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From the Editors

by Marilyn Odneal

This spring we go back to the basics of soils and water. We also look at both the good (strawberries, asparagus and state fruits) and the bad (collar rot, red necked cane borer and flower failures). Keep in mind that you can subscribe or unsubscribe to the electronic version of the Berry Basket at <http://mtngrv.missouristate.edu/newslet.htm> or request a paper copy from Pamela Mayer at the address below.

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Soil - The Basis of Life (The Physical Factors)

By Ben Fuqua

Professor, Soil Science

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Soils form the base of the biotic pyramid. Most plant and animal (including human) life depend on soils for their existence. The physical and chemical properties of soils control to a large extent the amount and type of plant growth and the capacity of the soil to support animal and human populations. For plants, the soil represents a medium for plant root growth and a supply of essential plant nutrients. Soils provide a place for plants roots to anchor, support upright plant parts, insulate roots from drastic changes in soil moisture and temperatures, and are storage areas for water, air, and plant nutrients.

Many physical characteristics of soils are revealed by an examination of the soil profile. The soil profile, a vertical section of soil extending from the surface into the parent material, is composed of layers (roughly parallel to the soil surface) known as soil horizons. Individual soil horizons differ in properties and characteristics from adjacent horizons below and above. For small fruit crops (blueberries, strawberries, brambles), the horizons in the top 12-15 inches are the most crucial, although horizons at deeper depths are also important, especially those that affect drainage. Since many crop management decisions, such as site selection, crop selection, etc., are made on

the basis of the physical features of soils, the proper evaluation of soil profile characteristics is an important key to producing high yields of quality fruit.

Soil texture: The textural class of a soil is determined by the relative amounts of sand-, silt-, and clay-sized particles (particles less than 2 mm in diameter). Gravels, rocks, boulders, and other large particles that often influence the use of a particular soil are not considered in the textural classification. Since soil texture does not readily change in the field, fruit growers should consider the textural classification as a major factor when choosing a suitable planting site. The best soils for production of small fruit crops are those that have good drainage, moderate water-holding and good nutrient-supplying capacities. Soil textural classes such as sandy loam, silt loam, loam, and sandy clay loam identify soils that have these favorable characteristics.

Soil structure: Soil structure refers to the combination of primary soil particles into clusters called soil aggregates or peds. The soil structure is identified by aggregate strength (e.g., weak, moderate, strong), size (e.g., very fine, fine, medium), and shape (e.g., granular, subangular blocky, blocky). The arrangement of soil aggregates in relation to pore space (voids between aggregates) greatly influences water movement, heat transfer, aeration, and plant root growth. Although soil structure is the result of several biological and biochemical processes, growers can improve (and destroy) the soil structure by management practices. One of the best ways to improve soil structure is to incorporate organic matter into the planting site. As the organic matter decomposes (mineralized by microbes), soil aggregate formation increases and aggregate stability is improved. Mulching the plant rows will also help improve soil structure while simultaneously improving water/air conditions around plant roots. On the other hand, soil structure can be destroyed by tilling or cultivating when soils are too wet, resulting in hard “cloddy” soils with unsuitable conditions for plant roots.

Bulk density and pore space: Soil bulk density and % pore space are greatly influenced by both soil texture and structure. Bulk density reflects the denseness or compactness of soils and is inversely related to % soil porosity, i.e., high soil bulk densities results in low % pore space. High soil bulk densities in the surface horizons are often caused by human activities such as compaction from traffic (cars, trucks, tractors, etc), animal (and human) paths, and from tilling or plowing the same depth year after year (plow pans). Other horizons with high bulk densities, such as fragipans and clay pans formed by natural processes during soil development, may be found in deeper subsurface horizons. Regardless of the depth of the compacted area, high soil bulk densities reduces the amount of pore space and therefore interferes with water/ air movement and plant root growth. Deep plowing or tilling has proven effective in breaking up many high bulk density, compacted areas, especially those found in the upper 15 inches of soil. On the other hand, fragipans and clay pans are more difficult, if not impossible, to alter by normal cultivation practices, but still must be considered as a major factor in growing plans since they affect water and air movement (and sometimes root growth) and drainage. Another excellent way to reduce the bulk density and increase the % pore space of surface horizons is by incorporating organic matter. The organic matter lowers the weight per unit volume of soil, thereby reducing the bulk density and increasing % pore space. (Adding organic matter provides multiple benefits for the growth of plants; improves aggregate stability, increases pore space, improves water/air relationships, supplies many nutrients, etc.). An “ideal” soil for growing small fruit crops should have approximately 50 – 60% pore space with a corresponding bulk density of 1.1 to 1.3 g/cm³.

