



# The Berry Basket

Newsletter for Missouri Small Fruit and Vegetable Growers

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## Newer Cultivars Deserve a Look

*By Ben Fuqua*

*Professor, Soil Science, SMSU*

Choosing the right cultivar (variety) is an important step when establishing or expanding a blueberry planting. Much of the success of a blueberry enterprise hinges on which cultivars are selected. Several cultivar releases by the USDA and other university plant breeding programs show potential for use in Missouri. However, these cultivars need to be properly evaluated for plant growth and yield performance under Missouri soil and climatic conditions. Information on overall growth, yield, berry size, taste, disease resistance, date of ripening, soil/climatic adaptability, etc. is invaluable. Field trials and advice from horticultural/fruit specialists, nurseries and other blueberry growers are valuable resources that can often save both time and money when selecting blueberry cultivars to grow.

Since 1975, several cultivar evaluations have been conducted at the Darr Agricultural Center in Springfield and the Fruit Experiment Station in Mountain Grove. Dr. Martin Kaps and Mr. Patrick Byers presented results from the most recent evaluation at the 2005 Small Fruit and Vegetable Conference\*. This trial was planted in 1998 at Mountain Grove and consisted of fourteen cultivars of three maturity groups. These included early season Collins, Duke, Nui; mid-season Bluecrop, Brigitta Blue, Legacy, Ozarkblue, Reka, Sierra, Summit, Toro; and late season Chandler, Darrow, Nelson. The first five harvest seasons were reported.

## From the Editors

*by Marilyn Odneal*

Spring has sprung and everyone is getting busy. We updated our mailing list for regular mail paper copies of the Berry Basket. If you or any other Missourians you know would like to receive the Berry Basket via post, please contact Pamela Mayer at the address below. If you would like to subscribed to the online version, go to <http://listserver.smsu.edu/mailman/listinfo/nl-berrybasket> and put your name on the listserv. You will receive an email notification each time a new newsletter is posted.

**Berry Basket Newsletter Staff:**

Patrick Byers, Gaylord Moore and Marilyn Odneal - eds.  
Pamela Mayer - proofing, layout and mailing list.

Please direct comments to:

Marilyn Odneal, SMSU - Mountain Grove, 9740 Red  
Spring Road, Mountain Grove, MO 65711

phone: 417-926-4105, fax: 417-926-7421

e-mail: [mbo774t@smsu.edu](mailto:mbo774t@smsu.edu)

Internet: <http://mtngrv.smsu.edu>

### Early Season Cultivars:

The first harvest of the early-season cultivars in Missouri normally occurs during the first or second week of June. Early season cultivars produce high yields of good-sized, flavorful berries in time for the early fruit markets. Collins and Duke are the standards to which other early ripening cultivars are compared. Both Collins and Duke have performed satisfactorily in several plantings across the state, although both have shown some susceptibility to stem blight (*Botryosphaeria dothidea*). Nui, a 1989 New Zealand release, out-yielded both Collins and Duke in the Mountain Grove evaluation. Two year (2003 and 2004) average yields from Nui were 32% greater than Duke and 63% greater than Collins. Nui also produced larger berries than either Collins or Duke, averaging 2.4 grams per berry. Nui is a short, compact plant with good new cane production, but is somewhat harder to pick because of its height and dense foliage that hides fruit. However, the compact size makes Nui an excellent choice as a landscape plant and would be a good cultivar for home gardens. The potential for high yields and large berry size also make Nui attractive for commercial production.

Bluetta and Earliblue are two other early-ripening cultivars that have done well in several plantings in Missouri. Bluetta is very susceptible to stem blight, although the severity of the disease seems to vary from planting to planting. Most Bluetta plantings have only been productive for 8-10 years in Missouri, although one planting established in the early 1980s is reported to still be going strong. Earliblue has been a rather inconsistent producer in most Missouri plantings.

### Midseason Cultivars:

Picking of midseason cultivars in Missouri starts in mid- to late June. Bluecrop and Blueray are the most widely planted midseason cultivars in Missouri and are frequently used as the standards for comparison purposes. In the Mountain Grove trial, Bluecrop yields averaged nearly 12 pounds per plant in 2003 and 2004. Other midseason cultivars Brigitta Blue and Legacy produced 14 pounds per plant and Reka 13 pounds per plant during these

two years. Brigitta Blue and Legacy also produced the largest berries among the midseason cultivars at nearly 2 grams per berry. Fruit size was close to 1.6 grams for Bluecrop, Ozarkblue and Sierra. Brigitta Blue was reported to be somewhat difficult to harvest due to its dense foliage. Reka was also harder to pick because of its small fruit size and uneven fruit ripening.

Two other midseason cultivars in the Mountain Grove trial, Sierra and Ozarkblue averaged 9 pounds or more in yield in the 2003 and 2004 seasons. Berry weight averaged 1.6 to 1.8 grams. Ozarkblue is a 1996 release from the University of Arkansas and appears to be adapted to southern Missouri. Because of its southern highbush parentage, its adaptability to northern Missouri is still in question. Sierra is a 1988 USDA release and appears to be adapted to Missouri soil and climatic conditions. Production from Summit and Toro cultivars was low in this particular evaluation.

Other midseason cultivars that have performed satisfactorily in Missouri include Blueray, Berkeley and Jersey. These have averaged 12-14 pounds per plant in the cultivar evaluations conducted in Springfield. Blueray and Berkeley produce medium to large-sized (1.6 to 2.0 grams) berries. Berries from the Jersey cultivar are very sweet and tasty, but are very small (1 gram).

