



The Berry Basket

Newsletter for Missouri Small Fruit and Vegetable Growers

Volume 4 Number 1

Spring, 2001

Contents:

Nitrogen - A Major Macronutrient.....	1
Blueberry Council News.....	3
Pollinators for Small Fruit Crops 2.....	5
Good Agricultural Practices for Missouri Strawberry Growers.....	7
Vegetable Disease Management.....	8
New Primocane Raspberry Potentials for Colder Areas.....	9
A Prickly Subject - Brambles!.....	11
Southeast Fruit Growers Tour.....	12
Harvest Connection.....	12
Captan Registration.....	13
Missouri Small Fruit Growers Association.	14
Falling Fruit Lands Man in Jail.....	14
Crop Cart.....	14
Classifieds.....	15

From the Editors

by Marilyn Odneal

We all hope that the spring frosts have missed their mark this year and we can all look forward to a bountiful harvest!

Berry Basket Newsletter Staff:

Patrick Byers, Gaylord Moore and Marilyn Odneal
- editors.

Pamela Mayer - proofing, copying and mailing list.

Teresa Inman - posting and sending.

Please direct comments or suggestions to:
Marilyn Odneal, SMSU - Mountain Grove, 9740
Red Spring Road, Mountain Grove, MO 65711,
phone: 417-926-4105, fax: 417-926-6646,
e-mail: mbo774t@smsu.edu
internet: <http://mtngrv.smsu.edu>

Nitrogen - A Major Macronutrient

by Ben Fuqua

Nitrogen is a plant nutrient of particular interest to blueberry growers in Missouri. While some nitrogen (N) is required by all plants for growth and production, rather high amounts are needed by highbush blueberry plants. Currently in Missouri, nitrogen recommendations range from 60 to 120 pounds(#)/Acre(A), depending on soil type, soil organic matter content, and the age and vigor of the blueberry plants. In addition, nitrogen must be applied several times during the growing season to sustain healthy, highly productive blueberry plants. Nitrogen has many functions in plant metabolism, including amino acid and protein synthesis, nucleic acid formation, and regulation of carbohydrate assimilation. Nitrogen is also an integral part of the chlorophyll molecule, thereby playing a vital role in photosynthesis. Highbush blueberry plants use more nitrogen than any other plant nutrient, thus decisions concerning nitrogen sources, fertilizer rates, and the time of application can have a major impact on plant growth and berry yields.

Deficiency Symptoms: Inadequate levels of nitrogen in the soil result in an overall reduction in the growth and production of highbush blueberry plants. Smaller leaves, little or no new growth of shoots and branches, fewer new canes being initiated, and a lower number of flower buds being formed are just a few of the problems associated with low plant nitrogen content. In severe deficiencies, the plant leaves turn pale green to yellow (chlorotic), starting on the older leaves and

progressing to the younger ones. Leaves that are nitrogen deficient also tend to develop fall coloration and abscise much earlier than leaves on plants containing adequate nitrogen.

Nitrogen Sources: Most nitrogen sources can be used to fertilize highbush blueberry plants. However, some fertilizers are easier and more convenient to use than others. Some of the fertilizers are organic; some are chemical or synthetic. Some fertilizers are dry solids, while others are liquids. Each fertilizer has unique characteristics or properties that will dictate how and when to apply the fertilizers for best results.

Organic materials, such as feather meal, blood meal, soybean meal, and cottonseed meal are popular nitrogen fertilizers for blueberry plants. These fertilizers are solid, dry materials and can easily be broadcast-applied to the plant row. The nitrogen in organic fertilizers, however, is not immediately available or usable by blueberry plants. The organic forms of nitrogen must be converted (mineralized) by soil microorganisms before the roots can absorb the nitrogen for plant use. This generally requires from 4 to 12 weeks, depending on the type of organic fertilizer applied, the soil moisture content, and soil temperature. Thus, organic fertilizers must be applied several weeks earlier than comparable chemical fertilizers in order for the nitrogen to be available when needed by the blueberry plant.

Chemical fertilizers, in general, have higher nitrogen content than the organic sources and therefore, fewer pounds will be needed to supply the same amount of actual nitrogen to the plant. Urea and ammonium sulfate are the two dry, solid nitrogen fertilizers most often recommended for blueberries. Both fertilizers have excellent handling properties and are easy to apply to the blueberry row via broadcast applications. The current recommendations for use of urea and ammonium sulfate are based on the soil pH. Urea is recommended when the soil pH is less than 5.0 and ammonium sulfate when the soil pH is greater than 5.0. Since both fertilizers affect the soil pH, the selection of the proper fertilizer helps stabilize the pH, while at the same time supplying the plant with nitrogen. Ammonium nitrate is another dry, solid

nitrogen fertilizer that can be used to fertilize blueberry plants. While some researchers are reluctant to recommend ammonium nitrate because of the “nitrate” form of nitrogen, plants in Springfield fertilized with ammonium nitrate for the past 15 years show no adverse effects from its use.

Nitrogen solutions are becoming more and more popular as a fertilizer for highbush blueberry plants. Solutions have an advantage over dry, solid fertilizers as the nitrogen goes directly into the soil solution and is immediately available for absorption by the plant roots. Liquids can be sprayed or dribbled on the soil/mulch surface, or injected into the irrigation water (fertigation). While there are a few new nitrogen solutions that can be sprayed directly on the blueberry plant, foliar applications should be approached with caution as many nitrogen formulations burn plant leaves.

Rates: The amount of nitrogen applied depends on the soil type, percent soil organic matter, plant age, and the health or vigor of the blueberry plant. During the first years of establishment, blueberry plants need annual applications of approximately 60 # N/A for growth and new cane production. Producing plants also need nitrogen for growth and cane production, plus additional nitrogen for berry development and ripening. In most Missouri soils, the total nitrogen requirement for healthy, producing blueberry plants will vary from 90 to 120 # N/A. Nitrogen rates need to be slightly increased each year as the plants mature and berry yields increase (berry yields tend to level off after the fifth or sixth harvest year). Plants of low vigor or plants that exhibit nitrogen deficiency symptoms need more frequent applications or higher nitrogen rates than normal plants. A foliar (leaf) analysis is a good tool for assessing the nitrogen content in plants and helping assess the nitrogen status of individual plantings.

