Growing Berries
In Your School Garden

Massachusetts Agriculture in the Classroom

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Cover Image: A future bounty of strawberries at the
Barnstable Community Horrace Mann Charter Public School.

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Side Note: Defining Terms
"small fruit," and "berry"

The "small" in small fruits refers to the size of the plant, rather than the actual fruit. Therefore cherries are not considered small fruit. Additionally, the botanical definition of a "berry" is a fruit that is multi-seeded and derived from a single ovary. So technically strawberries and raspberries are not true berries. This guide uses the common meaning of "berry" to describe these small fruits.

Growing Berries In Your School Garden

Introduction

Berries are great plants to grow in a school garden. There is little more exciting than finding a ripe dew covered strawberry hiding under the leaves, and experiencing the burst of aromatic taste once you pop it in your mouth. Berries can be a great way to introduce students to the garden that might be reluctant to eat a vegetable.

Berries are packed with nutrition and often have a prolific harvest, so many hands can have a chance to pick one, which is helpful in a school environment. They are fairly low maintenance perennials, although to have a well managed crop you will need to pay attention to needs that are different from annual vegetables. There are of course many curricular connections including historical food in the Americas and around the world, ancient history and culture, nutrition, plant and natural science, and the engineering and math that goes into planning planting and building garden structures.

Picking Grapes: Tacuinum Sanitatis 1474

In this guide I recommend berry plants that are hardy to all parts of Massachusetts, and are harvested in the fall. I focus on lower maintenance growing techniques, and plants that do not have controversy around invasiveness or legality. Finally, I focus on berries that are not likely to cause stomach upset if eaten unripe, in case young children end up unsupervised in the garden. (It is always good to have a policy not to eat anything in the garden without asking a knowledgeable adult first.) There are many amazing berries that do not fulfill these criteria, both native and from around the world, that you could grow in Massachusetts. If you have older students, a strong summer program, or wish to provide berries for your summer garden maintenance volunteers, consider expanding your berry types outside of the ones included in this guide. There are also more unusual berries that may fulfill these criteria that are not included in this guide. Look into Gogi berries, Arinoia, Garden Huckleberry, Honey berry, Bilberry, Dewberry, Chinaberry, Boyesnberry, Marionberry, Cloudberry, Salmonberry, Thimbleberry, Wineberry, Loganberry, Bingleberrry, Olallieberry, Lucretiaberry! The berries chosen here are Strawberries, Raspberries, Grapes and Cranberries which offer a delicious start to your berry adventures

Note: *Ribes, including currants and gooseberries, are wonderful berries but currently are not legal in all places due to their potential to harbor a virus that can infect white pine trees. Contact your extension agent if you are interested in growing these. Additionally hardy Kiwi can be a great plant in some gardens but I have not included it here because it is not appropriate for a garden without a high level of maintenance.*

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Curriculum Standard Connections

The techniques and information in this guide can be adapted towards any grade level. Some of the methods have elementary or middle school students in mind. Growing berries can be integrated into many curriculums as it connects well to both state standards and STEM guidelines. Below are an example of curriculum connections for grades 1-4, followed by middle school connections.

Grades 1 & 2	Grades 3 & 4	Sample Activities
Earth and Space Science: 4. Recognize that the sun supplies heat and light ... and is necessary for life.	Earth and Space Science: 4. Explain and give examples of the ways in which soil is formed. 5. Recognize and discuss the different properties of soil...	Turn your bed preparation into a soil exploration. When you are digging, look at the different layers and properties of the soil.
Life Science: 1. Recognize that animals and plants are living things that grow, reproduce, and need food, air and water. 3. Recognize that plants and animals have life cycles...	Life Science: 2. Identify the structures in plants that are responsible for food production, support,... (etc.) 9. Recognize plant behaviors 11. Describe how energy derived from the sun is used by plants to produce sugars...and is transferred within a food chain...	- Identify the different parts of your berry plants and try finding the seeds in each berry. - Look at how the sugars produced by berries move though a food chain.
History and Social Studies: 1.9 Explain that Americans have a variety of different religious, community and family celebrations and customs. 2.8 ...give examples of traditions or customs from other countries that can be found in America today.	History and Social Studies: 3.2 Identify the Wampanoags and ...describe their way of life. 3.4 Explain how the Puritans and Pilgrims differed... describe the daily life, education and work of the puritans in the Massachusetts Bay Colony.	- Study the history of cranberries in the state and plant a cranberry bed! - Make a map of berries around the country.
Math: Measurement and Data. 1. Work with time and Money. 7.	Math: Geometric measurement 5, 6, 7	-Measure growth on this years canes of your raspberry plants. Keep data on this year to year to determine variability and compare this to weather patterns, age of plants etc. - Measure yield from year to year of your berry plants.
English and Language Arts: 2. Write informative/ explanatory texts	English and Language Arts: 7. . Participate in shared research writing projects	Write a step by step berry growing guide for next years class. Write an article about your favorite berry and make a garden newsletter.

