

Contents:

Pruning for Profit	1
Selection and Routine Maintenance	
of Roses.....	3
Persimmon Update	5
Native Cut Flower Update	6
Phenology and Freeze	8
Horticulture Advisory Listserv.....	11
Strawberry Fertility	11
Starting Plants from Seeds	13
Two Seasons of Plasticulture Strawberries ..	14
Coming Events	15

Pruning for Profit

By Ben Fuqua

Professor, Soil Science

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“Pruning for Profit” is a borrowed (stolen?) phrase from a presentation I heard several years ago that seems very appropriate for Missouri blueberry growers since: 1) it is “catchy” and easy to remember, 2) pruning is one of the more important cultural practices in growing blueberries, and 3) properly pruned blueberry plants produce higher yields and better quality berries, resulting in (hopefully) more “profits”.

While pruning practices are neither exact nor perfect, there are several factors to consider in pruning blueberry plants. The goals for pruning blueberry plants are quite simple: remove damaged, diseased and unproductive canes, promote new cane growth, maintain plant vigor, and balance fruit production with vegetative growth. Deciding how to accomplish these goals, however, is sometimes quite difficult. Most highbush blueberry plants need some pruning each year, the extent depending on plant age, plant vigor, and overall growth habits of plants. Pruning will definitely reduce the number of fruit buds and subsequently lower the number of berries per plant, but the remaining berries will be larger and usually will ripen slightly earlier than fruit from unpruned plants. Pruning also allows better light penetration through the plant canopy into the center of the plant, thereby increasing the sweetness and improving the flavor of ripened fruit.

From the Editors

by Marilyn Odneal, Managing Editor

Winter is a the best time for introspection, self evaluation, and planning for the new year. Speaking of evaluation, we ask you PLEASE to fill out our Berry Basket evaluation form between pages 8 and 11 in this issue and either send it in - OR - drop it off at the Small Fruit and Vegetable Conference Registration Table - OR - fill out the evaluation form ONLINE at the evaluation link on <http://mtngv.missouristate.edu/newslet.htm> The evaluation is your ticket to GREAT PRIZES (like FESTival jam or a free soil sample analysis)!

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While pruning can be done any time during the dormant season, the best time in Missouri is during January, February, and early March (before bud swell). Pruning at this time enables growers to easily identify diseased or damaged canes, reduces the chance of freezing injury to newly cut surfaces, makes it easier (no leaves) to properly shape and thin the plant, and colder temperatures help lower the risk of spreading diseases from one plant to another. Pruning after growth starts should be avoided (except for tip-pruning) as developing buds and flowers can be easily damaged.

The flower buds for this year's fruit crop were initiated in late summer/early fall of last year. The buds are located near the tip of one-year wood (new growth) and under good growing condition every new shoot, including tiny lateral shoots, will set one or more flower buds. Since there are direct correlations between the size of fruiting wood and berry size (thicker wood produces larger berries) and the age of fruiting wood and berry yields (older canes are less productive and inhibit new cane production), selective pruning is needed to sustain high yields of quality fruit. Mature, producing blueberry plants should have a good balance of new and old canes.

Other Pruning Tips:

Young plants: Only limited pruning is required on non-producing blueberry plants. The emphasis during these early years should be placed on developing good, strong, properly shaped bushes, not production. Flower buds should be rubbed off by hand for the first one or two growing seasons (low-vigor may need three to four years) to allow plants to form a strong plant framework. Other pruning activities should be limited to removing diseased, broken, low-growing (less than 12" above the ground) canes, and thinning out any weak, twiggy growth within the plant.

Producing Plants: During the first two to three years of production, emphasis of pruning

should be placed on both plant development and berry production. Pruning activities will still focus on removing diseased, broken, low-growing canes and branches, but larger and stronger canes should be allowed to set an increasing amount of fruit each year (tipping or tip-pruning to remove a few flower buds may be warranted to balance fruit load). While the rate of plant growth varies greatly among blueberry cultivars (varieties) and from one blueberry planting to another, a 6-year old, healthy, blueberry plant should contain between 15 and 20 strong canes.

As blueberry plants age, more pruning is required. When pruning older plants, first use loppers to remove any damaged, diseased, weak or low-growing canes and branches. Remove 15-20 % of the older (6-year +) canes by cutting canes off at or below ground level. Cutting canes off too high above the crown encourages weak, twiggy cane growth and leaves stubs or stumps that rot and become sources of disease inoculum. If several older canes are present, remove the ones from the center of the plant first. This will allow more sunlight to penetrate the plant canopy and help with the ripening of berries. Use hand shears to complete the job by removing weak, twiggy growth, thin out the center of plants, tip-prune to remove excess flower buds (if needed) to balance vegetative growth with fruit load, and remove other broken or damaged branches.