### Late season cultivars:

Coville is the late-ripening cultivar with the most acreage in Missouri and has an early- to mid-July first harvest. Chandler, Darrow and Nelson, the late season cultivars included in the Mountain Grove trial produced yields of 11, 12 and 14 pounds per plant, respectively in the 2003 and 2004 seasons. Berry weight for Darrow averaged 1.7 grams while Nelson averaged 2.0 grams. Chandler had an average berry weight of 3.0 grams, making it the largest berry among the cultivars tested. Chandler berries are much larger than any of the cultivars currently grown in Missouri; only 150 berries of Chandler would be needed to equal one pound. Since consumers rate berry size as the most desirable fruit characteristic, the large sized Chandler berries should be easy to sell.

Lateblue and Elliott are also late ripening cultivars currently grown in Missouri. Lateblue has consistently produced high yields of large sized berries in limited plantings, while Elliott has been more erratic in production.

**Summary:**

Missouri blueberry growers have many options when selecting which cultivars to plant. Growers wanting to hit the early market should select one or more of the earlier ripening cultivars. Growers wanting to concentrate the harvest season into a three or four week period can select cultivars from just one maturity group. Others who want to spread the harvest and labor over several weeks can include cultivars from two or all three of the maturity groups. By properly selecting cultivars, ripe blueberries can be produced in Missouri from early June through early August. While most of the “old standards” in each maturity group are still good choices for Missouri growers, many of the newer cultivars may be even better. Growers should at least plant a few plants of the newer releases and do their own evaluation. Who knows, you may find a much better blueberry!

\* Complete article printed in *Proceedings of the 25<sup>th</sup> Annual Missouri Small Fruit and Vegetable Conference*. pp 57-62.

## The Horticulture and Agriculture Industry of Costa Rica

*By Jennifer Barnes-Schutter  
Regional Horticulture Specialist, MU*

January 13-22, 2005, I traveled to Costa Rica with sixteen Master Gardeners from around Missouri and the State Master Gardener Coordinator. During our stay we visited waterfalls, a rainforest, dry tropical forest, hot springs, butterfly conservatory, fruit market, Tortuguero National Park—a vital nesting ground for the green sea turtle, Carara National Park, and much more on the Caribbean coast, Pacific Coast, mountainous regions/the



highlands, lowlands, and the city. We went white water rafting down a river and floated down another looking at plants, beautiful flowers, animals, butterflies, and birds.

Costa Rica, a developing country about the size of West Virginia, contains several distinct climatic zones. There is no winter or summer as such and most regions have a rainy season from May to November and a dry season from December to April.





Costa Rica grows many exotic fruits, with bananas being the leading export. Banana cultivation started in 1878 (the first 360 stems were shipped to New Orleans). Costa Rica became the first Central American nation to plant bananas. The finishing of the Atlantic Railway in 1890 made the banana export boom. In the early to mid-1900s there was a decline in banana plantations due to a fungus that was destroying the banana crops. In 1998 Costa Rica produced 115 millions boxes with an export value of \$670 million of dollars.

Costa Rica is the world's leading exporter of pineapple. If you go to a grocery store in your area, you may just find a pineapple that is a product of Costa Rica. Costa Rica exports a lot of coffee and sugarcane. A lot of the sugarcane is processed, but a lot is fed to cattle. Thousands of people are employed by pineapple and coffee industries.



Costa Rica was the first Central American country to establish coffee as an industry (see photo lower left). Most of the coffee plantations that surround the Great Metropolitan Area (San Jose, Cartago, Alajuela, Heredia) are rapidly disappearing as rising real estate prices push the farmers to sell, giving in to the expansion of the urban cities into the traditionally agricultural countryside. . . . something we deal with every day in the United States. On the Caribbean side of the country, a lot of cocoa is grown. Cocoa is a tree crop which is grown under the shade of other trees. Cocoa was the most important commercial crop between 1940 and 1970. Banana plantations were re-initiated in the late 1970s and many of the lowland cocoa planta-



tions were converted to banana plantations. Today, sixty thousand people are employed in the banana industry, with banana trading belonging to three big companies: Standard Fruit Company, Chiquita, and Dole.

Other fruits commonly grown and eaten in Costa Rica include guava, papaya, watermelon, cantaloupe, tomatoes, passion fruit, and blackberries. Some of these crops such as the melons and tomatoes are grown in hoophouses.

The nursery industry is important to Costa Rica. Millions of potted plants such as palms, ferns, and bromeliads are grown in shade houses for export. Beautiful tropical flowers can be found all over the country.

While in Costa Rica, we hiked through a dry tropical forest and a rainforest. A typical rainforest receives over 300 inches of rainfall per year. In Costa Rica alone, there are more than 9,000 types of flowering plants, including 1,200 species of orchids, 35,000 different insects, 205 species of mammals, 376 species of reptiles and amphibians, and 850 species of birds. About 10% of the butterfly species that exist in the world can be found in Costa Rica. While hiking through Carara National Forest (dry tropical forest), we saw the beautiful Scarlet Macaw. We also saw parrots, toucans, crocodiles, a poisonous viper, and several species of monkeys.

Brahma is the major breed of beef cattle in Costa Rica, found throughout most of the country. Brahma can tolerate the warm and humid climate. Holsteins and Jerseys are the major dairy breeds. Dairy cattle are found in the cooler mountainous regions of the country. The average size dairy has 25-30 cows compared with our 60-100 herd dairies or even 500-5,000 herd dairies. The milk is taken to processing plants where it is processed into cheese and other dairy products. The products stay right there within the country. Most of the dairies milk the cows in stanchion barns similar to the stanchion barns in the U.S. in the 1960s and 70s. In some areas, oxen are used to plow and prepare the fields for planting. Horses can be found throughout the country and people in the rural countryside still use them as a means of transportation. Horses in Costa Rica are smaller and shorter bodied compared with most of the breeds of horses found in the United States. There are not many sheep, goat, or hog farmers in Costa Rica. There are poultry farms in which chickens are raised in long chicken houses similar to the ones here in the states. In remote areas you will see chickens running around loose in the yard, road, or around the farmstead.