Grade 6	Grade 7	Sample Activities
6.MS-LS1-1. Provide evidence that all organisms (unicellular and multicellular) are made of cells.	l7.MS-LS1-4. Construct an explanation based on evidence for how characteristic animal behaviors and specialized plant structures increase the probability of successful reproduction of animals and plants	Do a seed saving activity with your alpine strawberry plants. Examine how the grain reproduces and what the berry plant does to ensure its success and distribution.
6.MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution. Include potential impacts on people and the natural environment that may limit possible solutions.* 6.MS-ETS1-5(MA). Create visual representations of solutions to a design problem. Accurately interpret and apply scale and proportion to visual representations.	7.MS-ETS1-2. Evaluate competing solutions to a given design problem using a decision matrix to determine how well each meets the criteria and constraints of the problem. Use a model of each solution to evaluate how variations in one or more design features, including size, shape, weight, or cost, may affect the function or effectiveness of the solution	- Design a model of a sorting machine for sorting berries.
6.MS-ETS2-3(MA). Choose and safely use appropriate measuring tools, hand tools, fasteners, and common hand-held power tools used to construct a prototype.	Geometry: Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	Build raised beds for your school garden using common hand held tools. Determine surface area and amount of soil needed to fill them.
History and Geography 3. Interpret geographic information from a graph or chart and construct a graph or chart that conveys geographic information (e.g., about rainfall, temperature, or population size data). (G)	Human Origins 7.4 Explain the importance of the invention of metallurgy and agriculture (the growing of crops and the domestication of animals). (H) 7.5 Describe how the invention of agriculture related to settlement, population growth, and the emergence of civilization. (H)	Learn about hunter gatherer societies and their wild harvesting practices.
English and Language Arts: 2. Write informative/ explanatory texts	English and Language Arts: Conduct research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation	Write a step by step berry growing guide for next years class. Write an article about your berry crop and how it relates to agriculture in the U.S. today.

Berry Science and Nutrition

Botanically, a fruit is the seed bearing part of some plants that is formed by the plants ovary after flowering. Plants with berries usually rely upon animals to eat their fruit in order to disperse their seeds. So many fruits are sweet in an attempt to be delicious for animals. Who knew that when you eat an apple, you are participating in the apple trees plan to disperse its seeds!

A berry is a simple fruit whose seed s and pulp are produced from the ovary of a single flower. The outer wall of this plant ovary, known as a "pericap," develops into an edible, soft walled fleshy part that surrounds the seeds. We know this as a berry.

Berries are nutritional power-houses! They are full of antioxidants. Antioxidants help to protect your cell DNA, which in turn helps avoid mutations that can lead to tumor growth. They contain many vitamins and other elements that are beneficial to our health. Although they are sweet, their sugars are 'gentle' and can be eaten even by people who have to avoid other sugars.

Nutrition composition chart

Compare and contrast your berries to other fruit!

Table 1: Approximate nutrient composition (per 100 g) of various fruits

Fruit	*Calories (kcal)*	*Vitamin C (mg)*	*Sodium (mg)*	*Calcium (mg)*	*Phosphorus (mg)*	*Potassium (mg)*	*Iron (mg)*	*Magnesium (mg)*	*Zinc (mg)*
Apple	55.4	12.0	3.0	7.1	12.0	144	0.48	6.4	0.12
Banana	49.4	12.0	1.0	8.7	28.0	393	0.55	36.0	0.22
Blueberry	62.4	22.0	1.0	10.0	9.1	65	0.74	2.4	0.10
Cherry	60.2	12.0	2.0	8.0	7.0	114	—	8.0	—
Currant	45.0	36.0	1.4	29.0	27.0	238	0.91	13.0	0.20
Elderberry	46.4	18.0	0.5	35.0	57.0	305	—	—	—
Orange	53.8	50.0	1.4	42.0	23.0	177	0.40	14.0	0.10
Peach	46.0	9.5	1.3	7.8	23.0	205	0.48	9.2	0.02
Pear	55.7	4.6	2.1	10.0	15.0	126	0.26	7.8	0.23
Raspberry	40.2	25.5	1.3	40.0	44.0	170	1.00	30.0	—
Strawberry	36.9	64.0	2.5	26.0	29.0	147	0.96	15.0	0.12

(Cornell Guide to Growing Fruit- see sources)

The Massachusetts Berry Calendar Year

This calendar is an estimate, a guide to give you a sense of how growing berries might fit into a school and garden year. As perennials, berries may not be planted every year, but will need yearly maintenance.

Berry ripening times rely on temperature, and and harvesting dates may vary due to the climate in your area, seasonal variations, and the micro-climate of your site. When determining to plant in the spring or fall, you will need to wait for a cool dry day when the ground is no longer, or not yet frozen . Talking with other gardeners and farmers in your area, or your locally owned garden center is the best way to figure out when to plant and harvest.

Berry Planting and Harvest Calendar Years 1-2

BERRY	STRAWBERRIES	RASPBERRIES	GRAPES	CRANBERRIES
Oct	Prepare beds for your strawberries	Plant your raspberries	Build grape trellis or arbor	Prepare beds for cranberries
Nov		Keep watered		
April	Plant strawberry plants in your beds		Plant grapes	Plant cranberries
May	Pinch off new blossoms		Keep watered	Water
June	Pinch blossoms		Water	Weed and water
July/ August	Water	Water as needed. Some harvest.	Water	weed and water
Sept	First harvest	Harvest	Harvest	
Oct		Harvest	Some harvest	Harvest
Nov-Dec-Jan-Feb-March	Mulch for overwintering.	Cut down plants	Prune late winter	Protect with row cover for winter
April				
May				
June	Small spring harvest.			

Growing Berries

These berry plants are perennials. Perennials require a different rhythm of care throughout the year than annual plants do. Maintenance is not optional! Although you do not have to plant your berries each year, to ensure healthy productive plants you have to work with them on an ongoing basis.

