

# THE BLUEBERRY BULLETIN

*A Weekly Update to Growers*  
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## AT A GLANCE...

This is the last issue for the 2005 season. I wish you all a very safe and happy holiday season.

### Problem – Solution

In the fall it is wise to:

- 1) assess how well your herbicide program performed and plan adjustments.
- 2) Take soil samples to determine if pH should be adjusted (fall is best).
- 3) Use Ridomil where Phytophthora is present
- 4) Apply lime sulfur when 2/3 of the leaves drop to control Phomopsis, cane canker, etc.

### Disease and Culture:

*Dr. Gary C. Pavlis, County Agricultural Agent  
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**Lime Sulfur:** I have recommended the use of lime sulfur for Phomopsis control. The fall application should go on when 2/3 of the leaves drop. Some growers have balked at using this material because of its corrosive nature. A grower from Massachusetts wrote to me and says he has a solution to this problem. He says that, "before applying the lime sulfur, I first spray the tractor and sprayer with a light oil and then the lime sulfur comes off when I wash the equipment after application. What works best, believe it or not, is "PAM", which is a combination of vegetable oil and lecithin which are biodegradable and therefore not the environmental hazard that motor oil would be. Generic brands of this cooking oil are cheaper and are equally effective. I can cover my equipment with 3-4 cans for a total of about 6-7 dollars." Sounds like a good idea to me. I wouldn't want to do this for a weekly spray but lime sulfur is applied just once in the fall and once in the spring.

**Roguing:** Roguing of diseased bushes should be progressing. This is important in all varieties but should be done with extra care where blocks of Bluetta or Weymouth are located close to Blueray or Bluecrop. In the Pemberton area where there is still an appreciable acreage of Rancocas, varieties adjoining this old variety should be carefully inspected. In such situations there seems to be a more rapid spread of stunt disease. The Rancocas is very resistant to this virus disease but it is susceptible and may be a source of the disease without showing symptoms vividly. After many years of harboring the disease some Rancocas bushes are now clearly exhibiting stunt symptoms. All old plantings of Rancocas should be carefully rogued. Remember to spray diseased bushes before removing them. It is necessary to kill the leafhoppers and it is more efficient, more economical, and wise from the standpoint of conservation of beneficial insects to spray individual bushes rather than entire fields.

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**Disease Identification:** A few growers have asked me to provide them with information so that they are more able to identify the typical blueberry diseases such as Alternaria, anthracnose, Phomopsis, botrytis and mummy berry. I should just explain that the ability to positively identify a disease comes largely from experience. I once spent a few days looking at thousands of plants and tagging those with stunt while I was working on my masters degree in Arkansas. This experience was very early in my career and I accompanied Dr. Jim Moore from Arkansas and Dr. Al Stretch, USDA Pathologist. As a result of this experience, I have never forgotten what stunt looks like. This experience was invaluable and a grower who is not sure about disease ID should invite someone to his field who can spend some time and help him with identifications. This ability is critical in the choice of cultural and pesticide decisions.

Another aid to Disease ID are extension publications. The Highbush Blueberry Production Guide has photos and descriptions that will be of great value in disease ID. Also, Michigan State produces one called 'Blueberry Diseases in Michigan', Extension Bulletin E-1731. Write Michigan Cooperative Extension, Michigan State University, East Lansing, MI 48824. There is also the new Compendium of Blueberry and Cranberry Diseases. This is an excellent resource for growers and researchers alike. This manual is produced by the American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121-2097. It should be realized that there are many times where disease ID is impossible without the help of their cooperative extension office in these cases.

Dr. Marvin Pritts, Cornell University has developed a Web-based diagnostic tool to help the grower/educator determine what might be wrong with their berry plants - from pest injury to herbicide injury to nutritional deficiencies. By answering a series of questions about symptomology, one is led to a possible cause. The site uses lots of photographs and can be very useful. To access the site, go to <http://www.hort.cornell.edu> or <http://www.fvs.cornell.edu> and select "Resources." Then select "Berry Diagnostic Tool."

