



The Berry Basket

Newsletter for Missouri Small Fruit and Vegetable Growers

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Contents:

From the Editors.....	1
Signs of Chlorosis.....	1
Blueberry Council News.....	3
Farm Tour 2000.....	3
Plant Propagation II.....	4
Proper Storage Retains Vegetable Quality	5
Bees, the Beneficial Insect.....	6
Missouri Department of Agriculture Striving to Increase Market Opportunities	7
2001 Missouri Small Fruit Conference.....	7

From the Editors

by Marilyn Odneal

Here in southern Missouri we are enjoying beautiful fall weather; warm sunny days and cool nights. Many of you are almost finished with your end of the season maintenance chores. Fall is a great time to reflect on the experiences of the past growing season and to plan for the future. It's time to wind down, read and reflect. Enjoy the newsletter and relax. You deserve it!

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Signs of Chlorosis

by Ben Fuqua

Chlorophyll is the complex organic compound responsible for the green color of plants. Chlorophyll is required for photosynthesis and sugar formation and, therefore, is absolutely essential for the production of high yields of quality blueberries. Blueberry plants that lack adequate chlorophyll are pale-green to yellow (chlorotic) in color as opposed to the normal, dark green color of healthy plants. While chlorosis can be caused by several factors, the most common cause is poor nutrient management; i.e., nutrient(s) deficiencies or nutrient imbalances.

Nitrogen: Nitrogen is required in rather large quantities by blueberry plants and is probably the number one cause of plant chlorosis in Missouri. Since nitrogen is one of the inorganic components of the chlorophyll molecule, chlorotic plant leaves can appear any time during the growing season when nitrogen is deficient. A nitrogen shortage in blueberry plants usually results in uniformly chlorotic leaves, with no mottling (spots) or other characteristic patterns. Older or lower leaves generally become chlorotic before the younger leaves, but the symptoms will eventually cover the entire plant as the deficiency becomes more severe. Leaves of nitrogen deficient plants often turn a reddish color (can be mistaken as early fall coloring) and prematurely drop in late August and early September.

Inadequate nitrogen also causes an overall reduction in growth of blueberry plants. Nitrogen deficient plants produce few new canes, the leaf size is greatly reduced, and fewer fruit buds are initiated.

Thus, both vegetative and reproductive growth of blueberry plants are adversely affected by a lack of nitrogen. Nitrogen deficiencies can usually be corrected by applying soluble nitrogen fertilizers, although precautions must be taken to avoid applying too much nitrogen. Excess nitrogen is also harmful to the growth and development of blueberry plants.

Iron: A lack of available iron ranks as the second most common cause of chlorosis of blueberries in Missouri. Although iron is a micronutrient, blueberries have a rather high demand for the nutrient. A deficiency of iron shows a rather distinct pattern of chlorosis on blueberry leaves. The chlorosis appears between the leaf veins, with the leaf mid-rib and subordinate veins remaining dark green. The symptoms appear first on the youngest leaves and the chlorotic tissue may range from a light yellow to bronze in color. Reductions in leaf size and very poor shoot growth also occur when iron is lacking.

The poor absorbance of iron by blueberry roots is primarily a problem of iron availability, rather than a lack of iron in the soil. Most soils in Missouri contain an abundance of iron, but the iron is in an insoluble or unavailable form. Since the solubility of iron is greater in acid conditions, it is imperative to maintain the proper soil pH (4.5-5.0) for maximum growth and production from blueberry plants. Applying iron as a foliar spray or a soluble liquid is a good short-term remedy for correcting an iron deficiency problem. For the long-term, the best way to insure an adequate supply of iron for plants is to maintain an acid soil pH.

Magnesium: The magnesium ion is located in the center of the chlorophyll molecule and chlorotic blueberry plants result when magnesium is lacking. The deficiency symptoms of magnesium in blueberries begin at the base, or older leaves, of young shoots. A distinctive pattern of chlorosis between the main veins of leaves produces a “Christmas tree-shaped” green area in the middle of the leaf. The young leaves at the tip of shoots are not usually affected. The chlorotic leaf tissue may turn brilliant yellow, red, or purple colors as the deficiency progresses.