We learned a lot on the trip and it was a wonderful cultural experience. The trip is taken annually and is open to Missouri Master Gardeners and horticulturists.

## **Tomato Blight a Foliar Black Mark**

*Gaylord Moore*

*Regional Horticulture Specialist, MU*

Tomatoes are, without doubt, the number one crop planted in the vegetable garden. While tomatoes are popular and easy to grow, both the home gardener and commercial grower find it challenging to maintain productivity throughout the growing season. Diseases such as Septoria leaf spot and early blight affect the lower portion of the tomato plant and shorten productivity. Without effective control, the disease will start at the bottom of the plant and work to the top until plants completely defoliate. Blight may be worse during some years versus others and as with many diseases; environmental conditions play a role in presence and severity of certain diseases. Abundant rainfall and high humidity can lead to severe blight conditions. Proper precautions should be followed to reduce the incidence of blight in tomatoes.

Very little resistance to blight is available through variety selections so proper cultural management techniques are important for control. Disease management must start early in the season. Once you have the problem, control is difficult to maintain. Some of the following management practices are important for blight control and should be considered.

First, begin with site and ground selection. If possible, a three to four year rotation with crops outside of the Solanacea family should be followed. Potatoes, tomatoes, peppers, and eggplant are within the same family and these crops should not be included in the rotation planting cycle.

Second, fertile soil, disease free plants, and observing proper planting dates should be followed. If plants are stressed prior to planting or following planting, this may lead to disaster. Home gardeners,

try to avoid planting tomatoes before the soil has sufficiently warmed to avoid stunting and plant stress. A healthy plant will more likely resist some diseases that potentially reduce productivity. For best results, plant tomatoes after the last frost date within your area. Check with your local University of Missouri Extension Center in your area for the correct planting time.

Third, avoid ground contact with plant foliage. For best results, stake tomato plants and mulch underneath them to reduce the incidence of blight transfer from the soil to the plant. Avoid mulching tomatoes until the soil has thoroughly warmed to allow for optimum growth. For the home gardener wheat straw is an excellent mulch source. Blights are soil borne diseases and anything that inhibits the transfer of spores from the ground to the plant will increase chances for control.

Fourth, good air circulation around and about the plants will reduce blight infections. Proper plant spacing and pruning of your tomatoes will help. If room allows, 30 inches between staked indeterminate plants is suggested. In my opinion, staked versus caged tomatoes will be less prone to disease. Staked tomatoes are more accessible to proper pruning, which removes excess foliage that may hinder good air circulation. Basic pruning is simply the removal of side shoots or suckers when they are three to four inches long. However, my pruning preference is the “Missouri Method” of pruning. This is the same as the basic method except you do not remove the side shoot or sucker **directly below** a flower cluster. When this side shoot or sucker directly below a flower cluster attains a length of about six inches, pinch out the growing tip of the sucker, leaving only the two leaflet branches. These leaflet branches increase the leaf area of the plant, providing added food manufacturing capability and also some shading of the lower fruit.

Fifth, avoid overhead irrigation during the evening. Better yet, trickle irrigation or bottom irrigation will help avoid moisture contact with the leaves reducing conditions for ideal disease development.

Sixth, if all procedures fail to control blight be

prepared to replant transplants about the middle of July for a fall crop. Typical summer conditions of heat and dry weather result in less incidence of disease thus providing productive plants until frost.

Seventh, chemical fungicide application is often necessary and application timing is crucial. Start with fungicide applications at 7-14 day intervals beginning 2 weeks after transplanting. For the commercial grower, Quadris will provide the best control of foliar disease when alternated with chlorothalonil or mancozeb. Spray intervals of 7 days are generally best during the early season. Intervals between sprays may be longer later in the season with less frequent rainfall.

There are no guarantees for 100% control. But following all the suggest recommendations for good management and cultural practices is a giant step in the correct direction.

## Midwest Gardening Symposium

*By Marilyn Odneal*

*Horticulture Outreach Advisor, SMSU*

The Midwest Gardening Symposium was held at the Morton Arboretum in Lisle, Illinois in mid-March and featured an excellent program with topics on garden design, new plants, garden structures, plant combinations, selection and planting of trees, as well as a detailed look at hydrangeas.

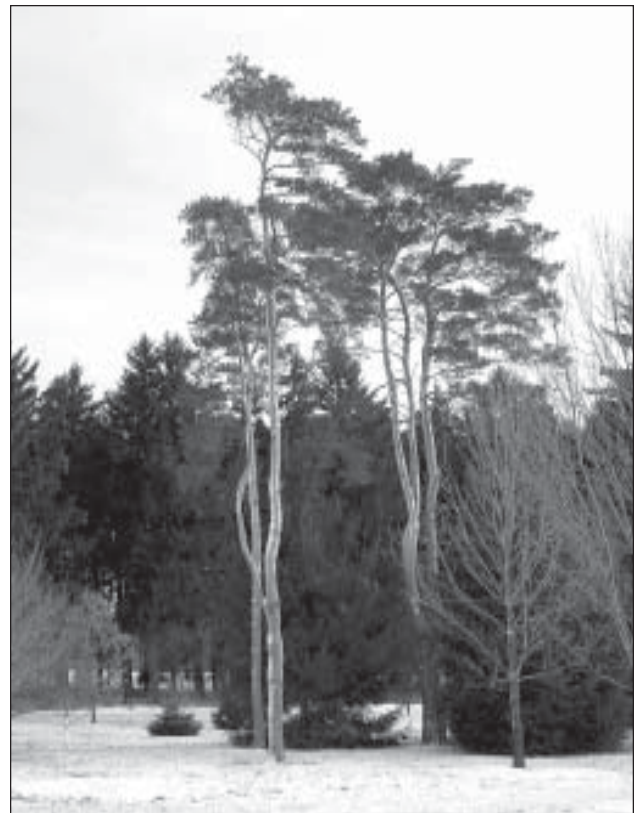
On the first evening we went “On the Wild Side” with Keith Wiley who posed the question “How do I take a natural landscape and modify it?” Head Gardener at The Garden House in Devon, England, Keith has traveled the world gathering inspiration from natural landscapes and using these scenes as templates for his gardens. He emphasizes the “big picture” looking at a garden as part of the larger vista and looking at plants not as individuals to be separated from one another but as part of a community growing through one another.