Overall growth habits of different varieties also affect the type and extent of detailed pruning needed. Varieties such as Bluetta, Blueray, and Bluecrop often produce an excessive number of new canes year from the crown of the plant, necessitating the removal of some of the newer, weak canes. On the other hand, Berkeley and Coville produce most new growth off existing canes, therefore thinning weak, twiggy growth from interior branches of the plant, rather than completely removing the canes, is needed to balance vegetative growth and fruit load. Ideally, a mature highbush

blueberry plant should have an equal number of 1, 2, 3, 4, 5, and 6- year old canes. This balance can be maintained in subsequent years by removing 15-20% of the older canes each year.

Complete Rejuvenation: Rather severe pruning will often revitalize older plants and encourage new and more productive cane growth. When canes are cut off at ground level, a large number of new canes are usually produced that first summer. Select 6 to 10 of the strongest canes and remove the rest. Do not fertilize during the year of pruning. Return to a regular pruning schedule the following year by removing 15-20% of the oldest canes. Eventually these plants will become more productive, but growers should expect to lose 1-3 years of berry production.

Sanitation: Good sanitation is essential when pruning. All pruning tools should be thoroughly cleaned and sharpened so clean, smooth cuts that callus rapidly can be made. Cut at or below ground level when removing older canes and cut branches off as close to the main cane as possible. Avoid leaving short stubby wood. Disinfect all pruning equipment by frequently dipping tools into a disinfecting solution (20% bleach and/or 70% alcohol solution). Remove and dispose of all pruned material from the planting to help prevent spreading of disease inoculum to adjacent plants.

Summary: Annual pruning of highbush blueberry plants is required for sustained production of quality blueberries. Weather conditions or other uncontrollable factors that affected growth and production last year should not influence the extent of pruning this year. For U-Pick growers, prune with your customers in mind; make it easy to pick large-sized, quality berries. After all, satisfied customers make “pruning for profit” a reality.

Selection and Routine Maintenance of Roses

By Jennifer Schutter

*University of Missouri Extension
Horticulture Specialist*

The remarkable beauty, scent and color of roses make them one of the most popular flowers in the world. Cultivation of roses started in Greece and Asia about 3,500 years ago. Since medieval times, roses have been used as food and medicine. Healers believed roses could cure all kinds of ailments. Their nutritional value was confirmed during World War II when scientists discovered rose hips contain as much or more vitamin C than most fruits or vegetables.

So Many Choices.....there are literally thousands of roses available to modern gardeners. Luckily, these beauties are divided into distinct categories. Some of the most popular ones include:

Old roses are varieties that were introduced before 1867. These fragrant types include Gallica, Damask, Bourbon and Tea roses. They are hardy, more disease resistant and easy to grow, but not as showy as newer types.

Hybrid tea roses are the most popular rose. Their flowers are showy, and are used in arrangements. They can be more susceptible to disease, however, and need protection from cold winter temperatures.

Floribunda roses are a cross between hybrid teas and a low-growing hedge variety called Polyantha. They tend to be shrubbier and grow 2-3 feet tall, producing clusters of blossoms.

Grandiflora types were created by combining long-stemmed hybrid teas and the clustered flowers of floribundas. These roses can grow as tall as 6 feet.



Rose photo provided by Fran Boness

Shrub roses are large full plants that can be hybrids or naturally occurring natives. They're hardy in almost every Plant Hardiness Zone and often fragrant. Some new types are repeat bloomers.

Climbers produce long stems called canes that need to be supported, making them ideal for trellises, arbors and walls.

Roses are well adapted to many different environmental conditions, but they do need proper care after planting to develop into beautiful and productive specimens. Roses prefer a slightly acidic soil pH from 5.5 to 6.5. Once established, they need additional fertilizer for best performance. Generally, roses need a higher percentage of phosphorus than nitrogen or potassium. Therefore, analyses such as 5-10-5, 4-8-4, or 4-12-4 are good maintenance fertilization for roses. However, if unable to find fertilizers with these or similar analyses, a 1-1-1 ratio such as 8-8-8 or 12-12-12 may be used. Aged manure is excellent for mulch or for incorporating into the soil. Never use fresh manure as there is a chance you may burn your plants. Manure should be spread on the surface to a depth of 2 to 3 inches. The first application of fertilizer should be given in spring after the danger of a freeze is past. Additional applications should be made about every six weeks. It is best to

reduce fertility in the fall to help harden the plants for winter.