Color: The color of soils has little impact on plant growth or production, but provides valuable clues to other soil conditions. Organic matter contents are normally higher in the upper soil horizons and therefore the surface horizons will be darker in color. As the organic

matter content decreases at deeper depths, other colors associated with parent materials and clays become more apparent. Soil color is most useful to small fruit growers as an indicator of soil drainage conditions. Bright red or brown colors, implying that air and water move with ease in these horizons, are typically found in well-drained soils. The presence of gray, blue-gray, and gray-green (gley) colors are indicators of drainage problems due to excessive amounts of water in the soil profile. Subsurface horizons in poorly-drained and very poorly-drained soils are often uniformly gray in color. In other soils, the gray colors may only appear as spots or splotches (mottles). Mottles also indicate some problem(s) with drainage; the more mottles and the closer they are to the soil surface, the greater the problem...

Summary: Physical and chemical properties of soils both play major roles in the production of small fruit crops. Small fruit crops require soils with good physical properties. While some physical limitations for growing small fruit crops can be overcome by slight modifications of the soil, others (at least not economically) cannot. Identifying these limiting factors is important and can often be “seen” by examining the soil profile. While soil survey reports (available from NRCS and local Soil and Water Conservation Districts) are useful starting points for identifying the best soils for small fruit production, an on-site evaluation by a horticultural or fruit grower specialist gives valuable insights in “fine tuning” the process. After all, growing fruit crops on the best available soil is often the difference between black and red ink at the end of the harvest season.

Coming Event

Compost and Green Manure Workshop

Thursday, May 11, 2006; 8:30 am to 4:00pm

State Fruit Experiment Station

Missouri State University-Mountain Grove.

A workshop designed for home gardeners, farmers, professional groundskeepers, institutional managers and educators.

<http://mtngrv.missouristate.edu/news/>

Collar Rot – Hidden Tree Fruit Menace

By Patrick Byers

Fruit Grower Advisor

Missouri State University

The 2005 growing season was interesting for tree fruit growers, to say the least. As we plan ahead to the 2006 growing season, I thought it might be interesting to discuss a problem that was reported from several orchards in 2005, the disease collar rot.

Collar rot, sometimes called phytophthora root and crown rot, is a common and destructive disease of fruit trees, including peach, apple, and cherry. According to reports, plum and pear are relatively resistant. Above ground symptoms include reduced tree growth and vigor, yellowing or chlorosis of leaves, and eventual collapse and death of the tree (Figure 1, photo courtesy of Tim Baker). Decline may be gradual, over several years' time. Collapse and death can also be sudden, often following excessively wet periods. Also noted is the sudden collapse of trees following apparently healthy growth in the spring. Symptoms below the ground on the trunk and crown of the tree are characteristic – a reddish brown discoloration of the inner bark and wood, with a sharp line of demarcation between healthy and



Figure 1. Peach tree showing decline resulting from collar rot.

diseased tissue. Similar symptoms may appear on the roots. Visual symptoms are often used to diagnose collar rot; however, an ELISA-based laboratory test is available to confirm the presence of *Phytophthora* in a tissue sample.

Collar rot can be confused with other tree fruit disorders, but a close examination of symptoms and circumstances can often eliminate other problems that resemble collar rot. "Wet feet", or damage to crowns and root systems caused by excess soil moisture, usually results in blackened tissue with no clear line of demarcation and an unpleasant smell. Discoloration from cold or winter injury is usually above ground, while the below ground portion of the tree appears normal. Winter-injured trees often sucker profusely from the root system.

Collar rot is caused by several species of *Phytophthora*, including *P. cactorum* (common on apple) and *P. ambivora* and others (found on stone fruits). All are soilborn, and are common inhabitants of many orchard soils. These fungi may also be introduced to sites on contaminated planting stock or through the movements of contaminated soil or water. All species require extremely wet or saturated soils in order to infect and cause injury; thus collar rot is commonly found in poorly drained areas of the orchard.

