

## Massachusetts Agriculture in the Classroom

Social Studies  
Economics  
Nutrition  
Science



### Workshops & Conferences

#### Greening the School Conference

Saturday, November 6, 2010

8:30 a.m. to 3:30 p.m.

Clay Science Center, Brookline

Choice of 5 concurrent workshops in each of four sessions Fee: \$50

#### Annual Winter Conference

Saturday, March 12, 2011

8:30 a.m. to 3:30 p.m.

Baird Middle School, Ludlow

4 concurrent workshop sessions  
Fee: \$50 (\$45 until Dec. 1)

Conference Information &  
Registration on page 7.

### Feature Topic: Trees Are Our Treasures



*Mission: Massachusetts Agriculture in the Classroom is a non-profit 501 (c)(3) educational organization with the mission to foster an awareness and learning in all areas related to the food and agriculture industries and the economic and social importance of agriculture to the state, nation and the world.*

Massachusetts Agriculture in the Classroom is now on Facebook

To register visit our website at  
[www.aginclassroom.org](http://www.aginclassroom.org)

### Fun Ag Activities for Kids

Massachusetts Agriculture in the Classroom is pleased to announce that this past May we were awarded a Marketing Grant from the **Massachusetts Department of Agricultural Resources**. This grant funds the development of several fun agricultural activities for kids that will be available on the MAC website and will also be taken to fairs for hands-on interaction and education. We are very grateful to the Department for their support.

**Five fun agricultural activities** are now being developed by classroom teachers. They will be field tested in classrooms this fall. Each activity will offer kid-friendly games, puzzles, coloring sheets, recipes and more that may be printed or worked on-line. The five Massachusetts crops that we will be featuring in these activities are: carrots, cranberries, honeybees, tomatoes and nursery. It's our plan to develop activities and lessons for additional products in the future.

MAC is also developing **two exhibits with hands-on activities for children** and accompanying adults that will be previewed at two fairs this fall. MAC will be at **The Big E** in West Springfield on **Thursday, September 23** and **Friday, October 1** with an exhibit and tree planting activities. On **Saturday, October 9** we'll bring honeybee activities to the **Cranberry Harvest Festival** in Carver. **We are now looking for volunteers** to help us with these hands-on interactive exhibits for children on all three fair days. To volunteer send an e-mail to [massaginclassroom@earthlink.net](mailto:massaginclassroom@earthlink.net).

### 2011 Massachusetts Agriculture Calendar



The **2011 Massachusetts Agriculture Calendar** is now available. Show your enthusiasm for agriculture while you support MAC, the designated recipient of all proceeds. The calendar is a collaboration between the **USDA Natural Resources Conservation Service, Massachusetts Dept. of Agricultural Resources** and MAC. It was created to educate consumers about the rich diversity of agriculture in the state, while also providing a daily reminder of agriculture.

Each calendar month features one full-size photograph that portrays a local farm or farm product. Photos were submitted by amateur photographers from across the state. View the winning photos from the contest at [www.mass.gov/agr/events](http://www.mass.gov/agr/events).

The calendar also includes local agriculture and conservation facts, events and websites. Nine non-profit agricultural groups each sponsored a page. Calendars may be purchased for \$10 each or at a discount of \$5 each for 5 or more calendars. Send your payment to Calendar, MAC, P.O. Box 345, Seekonk, MA 02771.

## Mini Grants

In April of 2010, the MAC mini-grant committee awarded grants in the amount of \$300 each to two schools for embryology projects. The mini-grants to **Jill Phelan** and her 2<sup>nd</sup> grade students at the **Barry School** in **Chicopee** and to **Julie Letourneau** and her 4<sup>th</sup> graders at the **West Street School** in **Southbridge** provided the funds to purchase incubators and other supplies that enabled the hatching of chicks in these agricultural classrooms.



Any Massachusetts teacher or school can apply for a mini-grant to support their agricultural education efforts. Each year MAC awards **grants of up to \$1,500** to teachers for agricultural education projects. Mini-grants are due the first of April, September and November. To receive a copy of our mini-grant guidelines, send a letter or visit [www.aginclassroom.org](http://www.aginclassroom.org).

## Educational Resources Available from MAC

<b>School Gardens &amp; Their Community Partnership Manual</b>	<b>\$10</b>
<b>Farm Field Trip Manual</b>	<b>\$12</b>
<b>8 Lessons about Agriculture &amp; the Environment Manual</b>	<b>\$5</b>

## Make a Donation Today

We need your support. If you like what we do, please make a donation today to support Massachusetts Agriculture in the Classroom. We are a small non-profit with a big impact in classrooms across the state. All program and operational support is raised each year through donations and grants; we receive no direct state or federal dollars. You can help us grow. Thanks!