All roses benefit from mulching. Mulch should be 2-3 inches deep and placed over the bed or around individual plants. This helps keep the roots cool, moist and reduces watering. Keep the mulch away from the base of the stem to reduce rotting or disease.

Roses are susceptible to several insects and diseases. Most can be controlled with sprays available from garden centers or nurseries. The first step to good control is in identifying the problem. A successful control program includes a regular spray program, using the sprays carefully as indicated on the label. Thorough spraying of both the upper and lower leaf surfaces is important. Liquid sprays are generally more effective than dusts, especially for disease control.



New Dawn pink climbing rose in the Centennial Garden on the Mountain Grove Campus

Black Spot, a fungal disease, is one of the most troublesome pests of roses. As the name implies, black spots with fringed margins appear on the leaves. Spots enlarge as they develop, until the leaf yellows and finally falls off. This defoliation, if severe will weaken the plant, reduce flowering and make the plant more prone to winter damage. Plant roses where there is good air movement and where the sun hits the plant early in the morning to rapidly dry wet foliage. On the more susceptible varieties, a regular spray with a good fungicide is important. Cleanliness around plants is also important, since the fungus is carried over winter by dead leaves on the ground and infections on the stem.

Other diseases include rust, crown gall, anthracnose, powdery mildew, rose rosette and petal blight. Aphids are the most common insect pests of roses. Sometimes called the plant lice, they are soft-bodied, green, brown or reddish colored. They are usually abundant in soft growing tips and on the stem immediately below the flower buds. Severe infestations may deform the leaves, stems or buds. Several good insecticides are available for control. Begin sprays as soon as noticed in early spring.

Spider mites are another insect pest of roses, and often can be difficult to detect and control. Mites are very small, hardly visible to the naked eye. Tiny webs between veins on lower sides of leaves give indication. As mites feed, the leaves become yellowish and finally brown. Mites are most serious in hot, dry weather. When present, an effective miticide must be used frequently. In severe infestations, sprays about every four days will be necessary to clean up the pest.

To keep your roses looking healthy and productive monitor them regularly for insect pests and diseases, follow a spray schedule, and provide routine maintenance as needed.

Persimmon Update

By Patrick Byers

Fruit Grower Advisor

Missouri State University

Persimmons are a unique native tree, long enjoyed for the delicious flavor of the ripe fruit. Unfortunately, many of our wild trees produce fruit that is small, seedy, astringent, or just plain bad tasting. For many years I have fielded questions on native persimmons and their suitability for commercial production. In response to this interest John Avery and I decided to establish a persimmon orchard where we could test the best cultivars of native persimmon currently available. Over the years persimmon enthusiasts have collected superior wild trees, and several persimmon breeders have attempted to develop improved cultivars. One individual in particular, Jerry Lehmann of the Northern Nut Growers Association, has contributed greatly to the promotion of native persimmon, and we went to Jerry for assistance with this project. Jerry provided budwood and encouragement as we established the orchard.

The first step in establishing the orchard, which was to include only grafted improved persimmons, was to find a suitable rootstock. With Jerry's guidance, we collected seeds from a remarkable orchard, the Claypool persimmon orchard, near St. Elmo, IL. This orchard includes hundreds of persimmon seedlings, planted and nurtured by Jim Claypool.



Several extremely promising selections originated in the Claypool orchard. We gathered seeds from selection B-101 in fall 2000, stratified the seed over the winter, and direct planted 4 seeds at each tree site in the new orchard. The seeds germinated and the seedlings grew during the 2001 season. We selected the 2 strongest seedlings for use as rootstocks, and removed the remaining rootstocks.

With the input of several persimmon experts, including Jerry and Andrew Thomas of the University of Missouri, we selected 11 cultivars and selections for the orchard. The trees are replicated, which means that we included 4 trees of each cultivar/selection, and the trees were arranged randomly in the orchard. The cultivars and selections included Killen, Claypool A-118, Claypool H-118, Early Golden, Garretson, Lena, Rosseyanka (*a D. virginiana x D. kaki* hybrid), Wabash, John Rick, and Yates (sometimes called Juhl). We included a male selection, Claypool F-100, to provide adequate pollination (native persimmon trees are either male or female).

The two strongest rootstocks at each tree site were grafted in spring 2002, using a whip and tongue graft. Grafting was quite successful. The weaker of the two resulting trees was removed after 1-2 years of growth. The trees are on a windy site, and we staked the trees to allow for straight growth. The data that are collected annually on each tree include plant growth measurements, phenology, and insect/disease susceptibility. As the tree produce fruit we will include harvest information such as productivity and fruit size. We also hope to evaluate post-harvest handling, and possibly processing use of the fruit.