The *Phytophthora* species that cause collar rot have fascinating life cycles. These fungi overwinter and persist in the soil as mycelium in infected tissue or as thick walled spores, called oospores, which can remain viable for years. When soil conditions are favorable (wet), oospores germinate and form mycelia. Mycelia from germinated oospores or from infected tissue form reproductive structures called sporangia. These sporangia produce motile infective spores called zoospores. The zoospores are released from the sporangia when the soil is completely saturated with water, and they use flagella to swim to susceptible plant tissue, which they infect. The zoospores may also swim to the surface and travel long distances in runoff water.

Control of collar rot is most successful using a combination of cultural practices, choosing the proper fruit species and rootstock, and chemical control if needed. Avoid planting sites that are poorly drained or prone to flooding. Modify marginal sites to provide additional drainage, and consider planting on raised ridges or berms.

Pears are the most resistant tree fruit to crown rot. Apple rootstocks are commonly ranked in the following order: resistant: seedling; relative resistant: M-9, M-2, M-4, Ottawa-3; moderately susceptible: M-7, MM-11; susceptible: M-26, MM-106; highly susceptible: MM-104. Among the stone fruits, plums are relatively resistant, while others are susceptible to very susceptible.

Fungicides are available that are most effectively used to prevent the disease. These materials, however, are often not effective in reviving infected trees. At present (2006) three materials are labeled for use on tree fruits. Mefenoxam (brand name Ridomil Gold) is applied in early spring and fall, as a soil application. Fosetyl-Al (brand name Aliette) is applied as a foliar spray, to non-bearing trees only. Phosphorous acid (brand name Phostrol, Prophyt, Fosphite, others) is applied as a foliar spray in the spring and at 60 day intervals. Remember to consult the label before purchasing or applying any pesticide.

April Showers

By Marilyn Odneal
Horticulture Outreach Advisor
Missouri State University

April Showers

. . . Bring May flowers. At least that is the way it is supposed to go. Spring is the time we get ready to supply supplemental irrigation to our plantings. It is also time to put new plantings in and water supply is an important consideration here as well. We will go over some things to consider concerning water, just

keep in mind that June, July and August aren't the only months we need to worry about.

Rainfall amount and distribution.

The seasonal rainfall amount and distribution is one consideration. John Avery, who collects the Mountain Grove weather data for the National Weather Service, says we average 45-46 inches of precipitation annually (1971 - 2000 data). Most small fruit crops, for example, need about 25 inches of rain to grow. It sounds like we get more than enough for those crops, but not necessarily so. The distribution of the rain is another matter. We received only 39 inches last year and experienced a midsummer dry spell. Dry periods can be detrimental to plants in the growing season and can be tricky when they occur in spring or fall when we aren't worrying about water as much as in the summer when plants are in full canopy and are using the most.

In fact we suspect that low winter precipitation this year (a 5 inch deficit November through February at Mountain Grove) may have contributed to the fact that our Dianthus 'Bath's Pink', which has green leaves in the dormant season, winter burned this mild year but did not show any burn last year at this time. Fluctuating temperature could also have caused the problem. Whatever the reason, we often don't think of water deficit in fall, winter or spring.

Symptoms of drought or dry weather may not be apparent, but the effects of stress from drought may be seen later on. We are always cautioned not to fertilize or over-water plants going in to fall because you will promote new growth and the plant will not adequately harden for winter. That doesn't mean no water is needed! Dr. Ben Fuqua noted the effect of a fall drought on blueberries in a former Berry Basket article when he observed that Missouri blueberry growers who judiciously watered their plants into November had a good crop the following year, whereas those who did not had lower yields. It was a dry fall and the plants that were not watered and encountered stress during the critical period when they were initiating fruit buds for the next year's crop.

Soil texture and depth. The water holding capacity of your soil is another consideration. Sandy soils do not hold as much water as heavier clay soils, therefore sandy soils need to be irrigated more frequently.

Many small fruit crops are shallow rooted, like highbush blueberries, strawberries and raspberries. Even the more deeply rooted crops like grapes and apples are rather shallow rooted when first planted. And remember, no matter how deeply rooted the plant may be, it can only go so far in shallow topsoil which is characteristic of some Ozark soils. On heavy or shallow soils, it is often necessary to create ridges, berms or raised beds to plant in so that water drainage is improved and the plants are not standing in water when you get too much rain.