He designs with his natural template first by laying out the foundation or bones of the garden using plants from which he knows what to expect, and then he mixes others in between. One example was taken from the beautiful South African wild flower landscapes. With over 25 species in a square meter, Keith recreated the effect in England by putting a layer of sand over compost and using plants that would grow in the English environment to create the same color distribution – not necessarily with the same colors. Another example is his interpretation of a common English scene, the ruin of a small stone barn overgrown with brambles and nettles. He constructed a new “ruin” in his garden and instead of brambles and nettles, he used roses and wild flowers to create a romantic scene where the garden reclaims the ruin, much like the English landscape reclaims the old barns.

Keith’s gardening style evolved somewhat from necessity. One of two gardeners tending the Garden House, compared to the nine gardeners tending the same sized 2-acre garden at Sissinghurst, it made sense to find a new approach. By allowing plants to grow together and reseed in between, he lessened the need to continually weed. “As a gardener I remembered where every plant was and knew what it would do in the traditional part of the garden.” On the Wild Side, however, you learn something new and are very often surprised. Many of the beautiful photos used in his presentation are published in Keith’s book *On the Wild Side: Experiments in the New Naturalism*.

Beginning the next day, Rick Darke, author, photographer and design consultant, presented “The Luminous Landscape: Darke on Light” where he discussed light and shadow both in the garden and in photography. Rick is author of several books including *The American Woodland Garden* and *The Color Encyclopedia of Ornamental Grasses*. Kris Bachtell, Director of Collections and Grounds for the Morton Arboretum, followed with “New Plants for Midwest Gardens” by presenting the Chicagoland Grows®, Inc. Plant Introduction Program (<http://www.chicagolandgrows.org/>). Established in 1986, the program is a partnership between the Chicago Botanic Garden, The Morton

Arboretum and the Ornamental Growers Association of Northern Illinois working with other industry professionals throughout North America to select, evaluate, produce and market new and recommended plant cultivars with proven performance under Midwest growing conditions. Dr. Jim Ault of the Chicago Botanic Garden developed Orange Meadowbright™ Hybrid Coneflower as well as Mango Meadowbright™, a breakthrough in ornamental plant breeding. The disease and pest resistant Accolade™ Elm has been released as well as several other elms in limited release – Vanguard™, Triumph™, Danada Charm™, and Commendation™. Due to the emerald ash borer devastation of the widely planted green ash in some areas such as Michigan and its threat to other states, there is much interest in Chicagoland Grows® elm releases as street trees. Kris stressed the importance of diversifying street tree plantings rather than planting all one species. American elm was over-planted and when Dutch elm disease hit, street plantings were wiped out. Now we are



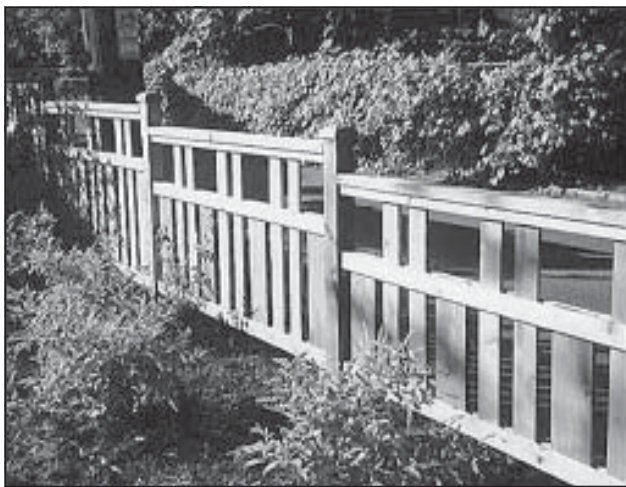
*Taking some of Rick Darke’s Advice, I photographed the light trunks of Scot’s Pine in the arboretum with dark shadowy evergreens as a background.*



*Orange Meadowbright™ Hybrid Coneflower from Chicagoland Grows® Inc.*

encountering the same thing with green ash and the emerald ash borer.

Bill Mitchell of Chicago Specialty Gardens, presented “The Structure of the Garden” where he shared his experience in constructing fences, arbors, pergolas and deck in the afternoon. Some great ideas were presented including putting shuttered “windows” in your fence for occasional viewing on the other side (next year he will install window boxes). The elegant Virginia Small, Senior Editor of Fine Gardening Magazine (co-sponsor of the



*Bill Mitchell of Chicago Specialty Gardens constructed this Mission Style fence. Other designs are featured at the website <http://www.chicagogardens.com/>*

Symposium) shared her “Secrets to Successfully Combining Plants” and focused on plant color, shape and texture and how to balance harmony and contrast in a garden.

“Contrasting Designs” kicked off the last day of the lecture series. Jan Little, the Assistant Director of Education for the Morton Arboretum as well as a licensed landscape architect designed a residential planting and asked a panel of three horticulturists, Marcy Stewart Pyziak of The Gardener’s Tutor, Roger Ross, and Kelsay Shaw of Possibility Place Nursery each to choose plants for the design and explain their choices. Kelsay Shaw, a proponent of native plants, used paw-paws as a yard tree and felt that homeowners need to look past fallen fruit as a problem in order to use some great choices for their landscape. Roger Ross also promoted the use of some fruit in the planting and specifically liked the Turkish Filbert, *Corylus colurna*, which is actually a lovely tree rather than a shrub. Marcy Stewart Pyziak worked many herbaceous perennials into her list along with fragrant shrubs like Fragrant Judd and Korean Spice viburnum.