The 2006 season was exciting – we harvested the first small crop from the trees. The cultivars Lena, Killen, and Claypool H-118 produced fruit. I was impressed with the fruit size – Lena, for example, produced fruit that was 55 g/fruit. The harvest season began September 26 and concluded October 10. Stay tuned for more updates on the persimmon orchard in the future!

Native Cut Flower Update

By Marilyn Odneal
Horticulture Outreach Advisor
Missouri State University

A research planting designed to explore the use of native plants as cut flowers was established in 2006 and here are some first year observations. The project was sponsored by the Grow Native! program of the Missouri Department of Agriculture and the Missouri Department of Conservation and the State Fruit Experiment Station of Missouri State University at Mountain Grove.

The first challenge was the availability of reasonably priced plug plants for establishment. The majority of the plants were supplied by a native plant plug producer and were contract ordered in January. Additional treatments were supplied by a producer who supplied larger plants and by the George O. White State Forest Nursery. Fourteen native plant species were established in a randomized complete block design with three replications per treatment (species) at Mountain Grove and were planted in late May. Each plot is 10 feet long and has either 30 plants (herbaceous perennials) in three rows at 12 inch spacing or 3 plants (woody



Dallas Dawson harvesting Rudbeckia

perennials) in one row spaced 3 feet apart. We did not look at any annual species.

Six of the herbaceous perennial plants were harvested this first year and data has been recorded. Although we did not conduct a formal vase life trial this year, several staff members were very helpful and served as postharvest observers of bouquets on their desks. Here are some first season notes on them.

Aster oolentangiensis (azureus) - Sky Blue Aster (not promising)

Plots were established and rated very highly. Plots were harvested but mildew on stems, ranginess of plants, and short vase life indicate low potential. This species will be replaced by another in 2007.

Chasmanthium latifolium - Northern Sea Oats (already used in industry)

Excellent establishment. This is already used as a cut flower in the industry. The question here is whether marketing this species as native will improve its market value.

Helianthus salicifolius - Willow-leaved Sunflower (somewhat promising)

Excellent establishment. Flowers drop a great deal of pollen, so this may make the flower unsuitable as a cut. Foliage is attractive and we will harvest for foliage in 2007. A grower at a recent conference mentioned that her experience with the foliage was that it was short lived in the vase, and this will be observed.

Liatris scariosa - Eastern Blazing Star (very promising)

Establishment was somewhat difficult, but once plants took off, several flowered in 2006 and data was taken. The flowers are beautiful and long lasting. We established the plots using plug plants and plan to establish another earlier blossoming liatris with corms rather than plugs for better potential establishment.

Rudbeckia subtomentosa - Sweet Coneflower (very promising)

Excellent establishment. Several harvests this year. Some pollen drop, not as much as willow leaved sunflower but more than gray goldenrod. This variety according to Scott Woodbury of Shaw Nature Reserve is a stronger perennial than other Rudbeckias (e.g., hirta).

Solidago nemoralis - Gray Goldenrod (very promising)

Excellent establishment. Harvested 2006. Many soldier beetles (beneficial insect) as well as red wasps as it warmed up. The pests could be brushed off, but something to look at next year. Some pollen drop but not a large amount. A volunteer flower observer brought up the question as to whether hay fever would be a problem with this species. It is not, but rag weed blossoms at the same time and is usually the culprit. This may be a marketing issue.

If you want to follow this experiment, visit the website at <http://mtngrv.missouristate.edu/specialtycrops/> or contact me at MarilynOdneal@missouristate.edu If you are a cut flower grower who markets native cuts or is thinking of doing so, please join our interest group. Contact **Tammy Bruckerhoff** through <http://www.grownative.org>



Plug plants used for planting in the spring

Phenology and Freeze

By Marilyn Odneal
Horticulture Outreach Advisor
Missouri State University

Phenology is the interesting study of the seasonal development of plants and animals and how they relate to the environment and each other. In horticulture, phenologists record the timing of bud break, flower emergence or other events through the season. Different phenological events can be related to each other to help us manage our plantings with signs from nature.