Chlorosis caused by a deficiency of magnesium has not (to my knowledge) been a major problem in Missouri-grown blueberries. While the characteristic or textbook deficiency symptoms of magnesium differ greatly from nitrogen, they often look alike in the field. Thus, several suspected magnesium deficiencies in blueberries have actually turned out to be nitrogen problems when the leaves were analyzed.

Sulfur: Sulfur-deficient blueberry plants develop leaf symptoms very similar to those of nitrogen; including stunted, spindly young plants and the uniform leaf chlorosis. Sulfur is not translocated from old to new plant tissue as easily as nitrogen, therefore, sulfur deficiencies will appear first on the younger rather than older plant leaves. Since sulfur is often applied in blueberry plantings to lower the pH of Missouri’s mineral soils, sulfur deficiencies are not usually a problem in the state.

Potassium: A potassium deficiency can cause chlorosis of blueberry leaves, but generally exhibits several other symptoms as well. Potassium deficient symptoms include scorch along the leaf margin, leaves cupped or curled, and leaves having necrotic (dead) spots. Older leaves normally show potassium deficiency symptoms first, but the young leaves may also be affected, especially those toward the tips of new shoots. Potassium deficiencies are observed most often in extremely sandy soils and have not been a major problem in Missouri blueberries.

Manganese and Molybdenum: While researchers in other states have found leaf chlorosis to be a deficiency symptom of these two micronutrients in several agronomic and vegetable crops, deficiencies should not be a problem in Missouri-grown blueberries. One precaution should be noted about the availability of manganese, however. Manganese can be toxic to plants growing in extremely acid soils; thus, another good reason to monitor the soil pH on a regular basis.

Summary: Chlorotic plants send an obvious message of a potentially serious problem in blueberry plants. Growers observing chlorotic plants should get the problem identified as soon as possible. Since chlorosis in blueberry plants is frequently caused by a deficiency or imbalance of

nutrients, soil and leaf tests are excellent starting points in diagnostic process. Eliminating all chlorosis in a blueberry planting may be difficult (if not impossible). But remember, chlorotic blueberry plants cannot produce as high a yield or as good a berry as healthy, dark green plants. Therefore, reducing chlorosis is another important challenge for all blueberry growers.

Blueberry Council News

by Bob and Ronnie Hershey

Update on the USA Blueberry Council

The votes are in and we now have a USA Blueberry Council. This new organization, under the direction of the USDA, will collect assessments from blueberries produced in the United States, as well as all blueberries imported into this country.

This new organization comes at a perfect time, with interest in blueberries at an all-time high. The funds collected will be used for research, and to promote the great health value of blueberries.

The future looks great for all blueberry growers, thanks to the North American Blueberry Council for work done in the past. Now the USA Blueberry Council can increase efforts to promote blueberries on an even greater scale.

The formation of a USA Blueberry Council gives the Blueberry Council of Missouri an even greater opportunity to increase our state consumption of great Missouri-grown blueberries. We can let the "big boys" do the national promotions, and we can get the word out that the "best blueberries" are found in Missouri at the member farms of the Blueberry Council of Missouri.

If you are not a member, wouldn't this be a perfect time to join us?

Notes from the Secretary (Ronnie).

I hope by now everyone has reviewed the farm information on the trails brochure, and I have been contacted with any needed corrections and changes. The new Trails co-chairpersons Linda Jones and Juanita Steinbaugh have submitted an application to the Agri-Missouri matching funds program, and are awaiting notification of approval or denial for this project.

The Blueberry Council will again serve blueberry sauce for the Missouri Governor's Conference on Agriculture on Sunday, December 10. It is expected that around 1200 persons will be attending this event held at Tan-Tar-A. We have four volunteers, but it is always good to have some new faces. This is the Councils' biggest promotional event...so why not take part!

I may be reached during the day at (573)547-4502. My daytime phone and fax are the same number. Evenings (573)547-4448

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Farm Tour 2000

by Bob Hershey

Highland Blueberry Farm was featured on the Farm Tour 2000 sponsored by Missouri Farm Bureau Young Farmers and Farm Wives. In mid-August we had about 200 people in two separate groups tour our farm. Ronnie conducted the field tour and Bob had the shop set with his slide show on planting, pruning, harvesting, and bird problems. The equipment was washed, waxed, and lined up, and the sales office was in perfect form. One of the local banks had a refreshment truck following each group of tour buses. The Perry County Young Farmers who were the host for this year's tour, are to be commended on their planning for this event.