## President's Message

The **2010 Summer Workshops on the Farm** began with Sheep to Shawl, which is always popular with teachers. Over the summer, they learned about earth-colored grains grown in the flat CT River Valley, vegetable and fruit farms that market directly to consumers in the northeast and cranberry bogs where the spray system is computerized.

As always board members, past and present, hosted and presented. **Ken Oles** explained beekeeping and pollination. **Jay Healy** discussed sustainable practices at his tree farm. **John** and **Annette Lee** outlined farm education programs and discussed "Slow Food." **Debi Hogan** invited teachers to the gardens and growing fields at Tranquil Lake Nursery and provided hands-on activities with herbs.

**Jan Wentworth** took teachers into her kitchen to show them how to create strawberry jam that is healthy and tasty. There was a day spent in the Berkshires discussing many agricultural books written for children and adults. Additional workshops showcased school gardens and the wonderful heirloom seed and seed saving traditions at Old Sturbridge Village.

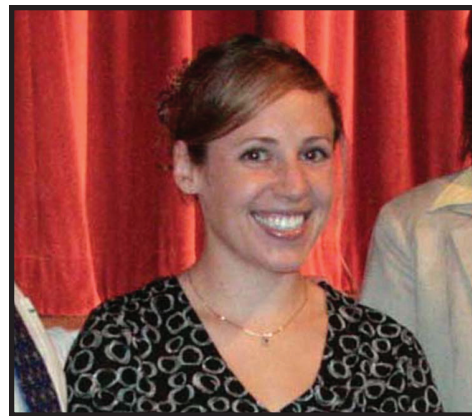
I observed that many teachers were working to enhance their science curriculum. For some science was their primary teaching duty, while others were supplementing a portion of their lesson plans for younger children. One teacher, who had attended workshops in past years, spoke of the knowledge to be gained by visiting farms and listening to how farmers make their decisions. All participants felt farm education and tours lent authenticity to subject matter. I value that compliment.

We are indebted to Bobbie Oles, Debi Hogan and the many host farmers who assisted with local lunches. **Ken** and **Bobbie Oles** along with **Debi Hogan** attended most workshops.

If providing an educational opportunity for teachers on your farm is of interest to you, talk with us at the **Annual Farm Bureau Convention** on **Thursday, December 2** in Springfield. We will be at the convention running the **Silent Auction**. Please consider making a donation to the auction to support MA Agriculture in the Classroom.

*Marjorie Cooper  
President*

## 2010 Teacher of the Year



*Cassie Uricchio is our 2010 Massachusetts Agriculture in the Classroom Teacher of the Year.*

MAC is proud to announce that our **Teacher of the Year for 2010** is **Cassandra Uricchio**, who teaches agriculture and life science at **Mount Everett High School** in **Sheffield**. Cassie participated in our 2007 Summer Graduate Course. She was awarded a mini-grant in 2008 to construct a school farm on campus. We have been inspired by her energy and passion for teaching agriculture and the many new programs she created.

The local Sheffield community also shares our enthusiasm for Cassie and her agricultural education efforts. We received nomination letters from the school's principal; director of technology and vocational education; FFA president; the regional school district and the executive director of the Land Trust as well as a local farmer. All applauded her energy and drive and the connections she makes with her students, while also linking agriculture and the community.

After receiving a B.S. in Animal Science from UConn and a M.S. in Agricultural Education from NC State University, Cassie began teaching at Mt. Everett in 2006. She started a new agriscience program & FFA chapter in 2007. She developed new courses including Agricultural Biology; Agri-Science & Biotechnology; Animal Science, Plant Science; Pathobiology, and Fish & Wildlife Management. In the community she collaborated with the building structures program to raise a barn on school campus. Cassie is currently on leave of absence to return to NCSU on full assistantship to finish her Ed.D in Agricultural & Extension Education. We congratulate her and wish her the best in her studies.



## Tree Resources

**MA Nursery & Landscape Association**  
P. O. Box 387 Conway, MA 01341  
[www.mnla.com](http://www.mnla.com)

**MNLA Foundation Scholarship**  
[www.mnlafoundation.org](http://www.mnlafoundation.org)

**Massachusetts Flower Growers' Assn.**  
8 Gould Road Bedford, MA 01730-1241  
[www.massflowergrowers.com](http://www.massflowergrowers.com)

**MA Dept. of Agricultural Resources**  
251 Causeway Street Suite 500  
Boston, MA 02114-2151  
[www.mass.gov/agr/](http://www.mass.gov/agr/)

**MA Dept. of Conservation & Recreation  
Division of State Parks**  
[www.mass.gov/dcr/forparks.htm](http://www.mass.gov/dcr/forparks.htm)