Here is a weedy example of how phenology can help us garden. We know that crabgrass, an annual grass, germinates when soil at 4 inches in depth stabilizes at 55 degrees Fahrenheit. Although soil and air temperatures are not directly correlated, this particular soil temperature correlates roughly to when the forsythias are blooming. So if you are planning to use a pre-emergent herbicide, effective only when the crabgrass seed is germinating, pay attention to the forsythias! They bloom at the best time to apply the preemergent material for crabgrass control. In fact, most pesticide spray schedules are based on phenology rather than the calendar year.

Since fruit growers will soon be worrying about late freeze damage to emerging shoots and flowers this spring, it is a good idea know where to find information to help us through this hazardous time. The phenological stage of development for fruit crops has been related to "critical" temperature levels where cold injury may be expected. In general, as a bud, shoot or flower develops, it becomes less hardy and more susceptible to cold injury it becomes. Each phenological stage has different critical temperatures associated with it.

Here are some links to information with the relation of the stage of development of the fruit bud, blossom or shoot and the critical temperature at which cold injury will probably occur in late winter or early spring.

Tree Fruit:

Colorado State University Extension has put together phenology photos of tree fruit and related them to critical temperatures.

<http://www.colostate.edu/programs/wcrc/infopages/fruitphenology.htm>

Small Fruit and Grapes:

Sonia Schloemann's article "Critical Temperatures for Small Fruit" (Fruit ICM News 6(11) April 25, 2002) is online with tables of critical temperatures at different stages of development for strawberries, blueberries and grapes. Also provided is a table indicating the amount of water per hour to apply under several sets of conditions in order to adequately protect your crop if you are using overhead irrigation for frost protection.

<http://ipm.osu.edu/fruit/02icm11.htm>

Dr. Gordon Howell's excellent guide relating the stage of grape bud/shoot development to the critical temperatures in late winter/spring that may cause damage. He also differentiates between "white" and "black" frosts.

<http://web1.msue.msu.edu/fruit/grpfrost.htm>

Keep in mind that your set of circumstances will impact the severity of spring frost injury at your site, as well as Mother Nature. The links above are general guidelines. When your plants start developing in spring and you have a cold snap, make sure you note the stage of development as well as the low temperature at your site. The references above will help you decide what to do and will take some of the worry out of the spring temperature ups and downs.

Berry Basket Newsletter Survey

Dear Reader:

We need your input to make the Berry Basket Newsletter even better! **We need your input by FEBRUARY 14 in order for you to have the chance to WIN A PRIZE!**

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Please choose one of the THREE OPTIONS TO SEND YOUR INFO.

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<http://mtngrv.missouristate.edu/newslet.htm>

OPTION 3. If you are attending the **Missouri Small Fruit and Vegetable Conference** February 12, 13, 14, you can drop off your form at the registration desk (and forms will be available at the conference as well).

SURVEY QUESTIONS:

How do you get the Berry Basket? Please circle the number.

1. I subscribe to receive a paper copy.
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Please rate the following by circling the rating level:

The newsletter covers information of interest to me:

never seldom usually almost always always

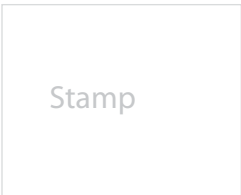
The Berry Basket is sent out in a timely manner:

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The overall quality of the Berry Basket is:

terrible poor fair good great

Please put additional comments on other side where indicated. Thank you!!



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Write additional comments here.

Horticulture Advisory Listserv

*By Marilyn Odneal
Horticulture Outreach Advisor
Missouri State University*

We have a new listserv to keep you up to date on happenings at the Fruit Experiment Station in Mountain Grove and related programs including the Department of Agriculture at Missouri State University. If you want to receive e-mails with information and reminders concerning our horticulture programs along with news items related to plants, please subscribe to the Horticulture Advisory Listserv at <http://mtngrv.missouristate.edu/Publications/HortAdvisory.htm>

If you use Internet Explorer, please see note in next column.*

After you subscribe, you will receive a confirmation e-mail from the listserv. All you need to do is “reply” to this e-mail leaving the subject line intact. You don’t have to type anything in. Once you reply, you will be put on the list.

This listserv is not set up for general conversation, so you cannot reply directly to the listserv group. However, you will be able to reply to the person posting the event information or news as they will supply their personal e-mail in the message. You can make suggestions to the listserv moderator for items to send to the group on horticulture events and news.

You will receive periodic e-mails from the listserv with information on unsubscribing or re-subscribing with a new e-mail address. If you have any questions about this process or the listserv in general, please do not hesitate to contact me at MarilynOdneal@missouristate.edu or 417-547-7513.