The entertaining Dr. John Ball of South Dakota State University presented “Trees: Selection and Planting” and emphasized the fact that many mistakes that become evident 20 years down the line are preventable if trees are sited and planted properly.

Kris Bachtell returned to talk about Hydrangeas, an old fashioned plant that had fallen out of favor in the sixties and seventies, but is making a comeback. Some hydrangeas bear flowers on old wood, some on new wood, and some on both old and new (remontant bloom - blooming more than once a season) so pruning the different types was explained.

Kris’s useful hydrangea lists includes:

**Smooth Hydrangea** *Hydrangea arborescens* ‘Annabelle’, ‘Dardom’ White Dome®, and Grandiflora, (known as the Hills of Snow hydrangea);

**Bigleaf Hydrangea** *Hydrangea macrophylla* ‘Bailmer’ Endless Summer™

**Panicle Hydrangea** *Hydrangea paniculata* ‘Pink Diamond’ and ‘Unique’;”



**Climbing Hydrangea** *Hydrangea petiolaris* a vine; and  
**Oakleaf Hydrangea** *Hydrangea quercifolia* 'Snow Queen'.

The lecture series concluded with the lovely English lady, Rosemary Alexander, founder and principal of the English Gardening School in London. Rosemary discussed garden design and showed several examples of Mood Boards that her students create to display their garden designs. The boards have a small flat garden diagram, which many find difficult to visualize, so it is surrounded by the photos and catalog cutouts of proposed flowers, accessories and hardscape to help people see the ideas. Rosemary has written *The Essential Garden Design Workbook* and has another book on structure and hardscape in process entitled *The Garden Maker's Manual*. More information on the English Gardening School can be found at <http://www.englishgardening-school.co.uk/>

Attending the Midwest Gardening Symposium is a wonderful way to welcome spring. You can find out more about the program as well as a great deal of information on woody plants at the Morton Arboretum website <http://www.mortonarb.org/> or try to visit the arboretum which is located just west of Chicago. A new visitor's center has just opened, a new maze garden will open this May and the new Children's Garden will open in September.



"Mood Boards" produced by Rosemary Alexander's students for their garden designs were displayed at the symposium.

## Hand Thinning of Deciduous Fruit Trees

By John Avery,  
*Horticulture Research Assoc., SMSU*

The weather is starting to warm as I sit here to write this article. The red plums have buds that are in the popcorn stage, petals visible but still green and not turning to white quite yet. By the time you are reading this article, the apple should be starting to drop their petals, the bees having done their job of pollinating the flower for the year. Peaches and plums will be starting to size up and it will be time to consider thinning the crop. Most all of the deciduous fruit crops need to be thinned to some degree so that the fruit will size up properly. This, however, is only one of several reasons to thin the fruit on your trees.

So, what are the benefits to thinning your trees early in the spring? The first and most obvious is the increased sizes of the fruit come harvest time. The second is to reduce the weight of fruit when fruit swell begins about mid summer thus reducing limb breakage especially during high winds. The third reason is to reduce the likelihood of alternate bearing especially in apple but also in other fruits where severe overcropping is allowed to occur.

Deciduous fruit trees generally flower far heavier than what the plant can support or mature, if all of the flowers were to develop into fruit. In a good year where all flowers are alive and healthy, about 70 to 85% will have to be removed to balance the fruit load with the growth of the tree. A number of environmental factors will have an effect on the number of flowers that actually end up pollinated and developing fruit; then some of the fruit that starts to develop will fall off due to inadequate pollination or early insect damage. But generally, even with all this reduction, thinning will be needed to balance the crop with what the tree can mature.

So, how should an apple or peach tree be thinned to give the best quality fruit and still keep the tree healthy and productive? Although a general rule cannot be given for all types of fruit trees, for standard trees of apple, pear, or peach on non-dwarfing rootstocks, research has shown that a spacing of eight inches between fruits along major limbs will give the best balance between size of fruit and total production per tree. This, for the average person, is the distance between the tip of your thumb and the tip of your middle finger when spread out between fruits.

Apples generally have five blossoms per bud, with the middle blossom opening first. It is called the king blossom or when set, fruit. Because this blossom opens three to five days earlier than the other flowers the king fruit will be larger than the other four fruit. For this reason, the first thinning should be removal of the fruit around the king fruit. At times there may be reasons to leave one of the other developing fruits other than the king fruit. If there are late spring frosts that damage the king flower at pollination time there may be damage to the fruit as it starts to develop or it may be missing all together. Some years there can be insect damage to the fruit or maybe hail damage during a thunderstorm, and then the best fruit should be saved.

After thinning the cluster to one apple; you should thin to space the fruit for proper development and sizing for your tree size and age. A general rule of thumb for apples is to thin so that you get about 12 inches of new growth each year after the trees are mature. You must look at the entire tree to determine how much growth you have for the year. It is not just looking at the tips of the central leader and major scaffold limbs, because these may and should grow more than 12 inches each year. You have to examine all the fruiting limbs on the tree. Some will have less than the 12 inches you want and others may have considerable more than 12 inches of growth. This will take a few years of experience to learn how much to thin each year. While the trees are young and developing there should be more than the 12 inches growth each year. Thinning

should be sufficient for the tree to continue to develop its main structure. If a young tree is allowed to set too heavy a crop there will be a noticeable decline in its growth, then fruit should be removed immediately.

For spur type apple cultivars, spacing of 4 to 6 inches is considered acceptable on mature trees. Internode length on these type trees is shorter and short spurs develop along limbs resulting in more closely spaced leaves. Thus, more fruit can be left on the tree per linear foot of tree limb.