We know the folks that left this blueberry farm had a greater understanding of growing and marketing blueberries in Missouri. We also know everyone left knowing that growing blueberries is not a half-hearted venture.

Next year the Farm Tour might be in your part of the state. To host a tour group may take a little more effort, and a little extra clean up, but what better way to showcase your farm and Missouri Blueberries!

Plant Propagation II: Summer Greenwood Propagation of Woody Plants *by John Avery*

In this second of two articles on propagation of small fruit plants we will consider methods for the successful propagation of summer leafy cutting of the different small fruit species. As the title implies, the procedures used will take place during the active growing season and will require the use of a mist system. The active growing season lasts about six months. All species and/or cultivars will not root equally at a given time during this period. Some species may root better with softwood cuttings taken early, while others do better later in the season with more mature tissues. Some species require the use of rooting hormone for best rooting percentages and/or quality while others will root without the use of these hormones. We will look at the needs of each of the major small fruit plants grown in Missouri.

The first consideration is the source of your propagation material. It should be obvious that your mother plants need to be true to type or name for the cultivar. Mother plants should only be selected after they have borne at least one crop. Cultivar characteristics should be studied for each of the plants selected for use in propagation. Any plants that are suspect should not be used. Three to five years down the road is not the time to find out you have propagated something other than the cultivar you were interested in.

Only healthy plants should be chosen for propagation purposes. Any plants that have diseased leaves, stems or roots should be rejected for propagation. Mother plants should be fertilized well to encourage strong healthy growth. In some cases the plants should be defruited the year propagation is planned.

The collection procedure for propagation material is very important to the success of the project. Plant material should never be allowed to dry out or leaves allowed to wilt. Cutting material should be kept cool and moist at all times until placed in the mist beds. Bags with moistened paper towels or

newspapers can be used to store plant material as they are collected. The bags can then go into a large cooler where ice has been placed on the bottom. This will keep plant material cool during transport. Newspapers or towels should be placed directly over the ice so that cutting material will not come in direct contact with the ice. Cuttings can be trimmed in the field or you can wait until back at the greenhouse facility to do final trimming. Materials that are handled properly can be held for three to five days before placement in propagation beds.

Hormones are generally needed for best rooting of greenwood cuttings. The need for hormones is species and cultivar dependent. Indole-3-butyric acid (IBA) and Naphthaleneacetic acid (NAA) are the two most common hormones found in commercial rooting products.

Commercial hormone products come in two basic formulations, a dry talc powder mix and liquid formulations. The talc powder products comes in a limited number of concentrations while the liquid comes in a high concentration formulation which can be diluted to the desired strength. When using the talc powder formulations the cutting base should never be dipped in water before dipping in the hormone powder. This will result in the caking of powder on the base of cutting, resulting in damage or death of the basal tissue and loss of the cutting. The cutting base should be dry so that a very fine layer of powder is deposited on the cutting base when dipped in the hormone powder. Although not always needed to insure rooting of cuttings, hormone dips will speed up rooting and increase quality of roots on new plants.

Blueberry

Softwood cuttings root best from material taken during May and early June with decreasing success later in the summer. Dip the cutting's base in 0.8 % IBA in talc powder or similar strength liquid hormone. Cutting should be stuck in a peat/sand (1/1, v/v) mix in outside beds or in a greenhouse. Be sure not to use prepared soil-less mixes that have had the pH adjusted to 7.0. Blueberries need an acid soil environment of around 5.4 pH to grow best. New cuttings should be allowed to grow for one to two years before moving due to the very fine

root mass formed. In areas with hard water, an injection system may be needed to inject sulfuric acid to counteract the carbonates and minerals found in hard water.

Bramble

This group of plants include blackberries and raspberries plants. Generally blackberries are propagated by the use of root pieces while raspberries are tip layered. Both can be propagated by the use of four to six inch shoot tips. Tips can be collected anytime during the summer. The growing tip itself should be left on the cuttings with just enough basal leaves (about one inch or two to three nodes) removed to allow the base of cutting to be dipped in hormone and then stuck in the rooting media. A low concentration dip (1000 ppm or 0.1%) of IBA or NAA in talc should be used. Any course, well-drained potting mix can be used to propagate brambles.