**Mass. Forest Landowners Association**  
[www.massforests.org](http://www.massforests.org)

**Massachusetts Arborist Association**  
[www.massarbor.org](http://www.massarbor.org)

**UMass Extension**  
[www.umassgreeninfo.org](http://www.umassgreeninfo.org)

## Curriculum & Resources

**American Forest & Paper Association**  
[www.afandpa.org](http://www.afandpa.org)

**Arnold Arboretum of Harvard University**  
[www.arboretum.harvard.edu](http://www.arboretum.harvard.edu)

**Bringing Nature Home: A Case for Native  
Plants** - <http://bringingnaturehome.net>

**Forest History Society**  
[www.foresthistory.org](http://www.foresthistory.org)

**National Arbor Day Foundation**  
[www.arboday.org](http://www.arboday.org)

**The Nature Conservancy**  
[www.nature.org](http://www.nature.org)

**Project Learning Tree** - [www.plt.org](http://www.plt.org)

**Talk About Trees Lessons & Resources**  
[www.talkabouttrees.org](http://www.talkabouttrees.org)

**The Secret Life of Trees Video**  
<http://urbanext.illinois.edu/trees2/guide.html>

**Tree Curriculum**  
<http://esa21.kennesaw.edu/activities/trees-carbon/trees-carbon.pdf>

**USDA Natural Resources Conser. Service**  
[www.nrcs.usda.gov/feature/backyard/treetpg.html](http://www.nrcs.usda.gov/feature/backyard/treetpg.html)

**USDA Forest Service**  
[www.fs.fed.us](http://www.fs.fed.us)

**World Forestry Center**  
<http://wfi.worldforestry.org>

*Information for this Teacher's Resource  
was taken from the references listed above.*

## Trees Are Our Treasures

Trees are a vital and nurturing life force. They give us the air that we breathe along with food, shelter and medicine. They protect us from harsh environments moderating the effects of sun, wind and rain. They also clean and filter the air, water and soil. Trees provide habitat for wildlife and aesthetic beauty. They also utilize the byproducts of human consumption, such as carbon, nitrogen, phosphorus and potassium.

### Air

Trees and plants provide us with **the air that we breathe**. During photosynthesis leaves take in carbon dioxide to make food, releasing oxygen to the atmosphere. In this process they also **absorb other gaseous pollutants** such as ozone, carbon monoxide, sulfur dioxide and nitrous oxide. Larger particulates like smoke, dust and ash collect on the leaf surface and are washed to the ground by rain. It's been estimated that trees reduce air particulates by as much as 60 percent.

High levels of CO<sub>2</sub> and other gases in the Earth's atmosphere prohibit the release of heat into space -- a phenomenon known as the "greenhouse effect." Trees are **useful in mitigating some of this carbon accumulation** by absorbing CO<sub>2</sub> from the atmosphere and storing it in their structures.

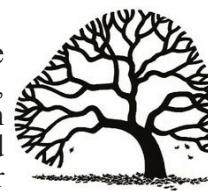
### Water

Trees reduce surface rainwater runoff preventing erosion, flooding and the washing of soil and pollutants into waterways. The tree canopy slows rainfall and **absorbs moisture**. It has been estimated that one large tree can intercept 760 gallons of rainwater in its crown. On the ground, leaves trap more moisture, as well as pollutants, keeping them out of lakes and rivers. In the soil, fallen leaves form a spongy decomposed humus layer that absorbs and holds the water so it can recharge the ground water supply.

Trees planted along streams, lakes, and ponds help control stormwater runoff, reduce flood damage, remove sediment, and increase water quality. They also remove suspended phosphorus, nitrogen and heavy metals from waterways.

### Soil

The roots of the trees **hold the soil**, protecting it from erosion from wind and water. Their leaves fall to the ground and decompose, becoming food for numerous soil organisms, **enriching the soil** with nutrients in the process. A number of trees and plants have been found to be useful in **removal of soil toxins**.



### Shelter

Trees **shade and protect us from direct sunlight** and also **provide additional cooling**. This cooling is accomplished as water that is not needed by the tree is released into the air through the stomata on the leaf epidermis. This water then evaporates from the leaf surface. The change from water to water vapor uses heat energy from the air. A single large tree can release up to 400 gallons of water into the atmosphere each day.

Trees planted around the home have been found to reduce the need for air conditioning by 30 percent. They also **reduce energy costs** in winter by as much as 50 percent by providing a windbreak and shelter from snow. Additionally trees protect us by providing the very **wood used to build our homes and furnishings**. When dead, trees **warm us** either as firewood from recently downed trees or fossil fuels made from ancient plants.



### Food, Medicine & More

Trees are a source of food for humans and all organisms. We utilize their fruits; seeds and nuts; leaves; bark; roots, and sap for nourishment. In addition, all parts of the tree are used for medicines, with new potential cures being discovered every day. We use trees for many other useful products, including paper and books.

### Wildlife Habitat

Trees provide food, shelter and a place for wildlife to raise offspring, increasing biodiversity by **attracting insects, birds and other animals**. Along waterways, trees offer shade and filter the water, providing habitat for the many aquatic species that need clean, cool water.