**For those who are using Internet Explorer Version 6 or 7, there is a glitch in this process that is easily overcome, but it can be confusing. Due to the way that Microsoft’s Internet Explorer handles browser security certificates, you may receive a warning or error when accessing the listserv website. When the warning page appears, you may take the option to continue to the Listserv site - even though the notice warns against this. You should be able to go on to the site with no problem.*

You may wish to take the following steps to avoid getting the message in the future:

- 1. The address bar will display red, and a certificate error will appear next to it. Click on the Certificate Error box to display details about the error.*
- 2. At the bottom of the Certificate Error window, click the option to View Certificates.*
- 3. The certificate details window will appear, with an option to install the certificate. Click the button to Install Certificate.*
- 4. A wizard will walk you through the certificate installation process. Take the defaults in each window.*
- 5. When you are presented with a confirmation to import the certificate, click Yes. Complete the installation by closing all of the remaining certificate windows.*
- 6. Restart your browser and reconnect to the Listserv site.*

Strawberry Fertility

*By Jay Chism
Agronomy Specialist
University of Missouri Extension*

Fertilization is an important part of strawberry production. It is critical to have a good understanding of the nutrient requirements of the strawberry plant in order to maximize the yield potential.

The best way to estimate the amount of nutrients available to plants is to take a soil test. A soil sample should be taken from the top 6-8 inches of soil where most of the strawberry roots are located. Be sure to take at least 10-12 core samples per acre and mix into one composite sample to be sent into a soil testing lab. Soil tests will provide recommendations on the amount of nutrients required for crop production. A soil test will also indicate the pH of the soil showing producers whether lime is required or not.

Nitrogen is very important during the establishment year of a strawberry crop. A new planting should be fed adequate nitrogen throughout the establishment year. When fruiting begins, nitrogen should rarely be applied during the spring season. Typically nitrogen is applied immediately after harvest. Around 50-70lbs/acre of nitrogen can be applied at this time. Soils with high organic matter content may require less nitrogen while sandy soils with a low percent of organic matter may require more nitrogen. Additional nitrogen can be applied in the fall if the planting indicates a nitrogen shortage. An application of 30-40lbs of N/acre should be adequate in most cases.

There are several sources of chemical fertilizers available; urea and ammonium nitrate are common examples. To calculate the amount of chemical fertilizer, multiply the amount of actual N desired by 100 and then divide by the percent of nitrogen in the fertilizer applied. For example, if you want to apply 70lbs of nitrogen per acre,

take $70 * 100 = 7000$. Divide 7000 by 34 if the nitrogen fertilizer you are applying is ammonium nitrate (34-0-0). Therefore, you would apply 205lbs of ammonium nitrate to get 70lbs of N/acre.

Organic sources of nitrogen fertilizer include well composted manures, feather meal, blood meal and cottonseed meal. It is still important

to know the percentage of nitrogen in organic fertilizer and make the necessary calculation to insure the correct amount of material is applied.

Phosphorus is also an important nutrient for plant growth. Strawberries, however, tend to have lower demand for phosphorus compared to other crops. A soil test will indicate the amount of phosphorus available for plant growth and fertilizers can easily be applied prior to planting. Strawberry plants that are deficient in phosphorus develop a purple cast on the older leaves. Apply phosphorus fertilizers with readily available forms of P such as superphosphate if deficiencies are noticed. Rock phosphate can also be applied as an organic source of phosphorus fertilizer.

While phosphorus demand is low in strawberry plantings, potassium is a nutrient that is needed in relative high levels. Potassium availability is dependent on the amount of organic matter, the soil texture and many other soil chemistry characteristics. Potassium is important in many plant processes, including enzyme activation, the opening of stomates, protein synthesis, and photosynthesis. Typically, potassium is applied as a pre-plant fertilizer. In most soils an application of 100lbs of K_2O is adequate for strawberry production, but a soil test is necessary to confirm the amount of fertilizer to apply. Potassium chloride (0-0-60) is typically used as a potash fertilizer. Greensand contains 9% potassium and is one option for organic producers.

An understanding of the soil factors that affect nutrient uptake is important in strawberry production. Management practices, such as tillage and irrigation, will also affect how planting are fertilized. Since an interaction occurs between all these factors, it is difficult to provide specific recommendations for each site. It is important to begin with a good soil test. This information is important to develop a starting point that will lead to a better understanding of strawberry fertility.

Starting Plants from Seeds

By Gaylord Moore

Regional Horticulture Specialist

University of Missouri Extension

Whether you grow for pleasure or profit, starting your own plants from seeds can be a challenge. Before you start, be certain to consider whether you have the correct growing environment to achieve adequate germination and healthy plant growth. Otherwise, you may want to leave the growing to the experienced greenhouse operators.