Elderberry

Elderberry is a very easy plant to root. Hormone is not needed for good rooting success to occur, however, a low concentration hormone dip will speed up the process. Greenwood cutting can be collected as soon as mature leaves have formed. Two or three node cuttings should be collected, the soft shoot tips removed and discarded, and the basal leaves removed. Only the uppermost pair of mature leaves should be left. The leaves can then be reduced to a pair of leaflets on each leaf. Any well-drained, neutral pH potting mix can be used for propagation. Cuttings should root within two to three weeks.

Gooseberry (Currents)

Gooseberry is an easy plant to root. Cuttings can be collected in June and July when new shoots are 10 to 12 nodes in length. Basal leaves should be removed, leaving only two or three mature leaves near the apex. The soft shoot tips may be left or removed. A dip of 1000 ppm IBA will aid rooting.

Grape

Grapes are generally very easy to propagate from greenwood cuttings. Only cuttings with well mature leaves should be used, the apical two or three nodes with immature leaves and wood should be discarded. Cutting should be trimmed to two or three nodes with a leaf at the uppermost node. The

leaf should be cut in half to reduce transpiration loss of water. Hormone is not needed for good rooting success. A well-drained potting mix can be used for propagation. A note for those who may have an interest in our wild or native species of grape, if cuttings prove hard to root the use of hormone dips may be needed for successful rooting to occur. Start with a low concentration of hormone of about 1000 ppm, and increase the concentration until good rooting percentages are obtained. Some of our native species can be harder to root than are commercial cultivars.

Proper Storage Retains Vegetable Quality

by Gaylord Moore

Quality produce is a goal every grower is striving to obtain. Quality drives the market, sets prices and is important to retain customers. Quality is not only important at harvest, but impacts the storage life and quality of the crop after harvest as well. Knowing and following the storage requirements of vegetable produce is key to the ongoing success of the vegetable grower.

Placing good quality produce from the beginning into storage is an important factor. Produce maturity, freedom from defects and disease, plus proper sanitation are all equally important. However, all produce have minimal and optimal storage conditions that extend the quality of the product. Knowing and following the storage requirements for all produce will enhance your success for quality following harvest.

Different vegetables need different storage conditions. Temperature and humidity are the main storage factors to consider. There are three combinations for long-term storage: 1) cool and dry (50-60 degrees F and 60% relative humidity), 2) cold and dry (32-40 degrees F and 65% relative humidity), and 3) cold and moist (32-40 degrees F and 95% relative humidity). For cold conditions, 32 degree F is the optimal temperature, but it isn't easy to obtain unless refrigerated storage facilities are

used. Expect shortened shelf-lives for your vegetables as storage conditions deviate from the optimal, as much as 25% for every 10 degree F increase in the temperature. Some vegetables, such as cucumbers, peppers and tomatoes, require cool (55 degree F) and moist storage.

Without refrigerated units and controlled environments, storage facilities are often less than ideal. Different storage conditions can be found in a typical home. Basements are generally cool and dry. However, be sure and provide your vegetables with some ventilation. Crawl spaces under the house are often used for storage. Be sure these areas do not freeze thus reducing storage effectiveness. Home refrigerators are generally cold and dry (40 degree F and 50-60% relative humidity). This is fine for long-term storage of garlic and onions, but not much else.

Root cellars, which are often a thing of the past, provide cold and moist conditions. As with basements, provide ventilation and protection from rodents when storing vegetables in cellars.

University Extension can provide several different plans and ideas for storage facilities. Guides are available to help design and construct an outdoor pit, a storage mound, or even a house or outdoor cellar.

Some vegetables are more receptive to storage than others. For those hard to store items you may need to break out the canner or be prepared to freeze. Either way, local or home garden vegetables seem to be better or tastier and few people would argue that statement.

Bees - The Beneficial Insect

by Suzi Teghtmeyer

As we head into winter I am hoping for a cold one for no other reason than to kill off the chiggers, ticks and 'skeeters'! But we have to remember many of our favorite pollinators are insects, primarily bees. So, while buzzing about on the net I compiled a short list of informative bee-based websites to share.

Insect Pollination Of Cultivated Crop Plants by S.E. McGregor, USDA

<http://gears.tucson.ars.ag.gov/book/>

This site is actual a book, fully accessible over the internet. This marvelous site addresses many different crops with "Chapter 8" covering 17 different small fruits and brambles. Each fruit is profiled with its cultivation history, inflorescence structure, pollination requirements, and primary pollinators.