Refer to the "berry growing calendar year" for maintenance activities and general dates. Consider keeping this calendar or your own log posted in your garden shed so it is available to any future garden caretakers. Practice good record keeping! This could include:

Journals: Keep a record of your cultivars, dates they are planted, where they are planted, and where you got them. You will forget!

Maps: Garden maps of perennial plantings are key. Even rough sketches can help someone locate the plants.

Charts and files: Keeping a file on each of your cultivars is a great ongoing student activity. This could include growth information, taste surveys, information from nurseries and plant catalogues, even pressed leaves and pictures.

Site Selection

Take the following into account when selecting your plants and choosing your location to plant. For each berry, I suggest good cultivars for our area. If you live in an atypical place, such as next to the ocean or a mountain, or If you wish to branch out, pay close attention:

Macroclimate: USDA Hardiness Zone Map (See the map following)
Look at this map of Massachusetts to determine your general climate zone. When you buy plants, especially if you buy from a catalogue or online, you will need to know this number.

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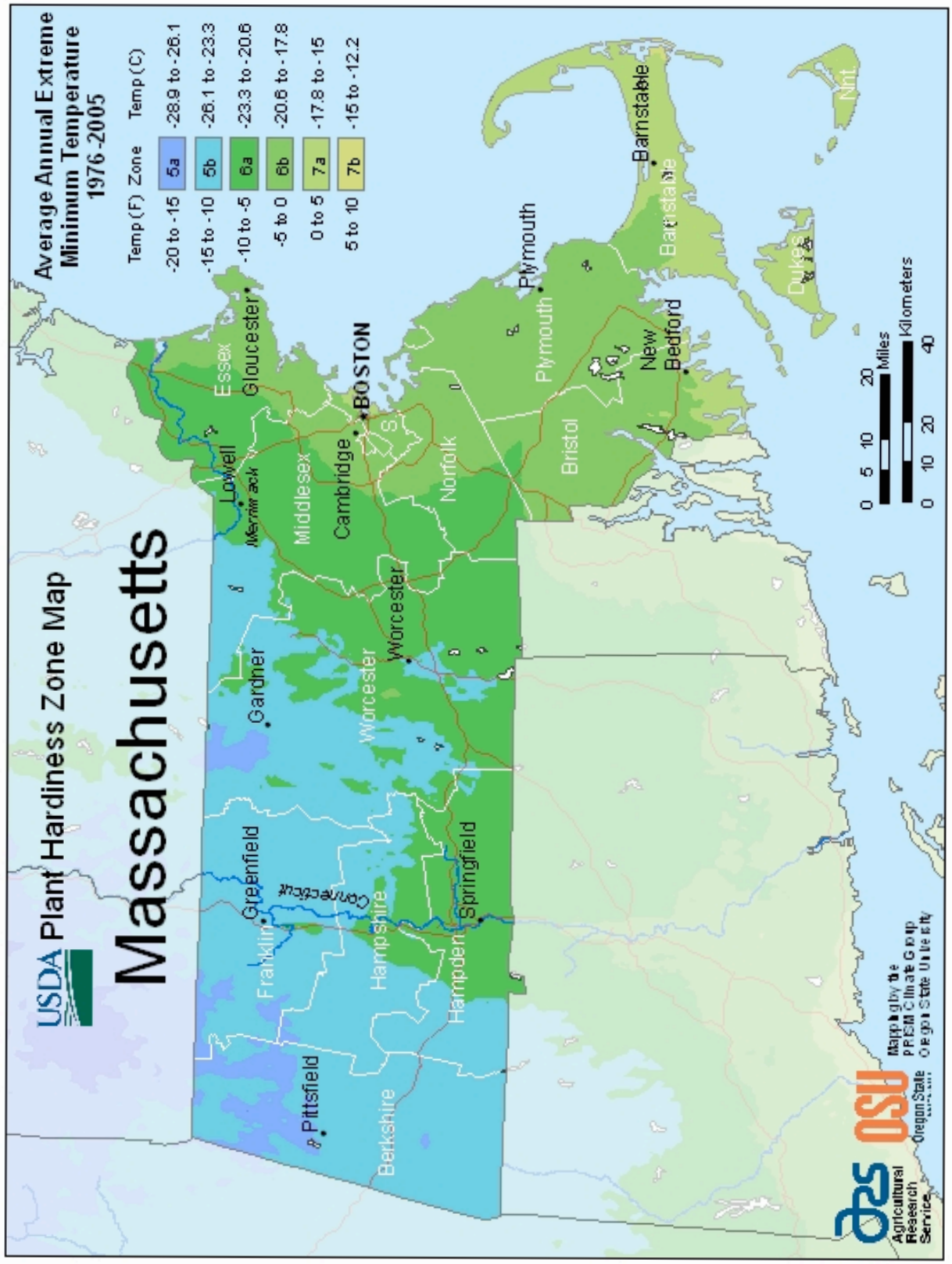

Mesoclimate: Being next to a large natural feature such as the ocean or a mountain, or a lake will affect your mesoclimate. Have students interview local gardeners to see how your area may differ from other places in your hardiness zone.

Microclimate: Your micro climate is affected by things in your particular site. This may include the presence of buildings, fences, trees, even large rocks. Keep your microclimate in mind when planting berries.

