where to begin with food safety? Start here! The PSA Grower Training is currently the only official FDA-recognized produce safety training to help growers implement Good Agricultural Practices (GAPs) and understand their responsibilities under new Federal regulations. Whether you have a farm that is fully covered by the law or a small, exempt farm and you're just looking for information, this training is for you. The PSA Grower Training Course satisfies the FSMA Produce Safety Rule requirement outlined in § 112.22(c) that requires 'At least one supervisor or responsible party for your farm must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration.' The training is also required for participation in Massachusetts' Commonwealth Quality Program. Trainings are presented by UMass Extension and the Massachusetts Department of Agricultural Resources (MDAR) and co-hosted by several different community organizations. These programs are funded in part by a grant from the USDA.

Registration: Cost is $40 for each program and includes the required PSA Grower Manual ($50 value), a Certificate of Course attendance from AFDO ($35 value), and lunch and refreshments.

The training will be held in 5 locations:

- **Plymouth, MA**

  When: Wednesday, February 13, 2019, 9am-5pm

  Where: Hotel 1620, 180 Water St., Plymouth, MA 12360

  Registration: Click here to register for the PSA Grower Training in Plymouth, MA.

- **Holyoke, MA**

  When: Friday, February 15, 2019, 9am-5pm

  Where: Holyoke Community College, 303 Homestead Ave., Kittredge Center room 205, Holyoke, MA 01040

  Registration: Click here to register for the PSA Grower Training in Holyoke, MA.

- **Westborough, MA**

  When: Wednesday, February 20, 2019, 8am-4pm

  Where: MA Division of Fisheries & Wildlife Headquarters, 1 Rabbit Hill Rd., Westborough, MA 01581

  Registration: Click here to register for the PSA Grower Training in Westborough, MA.

- **Beverly, MA**

  When: Friday, March 1, 2019, 9am-5pm

  Where: Wylie Inn & Conference Center, 295 Hale St., Beverly, MA 01915

  Registration: Click here to register for the PSA Grower Training in Westborough, MA.

- **Stockbridge, MA**

  When: Thursday, March 14, 9am-5pm

  Where: Stockbridge Town Hall, 50 Main St., Stockbridge, MA 01262

  Registration: Click here to register for the PSA Grower Training in Stockbridge, MA.

Questions? Contact for all programs: Lisa McKeag, lmckeag@umass.edu, (413) 545-1051

Planning for the Next Successor on your Farm

Massachusetts Department of Agricultural Resources is offering 3 sessions of this workshop across the state for farmers to better understand what is involved in succession planning. Experts from Land for Good and MDAR will provide tools and resources - including the state's Agricultural Preservation Restriction (APR) Program- to help you identify the next owner of the farm and take steps towards making the transition.

Workshop dates:

- Boyden Library, 10 Bird St. Foxborough 5:00 – 7:00pm Tues Jan 22, 2019
- Red Barn @Hampshire College, Amherst 5:00 – 7:00pm Wed Feb 6, 2019 (snow date 2/7, same place & time)
- Fidelity Bank, 9 Leominster Connector, Leominster 5:00 – 7:00pm Thurs March 7, 2019 (snow date 3/25, same place & time)

To register for a workshop session email Dorothy Du at Dorothy.Du@mass.gov – please include which date/location you will attend and how many people will be attending from your farm. Sponsored by MDAR's Agricultural Business Training Program.

7th Biennial New England Agricultural Marketing Conference & Trade Show

The Harvest New England Agricultural Marketing Conference and Trade Show is New England's premier agricultural marketing conference. Sponsored by the six New England State Departments of Agriculture, this biennial conference began in 2007. With nearly 30 workshops, about 800 people in attendance, and a trade show of almost 100 exhibitors, this is New England's largest agricultural conference solely dedicated to agricultural marketing. Farmers of all types and sizes, new and established, from throughout New England, attend to enhance their marketing and business skills.

When: February 27-28, 2019

Where: Sturbridge Host Hotel, 366 Main St., Sturbridge, MA 01566

Registration: Click here to register for this event.

Agenda: Click here to see the full schedule for this event.

THANK YOU TO OUR SPONSORS:

Vegetable Notes. Katie Campbell-Nelson, Genevieve Higgins, Lisa McKeag, Susan Scheufele, co-editors.

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