Small fruit growers who are thinking about adding vegetable crops to their operation should seriously consider contracting their bedding plant needs with local greenhouses.

First, expense of greenhouse construction may not fit your budget. Second, you may not have the expertise or time to grow healthy, vigorous transplants.

Almost everyone who has an interest in growing plants has tried starting plants from seed in their home. Maximize your success by following a few recommendations based upon direct plant needs.

Listed are several requirements necessary for good seed germination and healthy plant growth.

1. Start with quality fresh seed. Seed left over from previous years and not stored in an adequate environment may not germinate well.

2. Choose your growing container. The proper container helps seedlings get a good start and may save work in later stages of development. Any growing container should be cleaned before using. Sterilizing by washing with warm soapy water followed with a rinse of 1 part chlorine bleach with 9 parts water will help minimize potential diseases. Make sure the

container has drainage holes in the bottom or is porous enough to drain well.

3. Choosing the correct growing media is also important. I suggest soilless mixes that are prepared specifically for starting seeds. Soilless mixes are less likely to be contaminated with harmful diseases that may affect young germinating seedlings.

4. Be sure and watch watering techniques. Keep your mixes moist, but never soggy. A good rule is to allow drying between watering, but don't allow seedlings to wilt at any time. As mentioned before, make sure your container allows water to drain out so the seedlings do not sit in waterlogged conditions at any time.

5. Be aware of available light. Seedlings must receive bright light properly after germination. If a large, bright window is not available, place the flats under fluorescent lights. Place the seedlings about 6 inches from the light tubes, and keep the lights on for 14 to 16 hours each day.

6. Closely watch the room temperatures. Night temperatures should be about 60 degrees F and day temperatures, around 70 degrees. If temperatures are much warmer, the result will be leggy plants. Cool season vegetables may respond better to cooler temperatures, so adjust the temperature according to the crop you are growing.

7. Seedlings will need some fertilization. Totally artificial mixes need prompt and regular fertilization. Some soilless mixes have plant nutrients included so make sure you check the bag to see whether fertilizer is included. Soluble fertilizers high in phosphorus with a ratio of 1-2-1 are generally adequate.

Guide 6570 "Starting Plants from Seeds" is available through the local University of Missouri Extension Centers and on line at <http://extension.missouri.edu>

Two Seasons of Plasticulture Strawberries

By Jay Chism

Agronomy Specialist

University of Missouri Extension

As a partner in a plasticulture strawberry production system, our group is beginning our third season. I thought this might be a good time to share some observations about this new system and to discuss a few things we have learned from this experience.

In the fall of 2004, we planted 40,000 Chandler strawberry plants on the farm of Steve and Tami Fredrickson. The first season we were able to rent/borrow the equipment necessary to form the raised beds, inject methyl bromide and cover the beds with black plastic. We also borrowed a planter to transplant the strawberry plugs that we ordered through Goodson Berry Supply in Arkansas. Jim Goodson and the Arkansas Strawberry Growers Association (ASGA) were and continue to be a very good source of new information about plasticulture production. The association works closely with Barclay Poling from North Carolina, who spearheads much of the research being done on plasticulture production. My first suggestion is that new growers should consider joining the ASGA. It is well worth the association dues for the information you receive.

My second suggestion for beginners is to use strawberry plant plugs from a reliable nursery. We used plugs the first season, and while more expensive you will receive a plant well established and ready to be transplanted to your prepared beds. The second season we purchased tips and rooted the plant on the farm. The benefit of this is of course less cost initially, and having some control over final plant finishing.

My third suggestion is either to have a tractor with a creeper gear or add additional

seats to the planter before attempting to transplant the plugs. The first season we attempted to plant with only a two seated planter and a tractor without a creeper gear. The result was large number missed holes and many plants that were not set correctly. Even having someone follow the planter couldn't reset all the plants and hit all the skips. The second season, Bill Jenkins, Tami Fredrickson's father, joined our enterprise and purchased a waterwheel planter. On that planter, we added two additional seats, allowing each planter to only plant every other hole. The result is a plant that is set correctly with fewer skips in the field.