Timing of nitrogen applications: Highbush blueberry plants require different amounts of nitrogen at different stages of growth. Thus, the proper timing of nitrogen applications is crucial in providing plants with nitrogen when the nutrient is actually needed. A good way to time the fertilizer applications for blueberries is to correlate the plant growth/development to the activity of the root system.

Blueberry roots begin to grow in the spring when the soil temperature reaches approximately 43° F, corresponding to the time that fruit buds begin to swell and plants start to need nitrogen. The root activity peaks in late spring when the root zone temperature is between 55 and 65° F (plant growth stage of fruit set, berry development, and increased berry size), then slows as berries mature and ripen. Root activity increases again in early fall and continues until the soil temperature drops below 43° F. Root activity is greatest at bud break, berry formation/development, and after harvest, when blueberry plants form next year's fruit buds. Therefore, the recommended fertilizer application schedule of applying nitrogen at bud break, followed by two additional applications at 6-week intervals coincides to the time periods of highest root activity (nutrient absorption) and the greatest usage of nitrogen by blueberry plants.

One grower, Dr. C. L. Scrivner, has taken the "fine-tuning" of nitrogen applications for his blueberry plants even further. Dr. Scrivner applies 10% of the total nitrogen requirement during the 5 weeks after bud break, 49% over the next 6 weeks during berry formation and development, 23% during the 5 weeks of harvest, and the remaining 18% in the 5 weeks immediately following harvest. While this technique requires considerable effort and is literally "hand-feeding" the plant, Dr. Scrivner has been successful in reducing the total amount of nitrogen applied and yet has maintained high yields of quality berries. While other growers may not be able (nor want to) apply nitrogen by this schedule, Dr. Scrivner's work shows that timing the fertilizer application to coincide with the seasonal demand of nitrogen by blueberry plants can improve the overall efficiency of nitrogen use.

Summary: Highbush blueberries require large amounts of nitrogen for plant growth and fruit production. In Missouri, nitrogen must be applied to blueberry plants each year. Soil and foliar (leaf) analyses are extremely helpful tools in monitoring the nitrogen status of plants and in developing good nitrogen use strategies. But regardless of the nitrogen source, rates, or the timing method used to schedule nitrogen applications, the goal of nitrogen fertilization remains the same: provide the correct

amount of nitrogen at the time when the blueberry plant needs it for growth and production.

Blueberry Council News: Singing the Blues

by Jay Chism

I thought my title for this article might describe the way some of us look at our Blueberry Industry in Missouri. At the annual meeting this year, the Blueberry Council of Missouri asked the question; "Should we fish or cut bait?"

The general reaction was that it would be sad to see our small group fall apart. I remember when my wife, Mindy, and I started our greenhouse/farm in 1985. I remember the excitement, and I also remember the urgency to get started. The first crop I put into the ground was blueberries. I wanted to get them planted and be one of the first growers to reap the windfall of cash that we would receive from the fruits of our labor. I wanted to beat the competitor to this untapped market. I was not the only one that was excited. Many of you had new plantings or were just starting to get into the blueberry business. The growers in Arkansas were increasing every day and the Arkansas Blueberry Grower's Association was a real player in our area. It looked like we were ready to come into the industry and really challenge some of the large blueberry states.

Then something happened. We did not seem to be increasing our membership or acres planted. We did a great job of promoting blueberries, however. The Council has always been active with the state legislature and the officers of the past did a super job of getting our name and product out for people to see. Even so, our industry seems to have stagnated.

After being away from the Council for a few years, I was surprised when I went to the annual meeting and saw very few new faces. Where were those young people in their 20's eager to learn and hungry for information that the more "experienced"

growers have?

So the question I asked was “Why?” Was it the economy? The last 10 years have been financially good for many sectors of our economy throughout the country. Almost anybody will tell you that there are easier ways to make a living than farming and that includes blueberry farming.

Was it the introduction of newer varieties to other states like Florida and North Carolina that ate into our regional market potential?

Was it that we do not have any processors in our area to handle a larger blueberry crop than we can sell directly from our farms?

It could be a combination of all of these factors and probably many more than I can address with so little writing space. So, maybe these things answer my question as to why we are where we are today.

However, when I “Sing the Blues”, I sing them with enthusiasm! We are still at the beginning of a new and thriving industry. I am proud of all of the founding members of the Blueberry Council of Missouri. You should not get discouraged. I want to encourage you. You are pioneers, trailblazers, and I am truly blessed by all the hard work that many of you have contributed in the past. As the economy takes a down turn, I predict that small acreage farms like many of ours will again look to alternative crops for extra income. I also think that if new varieties can be developed for Florida and North Carolina, they can be developed for our area, adapted to our soils, to maximize production. And concerning processors not being here, there won’t be any until we show them that there is a need to be here.

So when you hear me “Singing the Blues”, I hope it inspires you. I think that this is an exciting time for the growers of the Blueberry Council. It’s a time when we must look to each other for ideas and camaraderie. To look at our growing markets and work together to find the most profitable solution to our individual needs.

The question is not whether to “fish or cut bait”; the questions we need to ask are:

- 1) When I expand, what varieties best suit my farming and marketing needs?
- 2) Should a group of growers combine their resources to purchase a mechanical picker?
- 3) How many acres do I need to bring into production to fill the local market in my area?

These are the type of questions I like to ponder. Let me know what you think. I hope throughout the year I will be able to visit Council member farms and find out questions you’d like answers to. Please contact me with your ideas!