**Nut Sedge:** I visited a farm infested with nut sedge with our Weed Specialist last week and picked up a few things that maybe useful to growers fighting this weed. You may recall that I have recommended Sinbar for the control of this weed. Actually, I stated that Sinbar will do a good job if applied at the maximum rate but only on high organic matter soils. Applications are made as late as possible because nut sedge germinates about May 1. A combination of Solicam and Sinbar will result in early suppression by Sinbar until July 4<sup>th</sup>, and then Solicam will kick

in. The grower I visited last week did all this and still has a major problem. Dr. Brad Majek, our weed specialist, pointed out that Sinbar is very soluble and will not work when a trickle irrigation system is present, i.e. trickle + nut sedge = Roundup in early August. In addition, growers who have trickle systems would get better weed control from their herbicides if they would limit water applications in early spring when herbicides are first applied and are present. It actually might be a good idea to place the trickle tube at a 6 inch depth since herbicides work primarily in the top 6 inches of soil. Doing this may greatly decrease weed problems with trickle irrigation.

## **PRUNING BLUEBERRIES FACT & FICTION**

*By Dr. Gary C. Pavlis, Rutgers University*

New Jersey has approximately eight thousand acres of blueberries under cultivation and this is the primary crop for which I have extension responsibilities. Pruning continues to be little understood and poorly executed throughout the industry. In fact, it is rare to find two growers who prune the same. I would like to clear up a few misconceptions and try to outline a simple method of pruning blueberries.

The first place to start would be to discuss the importance of pruning. Growers often feel that pruning is of little value because the effects of the practice are not immediately apparent or dramatic. It should be noted that a well known blueberry researcher, Phil Marucci stated many years ago that there were a few factors which have greatly influenced the lack of increase in blueberry yield on a per acre basis over the last 30 years and pruning was the most significant factor.

More recent research has revealed that young canes are more efficient fruit producers than old canes. In fact, canes which are 3 to 10 years old allocate greater than 50% of applied water and fertilizer to fruit production. By the time a cane reaches 20 years of age, only 25% is allocated to fruit. (Water and fertilizer costs the grower money and there is no profit in the production of blueberry leaves.) Additional research compared three pruning types on yield and fruit size. Plants were 1) regularly pruned in a moderate manner such that one out of every six canes per cut out, 2) heavily pruned by removing 40% of all canes out every five years and 3) not pruned at all. The result was that the regular moderate pruning had the highest yield on the least number of canes. Research has also shown that as pruning increases, new cane production increases. These studies show us that young canes out produce old canes, the removal of one out of six canes produces the right number of new canes and the

highest yield and fruit weight is produced with regular moderate pruning.

It is also important to understand how a blueberry plant grows. Each year, canes are initiated from the base of the plant. Each succeeding year, the cane produces laterals, laterals produce laterals and so on. Each year the lateral production on any individual cane decreases in diameter, or put in other words, the wood becomes progressively twiggy. It should be realized that as wood becomes smaller, fruit size decreases. This is why we detail prune to increase fruit size.

With this information under our belts we can address how to prune. There are really 5 basic steps to keep in mind when approaching a bush which is to be pruned. 1.) Assess the plants overall vigor, is cane production adequate? 2.) Prune out all dead wood. 3.) Locate the oldest canes and prune out one of every six canes thus if the plant has twelve canes, remove two of the oldest. 4.) Prune out all low branches which will never be picked and are a source for disease. 5.) Detail prune, i.e. remove as much twiggy wood as time allows.

Armed with these basics, we can now deal with the different plant situations that arise. First, pruning young plantings has primarily the objective of establishing the plant to obtain full production as soon as possible. Thus, the first two years the procedure is to remove flower buds. Some growers cut off as much as the top half of the plant. This is really quite drastic. Rubbing off lower buds would be sufficient however in a big operation it is usually less labor intensive to cut the top 3-5 inches off each cane which will remove most flower buds. Any weak twiggy growth should also be removed.