Pear trees should be thinned similar to apple trees. Pears have various numbers of blossoms per cluster that open more or less together, so that most fruit will be of similar size. None-the-less, clusters should be thinned to one fruit and fruit thinned to about 8 inches apart. Because pears are vigorous growers expect more than the 12 inches of growth per year though. If you have other pome fruit species (quince, medlar, etc.) in your home garden, then they will need thinning similar to the apples and pears.

For peaches and nectarines, thinning can be somewhat easier than with the apples. Peaches do not have clusters of blooms, but have blooms on new wood (wood produced the previous summer) at each of the nodes. There will be one bloom on each side of each leaf bud on a new shoot. Thinning should consist of removing double fruits first and then thinning fruit to about 8 inches apart along scaffolds and secondary limbs. With peaches the best fruit will be produced on new shoots that are 12 inches or more in length. For shoots that are 12 inches or shorter, one peach should be left and with shoots that are longer than about 18 inches, two or more fruit can be left with spacing being about 10 to 12 inches apart.

For large fruited plum cultivars (some red and most purple plums) about 4 inch spacing gives the best size of fruit while the small fruited plum cultivars are not generally thinned at all. Cherries generally are not thinned due to their small size.

Thinning should be performed as soon after pollination as possible. By the time the fruit have reached the size of the end of your little finger thinning can start. This will be about 3 to 4 weeks after bloom. If thinning is left for later in the season the result will not be as effective as the earlier thinning. During the first 60 days after pollination is the time when fruit development is most rapid with cell division taking place. After about 60 days cell division ceases and cell enlargement begins, with enlargement being most rapid about three weeks before ripening. So, to have the largest potential fruit develop, cell division needs to be encouraged by removing excessive fruit during the first two months of development. Thinning of your fruit trees should be performed early in the season to get the most benefit with larger fruit, better develop of the tree for future years, and consistent production for many years.

## Grow Native! Brings Flowers that Fly to Your Yard

*Judy Allmon, Grow Native!*

April marks the return of the Ruby-throated Hummingbird to Missouri from Central America. Their acrobatic almost magical flight makes them a favorite among young and old. And while “hummers” will eagerly come to feed at sugar-water feeders, you can easily create a hummingbird garden with native plant species that will attract many more regular Ruby-throats. Add a fine water mist spray to create a hummer-sized shower to cool the birds on a hot day or to help them clean their tiny feathers.

Plan your Hummingbird Haven in a warm, sheltered site where it will be easy to view. Your Haven can be a small berm, a larger, multilevel garden or a simple trellis filled with Trumpet Vine. Even a container garden on your deck or patio can do the trick! Choose native species with bright-colored tubular flowers. Orange and red flowers are the most frequently visited, but hummers will visit

massed flowers of any bright hues. You might also consider mixing some of our suggested native wildflowers in an existing border. Enjoy the return of native perennials—and hummingbirds—year after year.

### PLANT LIST

#### Wildflowers

Bee balm  
Blazing star  
Blue sage  
Cardinal flower  
Columbine  
Fire pink  
Foxglove beardtongue  
Jewelweed  
Phlox  
Royal catchfly  
Solomon’s seal

#### Small Shrubs, Trees and Vines

Beautyberry  
Golden currant  
Gooseberry  
Trumpet creeper  
Yellow honeysuckle  
Hawthorn  
Ohio buckeye  
Red buckeye

The Grow Native! website, [www.grownative.org](http://www.grownative.org), can help you choose the right native plants for your site whether it’s sunny or shady, dry or damp. The website’s “Plant Info” section has scores of native perennials, shrubs and trees to consider plus a “Plant Search” to help you narrow your search and create a personal planning and shopping list. Its “Buyer’s Guide” and “Find Supplier” features will also guide you to qualified member retail nurseries that offer nursery-propagated Missouri-natives to help ensure your native landscape’s success.

If you would like a copy of the Grow Native! guide for using natives around your home, write to Grow Native! P.O. Box 630, Jefferson City, MO 65102. This guide includes a sample design for a hummingbird garden plus several others. When buying plants, look for the colorful Grow Native! plant tag which guarantees that your plantings are Missouri natives and provided through ethical nursery practices.

*Grow Native! is a joint program of the Missouri Department of Agriculture and Missouri Department of Conservation.*

## The Obliquebanded Leafroller, Pest Biology and Control

By Daniel Waldstein,

Asst. Professor, IPM, SMSU

Obliquebanded leafroller (OBLR), *Choristoneura rosaceana* (Harris) is a native insect of North America that has been found on more than 80 plant species. This particular insect derives its species name because it is typically found on members of the rose family (Rosacea). Although OBLR are primarily a pest in apples they can be pests of other tree fruits including pears, cherries, plums, and peaches and may be found in strawberries and other small fruit crops.

Throughout most of its range, there are 2 generations/year of OBLR. This member of the family Tortricidae (same as codling moth, oriental fruit moth, and grape berry moth) overwinters in apple trees as a second or third instar larva.

First egg mass hatch for the summer generation occurs approximately 350 DD<sub>43</sub> (degree days base 43° F) after biofix (1<sup>st</sup> sustained moth trap catch). Degree days can be calculated by taking the average daily temperature (Max. + Min. divided by 2) and subtracting the developmental threshold (43° F for OBLR, 45° F for OFM, and 50° F for CM and GBM). For example if the high was 75° F and the low was 45° F, there would be 17 degree days base 43° F accumulated for that day.

Larvae are primarily foliage feeders but will commonly feed on fruit. Feeding preference is as follows: terminal foliage (most preferred) > spur foliage > fruit. Fruit damage by OBLR larvae begins 640 ± 50 DD<sub>43</sub> and continues until 1200-1300 DD<sub>43</sub> after first moth catch. In some orchards, fruit damage may begin as early as 500 DD<sub>43</sub> after first moth catch.