Blueberry news bites:

Do you know growers who are not members of the Blueberry Council? Have them contact me, Jay Chism, at 417-673-3734, 417-673-5555, or 417-359-2947. Or leave a number where I may contact them!!!

AG Day at the Capital. Thanks to the Meyers’ and the Scrivners’ for joining my son, Patrick, and myself in Jefferson City to serve Blueberry Sauce over ice cream to the legislators. Also I want to thank Tammy Bruckerhoff and Sarah Shultz, who helped us arrange for so many items in preparation for AG Day. We had a great day and hopefully we will continue to build relationships with those members of the State Legislature that have an ear to our needs.

June is Blueberry Month. I need volunteers for the signing of the Blueberry Proclamation in May. I will contact members as soon as I find out the date of the signing from the Department of Agriculture.

Blueberry Council Banner. I would like to have a sign or banner made with the Blueberry Council name and logo so we can display it at special events. Comments? Suggestions?

Pollinators for Small Fruit Crops 2: Other Bees

by John Avery

The United States has many pollinating bee species with about 3500 native species and a dozen introduced species. These species are small colony social bees or solitary bees. I will discuss three major categories of species and ways to encourage or increase their numbers. The **bumblebees** are the large hairy bees you see all summer, the **soil nesting bees** are solitary bees which you may not notice and tend to be crop specific, while the **wood nesting bees** are a group of solitary bees which are not noticeable but one of which has become a significant pollinator in the United States.

The **bumblebees** (*Bombus* spp.) are large hairy bees common in the United States. These are social insects, which have colonies of 100 to 200 individuals. They are good pollinators of blueberries and vegetables, but can be seen on most other fruit crops and the legumes. Bumblebees are particularly good pollinators because they will forage at cooler temperatures and higher wind speeds than will honeybees. The bumblebees nest in old rodent tunnels or other cavities in the ground, which are dry and well ventilated. To encourage high bumblebee populations, areas of overgrown fence rows or field edges should be left where mice, moles, and voles can live and produce the necessary tunnels and/or nests for the new bumblebee queens in the spring. The next generation of queens is produced in the late fall and requires good nutrition at this time of year. Growers should encourage the production of wildflowers or other pollen/nectar sources late in the year to produce a continuing abundance of bumblebees. Wildflowers to encourage or protect are the goldenrods and asters. Leaving a late red clover bloom in pastures will benefit the bees. The down side to bumblebees is the low populations for the early spring blooming crops. Queens must establish and provision their own nest for several weeks until workers are produced. There are commercially available colonies of bumblebees available on a year around basis but they are quite expensive to buy or rent.

There are many species of **soil-nesting bees**, which on a per bee basis are far better pollinators than the honeybee. They do tend to be crop specific and need long-term undisturbed nesting sites with dependable food sources on a yearly basis. With small fruit plantings this is not a problem but with some of the annuals such as the cucurbits it can be difficult to encourage good populations without annual plantings. Identify the species visiting your plantings, learn their life history, and then plan to protect areas of nesting cover in order to increase populations.

The **wood-nesting bees** are a diverse group of native and imported species that are good pollinators of the crops they are attracted too. They utilize holes in wood made by beetles, nails or other means. Because they will make use of any hole of the proper size their numbers can be encouraged by placing blocks of wood with drilled holes in the field or orchard. Commercially there are several species of native and imported bees available to purchase.

The blue orchard mason bee, *Osmia lignaria*, is one of the native wood nesting species that has become available commercially in nest blocks for fruit crops. They are good pollinators of apples, peaches, almonds, currants, blackberries, raspberries, and strawberries. The blue orchard mason bee will accept a variety of nesting material including drilled blocks of wood, styrofoam, reeds, or paper straws. The nest needs to be protected from rain and direct sun. A source of mud should be readily available. The female bee makes her nest in a pre-existing hole in wood; they will not tunnel into the wood. The optimal hole size is 4 to 6 inches deep and 5/16 inches in diameter. The female bee will provision several cells per hole, using mud to separate the cells. When the egg hatches, the larva will feed on the pollen/nectar provisions until it is consumed. The larva then spins a cocoon and pupates. After several days the pupae molts one final time into the adult stage. The adult bee then goes into dormancy until winter is over. In the spring the adults emerge to mate and the female starts to look for nest sites and provision them.

Growers can provide the nest sites for the blue orchard mason bee and then hold the nest in refrigeration until needed in the spring. Nests should

be allowed to warm up about 10 days before the crop that needs to be pollinated blossoms. Studies have shown that 250 to 300 females per acre are needed for crops like apple. A nest block will contain 4 to 5 cells per hole with a 2 male to 1 female ratio. Nests should be stored in a cool dry place during the summer and then moved to refrigeration in the fall after all larvae have developed into adults. In the spring blocks can be moved to the crop a few days before bloom. The bees will use the old blocks again and new blocks can be added if increased numbers are desired or needed for the future.

Nesting sites for the blue orchard mason bee can be provided. Nest location should be close to the orchard site because the bees will not fly long distances like the honeybee. The nest should be secured to a solid object so that the wind will not cause it to sway. The nest entrance should face south or southeast if possible to catch the morning sun. Many materials have been used to construct a nesting place for the mason bee. The most structurally sound is wood with 5/16 inch holes drilled in a block of wood at a 1/2 inch spacing. Note that the wood should be plain and not treated. Treated wood can be fatal to the young developing larva. Other materials that have been used are hollow reeds, bamboo canes, and paper straws. Plastic straws are not suitable as nest material because they will hold in excess moisture, thus allowing fungi to grow and kill the developing larva.