Student Observation and map activities (before you plant to determine your site?) :
Take daily soil temperatures, do a soil drainage test, buy a simple light meter and record your hours of sunlight.

Additional factors in siting your berries

On a hill? Cold air rolls down hill, so plant higher up if you can.

Drainage: Although some berries can tolerate "wetter feet" many can't so as a general rule, make sure your site is well drained! A good way to check this is to dig a small hole, and fill it with water. If it does not drain away by that time the next day, your soil has poor drainage.

Sunlight available: most berries need at least 8-10 hours full sun optimally. There are some exceptions, such as Alpine strawberries. Find a south facing site if you can to optimize available light. Simple light meters, available at most garden supply stores, can tell you the hours of sunlight at a given site.

Proximity to other natural and built features: Map your site, your school landscape or your garden area to determine where a good site would be to plant your berries. Even a simple map using a compass and counting steps between features can give you a general idea.

Proximity to water: Berries, like vegetables, need watering especially during establishment. Be sure you can reach your planting with a hose.

Once you have taken all this into account, you can have fun thinking about where to put your berries. You could plant tall berries as a kind of "living fence" or along an existing fence (especially if they need trellis support). You could plant smaller varieties among existing perennial plantings around your school, or in your vegetable beds. If you are tight on space, you could put them in containers at an exit or entrance. Berries are often pretty as well as productive!

The Human Factor

Maintenance available: Are you realistically going to keep your raspberries neat and tidy trellised next to the front entrance, or should you find an out of the way corner where they can relax and be a little unruly?

Space you have : Do you need to plant in containers? Or choose more upright, compact cultivars due to space limitations?

The ages of students who will be in the garden, and your comfort level/ level of supervision of them. This may affect whether you choose thornless varieties, and whether more unusual berries are worth planting.

Harvest time desired: This is key. The berries recommended in this guide fruit in the fall, so if you have a strong summer program you might consider others that fruit over the summer not covered here.

Taste! Visit a pick your own farm to taste and compare berry varieties. If you can, this is a great field trip. Or instead bring varieties back to the classroom and do a class taste test and survey of favorites.

Soil

General strategies for soil health include adding lots of good quality compost, keeping your soil well watered but not water logged, and keeping your soil covered with mulches and ground covers.

Take a soil test: A soil test is key to find out more about your soil. While home tests that you can buy can tell you some things, it is best to get a lab test. These are affordable and available at the UMass soil lab. Their website is listed in resources, and they provide information on how to do the test.

These test will tell you:

1. If there is any lead/ other heavy metals in the soil, in which case you would make a lead avoidance plan.

2. PH levels: Varies slightly by type of berry. The general approach to correcting soil PH is to add organic matter such as compost. Lime can also be added in cases of particularly acidic soil.

3. How much organic matter there is in the soil: A great way to improve this is to add good quality compost. Mulching around your plants also helps add organic matter when it breaks down.

4. Nutrients in the soil: All of these nutrients are vital to berry growth. Have older students research how. Here are some organic ways to increase your levels of these vital nutrients, in addition to adding compost, which is always a good bet:

   Phosphorus: Rock phosphate, soy husks, compost.

   Potassium: Green sand, composted sheep manure, dried seaweed, wood ash.

   Magnesium: Crushed egg shells

   Nitrogen: Composted manure, alfalfa meal, used coffee grounds, grass clippings, compost!

   Micronutrients: Generally if your PH is good, your plants will be able to get these vital micronutrients from the soil.

What if you have poor drainage, contaminated or poor soil or even no soil? Use raised beds and containers! Raised beds should be at least a foot and a quarter deep for most plants. Container pots should hold at least 7 gallons.

Where to get plants

Nurseries: It is really worth the trip to find a local nursery or garden center to buy your plants. They will have varieties adapted to your area, a knowledgable staff and be a place to go back to with questions and troubleshooting. You are not just buying a plant but getting to know a key local resource for your school. Supermarkets etc may have slightly less expensive plants but they are often not as healthy, may have disease and may be not a good match for your area. While you may get creative and save money with your trellis/ mulch/soil fertility materials, trying to save money on your culivars is a false economy!

Catalogs and online: There are many great plant nurseries that do mail ordering, where you may be able to find more specific cultivars or more unusual plants. Look for a company located regionally, or at least in your Macroclimate zone, or further north, and call them to double check that your selections will work in your area. Be careful to time your shipping well, and store your plants carefully until you can plant them. Many nurseries ship bare root (without soil) and these plants need special care to stay healthy until planting.

Prepare Your Site

Prepare your soil ahead of your planting day if possible. Prepare as you would for vegetables:

1. Fork up your garden bed or garden area and remove all weeds and roots.
2. Add your soil amendments.
3. Add good quality compost.
4. Water your soil in advance if it is especially dry.
5. It is better to build any trellises ahead of time so you do not disturb new plants when putting them in.

Planting Day

1. **Soak** your bare root plants in water 1/2 hour before planting if possible. Keep in your bucket, or in a plastic bag to stay moist when you go outside.
2. **Measure out** your planting trench with your string.
3. **Dig a trench** at least as deep as your plant roots along the line of the string.
4. Have students **place plants** at the appropriate distance using a measuring device. (Not burying them) The crowns of the plants should be above ground at this point.
5. Once you have checked the plants for spacing and height in the soil, carefully **push soil into the trench** around their roots.
6. **Tuck the plants in** by Pressing down around the plants firmly with your hands, double checking that the crowns are at soil level. (I like to give students chopsticks to sit the crown on. They place the stick over the trench, fill in around the roots, remove the stick and then mound the extra soil around the crown carefully, and press down with their hands.)
7. **Water in well** with a gentle shower.
8. **Mulch** around the plants at least 2" thick (you should not be able to see soil through the mulch) making sure the crowns are not covered. In a raised bed, this will cover the whole bed.