## Beauty & Comfort

Trees offer aesthetic beauty that improves the look and enjoyment of our landscapes, whether rural or urban. They can be sited to create a background, frame a view, soften architecture or bring natural elements into the city. They may be planted to reduce glare, reflect light, offer privacy, screen eyesores or guide the direction and speed of wind. They can also be utilized as a sound barrier. Urban trees can absorb as much as 50 percent of noise pollution.



## Health & Well Being

The benefits of trees goes well beyond their beauty. People have been found to respond favorably to the presence of trees, feeling more serene and tranquil. Hospital patients have been known to recover from surgery more quickly when offered a view of trees from their hospital room. Research providing visual exposure to settings with trees has also produced significant recovery from stress, with marked changes in blood pressure and muscle tension. Some research shows residents who live near trees have significantly better relations with their neighbors.

## Economic Benefit

The economic benefits of trees can be both direct and indirect. Studies show that trees attract new business and tourism. They report that people linger and shop longer on tree-lined streets and apartments there rent more quickly. Trees also add to property value, raising the appraised value of a home. Landscaping with trees, can increase property values as much as 20 percent.

Trees are also being used to enhance traffic calming measures. They are planted as buffers between vehicle traffic and pedestrians and are also utilized to guide and slow traffic through techniques such as extending curbing or using a row of trees to create an illusion of a narrower street.

## Recreation

Trees offer children countless outdoor activities such as climbing, swinging and playing in a tree house. They also provide a place to just rest and relax. Additional recreation opportunities such as trail walking, hiking, horseback riding, fishing, camping and the watching of birds and other wildlife can be enjoyed outdoors in the woods.

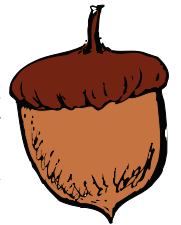
## Literature & History

Stories about trees fill the literature of every country and culture from the earliest times. They can be found in the great novels, poetry, lore, customs, and holiday traditions. They are also important in the history of each region. In many ways the native trees guided the development of cities, agriculture, industry and culture.

### In Massachusetts

The earliest history of Massachusetts centers around the trees and forests. The Native Americans utilized the woodlands for hunting game and gathering nuts and berries, while harvesting wood to cook and keep warm. Early colonists, cleared the forests for pastures, using the wood to heat, cook, and build homes and fences. The largest trees were sent to England as masts for sailing ships.

Today Massachusetts' farms, parks watersheds and private woodlands protect thousands of acres of forests, preserving their scenic beauty, wildlife habitat, and the quality of the air, soil and water. Plant a tree treasure at your home or school this fall and reap the many benefits.



## Fall Is The Time To Plant A Tree

**Late summer or early fall is the optimum time to plant a tree.** This gives the tree a chance to establish new roots before winter arrives and the ground freezes. When spring thaws, the tree will be ready to grow. The second choice for planting is in the spring once the soil temperature has warmed. However, trees properly cared for in the nursery or garden center and given appropriate care during transport to prevent damage, can be planted throughout the growing season.

**Proper handling** during planting is essential to ensure the health of the new tree. Be sure you have had all underground utilities located prior to digging. It is recommended that the planting hole be dug no deeper than the rootball as measured from the trunk flare to the bottom of the ball or container. The hole should be approximately three-to-five times the width of the ball. Try to keep the ball intact when planting.

**Set the tree in the hole** so that the trunk flare is at, or 1 to 2 inches above, the existing grade. Once properly placed, cut away and remove all visible rope, burlap, plastic or wire baskets. Backfill the planting hole with soil dug from the planting hole. Add an organic soil amendment only if the existing soil is of poor quality. To avoid air pockets, tamp the soil down after planting or water the soil halfway through the process and allow it to drain. Smooth the surface soil and check to ensure that the trunk flare is completely exposed. Water the rootball and planting area immediately after backfilling.

Newly planted trees must receive **adequate water weekly** during the entire first growing season, right up until dormancy in the fall. Fertilization is not recommended during the first season, unless there is a nutrient deficiency. Staking is necessary only for trees that are unstable in the soil or where wind conditions merit additional support. Stakes should be removed after one growing season.

**Mulch** to reduce weeds, moderate soil temperature and conserve soil moisture. Organic mulch may be placed in a wide band, approximately 3 times the diameter of the rootball, no more than 2 to 4 inches deep, tapering to, but not touching, the trunk. Prune only broken or damaged branches. Tree wrap is usually unnecessary.