There are predators and parasites of the blue orchard mason bee just as there are for the honeybee. The primary predator to consider with the blue orchard mason bee is a *Monodontomerus* wasp, which parasitizes the larva while it is developing during the summer. The wasp burrows into the wood of the nesting material and lays an egg on the developing larva. The larval wasp then feeds on the bee larva, thus killing it. The wasp larva matures and then emerges to start another generation. Three or four generations a year can result if the nest is not protected. The best protection is to remove the nest from the field as soon as the laying season is over in late May to early June. The nest can be stored in a warm, dry, dark room or building until fall and then transferred to a

cooler for storage over the winter. This will reduce the incidence of predation by the *Monodontomerus* wasp.

Mites are also a problem in the blue orchard mason bee and can cause reductions in the number of bees emerging in the spring. Wood blocks can make this a serious problem when used several years in a row. It is best to use new blocks each year or to clean old blocks after emergence and then use them the following year. Other materials generally do not have this problem because they are used once and then discarded.

There are many helpful web sites for those individuals who have access to the World Wide Web. A site on pollination botany with explanations and descriptions is located at http://koning.ecsu.ctstateu.edu/Plant_Biology/pollination.html. Sites on honeybee pollination and evaluating hive strength are available at Ohio State University's web page at http://www.ohio-state.edu/~ohioline/b559/559_6.html or go to the University of Georgia's site at <http://www.ces.uga.edu/pubcd/b1106-w.html>. For information on other bee species go to these sites for information; <http://pollination.com>, or <http://www.uidaho.edu/psu/Strickler/SolitaryBees/diversify.html> and finally <http://gardening.wsu.edu/library/inse006/inse006.html>. These sites have information on solitary bees and small hive social bees that are useful in crop pollination.

With the loss of hobby beekeepers and feral honeybees, the importance of commercial beekeepers and of native bee species in pollination of fruits and/or vegetables cannot be overemphasized. Growers need to know the basics of good pollination, what to expect from rented honeybee colonies, and how to encourage good populations of other bee species. In Missouri, growers generally have small acreages and there is available habitat for native species of bees to survive, but rented honeybee colonies can insure the best crop possible. Growers need to learn about pollination and the pollinators of their crops.

Good Agricultural Practices for Missouri Strawberry Growers

by *Patrick Byers*

A hot topic at the 2001 national meeting of the North American Strawberry Growers Association was food safety. Dr. Marvin Pritts and Ms. Elizabeth Bihn, both of Cornell University, presented timely information on this subject as it relates to strawberry growers.

Americans consumed 781 pounds of fruits and vegetables in 1997, and the trend is toward even higher consumption. While these fruits and vegetables are an important part of a healthy diet, produce-related food illnesses are unfortunately on the rise. On average, 76 million cases of food-related illnesses are reported each year, and 325,000 of these cases require hospitalization. Annually 5200 deaths are attributed to food-related illnesses. Estimates of the economic losses to producers and consumers from food-borne illnesses range from 10 to 83 billion dollars annually. Remember the outbreak of illness traced to strawberries in 1996? The strawberry industry lost \$50 million that year. The outbreak of illness traced to contaminated apple cider several years ago cost the company involved over \$12 million within 6 months of the incident.

Media attention related to fresh fruits and vegetables has focused consumer concern on produce-associated illnesses. Various types of bacteria, viruses, and parasites have been the causative agents in produce-associated outbreaks of illness. The reality is that certain types of produce, such as strawberries, are difficult to clean, and we can't completely eliminate the risk from raw fruits and vegetables. With these limitations in mind, what steps can a strawberry producer take to reduce the risk of food-borne illness?

The first step is to develop a food safety plan. This plan will include gaining knowledge of potential risks. All activities related to producing and marketing a fruit crop must be documented. The producer must also develop and implement good

agricultural practices. Let's discuss several of these practices.

Minimizing risk starts before planting. Select sites for production based on land use history and location. For example, has a piece of land been used for manure application? Is the site downstream or downwind from animal contaminants? Can contaminated surface water enter a site? Also, use careful methods of handling manure during site preparation. Proper composting, thorough incorporation, and proper application will reduce risks associated with manure. Store manure far away from production areas. Do not harvest fruits and vegetables within 120 days of a manure application.

Contaminated water that is used for irrigation or applications of crop protection chemicals can spread harmful organisms. Municipal water and potable well water are generally the safest water sources. Surface water, while a common water source for farm uses, can be contaminated. Test water sources at regular intervals for contamination. The water authority will provide tests for municipal sources. Test well water biannually. Test surface water three times in cooler growing areas such as Missouri – first at planting, second at peak use, and third at harvest. The EPA and other governmental agencies have established water quality standards for farm use. Use drip irrigation whenever possible – the edible portions of most crops are not wetted directly. Whenever possible, use potable water for overhead sprinkler irrigation. Consider not applying overhead irrigation within one week of harvest.

Do not apply fresh or slurry manure as a side dress to strawberries. Stay out of wet fields to reduce the spread of pathogens. Clean tractors or implements used in manure handling before entering produce fields. Do not allow poultry or other animals to roam in crop areas. Do not use weeder geese within 120 days of harvest. Minimize wild animal and bird traffic in production fields or water sources.

Provide clean, convenient, well-maintained toilet facilities for employees. Emphasize hygiene, and have adequate hand washing facilities and plenty of single use paper towels. Do not allow sick employees to contact produce. How long does it

take to properly wash your hands? Sing “Happy Birthday” to yourself twice to get an idea.

Harvest is a critical time for minimizing risks. Make sure that all flats, trays and harvest aids are sanitized before use, and clean these materials each day. Emphasize worker hygiene. In U-Pick operations, personal hygiene of customers is as important as that of workers. Provide adequate toilet facilities with liquid soap, potable water, and plenty of single use towels for customers. Encourage customers to wash their hands before entering the picking field. Do not allow customers to bring their own picking containers. Be sure to sanitize storage areas, such as coolers. Make sure that refrigeration equipment is working properly, and cool harvested fruit quickly. Whenever possible, use packaging that minimizes handling, such as plastic covered clamshells.