Obliquebanded leafrollers are typically not a problem on wild apple trees or in abandoned orchards because of natural control by predators

and parasitoids. OBLR is present in some commercial orchards because of elimination of natural enemies from broad-spectrum insecticide applications.

Guthion (azinphos-methyl) is effective on non-resistant populations of leafrollers. OBLR populations often become difficult to control as they develop resistance to Guthion. Populations of OBLR that are resistant to Guthion are typically also resistant (i.e., cross-resistant) to other organophosphates (e.g., Imidan), with the important exception of Lorsban (chlorpyrifos). Lorsban is usually effective on OBLR populations that are resistant to Guthion, but it can only be used prior to bloom on 1<sup>st</sup> generation leafrollers. Asana (esfenvalerate) and other pyrethroids (e.g., Danitol, Warrior, Proaxis) are generally effective on OBLR that are resistant to organophosphates (including Lorsban). However, pyrethroids have been shown to flare mite populations and are prone to decreased efficacy from relatively quick resistance development. In addition, pyrethroids are restricted use insecticides and require a pesticide applicator license to apply primarily because of their high toxicity to fish and aquatic organisms. Pyrethroids have very low toxicity to humans and other mammals.

The use of organophosphates and pyrethroids has been discouraged in integrated pest management (IPM) programs because these classes of insecticides have significantly higher toxicity to beneficial insects and/or mammals, birds, and fish than reduced-risk or biorational insecticides (e.g., Bt's, Confirm, Intrepid, SpinTor, and Entrust). Although most *Bacillus thuringiensis* (Bt) products (e.g., Dipel, Javelin, Deliver, Biobit, MVP, Agree and others) have been available to growers for several years, Confirm, Intrepid, and SpinTor (Entrust is an organic formulation) are relatively new insecticides that can be incorporated into IPM programs for leafroller control. Confirm and the related Intrepid are insect growth regulators that cause insects to undergo a lethal molt and have sublethal effects on female moths including decreased fertility and fecundity. SpinTor and Entrust are insecticides produced from a soil

bacteria fermentation reaction and act as neurotoxins by binding acetylcholine receptors in the target insect. Unlike the organophosphate and pyrethroid insecticides, biorational insecticides are not broad spectrum insecticides. Confirm, Intrepid, and Bt products are very specific to moth pests, whereas, SpinTor has some effects on flies and beetles in addition to moths.

Pheromone mating disruption is another IPM tactic that has shown promise in recent years. Under mating disruption, the synthetic pheromone or pheromone blend produced by females is dispersed in an orchard during moth flight. The synthetic pheromone competes with the females naturally produced pheromone and decreases the ability of male moths to locate and mate with females. As is typical of mating disruption for other insect pests, OBLR disruption is most effective on either low populations or high populations when used in conjunction with a limited insecticide program. The economics of combining biorational insecticides and mating disruption are justified in higher pressure blocks when packout can be increased to levels higher than with insecticide use alone. Mating disruption is generally more effective in larger acreage blocks or in small blocks when used in combination with border sprays of insecticides. Hand applied pheromone dispensers are sold as a combination product to control codling moth and leafroller species (for more information see [www.greatlakesipm.com](http://www.greatlakesipm.com)). Sprayable formulations of pheromone are also available for mating disruption of leafrollers (for more information see <http://www.certisusa.com/sprayable-pheromones/>).

The best way to determine if you have obliquebanded leafrollers in your orchard or small fruit field is to purchase traps and pheromone lures to monitor this pest and scout for the presence of this pest. For more information about the biology of obliquebanded leafroller and pictures of this fruit pest, see the following websites:  
<http://www.nysipm.cornell.edu/factsheets/treefruit/pests/oblr/oblr.pdf>

<http://www.nysipm.cornell.edu/publications/apple.man/contents.html>

## Plasticulture – Strawberries

*Jay Chism,*

*Regional Agronomy Specialist, MU*

As the weather continues to warm up, new growth is starting to appear on many plasticulture strawberry plantings. With this new growth there are many cultural practices that need to be initiated.

The first thing to consider is fertility. Research from North Carolina State University indicates that approximately 120 lb of N/acre is optimal for these types of strawberry plantings. Approximately half the nitrogen the crop needs should have been applied as pre-plant fertilizer. The best way to determine the remaining nitrogen needs is to take foliar tissue samples 3 to 4 weeks after new growth has started. The leaf petioles on the trifoliolate leaves will provide the best indication to determine if nitrogen needs to be applied. Early in the growing season, the petiole nitrate levels should be in the range of 600 to 1500 ppm. At early bloom nitrate levels should range between 3000 to 6000 ppm and during harvest levels will range from 2000 – 4000 ppm. Remaining nutrients will need to be at sufficient levels to optimize plant growth.

Another consideration during this time of year is control of Botrytis or gray mold caused by *Botrytis cinerea*. Botrytis is a common disease and will generally require some level of fungicide application to maintain control. An application prior to bloom may be necessary in plasticulture production. Applications of Captan or Thiram can be made early and should be effective in reducing inoculum buildup. During the bloom stage, a combination of fungicides will need to be applied on a weekly schedule. Contact your local university representative for specific spray recommendations.

Finally, row cover management is another cultural practice that will need careful consideration. As many of you may remember from last month we chose not to cover our strawberries with row covers in the fall after planting. After visiting a growers' farm where he did cover his planting, I

have to admit that his plants look much better. His crown development is much further along and he has much less leaf tissue damage on his older leaves. The amount of leaf damage is important not only because of the amount of plant energy healthy leaves provide but the damaged leaves also provide a location where *Botrytis* infection may begin.

Right now we still have lots of questions about how we handled our new plasticulture planting. As harvest gets closer I will let you know what the crop looks like and what the ramifications of the decisions we made have on the planting.