Surface and internal drainage. We are always advised to plant fruit crops on a well-drained soil, but what exactly is a well drained soil? I remember when I had just started working at the experiment station, I heard we had a "fragipan" which was described as a dense layer under about 15 inches of topsoil. The first highbush blueberry planting I worked with was already planted on a slope so I figured it must have good drainage. The heavily mulched blueberries, however, started dying one by one. The cause was a disease known as *Phytophthora* root rot, a fungus that thrives in poorly drained conditions. Digging up some of the dead plants, gray mottles in the heavy, wet clay soil were apparent. I realized that these were the gray mottles I learned about in Soil Science indicating poor water drainage in the soil profile. Well, the surface water drainage was fine as there was never any standing water in the planting. It flowed down the hill. It was the internal water drainage that was poor. The water stayed around the roots and didn't percolate down through the profile since it was blocked by the fragipan; it didn't soak through.

Mulch and organic matter. Applying mulch materials will help the soil retain moisture, will usually help the rain or water soak into the soil since mulch will keep the soil surface from crusting over. Be careful not to

apply too much mulch particularly on a flat bed or row on a heavy soil since you may retain too much moisture. Adding compost and organic matter to the soil and tilling it in will improve the water holding capacity of lighter soils and will provide more air space in heavier soils.

Plant age and size. Even though young plants do not require as much water in gallons during the growing season as a large, mature plant, they are more sensitive to drought since their root systems are small and not occupying a large soil volume.

Seasonal water requirements of fruit crops. Plants use less water early in the season when the leaves have not fully expanded and use more when they are in full canopy and fruit is sizing. After harvest going in to the fall, the need for water is not as great. Mature plants in full canopy will require the largest volume of water.

Critical stages. Water stress is more damaging at some stages of plant development than others. Grapes, for examples, are most sensitive to water stress at the period from bloom to 4 - 6 weeks later when the cells in the grape berries are dividing. Later on in development, moderate water stress will improve wine quality. The volume of water needed early in the season is not as great as later on, but if the vines do not get the necessary water at bloom and the 4 - 6 weeks afterward, the crop suffers.

Watering plants effectively depends on many factors. Understanding both your site and the plants you care for will help you plan your irrigation strategy that will insure a good crop both this season and the next year. For more technical information on irrigating crops, see <http://extension.missouri.edu/webster/irrigation/>

Coming Event

Alternative Fruit Crops Field Day

Thursday, August 3, 2006; 9:00am-12:00pm

State Fruit Experiment Station

Missouri State University-Mountain Grove

<http://mtngrv.missouristate.edu/news/>

Update on Red Neck Cane Borer

By Patrick Byers

Fruit Grower Advisor

Missouri State University

At the 2006 Midwest Fruit Growers Meeting I had the opportunity to hear an interesting presentation from Dr. Donn Johnson, research entomologist from the University of Arkansas, on management of red necked cane borer. Damage from this pest can be devastating, resulting in the loss of canes, reduced yields, and overall reduction in profitability of a planting. In my contacts with Missouri's blackberry industry, growers report that damage from this pest appears to be on the increase, with economically significant damage noted even in newly established plantings.

The red necked cane borer, *Agrilus ruficollis*, is a small wood boring beetle that can become a serious pest of blackberry and raspberry. Adults are ¼ inch long, black, with a metallic coppery-red thorax (hence the name "red necked"). The red necked cane borer overwinters in canes as larvae, which pupate in late spring. By late April to early June the adults emerge from the canes, and feed on young primocane foliage. Mating takes place, and eggs are laid on the primocanes. Eggs hatch from 4 to 24 days later, the larvae climb down the canes, and then bore into the primocane (usually within 12 inches of the soil). The larvae are white, flattened, legless, and about ¾ inch long when mature. The larvae tunnel in the cane in a spiral fashion, and often tunnel into the pith (Figure 1, photo courtesy of Stacy Hamblton). Infested primocanes develop thickenings or galls in the feeding area (Figure 2, photo courtesy of Stacy Hamblton). The larvae overwinter in the canes, pupate, and emerge as adults the following spring.

Growers should determine the presence and extent of damage from red necked cane



Figure 1. Interior of blackberry cane, showing red necked cane borer feeding injury.

borer each spring. Galled canes are easy to identify during dormant season pruning. Prune out and destroy galled canes; infested canes usually winter kill, or collapse and die once growth begins the following spring. Destruction of galled canes also destroys the overwintering larvae. Destroy adjacent sources of infestation, such as wild blackberries. Several biological controls are reported for red neck cane borer, including parasitic wasps and fungal diseases.