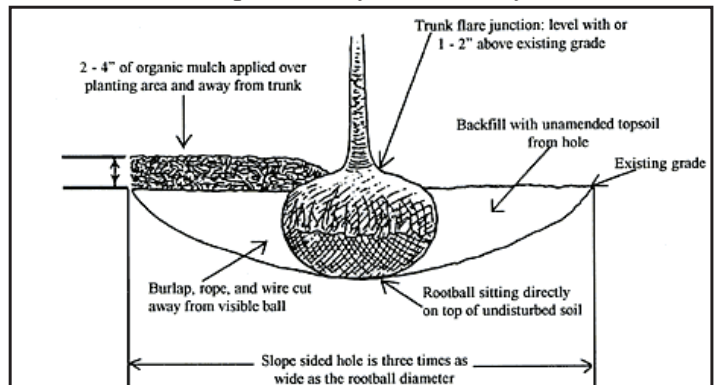


Diagram illustrating proper planting procedure for a tree or shrub.

From UMass Green Info Tree Planting Fact Sheet by Deborah Swanson.



## Spectacular Fall Foliage

Fall foliage color is directly caused by chemical processes that take place in deciduous trees as the season changes from summer to winter. **Four pigments** that are present in the leaves create the mixture of red, purple, orange and yellow that light up our autumns. They are chlorophyll, carotenoid, tannin and anthocyanin. The amount, intensity and duration of fall color is also related to temperature and moisture availability before and during the time chlorophyll is diminishing in the leaves.

The leaf is a food factory using radiant energy from sunlight to transform carbon dioxide and water into sugar through photosynthesis. This process takes place in **chlorophyll** containing cells called chloroplasts. During the growing season, chlorophyll is continually produced and destroyed in the leaf. It appears green because chlorophyll absorbs red and blue waves from the light spectrum reflecting back the green which makes it visible to us.

In the fall, as days shorten and nights become cooler changes occur in the leaves. Nitrogen and phosphorus are slowly withdrawn to be stored in twigs and branches. The loss of these nutrients along with the shorter days with reduced exposure to sunlight, gradually stops the production of chlorophyll and it disappears from the



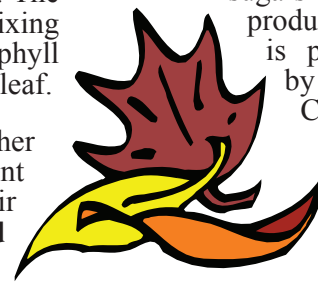
leaves along with the green color. The variation in fall color is due to a mixing of varying amounts of the chlorophyll residue and other pigments in the leaf.

As the green fades away, other pigments that were always present in the leaf are unmasked and their colors begin to show. **Carotenoid** pigments are responsible for the yellow and orange colors of autumn leaves. Carotenoids are also located in the chloroplasts and assist chlorophyll in the capture of sunlight for photosynthesis. **Tannins**, common waste products of cell metabolism, are responsible for the brown hues in oak and other leaves. Some yellow colors, such as that in beeches are caused by a combination of carotenoids and tannins.

Other chemical changes occur in the leaf causing the development of red pigments. Enzymes that promote the breakdown of cells are produced by the shorter days and cool nights, causing an **abscission layer** to form at the base of each leaf stem where it attaches to the tree. As the abscission layer forms, it gradually closes off the veins that carry fluids in and out of the leaf. Once the separation is completed, the connecting tissues are sealed off and the leaf will fall or be blown from the tree.

While the abscission layer is forming, the veins become clogged and trap

sugars in the leaf. The production of these sugars is particularly favored by warm sunny days. Cold nights and the gradual closing of the veins prevent the sugars from moving out of the leaves.



### Anthocyanin

pigments are formed when these sugars combine with complex compounds called anthocyanidins.

The anthocyanins are responsible for the pinks, purples and reds of autumn. They are usually not present in the leaf until they are produced in the autumn. There can be great variety in the pink to purple colors. This is influenced mainly by cell pH producing reds in acid solution and blue-to-purple in increased sap pH.

Autumn leaf color may also be affected by the amount of moisture in the soil, autumn temperature variations, autumn rains or early frost. A late spring or severe summer drought can delay the onset by a few weeks. A warm fall period may lower the intensity of color. Early frost can injure or kill the leaves before the pigments reach their maximum development. Rainy overcast fall days can decrease the intensity of colors by limiting photosynthesis and the sugars available to produce anthocyanin. Warm fall days with cool nights produce the best leaf color.

## Tree Rings

The trunk, branches and twigs are the stems of the tree. They consist of several layers that protect the tree, give it strength and provide transportation for food and water.

The **Outer Bark** is the outside covering. It protects the tree from injury and desiccation caused by insects, disease, animals, weather and fire. Bark may be thick or thin and varies in color and texture. Birch bark is just  $\frac{1}{4}$  inch thick while that of some giant sequoias reach 2 feet in thickness.

The **Inner Bark** (Phloem) is a layer of cells that transports the food that is produced in the leaves during photosynthesis to the rest of the tree where it is used for growth or is stored. The inner bark lies between the outer bark and the cambium layer.