Side Note:
Potential Issues with donated plants

Donated plants can seem great, but you should be aware of some possible pitfalls. If you are going to put all this time and effort into a berry planting at your school, this is not the place to skimp. You want to be planting the most vigorous and healthy plants possible, and ones that are the type you want.

It can be hard to turn down a well meaning parent donation, but perhaps you can re-direct their energy by asking them to instead help you at school with your exciting trial of a new variety!

When choosing to accept generously intended berry plants ask yourself few questions:

1. do you know what the variety is, or at least what category of cultivar it is? e.g. Day neutral strawberry, or primocane raspberry.
2. Does the plant have disease? Many older plantings of things like raspberries have viral diseases. You could visit the plant before they dig it up, or ask them to double check, if they don't know how, this might be a red flag.
3. Finally, be sure to have them leave it in the ground as close to when you are able to plant it as possible so that it does not lose vigor sitting in a corner of your school yard.

Tools and Supplies - A Checklist

Bed preparation

- ☐ Garden fork
- ☐ Compost
- ☐ Shovel
- ☐ Soil amendments determined by your soil test
- ☐ Refrigeration for plants before planting

Planting

- ☐ A string tied to two sticks to mark out your planting trench
- ☐ A yardstick
- ☐ Hoe
- ☐ Shovel
- ☐ Hose
- ☐ Shower watering hose attachment or watering can
- ☐ Bucket or other container to soak plants
- ☐ Mulch

Other Optional Materials

- ☐ Trellis materials
- ☐ Netting materials
- ☐ Aprons for students
- ☐ Garden gloves

Maintenance

Keep your plantings well watered, especially during the first year. See the descriptions of the individual berries for water requirements, but in general, watering your berries when you water your vegetables is a good practice. Water your plants at soil level if you can to avoid spreading disease. Replace mulch as it decomposes or is brushed away by wind or feet. In the late fall, check your management strategy for each type of berry. This usually includes adding more mulch, cutting down old or dead plant parts and generally cleaning up the area.

Netting

Netting can reduce the number of your berries that are carried away by birds who get to your berries before you do. As eating berries quickly is easy in a school setting, I do not cover netting here. Also, unless you are able to build a large upright netting cage, netting can be hard to maintain. Note: Most cultivars we talk about are self fertile - unlike many trees they do not require other plants to pollinate. They do require pollinators though! Encourage pollinators in your garden with flower plantings and teach students to respect and know them. If you do net, make sure pollinators can get in.

Harvest

Figuring out how to harvest berries is usually not a problem! You may want to flag certain plantings as "do not pick" to keep if you wish to do a harvest project with a particular group. Adding a "help yourself" sign to a berry planting might be a nice gesture to visitors in your garden. Practice with students how to find ripe berries, by color, softness and other factors. Talk about the reward of how much better they will taste once fully ripe!

Most berries do not store long, so if you are bringing them inside, wash them, and eat them that day. If you wish to preserve them longer, you can freeze them or make them into preserves. Spread them on a cookie sheet and flash freeze them so they do not stick together, then transfer them into freezer bags for later smoothies or baking! Many berries can be dried in a home dehydrator or in the oven on low. Berries of course make great jams, pies and crumbles fresh or frozen. Explore and research more information about these fun projects for food preservation.

The Berries

Day Neutral and Alpine Strawberries

Historical Note: The Chillean Strawberry is the mother of most strawberries. Cultivated from at least 300 BC. Most commerical strawberries in North America are a cross of this strawberry and a native North American one, and are all in the same species: F. xanasassa. (Except Alpine)

Strawberries are the ultimate small space berry. Even if you do not have a garden, you can grow strawberries in hanging baskets or containers.

Photo: Strawberries at BCHMCPS in Hyannis

Types of Strawberries:

June bearing: These are the most common strawberries grown commercially. Most cultivars are in this category, and June is the time of year that people think "Strawberries!" There are varieties that fruit earlier in June and others that fruit into early July. Although you could squeak a June harvest of strawberries in before school gets out using an early variety, I do not cover June bearing strawberries in this guide as this is often unreliable, and I find it sad to see students get so excited when they see the ripening fruit, but never get to eat them as they leave school before they are ready to harvest.

Day Neutral: These are a great alternative to June bearing strawberries, and so one of the two kinds I cover in this guide. These strawberries fruit throughout the growing season, with peaks in June, Mid summer and late summer/early fall. They also require no renovation, but do require re-planting every three years or so.

Ever-bearing strawberries are similar to day neutral cultivars but are generally less productive and so I focus on day neutral cultivars instead.

Alpine strawberries: Fragaria vesca are also a great school garden plant. They are related to wild strawberries but with bigger fruit - though

still very small compared to other domestic strawberry plants.

Photo: Strawberry and Rhubarb Interplanting- Morgan School Holyoke

Why you should love Alpine strawberries:

- They can tolerate part shade (as they are originally a forest edge plant)
- They will fruit June through October.
- You can grow them from seed, and also, they will come true to seed! (you can save your own seeds and plant them, or let them plant themselves!)
- They have an amazing aromatic flavor
- They are the best strawberries for fairy tea parties!