Additional control measures are warranted if more than 10% of canes are infested. Scout the growing primocanes in April and May to note the presence of adults. Early morning is a good time to scout for the adults on the upper foliage of

the primocanes, and watch for the characteristic feeding damage on the newly expanded leaves. The usual control recommendation is two applications of a labeled insecticide, 7 to 12 days apart, timed to coincide with adult emergence. At present the only insecticide that I am aware of that is labeled for red necked cane borer control is the Pyrellin. In the past Marlate was labeled for control of red necked cane borer; older packages of this insecticide may still list brambles. Red necked cane borer insecticide applications may coincide with bramble blossoming; use precautions to avoid injuring bees. Also, the later applications may coincide with bramble harvest; observe pre harvest intervals and reentry periods as listed on the pesticide label.



Figure 2. Blackberry cane gall resulting from red necked cane borer feeding.

Consider Asparagus for Home or Market Gardens

Gaylord Moore

*Regional Horticulture Specialist
University of Missouri*

Asparagus! As a kid I knew little about asparagus except it was slick, slimy, and came in a can. Mom never fixed it for a meal because I expect she knew the results. Nobody in the family would eat it. Eventually it would be thrown to the cats and dogs and they probably would not eat it either.

Things have changed. The taste buds are not quite the same as when I was a kid plus I now realize what I was missing over the years.....asparagus. Even today I am not a big fan of asparagus from the can but fresh from the garden there is nothing quite so good.

Nutritionally speaking, asparagus is low in calories plus has significant amounts of vitamin A and vitamin C.

I celebrate the true beginning of the vegetable gardening season with the first harvest of a good mess of asparagus. How you prepare it for supper is up to you. You have so many choices with various cheese sauces to a little lemon salt, pepper and a touch of butter. I prefer preparing in the microwave and not over cooking. I like a crunchy texture but that is an individual preference.

By following some basic guidelines and garden preparation, I have found asparagus to be a very easy crop to establish and maintain in the home garden. Once established this perennial can be productive for the next 10-15 years.

Since asparagus is a perennial crop good thought where to plant should be carefully considered and a major decision in the planting process. Asparagus will not tolerate wet or soggy soils so choose a well-drained field or use raised beds to promote drainage.

Be sure and check the soil fertility. Ample levels of potassium, phosphorus and nitrogen should be plowed or tilled in prior to

planting. Soil pH should be between 6.5 and 7.0. If in doubt of soil fertility, get a soil test. Additional organic matter will also be helpful.

Several good varieties are available today. In my opinion, the old stand by varieties such as Mary Washington or Martha Washington are a thing of the past replaced by some of the more vigorous and productive varieties. These all male varieties include Jersey Giant, Jersey Knight and Jersey Supreme and are great for the home garden.

For convenience one year old crowns are suggested for planting. Asparagus can be harvested for a limited time (two weeks) the second year after planting crowns. Three years after planting the crowns, asparagus can be harvested for five to eight weeks.

After harvest asparagus should be fertilized with about 1.2 lb/1000 sq. ft. of nitrogen to stimulate summer and fall fern growth. Herbicides can be applied after harvests to control any weed growth. Ferns may be cut back in early winter once they are desiccated and brown. Cutting the ferns back too early can reduce the crop the following spring.

Asparagus is a great choice for market gardens. It is perennial, easy to manage, great producer and high in demand. Average yields for most commercial plantings in Missouri are 2000-2,500 lb/acre.

Expect to harvest every one to three days as temperatures increase. Asparagus has a short shelf life and should be immersed in cold water after harvest and immediately refrigerated to maintain quality. Asparagus can be sold as ½ to 1 pound bunches. Normal spring harvest extends approximately from April 14 to May 30 in southern Missouri.

University of Missouri Extension guide 6405 "Growing Asparagus in Missouri" is a great educational resource for planning and establishing an asparagus planting and is available through your local Extension offices or on line at <http://extension.missouri.edu>

Why Plants Fail to Flower

By Jennifer Schutter

Regional Horticulture Specialist

University of Missouri

Plants that don't bloom when expected can be a big disappointment for gardeners. We wait all winter for the burst of spring color our bulb flowers and shrubs give us, and then often they fail to flower. This is a question I often receive many times throughout the year. Maybe it's a lilac that won't bloom, or peonies, tulips or even houseplants.

The answer to the problem is usually related to one of six causes: the age of the plant, temperature, light, nutrition or pruning practices.