An excellent resource that discusses food safety in detail is **Food Safety Begins on the Farm – A Growers Guide to Good Agricultural Practices for Fresh Fruits and Vegetables**, available from Cornell Good Agricultural Practices Program at (607) 254-5383 or email eab38@cornell.edu.

Vegetable Disease Management Strategies

by *Gaylord Moore*

Agricultural enterprises including vegetable production will not realize its potential unless the grower initiates a plan. Production strategies are long range and may include several management procedures. This holds true for managing diseases in vegetable crops as well. The commercial grower must develop a plan using several techniques or tools to reduce the incidence of disease. Healthy plant material, disease resistant varieties, tillage, crop rotation, sound cultural practices and the use of chemicals are all tools used in disease management. Engaging these tools requires a lot of thought and planning. Those who give time and thought to all of these practices should certainly be more successful.

One of the fundamental prerequisites for a healthy crop is the use of healthy seed or transplants. A crop started with infected or infested plant material will result in low yields with poor quality. Purchasing

healthy seeds and transplants are a must. Using reputable seed companies and greenhouse operations for transplants are important management decisions.

The use of disease resistant varieties is among the most reliable and least expensive disease-control options. Resistance may be complete, where no disease symptoms occur, or incomplete, where disease symptoms occur, but the severity of the disease is much reduced compared to susceptible varieties.

Many plant pathogens overwinter in association with crop residues and are unable to survive once the crop residue is decomposed. Fall tillage will help reduce the inoculum that survive the winter. Rotating crops each year will also help reduce incidence of disease. The longer the wait before returning a field back to an original crop, the better the disease control. The same holds true with plant families. For example, the same disease may be present within botanically related vegetables such as potato, tomato, pepper and eggplant that belong in the Solanaceae Family. The Crucifer Family would include kale, broccoli, cauliflower, cabbage, Brussels sprouts, and radish. Other common botanically related vegetables are cucumber, squash, pumpkin, muskmelons, and watermelon.

Other cultural practices such as planting times, modifying irrigation methods, use of raised beds and altering plant density can also be used to make conditions less favorable for diseases.

Chemical applications are also important pieces in the puzzle for good disease control. Diagnosing certain diseases before applying any chemical is so important. Knowing how effective a chemical may be for certain diseases is also a must. Be aware of pre-harvest intervals before applying any chemical and read all label components on a chemical.

Vegetable growers, you need to be aware of the Midwest Vegetable Production Guide for Commercial Growers. This publication is a must for the commercial grower. To get your copy contact your local University of Missouri Extension Center and ask for publication number FMX-384. You may also visit this publication web site at:

<http://www.intm.purdue.edu/entomology/ext/targets/ID/index.htm> for reference.

New Primocane Raspberry Potentials for Colder Areas

by *Charlie O'Dell*

Editor's note: Charlie O'Dell is an Extension Horticulturist for Virginia Tech in Blacksburg, Virginia. This article was originally published in the Proceedings of the 2001 Missouri Small Fruit Conference, but has since been updated by the author from the original copy (#15 under "Some Primocane Raspberry Considerations" and revisions to the harvest-aid trellis). If you have the original proceedings, you may want to note the changes.

In this region, older raspberry cultivars (varieties) such as Heritage were late maturing, often 80% or more of the crop was lost to fall frosts before significant amounts of fruit ripened. Most growers abandoned such attempts to produce late summer - early fall raspberries with older varieties even though they found very high customer acceptance for raspberries in this later part of the growing season.

Please take time to "read up" on development of newer primocane varieties. Some, like Caroline, Polana and Autumn Bliss, are much earlier ripening than the older Heritage, allowing first harvests to begin in early August in many areas! Other fine fruit attributes include much larger berry size along with very fine flavor and appearance; features that are all welcomed by growers, consumers, and produce buyers. An exciting new primocane varieties performance test was reported by our Pennsylvania State University colleagues Barbara Goulart and Kathy Demchak from their several years' study in central Pennsylvania. Four years of harvest data were obtained from several new selections before the selections were commercially available, allowing growers over this region to get an early look at new varietal performance in colder areas of this region.¹

Also, one of the new selections was reported to be even later by some 5 days than Heritage, but to be of very large size and of very high flavor. This new golden colored one will soon be commercially available, named Anne (named by her husband, our own Virginia raspberry breeder/researcher, Dr. Herb Stiles, for his wife, Anne). Interest in such new, flavorful, large fruited, but later maturing varieties, may stimulate research and grower interest in possible use of late season high tunnels to increase

and lengthen the fall fruiting season and to make possible profitable yields of new, late season primocane varieties in colder areas.

Researchers at Cornell University, led by Marvin Pritts, and at Rutgers University, led by Joe Fiola, working with the late maturing older variety Heritage a few years ago, successfully used crop covers over the freshly mowed crowns in late winter to speed new primocane emergence and early season growth rate. They used the temperature-warming crop covers for the month of March, sometimes into early April (depending on spring's speed of arrival) to gain 2 weeks or more of earlier harvests compared to uncovered plots. We plan to work with this technique on this new variety Anne, because its outstanding size, appearance and flavor draw us to seek ways to make it productive in this region of cooler, shorter growing seasons! If necessary, we'll even trellis it and grow it as a summer-bearing type. Perhaps, like experimenting grower in Giles County, Virginia, Mr. Ralph Farley, we'll grow some by each production system in order to have fruit both early and late in the growing season.

You may wish to investigate and trial-plant these new varieties at your farm location. For your planning efforts I have developed the following 15 primocane raspberry planning considerations from our production experience here. Also included is a crop production budget scenario, developed with the able assistance of our Southwest Virginia Cooperative Extension Area Agent for Farm Management, Mr. Henry Snodgrass, and Kathy Demchak, Senior Extension Associate, Department of Horticulture, Pennsylvania State University. I have also enclosed data on blooming dates versus crop yields of several new varieties obtained from our colleague at Pennsylvania State University, Kathy Demchak. **Note:** Please don't try this crop without drip irrigation! Raspberry plants and fruit suffer under moisture stress more than other small fruit crops, especially under the hot late summer and fall fruiting period for primocane raspberries.