Varieties to plant

Ever-bearing "Seascape," is a good bet for a prolific fall crop, or try "Mara Des Bois" for a spring and continuous summer and fall fruiting with amazing fragrant scent and strong flavor. Alpine strawberries generally are just called "Alpine Strawberries."

Where to plant

(follow general siting guidelines.) Additionally:

- Plant in your garden: You don't have to have designated strawberry beds, you can plant amongst your vegetables! (see the photo above for another interplanting idea)
- Raised beds are great for drainage, keeping suckers contained and being generally school friendly.
- Strawberries are the perfect container berry. Place containers or hanging pots wherever you have space. (note - these require careful watering)
- Make a strawberry pyramid! Place bricks in a tiered pyramid and fill with soil, plant into the terraces for a cascade of berries!

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Prepare your site

Follow general guidelines for preparing your soil. PH is important for strawberries, they like 6.5. Plant your strawberry plants in early spring. Consider preparing your strawberry bed the fall before you plant, and seed a cover crop or mulch over the winter.

Planting

Strawberries are easy to plant following general planting guidelines. Be sure not to bury their crowns and water in well and during establishment. Mulch well around your plants, you should not be able to see any soil through your mulch. Straw mulch is best for "straw" berries!

Maintenance

Follow general maintenance strategies. Additionally:

- Blossom pinching: Pinch off flowers to encourage root growth until early July the first year for these day neutral/ Alpine types, then stop.
- Water: Because of their shallow root systems, strawberries need especially careful watering. Strawberries need about 1" of water a week. You should also water on the ground if possible with soaker hoses or drip irrigation as overhead watering can cause more mold problems.
- Replace mulch and weed: This is especially important for strawberries as they do not compete well with weeds.
- *Note: Don't "renovate" as you would June bearing strawberries. Instead expect your day neutrals to last for about 3 years, Alpines can last longer, but will decrease in productivity.*
- Overwinter by covering with 4" mulch. Be sure to remove mulch in the spring with warmer weather.

Harvest

Wait until your strawberries are bright red and aromatic. This can be hard! Removing rotted fruit is important to avoid causing mold problems. Eat right away or refrigerate.

Note: What is that weird white foam on my strawberries? Unless you have been drooling over what a great harvest you are having, it is from spittle bugs, which are not usually a problem. For this and other disease/pest problems contact your MG or Extension.

Growing Berries In Your School Garden

Red and Yellow Raspberries

Photo: Raspberries at Watertown High School

A raspberry patch is a wonderful addition to a school garden, producing juicy sweet fruit right when students get back to school. Raspberries can also yield enough so that students and other visitors to the garden can graze on them without you being worried that there will not be enough for your class. A well managed raspberry planting can last for years, and so can be a mainstay of your garden.

Raspberries are a member of the botanical rose family. In ancient Greek mythology, the berries were once white, but when Zeus' nanny Ida pricked her finger on a thorn, it stained the berries red and they have remained so ever since. Thus, their latin name is Rubus idaeus, literally, bramble bush of Ida. The leaves of red raspberry are known to be a female health tonic.

Types of Raspberries

Raspberries are divided by color; red (includes yellow and golden), black and purple. They are further divided into floracane (fruit on the second year canes) and primocane (fruit on the first year canes) types. They are then further divided into different named cultivars. I will describe here how to plant and manage fall bearing, "primocane" red raspberries. Yellow or golden raspberries are just variations on these red raspberries and so can be planted in the same way.

Varieties to plant

"Heritage" is a heritage variety red fallbearing primocane that is hard to beat. Also try "Annie" for a yellow fall bearer with large berries.

Where and when to plant

Ideally, raspberries should be in a sunny, well drained location. If you do not have good drainage consider mounding your beds, or building raised beds as they cannot tolerate wet very well. A moderate amount of shade is tolerable, but is not ideal.

But What About the Thorns?!

Unlike most blackberries, raspberry thorns are small. I like to use them as a lesson in caution and slowness. You can consider giving sensitive students gloves to use while working with them. If thorns are a barrier to planting, thornless varieties can be found with some searching, although double check they are cold-hardy in your area.

Growing Berries In Your School Garden

Keep in mind that raspberries propagate themselves by sending out lateral suckers. This means they will spread! Consider a planting in a bed next to a paved walk way, wall, or at least an area that is regularly mowed. Your raspberry beds will need to be three feet wide. If you are planting multiple beds, they beds should be nine to ten feet apart. Raspberries do well with an early fall planting.

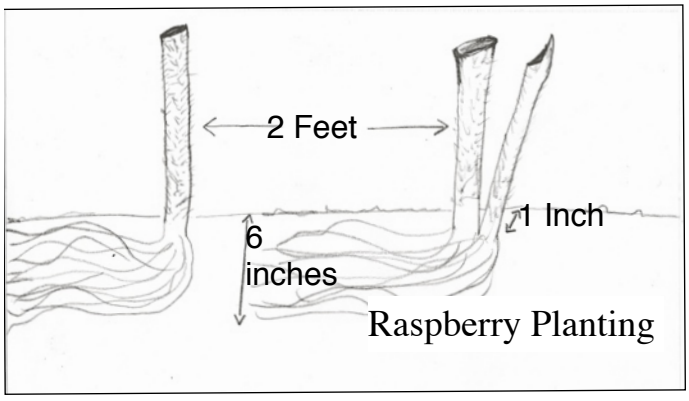
Photo: Raspberries at Sullivan School, Holyoke

Prepare your site

- Dig up the raised bed or planting area to a depth of 6" or more, and make sure you remove all roots and perennial weeds.
- Add some compost to the soil and mix it in well.
- If you are able, a fall cover crop the previous year is a nice way to prepare the area.
- Consider adding a root barrier of heavy landscape cloth or bricks around the edges to stop the raspberries spreading.