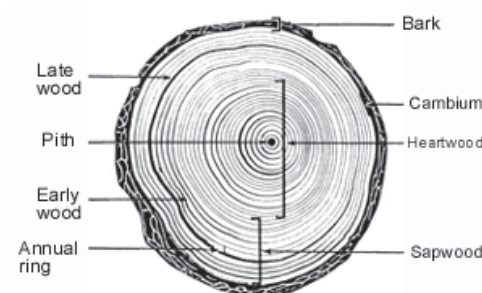
The **Cambium** is a thin layer of living cells that lies between the inner bark (phloem) and the wood (xylem). Here cells divide and grow, producing a new layer of wood each year.

The **Sapwood** (Xylem) is the newly formed wood cells that lie just inside the cambium. These cells transport water and minerals to all parts of the tree. New wood is continuously produced by cambium cells during the growing season.

The **Heartwood** is the dead inactive wood (Xylem) cells at the center of the tree. It gives strength to the tree and helps it stand straight. The **Pith** is the center of the stem. It stores food for the young tree and never grows larger than its first year's growth.

**Tree rings** are caused by annual changes in growing conditions from spring to

fall. **Pale colored rings** indicate the more rapid growth of spring and early summer when larger xylem cells are produced; **darker colored rings** mark the slower, denser cell growth of late summer and fall. Obtain a cross section of a tree. Count the dark rings to tell the age of the tree. Have students identify the bark, phloem, cambium, xylem, heartwood and pith and explain the function of each. Count the rings back from the outside edge to find the year in which students were born.



## Trees Support Wildlife

Trees and shrubs are an important source of food, shelter and nest sites for wildlife. Because animals directly or indirectly depend on plants for their food, the diversity of animals in a particular habitat is very closely linked to the diversity of plants in that habitat.



Green plants form the **first trophic level in the food chain**, capturing the sun's energy through photosynthesis and turning that energy into food. The **second trophic level** comprises all animals that eat plants and pass the energy on to higher levels. Of these herbivores, insects are the most important organisms because of their huge numbers and because they are very good at converting plant tissue into insect tissue, providing food for other species.

In order for insects to survive and be available as food for higher trophic levels, such as birds, amphibians and reptiles, they must have the food and habitat needed for their adult and larval life stages. It's been estimated that as much as 90 percent of insect herbivores have co-evolved with a specific plant or plant genus and require those plants for food and survival. These plants are native to the same habitat as the insect.

By favoring native plants, you can help sustain biodiversity producing more insects and therefore more food for other species of wildlife. This means sharing the garden with the native insects that eat plants. Nature will find a balance and predators and parasites will keep some in check, while many more will become food for baby birds and other wildlife.

Some native trees are particularly good hosts for a diverse number of insect herbivores. Some of the best are the oak, willow, cherry, birch, poplar, crabapple, blueberry, cranberry, maple, boxelder, elm, pine, hickory, hawthorn, alder, spruce, ash, linden, filbert, walnut beech and chestnut.  
*(From Bringing Nature Home by Doug Tallamy)*

Thank you to the Western Massachusetts Trustees of the Eastern States Exposition for funding the development of this Teacher's Resource portion of the MAC newsletter.

Massachusetts Agriculture in the Classroom  
P.O. Box 345 Seekonk, MA 02771  
[www.aginclassroom.org](http://www.aginclassroom.org)

## Carbon Sequestration

During photosynthesis, trees and plants absorb CO<sub>2</sub> converting it to oxygen which is released to the air and a carbon-based sugar that the tree utilizes for energy and growth. Much of this sugar is converted to cellulose and stored in the trunk, branches, leaves and roots. It's estimated that 45 % of the dry mass of a tree is carbon. This storage process is known as **carbon sequestration**.

Trees and plants also release CO<sub>2</sub> to the atmosphere during other physiological processes. When the rate of carbon sequestration is greater than the carbon released over some time, the resulting carbon accumulation is a **carbon sink**.

Carbon sequestration rates vary with tree species, soil type, regional climate, topography and management practice. A healthy tree is estimated to remove as much as 25 to 48 pounds of carbon from the air each year. It also releases enough oxygen to support two people. Carbon accumulation in trees eventually reaches a saturation point, beyond which additional sequestration is no longer possible. This happens when trees reach maturity.

## Taste A Tree

Trees have been harvested and grown as food crops for centuries. These are just some of the ways that we savor trees. How many of these foods can be grown outdoors in Massachusetts?

Trees that produce **edible fruits** include apples, apricots, avocados, cherries, coconuts, dates, lemons, limes, figs, mulberries, nectarines, olives, oranges, peaches, pears, persimmons and plums.

Trees with **edible nuts** include: almonds, Brazil nuts, cashews, chestnuts, filberts, hazelnuts, lychee, pecans and walnuts.

We eat the **bark** of the tropical cinnamon tree. Root beer, birch beer and sarsparella come from the bark and roots of the birch and sassafras trees.