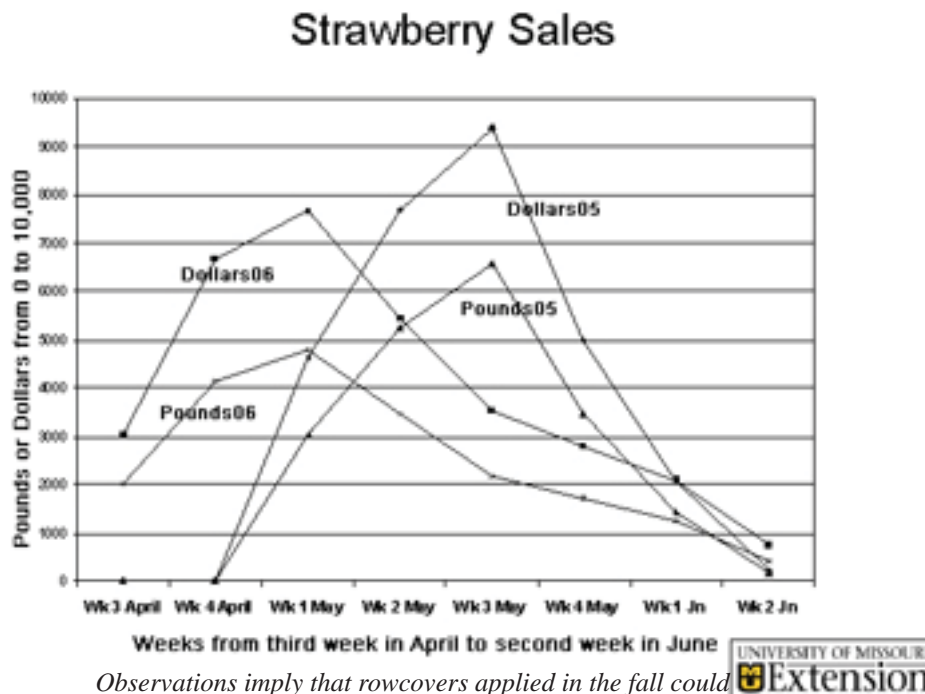
Another thing we have learned is that rowcovers are a 'must' for plasticulture strawberry production. The first season we opted not to apply rowcovers in the fall. The decision was probably made more from an economic standpoint than a plant management standpoint. Or in other words we didn't want to spend the money. We did, however, use rowcovers for frost protection in the spring during our first production year which is also an important function of these protective covers. The second season we did cover the plants in the fall after planting and the result was better quality plants coming out of the winter and an extended harvest season through earlier production. The "Strawberry Sales" chart on page 15 shows the early harvest when row covers were used the second production season.

Early production is one of the benefits of this production system. Learning how to manipulate the plant growth and protect the tender blooms from frost are just a few of the management decisions that need to be developed for anyone adapting this new system to Missouri. The earlier production is nice for strawberry growers where in some instances may see 10 days of rain during the peak picking season wipe out any hope for a profitable crop. Plasticulture with rowcovers does allow a grower to extend the season. Can a rain still spoil production harvest? Yes, but having extra weeks to spread out that

risk may be a good thing for many growers. This past season we did have a week of rain just as our berries were starting to reach peak production. The result was an estimated loss of 5000 lbs of fruit. A good week prior to that really helped offset some of the yield loss.

I do need to point out that the information provided is not research based information, and is not even from on-farm trials. The information is just to give some insight about observations we have made as we continue to tackle this new and challenging system. Our hope is to continue to improve on what we have learned and develop a reliable and profitable strawberry production system.

For more information about plasticulture strawberry production, contact Jay Chism at (417) 682-3579.



Observations imply that rowcovers applied in the fall could result in a two week earlier harvest.

Coming Events

Missouri Small Fruit and Vegetable Conference

February 12-14, 2007

Clarion Hotel and Conference Center
Springfield, Mo.

Sessions on strawberries, brambles, blueberries, vegetables, marketing, diversification, and more! Registration materials at:

<http://mtngrv.missouristate.edu/SFVC.htm>

Fruit and Ornamentals Pruning Day

Saturday, March 3, 2007

State Fruit Experiment Station
Mountain Grove, Mo.

Classroom presentation followed by hands-on learning basic pruning techniques.

Spring Horticulture Seminar

Saturday, March 31, 2007

9:30 am - noon

State Fruit Experiment Station
Mountain Grove, Mo.

Rain Gardens and Water Gardens are demystified in the classroom. A walking tour of the campus gardens and grounds will be held after class, weather permitting.

For information on these events, contact Pamela Mayer pmayer@missouristate.edu at the Missouri State Fruit Experiment Station, 9740 Red Spring Road, Mountain Grove, MO 65711-2999; telephone 417-547-7500; e-mail StateFruitExperimentStation@missouristate.edu <http://mtngrv.missouristate.edu/>

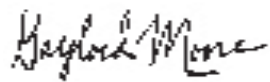
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