Thanks to the fine raspberry breeding team of Herb Stiles of VA Tech, Harry Swartz of University of Maryland, Joe Fiola of Rutgers and Brian Smith of the University of Wisconsin, consumers in this region may soon be able to find locally grown,

flavor-packed late summer raspberries. If these new varieties prove to be adaptable to both cooler and warmer areas, growers can begin successful production/marketing of this “new” crop of late season raspberries to our growing hoards of affluent urbanites.

Some Primocane Raspberry Considerations

1. Test plant to determine adaptability of these new varieties to your area, start small.
 2. High demand exists for locally grown raspberries, where/how will you market them?
 3. Off-farm marketing requires forced-air refrigerated cooling and transport.
 4. Distant-shipped only in ½ pint containers allows high prices for local sales, U-Picks.
 5. For local sales may be picked and marketed in 1 pint containers for greater sales.
 6. Drip irrigation required in this region, harvesting August, September, October.
 7. Not readily available in late summer from CA, Mexico, NAFTA, WTO!
 8. Raspberry growers in PA, WV, Northern VA retail fresh-picked at \$3 to \$4 per pint.
 9. U-Pick raspberry growers in this same region obtain \$1.50 to \$2 per pint.
 10. A perennial crown, up to 8 years of production from 1-time establishment costs.
 11. Grower-friendly, easy to manage, annual pruning by sharp mower in late winter.
 12. A harvest aid trellis should be installed on each row annually, see budget enclosed.
 13. No spring frost risk, blooms in summer, can use lower frost pocket sites.
 14. Income can begin the same year from April planting helping recover plant costs.
 15. Improved drainage from raised beds provides control of Phytophthora Root Rot, use strawberry bedder, drip tape off-center, 2” deep, rows 9’ apart, set plants 2’ apart in-row.
- Use 90 day biodegradable black plastic mulch for weed control first summer!

Notes on Construction and Annual Use of Harvest Aid Trellis for Primocane Raspberries
During the dormant season after mowing off canes in the late winter the year after planting, before really

heavy harvests begin, we cut 12” lengths of 2” diameter schedule 40 PVC, then cap the lower end of each 12” length piece. We drive each 12” length of pipe vertically or straight down into the raised row beds, slightly off-center of the buried drip irrigation tubing that is centered in each raised bed of raspberry plants. The lower cap may be glued onto each lower end to keep soil from filling the pipe as it is carefully driven into the soil down to the soil line. Cap, but do not glue the top cap, to keep soil and plant debris from clogging the pipe when it is not in use. Then, we obtain from our local building supply company 8’ lengths of treated 1.75” X 1.75” pickets (sold as “2” X 2” pickets”), #1 grade kiln dried, beveled edges, (current cost is \$2.69 each here, but they will endure for multiple-years use). Then we cut part of them into 4’ lengths, part into 24” lengths for cross-arms. Our raised beds and rows of primocane raspberries also are 24” wide, so the 24” long cross-arms keep the fruiting canes growing straight up, not angling out into the row middles. The middle space is needed by pickers, so keep those traffic lanes open. A 24” cross-arm length is double-bolted near the top end of each 4’ length of picket. Three-eighths inch diameter holes are drilled in the ends of each cross-piece for threading the support twine. Then, each year in early summer after most primocanes have grown 3’ in height or longer, before fruit weight pulls them downward, top caps are removed and saved as each piece of temporary trellis is placed upright into the PVC pipe. Then, heavy nylon twine is run through each end of each cross-arm so twine runs down both sides of each row to form a containment or harvest-aid trellis.

This harvest-aid trellis will keep fruiting canes upright and easily accessible to pickers, and also will keep row middles open so folks have room to travel up and down the length of each row to easily reach all fruit. Harvest efficiency is greatly improved along with customer satisfaction, especially with U-Pick enterprises. Place an upright trellis post every 30’ going down each row, about 160 to 180 T-bar posts per acre where rows are on either 9’ or 8’ centers. Growers have not found it necessary to brace the end posts, since there is little weight on the twine going down the rows lengthwise. After

harvest in the fall, cut the twine to remove it, then pull out the upright T-bar posts and store them in a barn, re-capping the top of each piece of PVC pipe as soon as you pull the post. Such a temporary harvest-aid trellis, stored inside when not in use, will last for many, many years of use.

Materials will cost in the range of about \$900/acre pro-rated over the expected 8 year or longer life of the planting, a bit over \$100/acre per year. Current costs, winter of 2000-2001 include:

1. \$364 for 135 of the 8' length pcs. of treated 1.75"X 1.75" needed per acre sold as pickets. 90 of them are cut in half, into 4' lengths. 45 of them are cut into 2' lengths for cross-arms.
2. 360 4" bolts, each with 2 flat washers and 1 threaded nut, \$144.
3. \$145 for 180' of 2" diameter PVC schedule 40 pipe needed per acre, priced in 10' lengths which you carefully cut into 1' pieces;
4. One or two 3/8" diameter wood drill bits, \$2 ea.
5. 5,445' of heavy nylon twine, similar to that used for string-weave tomato production, \$12.
6. 360 pcs of 2" pipe caps, PVC Schedule 40, \$0.79 each = \$285. Use a wood block or other pipe driving device to avoid splaying top end of each length of pipe when driven into ground, so pipe caps can be easily removed from top of pipe ends annually.
7. Your labor to cut, construct and install.

Concerning trellis needs: I have seen it tried by growers both ways, with and without a harvest trellis. I believe growers harvested several hundred dollars more fruit per acre where the trellis was used, simply by reducing loss from unpicked fruit. Berries that are left unpicked will quickly mold and rot, serving as inoculum sources for the rapid spread of Botrytis Gray Mold fruit rot. To me, the trellis does not, therefore, cost money, it saves money, each year!