Many plants must reach a certain age before they are mature enough to produce flowers. Fruit trees, such as apples and pears, may require as long as five or six years before they produce fruit. Ginkgo trees can take up to 15 years to before flowering. If young plants are in a stressful environment, flowering may be delayed even further. Plants which have been budded or grafted may have delayed flowering or early flowering depending on the type of rootstock onto which the plant was grafted. Rootstocks which restrict growth (such as those used on dwarf trees), typically produce plants which flower at a younger age than plants on rootstocks which do not limit growth. Plants that are old enough to flower, or have done so in the past, may quit doing so for a variety of reasons. Flowering may be sparse or completely absent when a plant is under stress, so be sure the plant is positioned in an appropriate location for that particular species. For example, some plants flower best in full sun; others may prefer the cooler conditions found in the shade. Some plants, such as peonies, will flower sparsely or not at all when grown in shade. Similarly, shade-loving plants, such as begonias, will not bloom well in full sun.

Temperature can have an effect on a plant's flower buds. Cold weather may kill the buds or partially opened flowers. Plants that are not fully hardy in your area are the most susceptible to this type of cold injury. During times of hot, dry weather or drought, flowers or flower buds dry up and drop off when there is temporary lack of moisture in the plants.

Pruning plants at the wrong time of the year can also be a reason plants fail to bloom. If the flower buds are removed during the wrong season, plants may fail to bloom because there are no flower buds present. For example, spring flowering plants, such as lilacs, azaleas, and forsythias begin setting next year's flower buds in the late spring. Pruning these plants in the summer or fall may prevent flowering next year. The best time to prune spring flowering shrubs is immediately after they are finished flowering. Also, cutting back a plant severely, such as with climbing roses, can remove all the flowering wood, thus preventing it from flowering.

Nutrient imbalances such as too much nitrogen can cause plants to produce primarily leaves and stems. The plant will be large and usually very green and healthy but will have few or no flowers.

Some plants such as fruit trees require a cold period. Various apple cultivars and peaches require exposure to certain periods of low temperatures, or flowering will not occur. This is also true for most spring flowering bulbs.

A plant may fail to fruit because of all the reasons I've listed for failure to flower. If there are no flowers, there will be no fruits. Then again, a plant may flower but fail to have fruits. One of the most common explanations is improper pollination. Some plants cannot pollinate themselves. They require a plant of the same species but of a different variety for cross-pollination. Two trees of the same variety will not pollinate each other. They must be different varieties.

Lack of pollination can occur if cold, rainy weather occurs when a plant is in full bloom. These weather conditions will keep bees from working, thus reducing or preventing

pollination and fruit-set. A frost while a plant is in flower also will kill the flowers and prevent fruit-set. Some plants are “dioecious.” This means all the flowers on a plant are either male or female. Both a male and a female plant must be present, and cross-pollination must occur for the female to produce fruit. Examples of dioecious plants are holly and bittersweet.

Spring Strawberry Checklist

Jay Chism

*Regional Horticulture Specialist
University of Missouri*

Spring is a time of excitement and anticipated harvest for Southwest Missouri strawberry growers. As with any crop many necessary chores will need to be considered before the “pickin’” begins. The spring workload really depends on the type of planting system growers are using.

In traditional matted row or ribbon row systems, the most critical chore that needs to be done (around mid March) is to remove the straw from plantings that was used for winter protection. The straw should be raked off the strawberry row into the walk isles. The straw mulch is an important component that helps keep the fruit clean prior to harvest. If needed, be sure and add additional weed free mulch to improve field conditions prior to harvest.

After the mulch has been removed, strawberry growers need to start thinking about weed control in their plantings. Weed control is a necessary requirement for strawberry production and growers must invest a great deal of time to achieve good weed control. The straw mulch will help suppress some weed development, but in most commercial plantings, chemical weed control will be necessary. Ideally, weed control should have started the year prior to planting. However, even with the best pre-plant cultural practices, spring preemergent herbicides will be necessary.

Herbicides labeled for strawberry plantings include Dacthal W-75, applied at a rate of 8-12 lbs per acre and Devrinol 50 WP, applied at 4-8 lbs per acre. Devrinol will also need to be watered in within 2-3 days of application. Both of these herbicides work well on annual grasses like crabgrass and foxtail.