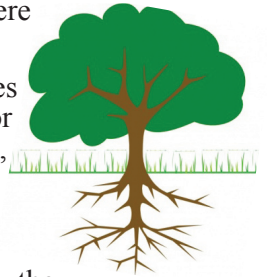
A favorite New England treat is maple syrup which is collected and boiled from the **sap** that rises in the spring from the sugar maple tree.

A number of **fungi** that grow on trees are edible and delicious. "Hen of the Woods" and "Chicken of the Woods" are two such mushrooms.

## It Comes From A Tree

A diverse variety of products that we use in our daily lives come from the trunk, bark, leaves, sap and other parts of trees. Here are just a few:

The **wood** from trees provides lumber for buildings, furniture, floors, firewood crates, boxes and much more.



**Cellulose** is the major component of wood and other plant products. Paper and paper products are derived from cellulose, including books, magazines, cardboard boxes, wrappers and more.

Some trees produce **sap called gums and resins** that are used to make rubber, paint thinner, varnish, soaps, chewing gum and medicines.

Some trees have spongy **bark** that is used for corks, corkboards and the insides of baseballs. Quinine and other medicines are derived from the bark of trees. Tannin, a chemical found in some bark is used to process leather.

## Activity Ideas

1. Plant a tree in your schoolyard. Ask students to research the best tree to match cultural conditions, the school year and wildlife needs.



2. Identify trees in your schoolyard. Bring in leaves and twigs and ask students to use a key to determine genus and species of each. How many different types did you find?

3. Ask each student to write a poem or draw a picture of their favorite tree. Read a poem or story about trees.

4. Research how different trees have adapted to survive and even thrive in harsh climates and difficult conditions such as cold snowy winters, deserts, alpine mountains, seashores and areas that frequently burn.

5. Try out some forestry skills such as how to measure the height, circumference and crown of a tree.

6. Tap a sugar maple tree to make syrup. Visit an orchard and pick apples.

7. Make recycled paper with the students from scrap paper and tissue.



## Fall Educator Conference

MAC will be sponsoring our second annual fall conference for educators on **Saturday, November 6<sup>th</sup>** at the **Clay Science Center** of the **Dexter and Southfield Schools** in Brookline. The school borders Allandale Farm where tours will be offered during the morning.

The theme is **Greening the School** and all of the workshops will focus on composting & healthy soils; gardening at the school; taking the garden into the classroom; nutrition & local foods, and natural resource conservation. Four sessions will be held throughout the day from 8:30 a.m. to 3:30 p.m., with a choice of five concurrent workshops/tours in each session. Workshops will offer how-to ideas, specific lessons, hands-on activities and much more.

**The Clay Center for Science and Technology** is a state-of-the-art astronomical observatory and learning center that features seven research-grade telescopes. It also contains sophisticated computer and science laboratories, a multi-media lecture hall, classrooms, dining, and meeting spaces, and a solar energy roof deck and wind turbine. Tour the school's solar panels, wind turbine and planetarium.

**Allandale Farm** is Boston's last working farm. It is located adjacent to

the Dexter and Southfield Schools in Jamaica Plain and Brookline. The farm follows practices that meet the growing methods of the National Organic Program, although they have chosen not to pursue federal certification. They rotate crops, amend the fields with organic fertilizers and their own compost, and use only approved herbicides and fungicide. The farm offers CSA Shares, a farm market with locally grown and artisan foods, a summer youth camp and a school. Farm tours will be offered in the morning.

The Northeast Region **Whole Foods Markets** made a generous donation to MAC to sponsor some of the costs of our fall conference for educators. We are most grateful for this support. **Lee Kane**, the EcoCzar from Whole Foods will offer a workshop on recycling and will also bring an exhibit where he'll answer questions. Additional exhibitors will also share resources.

Don't miss this day of discussion, interaction and activity ideas that will enhance your classroom. The \$50 fee includes all workshops and tours; workshop materials; breakfast snack; dessert and drinks at lunch; and 10 professional development points with a related classroom activity.

## Annual Winter Conference

MAC will host a full-day conference for teachers at the **Baird Middle School** in **Ludlow** on **Saturday, March 12<sup>th</sup>**, from **9 a.m. to 3 p.m.** This conference will provide teachers with activity ideas, resources and framework connections to bring agriculture alive in the classroom.

Four concurrent workshop sessions will be held throughout the day, with a choice of five-or-six workshops during each session. Workshops will be taught by a teacher or a teacher working together with a farmer and will offer specific background and activities for the elementary, middle or high school level. The \$50 fee (\$45 for registrations received by December 1) includes all workshops, lunch, materials and ten PDPs with a related classroom activity. Check below to request a brochure or visit the MAC website at [www.aginclassroom.org](http://www.aginclassroom.org).

## Summer Graduate Course

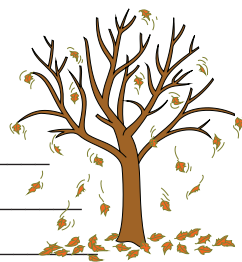
Check out our website for updates and workshop locations for the three-credit **2011 Summer Graduate Course** held in conjunction with **Fitchburg State College**. Participants must attend eight workshops on farms across the state, keep a journal and develop three lesson plans, presenting one to their colleagues at the last session.