In year three, a small crop is possible but not the expense of stunting the plant. Usually 1-2 pints/bush is the optimum and fruit should only be on strong wood.

The fourth and fifth year twiggy growth must again be removed as well as any lateral canes which have developed. Fruit production can be increased but the amount is dependent on the number of new canes which were produced the preceding years, 3-5 canes/yr is optimum. The blueberry planting should be in full production by the sixth year though there are numerous variables which will influence this timing. The most important of these being proper pH and nutrition, water management and the crop to cane production balance.

I have found it is also helpful to growers to discuss blueberry pruning strategies based on plant status. I do not believe there is a strategy for each variety though any one variety may fall into one of the following categories most of the time. For example, the variety Blueray often has a spreading or open habit in which canes tend to bend down to the ground. Plants of this type must be thinned to the 1

of 6 rule however canes that are bent over also tend to produce an upright shoot. These canes should be pruned just above this upright shoot to produce a more erect plant. Other varieties which often fit into this category are Berkeley, Bluetta, Coville, Weymouth and Patriot.

Varieties such as Bluecrop, Collins, Darrow, Earliblue, Herbert, Jersey, Lateblue and Elliot often fall into the erect plant category. These plants become overly dense in the center which decreases fruit bud initiation. The pruning strategy for this category is to remove older central canes before all others.

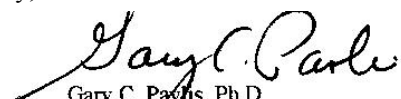
When plants are overly vigorous, the primary strategy is to remove entire canes rather than spend time on detail pruning. This is done at least until the proper fruit to cane production balance can be established through nutrition and fruit production management. Varieties which are prone to this situation are Earliblue, Collins, Blueray, Herbert and Collins though any variety can potentially be overly vigorous.

Weak plants are treated in the opposite manner. The primary procedure is to detail prune rather than whole cane elimination. Varieties which are classically put into this category are Weymouth and Bluetta.

I should take a moment to address the method of pruning on a field which has been neglected for a long time and needs to be rejuvenated. This question often comes up when a grower has purchased one of these fields.

The most important step is to inspect the plants in their field for virus symptoms. Any plant showing these symptoms should be pulled out. The plant inspections must be done during the growing season because symptoms are most easily seen on the leaves. The next step is to completely prune everything down to the ground, a chain saw is the quickest and easiest method. This pruning is best done in late winter. An application of a 10-10-10 fertilizer should be made in early April, usually at a rate of 400 lbs per acre. No crop will be harvested that year however the following winter the canes should be thinned to approximately 12-16 canes per plant. A full crop can be harvested that year. In summary, pruning correctly can 1) increase yield, by producing more young canes, 2) increase fruit size by producing more strong wood, 3) decrease disease by removing dead wood and, 4) increase cane initiation because as pruning increases, cane number increases. Pruning costs money, but it will cost a grower more if it isn't done and it isn't done correctly.

Sincerely,

  
Gary C. Parris, Ph.D.  
Atlantic County Agricultural Agent

## **INSECTS:**

*By Philip Marucci (Reprinted article)*

While pruning bushes this winter the observant grower might also be able to detect some marginal problems of blueberries. Two pests which should be looked for are **bud mite** and **bud gall**. See Gloria Jensen's drawings (on page 8) for help in identifying damage caused by these critters.

**Bud mite:** Bud mite is very tiny and inconspicuous, being only about 1/128 inch long. However, the plant reacts to the feeding of hundreds of the mites in such a way that heavy infestations may be suspected by the naked eye and confirmed with the aid of a hand lens. Even to the naked eye the heavily infested bud has a roughened appearance. Sunlight reflects from the many lens like protuberances, giving a distinct reddish glow. (In the winter with millions of little lenses on thousands of fruit buds, sunlight at the right angle can produce some strangely beautiful reflections. Enjoy the sight but be suspicious and check your fruit buds.) If you suspect bud mite or bud gall, take or send samples to the Rutgers Cranberry and Blueberry Lab, Chatsworth.