Plant

Dig a long trench, and place your plants 2' apart, with the roots trailing to the side (see diagram below). The crowns should be about 1" below the soil. Press in well for good soil contact, and trim the tops to 6-8". Water in well. Mulch a couple of inches deep with wood chips, hay or other sturdy mulch.



Raspberry Planting

Maintenance

- Water: Raspberries have shallow root systems. Keep regularly watered but not soggy especially during establishment of the plants in the first year, and between flowering and fruiting. To avoid viral disease water at ground level. You can do this by carefully positioning a hose or soaker hose, or installing drip irrigation.

- Fertilize: You can lay down some compost around the base of the plants in the spring before flowering. Don't smother your plants! Do not hill the compost or mulch around the stems, instead circle your plants closely.

- Suckers: Mowing around your raspberry beds or siting next to a wall should stop their spread being overly invasive. If you do find errant suckers, you can usually break them off from the parent plant with a sharp spade and then pull them up with thick gloves. If you are sure that your plants are disease free, you can establish a new bed with these suckers, but dispose of them if you are not sure. Watch out- raspberries are intrepid! It is a good idea to leave them out to dry and die on a walkway or other sunny space where they can bake, otherwise you may get a new raspberry patch in your brush pile!

On trellising

These primocane raspberries can do fine without trellising. If you wish to keep them more upright, tidy and easy to harvest, build a simple "T" trellis with wood and garden twine.

Photo: T Trellis at Abundance Community Farm Northampton

Harvest

Expect a small crop the first fall, then for years after! Raspberries are delicate, so pick frequently, and eat promptly :)

Concord Grapes

Photo: Yankeemagazine.com

Grapes are woody vining plants of the Genus Vitus. Grapes are delicious eaten fresh, and also make delicious juices and jellies. Grape leaves can also be eaten.

Grapes were first domesticated about 6-8 thousand years ago in the middle east, where the first records of winemaking were also found.

Types

The most common grapes cultivated around the world are native to southern Europe, (Vitis vinifera). These include the cultivars most commonly used for wine. The North America has its own native wild grapes, one variety of which (Vitis labrusca) form the basis for most grapes cultivated in the N.E. Concord grapes are one of these cold hardy and disease resistant cultivars, and so recommended and discussed here.

Varieties to plant

Try any Concord grape or Concord cross.

Where and when to plant

Choose a site with full sun and good soil. Southern slopes protected by buildings in the north are ideal. A good time to plant grapes is in the early spring.

Prepare your site and build your arbor!

Prepare your soil following the general guidelines.

- Build your arbor! This is a project, but very doable. There are many great instructions on how build arbors out there. Make sure your arbor is made of strong materials and well grounded in concrete posts or another sturdy foundation. Your arbor could be the site of a shady outdoor classroom sitting area, or serve as a dramatic entrance to the garden. Grapes can also be trellised, which is also a great way to grow them but involves a lot more maintenance and skill. Look into this art if you wish or if you have no room for an arbor.

- Plant your roots the same depth as they were at the nursery, usually 2-3" above the roots- you can usually tell where by a color change line just above the roots.

- Remove all but the strongest single cane above ground, and tie this cane to the leg of the arbor.

- Mulch around the base of your vines and around your arbor.

Maintenance

Growing grapes on an arbor is easier than trellising, but to get optimal harvests you want to maintain them carefully. This might be a

good area to ask for help from a skilled person, but if you need to do it instead, don't worry! Grapes are forgiving, so do your best and it will be fine.

- After several weeks buds should begin to grow on this cane, when they are generally 10" long, remove all but the strongest, as well as any side clusters growing from the roots.

- During the first year, continue to tie your cane to your arbor, and prune off side shoots.

- Prune your grape vine annually in the winter, taking out last years fruiting shoots as well as any unwanted side growth. Grapes are tough! You can prune back more than you think.

Harvest

Pick the clusters and eat right away. If you need to store them, the fridge is best. The grape skins can be tough, so you might want to remove them as you eat, and watch out for the seeds, which are harmless but quite large. Concord grapes freeze well and make amazing jelly.

Cranberries

Cranberries are a great Massachusetts crop of historical and contemporary importance. They are fun to grow, and cranberries do not need to be flooded to grow, this is just a method that commercial growers use to make harvest easier.

Types

Cranberries are a low creeping shrub with evergreen leaves, and are members of the Vaccinium genus, and a member of the Ericaceae - Heather or Heath- family. They grow low to the ground and are native to Massachusetts, and grow wild here. "High bush" cranberries are not actually cranberries at all, but members of the honeysuckle family, although their red fruit resembles them.

Look for three or four year cranberry plants to get yields right away. If you plant cuttings or first year plants, expect to harvest three or four years from now.

Varieties to plant:

Try "Stevens" or "Howes."

Where and when to plant

Consider preparing your cranberry bed in the fall and then planting into it in the early spring after the ground is thawed. This way your soil mixture has a winter to get fully saturated.