¹ Goulart, B.L. and K. Demchak. 1999. Performance of Primocane Fruiting Red Raspberries. *Fruit Varieties Journal* 53: 32-40

(Editor's note: In Mountain Grove, our main problem with harvest season of fall bearing raspberries has been that the fruit ripens in the very hot part of summer, starting in early August, and fruit quality is affected.)

A Prickly Subject-Brambles!

by Suzi Teghtmeyer

I noticed the other day I didn't have many websites about bramble crops on my Fruit Links page [<http://library.smsu.edu/paulevans/frtlinks.htm>]. While correcting this oversight I decided to share with you many of them, primarily those Midwestern.

Brambles - Production Management and Marketing by Richard C. Funt et. al, Ohio State University Extension Bulletin 782-99

<http://ohioline.ag.ohio-state.edu/b782/index.html>

This is the premiere site I found on brambles. The address given is to the table of contents, with the information divided into 6 chapters. Topics covered include Selection and Care of Plants, Insect and Mites, Integrated Management of Bramble Diseases, and Marketing.

Fruit - Raspberries & Blackberries

<http://ohioline.ag.ohio-state.edu/lines/fcrop.html#FRU.6>

Ohio State University Extension has other Bulletins not associated with the site above, concentrating primarily on bramble diseases. The web address given compiles sites on the following subjects: Anthracnose [of Raspberry and/or Blackberry], Spur Blight, Orange Rust, Botrytis Fruit Rot "Gray Mold", Verticillium Wilt, Cane Blight, and Phytophthora Root Rot.

Home Garden Raspberries and Blackberries Gerard Krewer et. al, Cooperative Extension Service University of Georgia

<http://www.ces.uga.edu/pubcd/c766-w.html>

A nice publication for the home grower.

Organic Culture of Bramble Fruits - A guide

Prepared by Guy K. Ames, George L. Kuepper, & Holly Born of ATTRA.

<http://www.attra.org/attra-pub/bramble.html>

There isn't much in terms of organic bramble production on the web, but this extensive publication (19 pages printed) is enough to get you started.

USDA Risk Management Agency Feasibility Studies- "Bramble Fruits: An Economic Assessment of the Feasibility of Providing Multiple-Peril Crop Insurance for Raspberries and Blackberries."

<http://www.rma.usda.gov/pilots/feasible.html>

For something different and that has "intrigue value", I included a federal feasibility study on brambles. The study was published in 1996 and is 90 pages if printed.

Chapter 7: Brambles

<http://ssfruit.cas.psu.edu/chapter7/chapter7a.htm>

from "Small-Scale Fruit Production: A Comprehensive Guide", a Penn State Cooperative Extension Publication. This is actually the full chapter from this informative book. Fun fact: the site defines different bramble types including "Tayberries."

Pruning Raspberries and Blackberries in Home Gardens by David W. Lockwood

<http://www.utextension.utk.edu/spfiles/sp284g.pdf>

Agricultural Extension Service, University of Tennessee

An in-depth site with many helpful illustrations of different pruning and trellising techniques.

Virus Diseases of Brambles in the Midwest

<http://www.ag.uiuc.edu/~vista/abstracts/aVIRUS.HTML>

A 7-page document in .pdf format (click on the page image) from the Cooperative Extension Service, University of Illinois.

As a final note, the Fruit Experiment Station also offers two publications that are not online about growing blackberries and raspberries in Missouri. For more information contact Pamela Mayer, pam621t@smsu.edu.

Harvest Connection

by *Teresa Hoy*

The Missouri Department of Agriculture Market Development division and the University of Missouri Outreach and Extension are offering a new service called Harvest Connection. The program's intent is to connect Missouri producers to new markets, primarily focusing on restaurants in the Kansas City and surrounding area. Each week a list will be compiled containing producers' names, that week's available produce and phone numbers. The information will be faxed to interested restaurants. The restaurants will then have the opportunity to contact producers, place orders and set up deliveries. Harvest Connection is a resource service only, requiring no sign up fee or membership. Seventeen restaurants have already signed up to receive the fax list and new ones are being added on a regular basis. Twelve Missouri wineries are participating. Producers of fruits, vegetables, cheeses and other Missouri foods are still needed and can add their name to the fax whenever their products become available.

To find out more about Harvest Connection or to be listed on the fax, contact:

Teresa Hoy

Harvest Connection Program Coordinator

University Outreach and Extension

135 W. Market

Warrensburg, MO 64093

ph: 660-747-3114

toll free: 877-684-0669

email: hoyt@missouri.edu

Southeast Fruit Grower's Tour

The Southeast Fruit Grower's Tour will be held on Wednesday, May 30, 2001. The William Beggs Peach Orchard in Cape Girardeau, the Pioneer Apple Orchard and retail sales in Jackson, and the Iller's Berry Farm in Millersville will be toured. Contact Tim Baker, Horticulture Specialist, University Outreach and Extension, P. O. Box 160, Kennett, MO 63857, 573-888-4722 or e-mail BakerT@missouri.edu.

Notes on Captan Registration and Disease Control Recommendation for Small Fruit and Tree Fruit in the Year 2001

by Michael A. Ellis

A revised label for Captan fungicide on small fruit and tree fruit was submitted to EPA in 2000. I received a copy of this proposed label and was under the impression that it was approved and the Federal registration was granted. This was not the case, and the label is still in review and should be approved during spring or summer of 2001.

I coordinate plant disease control recommendations for the Mid-West fruit worker's group. This group represents fruit workers from Universities in several states across the Midwest. The group publishes a regional "Commercial Tree Fruit Spray Guide" and a "Commercial Small Fruit and Grape Spray Guide".

(Editor's note: These guides are the recommended guides for Missouri tree fruit and small fruit growers (excluding grape growers).)