## Recommended Apple Books at Evans Library

*By Suzi Teghtmeyer*

*Evans Library of Fruit Science, SMSU*

Over the last 15 months Evans Library has acquired some noteworthy books on apple culture and biology. Apples are not berries, of course, but the berry growers I know are interested in many fruits, and these new books are worth mentioning.

The New Book of Apples, by Joan Morgan and Alison Richards. Meister publishing Co., 2003.

Albeit a British publication, *The New Book of Apples* is a worthy addition to anyone's personal library. The book of about 315 pages is divided into two main sections. The first is full of historic apple lore, with color plates and illustrations of woodcuts, paintings, and drawings gracing almost every page and interspersed within the descriptive text. The second section is a directory of apple varieties with a subchapter dedicated to cider apples. A directory key describes the abbreviations and numeric classifications used to keep the descriptions compact. Although this is an inconvenience at first, once one has studied a few descriptions the 'shorthand'

becomes second nature. Concise history lessons are included in some of the well-known (British) varieties like Granny Smith and Peasgood's Non-such. The book ends with appendices about cooking with apples (yes, there are a few recipes), growing apples, and world-wide apple growing associations. The only downfall I can see is that not all of the 2000 varieties may be grown in the US. Regardless, the history depth of facts, lore, and beautiful artwork make this an enjoyable read.

Apples: Botany, Production and Uses, edited by D. C. Ferree and I. Warrington. CAB International, 2003.

This work is for the serious grower and apple pomologist. The editors found experts in almost all aspects of apple culture who wrote 24 chapters, divided into six sections. Topic examples include genetic improvement, flowering, water and light relations, nutritional requirements, disease management, freeze protection, planting and trellising systems, orchard floor management, postharvest and processing issues - the list goes on. I recommend this book to those whose livelihood is the apple and orchard management. The information presented is supported by international research and production trials. Each chapter also has an extensive literature cited section which is handy when you want to learn more about specific facts. If you are seriously into apples, this is a reference book for you.

Apple Orchard Systems (*Compact Fruit Tree*, Vol. 36 Special Issue, June 2003), edited by Bruce Barritt. International Dwarf Fruit Tree Association (IDFTA), 2003.

The quarterly journal, *Compact Fruit Tree*, is for growers of dwarf fruit trees ([www.idfta.org](http://www.idfta.org)). In 2003 the journal released a special issue dedicated to growing apple trees often in high intensity, high production systems. The contributors utilize many graphs, tables, and drawings to illustrate the costs, benefits, and differences between trellising systems, canopy management styles, sunlight needs, and rootstock comparisons. At first, the articles may

seem too research-intensive for a regular grower, but the articles are well-written and the information is presented in an easy to comprehend manner. If I have one complaint about the book, it is that the print is small and hard to read in low light. Beyond that, the book (available at the website mentioned above) is for growers who want more out of their trees, whether shaping established trees or planning new orchards.

Biology of Apples and Pears, by John E. Jackson.  
New York: Cambridge University Press, 2003.

The last but not least book is another for the serious pomologist, specifically the apple (and pear) biologist. This is the second book in the *Biology of Horticultural Crops* series (the first being the *Biology of the Grape*). Most of the chapters concentrate on the cellular level of growth, from the roots all the way up through the trunk, the shoots, the leaves, the flowers, and, of course, the fruit. Other sections describe the biology of the formation of the grafting union; the role of water throughout the tree; mineral nutrition, requirements and uses; leaf area and light requirements; and apple and pear biotechnology pertaining to molecular markers and genetic transformation. This book is recommended for the curious who want to know what is happening within the tree, and the way external factors affect that inner growth.

## Coming Events

### Strawberry Field Day

SMSU State Fruit Experiment Station,  
9740 Red Spring Road  
Mountain Grove, MO 65711  
Thursday, June 2, 2005  
9:00am to 12:00pm

For more information contact:  
Patrick Byers  
plb711t@smsu.edu  
phone: 417-926-4105

### 2005 Grape Field Day

Mid-America Viticulture and Enology Center  
9740 Red Spring Road  
Mountain Grove, MO 65711  
Thursday, June 9, 2005

For more information contact:  
Gloria Smith  
gss989t@smsu.edu  
phone: 417-926-4105

### Centennial Garden Dedication

SMSU-Mountain Grove  
9740 Red Spring Road  
Mountain Grove, MO 65711  
Friday, June 17, 2005  
Starting about 1:30 (see <http://mtngrv.smsu.edu/calendar.htm> for updates)

For more information contact:  
Marilyn Odneal  
417-926-4105  
mbo774t@smsu.edu

### Blueberry Field Day

SMSU State Fruit Experiment Station,  
9740 Red Spring Road  
Mountain Grove, MO 65711  
Thursday, June 30, 2005  
9:00am to 12:00pm

For more information contact:  
Patrick Byers  
plb711t@smsu.edu  
phone: 417-926-4105

### Irrigation Workshop

SMSU State Fruit Experiment Station,  
9740 Red Spring Road  
Mountain Grove, MO 65711  
Tuesday, August 9, 2005  
9:30am to 2:00pm

For more information contact:  
Marilyn Odneal  
417-926-4105  
mbo774t@smsu.edu

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**Your editors of The Berry Basket:**

**Gaylord Moore**, Area Horticulture Specialist,  
University Extension, Springfield, Missouri.



**Patrick Byers**, Fruit Grower Advisor, and  
**Marilyn Odneal**, Horticulture Outreach Advisor,  
Fruit Science, State Fruit Experiment Station,  
SMSU, Mountain Grove, Missouri.



Send address changes and comments to:  
Dept. of Fruit Science, 9740 Red Spring Road,  
Mtn. Grove, MO 65711 or [mbo774t@smsu.edu](mailto:mbo774t@smsu.edu).

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