**Bud gall:** Bud gall is an interesting insect which has hitherto been found in heavy infestations only in wild blueberries and abandoned semi-wild fields. It is a tiny midge fly which lays its eggs in fruit buds in early August through September. In the act of laying eggs or in the feeding of larvae (or both) chemicals (enzymes) are released which cause abnormal (cancer-like) growth on which the larvae feed. In wild blueberries more than half of the fruit buds may be destroyed by bud galls. In abandoned fields more than 90% of the Weymouth fruit buds and more than 50% of the Rubels have been attacked in a single year. It is potentially a serious pest of cultivated blueberries in New Jersey but only a very few have been observed in regularly sprayed fields, usually along the edges where wild blueberries abound.

Be on the lookout for bud galls this autumn and winter. Not every fruit bud with some growth should be suspected. Many buds of early varieties make some normal growth in late summer and early fall at the same time that bud galls are causing abnormal growth. See Gloria's drawings for the distinction. The normally growing bud enlarges in length as well as girth and the bud scales are still tightly wrapped around the bud. In the abnormal growth the bud increases in girth more than in length; the shape is more globular compared to the more elongated normally growing bud. In the bud gall infested buds the bud scales are less tightly wrapped around the bud and their pointed tips extend above the bud like thorns. Tiny white larvae inside the bud are barely visible to the naked eye until mid November when they drop to the ground to make

their cocoons under trash, where they hibernate. Bud galls in the winter will have empty cavities or visible white larvae which are the parasites of the bud gall larvae and remain in the bud all winter.

**Blueberry stem gall:** Another gall, caused by a small wasp the blueberry stem gall, can be completely controlled by pruning. The peculiar kidney shaped enlargement of the one year old stem makes this gall easy to recognize. It is an inch to 1-1/2 inches long and contains several white larvae about 1/8 inch long. Jerseys are especially vulnerable to this insect and in unpruned fields as many as half of the stems may have galls. Pruned out stems will dry out and the larvae within galls will not survive for more than a few days.

**Gypsy moth eggs:** Gypsy moth eggs are very easy to detect in blueberries and their destruction should be part of the blueberry pruning process. Surprisingly large number of gypsy moth eggs are sometimes found in blueberry fields after pruning. The eggs are usually fastened to canes low in the bush. The egg mass contain as many as 800 individual eggs is tan in color, about 1/2 to 1 inch long and covered with a wooly like coating.

**Stunt & Red ring spot disease:** Advanced cases of stunt disease and red ring spot disease can be detected during pruning. The stunted bushes have very weak thin growth with very short distances between the leaf buds.

Wood of stunted bushes is less mature, greener and softer than healthy wood. In advanced cases of red ring spot disease the distinct red rings can easily be seen on the bark of the new shoots and sometimes even on the one year laterals. The suspected bushes should be marked for observation and confirmation of the disease next year.

## **DECONTAMINATING AND STORING SPRAYERS**

*Dr Andrew Landers, Cornell University*

### **Sprayer decontamination and maintenance**

Sprayers must be thoroughly decontaminated, inside and outside, after use. Regular maintenance of spraying equipment will prolong its life and ensure accurate trouble-free operation, enabling spraying to be done with the minimum loss of time and taking full advantage of favorable weather conditions.

NOTE: Read the sprayer manufacturer's instructions before beginning to wash out a sprayer. Wear protective clothing appropriate to the pesticide which has been used; this may include an apron, rubber gloves, boots and face shield.

It is important to clean everything thoroughly, including associated equipment such as mixers, the site where filling and mixing is done, and, of course, yourself.