If growers are using the annual plasticulture system of strawberry production, then straw and preemergent herbicides may not be necessary. Plasticulture strawberries are planted as plugs in late September or early October. The strawberry plugs are planted into black plastic mulch, usually in a double row. Later in the growing season, the plants bedded in the black plastic are covered with a row cover. Row covers are spun bonded fabric that do not produce extremely high air temperatures during the daytime and are effective at retaining heat for frost protection during the night. Plasticulture strawberry growers typically remove the row covers in late February or early March to help slow the blooming time of the plantings and to allow for pollination. The row covers will have to be moved back to the field if the blooms are threatened by late frost. Traditional strawberry growers can also use row covers for frost protection if necessary.

Fertility is an issue that plasticulture producers need to monitor early in the growing season. Phosphorous and potassium should be added prior to planting and is applied according to soil test. Nitrogen may need to be added as fruit begins to develop. Leaf samples will need to be collected every 10-14 days through the last week of harvest. When taking a leaf sample try to collect the samples in the morning to receive a more accurate reading. Each sample should consist of around 50 leaves with the petioles attached. The leaves should be the youngest fully developed leaves and randomly selected throughout the field. Send the samples to the University of Missouri Soil and Plant Testing Lab. The MU Lab will send back a recommendation, indicating if the nutrients levels in the leaf samples are adequate for optimum crop production.

Plant and fruit diseases are major concern for strawberry producers, no matter which type of growing system is being used. Protective fungicides should be applied beginning at or before bloom and continue through harvest. Growers should consult the Midwest Small Fruit and Pest Management Handbook for the latest pesticide information on strawberries.

Hopefully, by staying on top of a few spring chores, strawberry growers will enjoy a good “pickin’” season. If you have questions about strawberry production, contact the Missouri State University Fruit Experiment Station in Mtn. Grove or the local MU Extension Specialist in your area.

State Fruits

By Suzi Tegtmeyer
Head Librarian, Paul Evans Library
Missouri State University

Recently I was paging through an issue of *Bramble* and came across an article about bramble fruits being established as state symbols. I know that in 2003 Missouri adopted the Norton/Cynthiana Grape (*Vitis aestivalis*) as its official grape. This got me thinking – how many states actually have a fruit as a state symbol? Also, are any of their state flowers ‘fruit blossoms’ or trees ‘fruit trees’? The article (“Brambles as State Fruit?” *Bramble* vol. 21, no. 2, Summer 2005, p.7) recommended a Web site (www.netstate.com) that listed all of the state symbols and discovered that more than half of the states (26) actually have official state fruits! Nine states have tree fruits, two states have citrus, nine have berries, and two have grapes.

Apple: New York, Rhode Island (specifically Rhode Island Greening), Vermont, Washington, and West Virginia (specifically Golden Delicious).

Pear: Oregon.

Cherry: Utah.

Peach: Georgia and South Carolina.

Blueberry: Maine (Wild Blueberry, *Vaccinium angustifolium*, Aiton), New Jersey (specifically High Bush Blueberry, *Vaccinium corymbosum*), and North Carolina.

Cranberry: Massachusetts and Wisconsin.

Blackberry: Alabama and Kentucky.

Huckleberry: Idaho

Strawberry: Louisiana, North Carolina, and Oklahoma.

Grape: Missouri (Norton/Cynthiana Grape, *Vitis aestivalis*) and North Carolina (Scuppernong Grape).

Orange: Florida

Grapefruit: Texas (Texas Red).

Tomato: Arkansas (South Arkansas Vine Ripe Pink Tomato) and Tennessee.

If you noticed, North Carolina has three: an official fruit (Scuppernong grape), an official BLUE fruit (Blueberry), and an official RED fruit (Strawberry)! Arkansas’s South Arkansas Vine Ripe Pink Tomato is both the state fruit and the state vegetable.

As for state flowers, Arkansas and Michigan chose the apple blossom, Delaware chose the peach blossom, and Florida chose the orange blossom.

No state has a fruit tree as an official State Tree. However, two of them are nut trees: Texas has Pecan and New Mexico has the Pinyon Pine (*Pinus edulis*).

I believe that since fruits are such an essential part of a person’s daily diet that we need to actively encourage the residents of the 24 states that do not have a State Fruit to write their congress people and establish one (or two or three....) immediately!! Okay, perhaps after spring planting... The point is, be proud of your state if it has adopted a fruit because it shows your state has a commitment to the local industry and the good health of its citizenry.

To continue on this “trend”, in my next article I’ll examine the botanical representations on the new state quarters. Stay tuned!

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