## REGISTRATION ... DONATION... MATERIAL ORDER FORM

Please fill out this form and return it to: **MAC, Inc. P. O. Box 345 Seekonk, MA 02771**

Name \_\_\_\_\_  
 School or Organization \_\_\_\_\_ Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Phone Number (day) \_\_\_\_\_ (evening) \_\_\_\_\_ e-mail \_\_\_\_\_



I am registering for the Following Conference (Make Check payable TO MAC)

- ☐ Fall Conference for Educators on November 6, 2010 in Brookline ☐ \$50 enclosed ☐ Please send directions.  
☐ Winter Conference on March 12, 2011 in Ludlow; ☐ \$50 enclosed (\$45 prior to Dec. 1) ☐ Please send directions.

Please send information on: ☐ The Summer Graduate Course; ☐ MAC Annual Report; ☐ Mini-Grant Guidelines

- ☐ Farm Field Trip Manual \$12; ☐ 8 Lessons about Agriculture & Environment \$5; ☐ School Gardening Manual \$10

I'd like to make a tax-deductible donation in the amount of: ☐ \$10; ☐ \$25; ☐ \$50 Other donation \_\_\_\_\_

## Calendar

- 🐾 **Sept. 17 - Oct. 3 - The Big E: Eastern States Exposition**, West Springfield. **Sept. 23 is Massachusetts Day**, visit [www.thebige.com](http://www.thebige.com).
- 🐾 **Sept. 27 - Oct. 1 - Mass. Harvest for Students Week**. Contact 413-253-3844 or [massfarmtoschool@gmail.com](mailto:massfarmtoschool@gmail.com).
- 🐾 **October 1 - 11 - Topsfield Fair** from 10 a.m. to 10 p.m. daily. For information visit [www.topsfieldfair.org](http://www.topsfieldfair.org).
- 🐾 **October 2 - Boston Local Foods Festival**, Boston Waterfront 10-5, visit [www.bostonlocalfoodfestival.com](http://www.bostonlocalfoodfestival.com).
- 🐾 **October 9 - 10, Cranberry Harvest Festival**, at A.D. Makepeace in Wareham, 10 a.m. to 4 p.m. \$2. Visit [www.cranberries.org](http://www.cranberries.org).
- 🐾 **October 22-24, Bioneers by the Bay Connecting for Change Conference**, in New Bedford. For information visit: [www.connectingforchange.org](http://www.connectingforchange.org).
- 🐾 **December 2 -3, Mass. Farm Bureau Annual Meeting** in Springfield. For information, visit [www.mfbf.net](http://www.mfbf.net).
- 🐾 **December 9 - New Entry Sustainable Farmer to Farmer Conference** in Sturbridge, visit [www.nesfp.org](http://www.nesfp.org).

## Resources

- 🐾 **AG Census Lesson Plans** for Grades K-12 from the USDA & FFA at [www.nass.usda.gov/Education\\_and\\_Outreach/Lesson\\_Plans](http://www.nass.usda.gov/Education_and_Outreach/Lesson_Plans).
- 🐾 **New England Apple Association** news and information can be found at [www.newenglandapples.org](http://www.newenglandapples.org).
- 🐾 **Turkey** facts, recipes and more, visit [www.eatturkey.com](http://www.eatturkey.com).
- 🐾 **Cabot Cheese** recipes and teacher resources, [www.cabotcheese.coop](http://www.cabotcheese.coop).
- 🐾 **Cranberry Facts, Resources and Curriculum** from the Cape Cod Cranberry Growers Association at [www.cranberries.org](http://www.cranberries.org).
- 🐾 **New Food Safety Information and Education Materials** can be found at [www.mass.gov/dph/epi](http://www.mass.gov/dph/epi).
- 🐾 **Pollinator Garden Grants** are available from Project Learning Tree's Greenworks Program, the deadline is Dec. 1 at [www.plt.org](http://www.plt.org).
- 🐾 **Resources for Every Season** CD with agricultural fact sheets, units and lesson plans, teacher supplements and more can be requested from California AITC at [www.learnaboutag.org](http://www.learnaboutag.org).

🐾 MAC is seeking nominations for the **2011 MAC Teacher of the Year Award**. Do you know a teacher who does an exceptional job of bringing agriculture alive for students in the classroom? Consider nominating them for this special award. Send a description of their agricultural classroom, and the reason that you recommend them for the award, to the address below. Applications are due March 15, 2011. The winner will be highlighted in the Fall 2011 MAC newsletter and the award will be presented at our Annual MAC Conference the following March.

To receive more information, add a name to our mailing list or give us your comments:

**Mass. Agriculture  
in the Classroom**  
P.O. Box 345  
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