The Pollinator Home Page

<http://www.pollinator.com/>

This very extensive, multi-page site covers pollination for all levels between the new hive manager to the commercial beekeeper. The main page offers "Features", a site-wide search engine, and "Side Trips". Feature #1, the Managing Pollination link, will take you to sites such as "Crop by Crop" which highlights pollination sites of each individual crop, often listing many sites per crop. A short list of other choices from "Managing Pollination" include "Landscaping for Pollinators", "Why Manage Pollination?", and "Beekeepers Resources". "Side Trips" offers themes related to pollination. Examples include images and slide shows of pollinators, and evolution, history and myths of bees, and pollination theory.

Protecting bees when using insecticides.

<http://www.ianr.unl.edu/pubs/insects/g1347.htm>

University of Nebraska Extension offers this advice to help protect bees during a dangerous time for them.

Beehoo

<http://www.beehoo.com/>

"The World's Beekeeping Directory" offers information on a global scale. Historical information, research, pictures, and apiculture are just a few of the topics addresses, where the link will take you to sites around the world. The only drawback is that some of the sites are in their native language, but then there are many sites to peruse.

Missouri Department of Agriculture Striving to Increase Market Opportunities

by Tammy Bruckerhoff

Many of us have had our first frost, the leaves are turning brilliant colors, and winter will soon be setting in. As we hibernate in our houses for the winter, many of us think about what we can do in the future to make business better. This year, while the sun was still shining brightly and the heat was turned up outside, we started developing a couple of horticulture marketing projects at the Department of Agriculture to help farmers and producers gain new marketing opportunities.

The first project (which will soon have a name) is targeted at connecting farmers with institutions such as hospitals and nursing homes. Lauri Garman, Project Specialist, is working in Jefferson City with St. Mary's Health Center as our first pilot project. She has been meeting with their food buyer to find out what their fruit and vegetable needs are, and is working to find wholesale growers that can supply their needs. St. Mary's is very enthusiastic about working with growers, and hopes to have local foods offered in their salad bar starting next spring. As the relationships build, we hope to expand to other foods, such as honey, meats, eggs, grains, etc.

If you would like more information about this program, please contact Lauri Garman at the Missouri Department of Agriculture at 573-751-6808 or e-mail

Lauri_Garman@mail.mda.state.mo.us.

The second project is called Harvest Connection. Similar to the first project, the Harvest Connection will strive to connect farmers and producers to new markets. This project will not only focus on institutions, but will also invite restaurants, dietitians, grocery stores, etc., to be "connected." At the inception of this project, we will focus on fruits and vegetables, with the vision of expanding to other local foods.

Teresa Hoy has been hired to fill this part-time position at the University Outreach and Extension

office in Warrensburg. A grant from the USDA to the Missouri Department of Agriculture Market Development Division has made this position possible. Teresa will work closely with Ruth Anne Parrott and Tom Kerr of the Food Circles Networking Project, as well as myself.

Teresa will collect information from farmers every week about the products they will have available in the upcoming week. She will then distribute the information to restaurants, chefs, dietitians, grocers, and others interested in purchasing local food. It will then be up to the buyers to contact the sellers.

If you would like more information about Missouri's Harvest Connection, please contact Teresa Hoy or Ruth Ann Parrott at the University Outreach and Extension office at 660-747-3210 or e-mail ParrottR@missouri.edu.

You will have an opportunity to learn more about these projects at the Small Fruit Conference in February.

We look forward to working with fruit producers in these programs. While you're hibernating this winter, give us a call or drop us an e-mail and let us know what products we can help you market!

2001 Missouri Small Fruit Conference

The dates for the 2001 Missouri Small Fruit Conference have been set for February 19, 20 and 21 at the Clarion Inn and Convention Center in Springfield, Missouri. For information about the conference contact Mr. Patrick Byers, 1-417-926-4105, e-mail plb711t@smsu.edu. Those who would like to rent booth space in the exhibitors area contact Mr. John Avery, 1-417-926-4105, e-mail jda021t@smsu.edu. For currently updated information go to <http://mtngrv.smsu.edu/calendar.htm>.

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