The 2001 spray guides have the recommendations for the proposed Captan label incorporated in them. As of yet, the label has not been approved and all Captan products being marketed still contain the old (2000) label information.

(Editor's note: Captan labels and MSD sheets are available at <http://www.cdms.net/manufproducts.asp?product=captan>. Thanks to Suzi Teghtmeyer for contributing this link.)

The following changes (mistakes) were made in the 2001 spray guide and they need to be pointed out to growers:

Small Fruit:

1. Captan is not registered for use on brambles until the new label is approved. Several states have 24-C registrations for Captan and brambles so it can be legally used. The old reentry period is 4 days, so under the 24-C registration the reentry period is still (2001) 4 days. The new label proposes reducing the reentry interval on brambles to 24 hours.
2. No change on strawberry. Captan is registered for us on strawberry and the reentry interval is 24 hours.
3. On grapes, the reentry interval is still 4 days. The new label reduces the reentry interval to 3 days.
4. On blueberries, the reentry interval is still 4 days. The new label reduces the reentry interval to 3 days.

Tree Fruit:

1. On apple and stone fruit (peach, nectarine, plum and cherry) the reentry interval is still (2001) 4 days. The proposed new label reduces the reentry interval from 4 days to 1 day (24 hours) on apples and stone fruits.
2. No other changes have occurred in relation to Captan use on tree fruit.

I apologize for the confusion related to this mistake. It is important that growers remember that they must always read and follow the current label information on the product they are using.

Hopefully, the new registration will be approved this year. Our spray guides (recommendations) will be changed to accurately reflect the most current label information in 2002.

(Editor's note: You can access the commercial small fruit spray guide from the Publications page on our website at <http://mtngrv.smsu.edu/publications.htm>.)

Missouri Small Fruit Growers' Association

by Rex and Ginney Whipple

Here is a note to our Missouri small fruit growers. We both enjoyed working with everyone in the Missouri Small Fruit Growers' Association, but cannot do so anymore due to our personal situation. The Missouri Small Fruit Growers' Association has not assumed new leadership, so we have no choice but to discontinue its operation for now. We both hope that people interested in starting and running a group such as this one meet in the future to talk about how best to organize in order to promote our diversified operations and how best to get the information and support that we need. We wish you all bountiful harvests in the years to come.

Falling Fruit Lands Man in Jail

SINGAPORE (Reuters) - The negligent owner of a bag of durians — a spiky, pungent fruit the size of a soccer ball — landed in a Singapore jail for letting his parcel plummet from an apartment window, barely missing a construction worker.

The incident on December 29 led the irate worker to call the police but the owner of the bag, Lai Kok Hoong, retrieved the five durians and fled before they arrived, the Straits Times newspaper reported on Tuesday.

Lai was arrested two weeks later for stealing S\$230 (\$132) worth of goodies from a supermarket and later identified as the man who dropped his bag of durians from his apartment.

A district court sentenced Lai to 14 months in jail on Monday for theft and acting negligently with his durians.

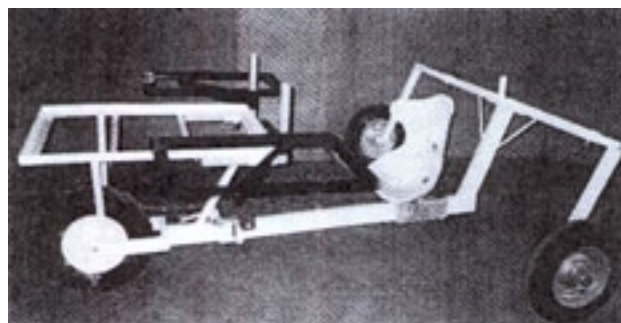
Singapore has tough laws against the dumping of objects or "killer litter," as the local media terms it, from the island republic's numerous high-rise residential buildings.

Thanks to Suzi Teghtmeyer, Paul Evans Library of Fruit Science, for submitting this article.

Crop Cart

Charlie O'Dell spoke on strawberries and introduced us to the Crop Cart by providing information at the 2001 Missouri Small Fruit Conference. Having planted, picked and weeded strawberries for a number of years, I thought that this would be nice to have! It is advertised to aid in the planting, weeding, deblooming, runner setting and picking of various crops including strawberries, asparagus, beans, peppers and cucumbers. Its specifications include:

- Spring-controlled tilting seat that adjust to the operator's weight and from front to rear
- Rear wheel width adjustable from 60 - 90"
- Frame ground clearance from 2.5 to 9"
- Center carry frame 24" X 30"
- Two picking frames 16" X 24" with adjustable height 12" to 20"
- Front tire 4:80/4:00- Agr. lug tread
- Rear tires 4:80/4:00-8 stud tread



Crop Cart

The Crop Cart is manufactured by Rusty's Ag Sales, 412 N. Seventh St., Fairbury, IL 61739. Call 1-800-373-2809 for pricing information.

Contributed by Marilyn Odneal.

Classifieds



For Sale:

A forty gallon self-contained stainless steel steam kettle for jam making, salsa making or other processing is pictured in the left column. Price is \$700. Contact Earnie Bohner, Persimmon Hill Farm, 417-779-5443.



For Sale:

A 22 acre berry farm, pictured above and below, for sale in north-central Arkansas. Call 870-425-7028 or go to <http://www.smittysupick.com>.



**COOPERATIVE EXTENSION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
UNIVERSITY OF MISSOURI
CLARK HALL
COLUMBIA, MO 65211**

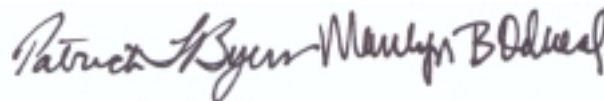
OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

Your editors of The Berry Basket:

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



Patrick Byers, Fruit Grower Advisor, and
Marilyn Odneal, Research Associate, Dept. of
Fruit Science, State Fruit Experiment Station,
SMSU, Mountain Grove,



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