You can plant from thaw up until early June if necessary.

Cranberries prefer full sun. Find an area where you can dig out a 4 x 8 foot bed, about 8 inches deep.

Photo: National Geographic. org

Prepare your bed

- Remove the soil from your bed area. Set aside and use elsewhere in your garden.
- If the ground underneath is very sandy, add a 6 mil liner (available at garden stores). If your ground is heavy silt or clay, you can skip this.
- Cranberries need a low PH and high organic matter, and so we will make our own soil blend. Although I do not usually use peat moss as it is an environmentally sensitive essentially non-renewable

resource, cranberries are a special exception. Cranberries need a mycorrhizae to grow that is present in peat moss and not regular garden soil.

- Layer four bales of peat moss with 1/2 lb bone meal, 1 cup of epsom salts, 1 cup of rock phosphate and 1lb blood-meal.

- Wet the mixture well with a garden hose. If you are preparing the bed in the spring right before planting take several days to water the peat moss until it is fully saturated. (If you are preparing it in the fall, you can leave it to settle and moisten in the winter snows and rains.)

Plant

- If you are planting three/four year plants, set one plant every four square feet. (If you are planting cuttings or small young plants, space every foot.)

- Sprinkle some compost around the plants, then cover the whole area around your plants with about 1/2" of garden sand, or "sharp" sand from the hardware store.

Maintenance

- Keep carefully weeded and watered. Cranberries will not survive if their roots dry out, but they also do not like to be saturated. Consider installing drip irrigation for low maintenance summer periods. Your peat moss should stay moist but not saturated- squeeze it to test!

- In the early winter, consider covering your cranberry beds with a couple of layers of floating white fabric row cover, or clear plastic to protect them. Remove this cover when the ground thaws in the spring, but consider putting it back on during cold snaps to increase your chances of good flower buds and more harvest that year.

- You can add more sand every few years to encourage an upright habit and health. Just scatter the 1/2" of sand over the plants and work it into the peat moss with your hands.

Harvest

Harvest generally in early October. You can tell when the berries are ready by the brown color of the seeds when you split open a berry. Also, good ripe cranberries will bounce! Rotten or unripe ones will not. Do a bounce statistical test with your class to determine the percentage of good cranberries in your harvest.

Trouble shooting : General practices

Healthy plants = less disease and less pests!

1. Pay attention to **site selection**
2. Work on your **soil health**. Healthy soil grows healthy plants!
3. Have good **watering practices** - not too little or too much.
4. Maintain appropriate **plant density**. Plants that are too crowded do not have enough air flow and may be more susceptible to disease.
5. **Harvest berries quickly** when they are ripe: Usually not a problem but if you have a summer fruiting be sure your garden volunteers know it is their job to eat them!

6. **Maintenance is not optional.**
7. **Consider your borders** and boundaries. Use walls and walkways to your advantage to contain your plantings.
8. **Specific diseases and insect infestations:** These are not covered in this guide. These are one of thousands of good reasons to develop a relationship with the Master Gardener association in your area, and with your Cooperative extension. They have help lines and may even be able to get a volunteer to come out to your garden to help you troubleshoot.
9. **Animals eating your berries?:** Consider netting and fencing if you have a lot of birds or animals after your berries.
10. **Guests and passers by may also eat your berries**, which you can usually manage by planting an additional berry fence for the public in easy reach, and adding signs to indicate which plants are for the public and which are for students only.

Resources and Sources

Mass. Ag. in the Classroom Guides:
Can be found at www.aginclassroom.org under "Classroom Agriculture"

Umass Soil Test: http://soiltest.umass.edu/

Plant hardiness zones map: **http://planthardiness.ars.usda.gov/PHZMWeb/Maps.aspx**

UMass small fruit guide: https://ag.umass.edu/fruit/ne-small-fruit-management-guide

UMass "Berry Notes" newsletter: https://ag.umass.edu/fruit/publications/berry-notes

UMass "Grape Notes" newsletter: https://ag.umass.edu/fruit/grape-notes

UMass home small fruit guide: https://ag.umass.edu/home-lawn-garden/fact-sheets/fruit

Cornell berry guide: http://www.fruit.cornell.edu/berry/

Penn State home berry guide: http://extension.psu.edu/plants/gardening/fphg/extension_publication_file

"Cranberry Creations" home growing guide: http://www.cranberrycreations.com/growing.html

Maine Organic Farmers Association article on home cranberry growing: http://www.mofga.org/Publications/MaineOrganicFarmerGardener/Winter20042005/Cranberries/tabid/1278/Default.aspx

Cranberry Experiment Station: P.O. Box 569, East Wareham, MA 02538. 295-2212

Mass. Master Gardeners Association: http://massmastergardeners.org/

Nourse Berries company website: *http://noursefarms.com/category/raspberry-plants/*

Unusual Berries*: http://www.garden.org/ediblelandscaping/?page=september_unusual*

About the author: Alice Posner's favorite berry is a raspberry. She has run her own jam making business using many kinds of berries and tree fruit, and has over ten years of farming experience on diversified farms in Western Massachusetts. She taught in school gardens at public schools for five years, and has also designed curriculums for summer programs on farms and in gardens in Massachusetts and New Hampshire, for elementary and middle school students. She has been writing garden guides and working in school gardens with MAC since 2012. She currently works independently to consult about and install educational gardens at schools and in community settings. You can contact her at greentoolbox@gmail.com