#### **Disposal of pesticide waste**

REMEMBER cleaning up should be done in such a way that washings DO NOT enter public sewers or any water courses, nor fields which have under-drainage and certainly not catchment areas for boreholes or wells.

The safe disposal of pesticide waste is a serious responsibility for sprayer operators. It is important, therefore, that everything should be done to keep to a minimum the amount of waste generated. Remember pesticide waste is of four types: Concentrated products, diluted pesticides, including washings, empty containers and contaminated clothing and other materials.

Try to keep the volume of tank washings produced to a minimum. Special low volume, inexpensive washing systems are now available which comprise spinning nozzle(s), mounted in the tank. The device can be connected to a hose or water tank and water, after it has passed through the rotating nozzle(s) cascades down the inside of the tank walls.

#### **Preparation for storage**

Sprayer decontamination is as follows:

1. Any spray liquid or contamination left in the tank should be disposed of correctly.
2. Remove tank drain plugs or open drain cock.
3. Hose down inside the tank and outside, including the tank top, scrub where necessary or use a special low volume washing system.
4. Replace drain plug.
5. Remove suction, main and in-line filter elements; wash them thoroughly in clean water with a soft brush and replace.
6. Remove nozzles, nozzle filters and nozzle manifold end-caps if they are fitted. Soak them all in a bucket of water with appropriate cleaning agent recommended for the cleaning of spray machinery. Scrub clean with a soft brush.
7. Partly fill the tank and pump out to flush all parts. Ensure you open/close valves during the flushing procedure to clean out crevices. Do this more than once if necessary.
8. Refill the tank with clean water or a recommended cleaning agent, there are about a dozen commercial tank cleaners designed to remove or neutralize most of the modern low rate chemicals. If no cleaning agent is recommended, one gallon of household ammonia

per 50 gallons of water may be used. Do not use chlorine-based cleaners such as Clorox. Recirculate for 15 minutes, then pump a quantity through the pipes and spray bars. Leave the remainder for as long as practicable, overnight if possible.

9. Discharge at least one quarter of the contents of the tank through the system and spray bars. Drain off the rest.
10. Check that no deposits remain in the tank or filters. If there are any, they should be hosed down and scrubbed off.
11. Repeat steps 8 to 10 using clean water with the appropriate cleaning agent.
12. Safely store nozzles and filters, leave valves open and the tank lid loosely closed. Ensure that the sprayer is completely empty of water, particularly the pump. If you are unable to completely drain the system, you may consider using an antifreeze solution. An environmentally safe anti-freeze diluted to 50% may be acceptable, alternatively, RV antifreeze may be used but remember it can't be diluted and so make sure the system is drained of water. Currently RV antifreeze costs \$2.00 – 2.50/gallon from stores such as Wall Mart etc.
13. Hose down the outside of the sprayer, scrubbing if necessary.
14. Ensure the sprayer is parked safely and securely
15. Wash down waterproof protective clothing, apron, boots and face shield.
16. Wash inside and outside of gloves with soap and water; rinse and dry them.
17. Finally thoroughly wash hands, face and neck with soap and water.

#### **Mechanical maintenance**

Lubrication must be carried out prior to storage, check oil levels in the pump. Check the soundness of all mechanical components. Electrical connectors which operate control valves, spray monitors etc need to be cleaned and a non-conductive grease, available at an auto store, applied to prevent corrosion. Check wheels, wheel bearings and tire inflation.

#### **Storage of sprayers**

Store the sprayer under cover, taking care to prevent dirt and moisture affecting the tank or working parts. Remember, sunlight softens and weakens rubber materials and can degrade plastic materials. Storing in a building also allows you the opportunity to conduct any routine or pre-season maintenance.

## YOUR QUESTIONS ABOUT PESTICIDES ANSWERED

*Reprinted: American Institute for Cancer Research Newsletter, Fall 1998, Issue 61.*

There's no question that diets high in vegetables and fruits protect against cancer, as well as heart disease and many other chronic illnesses. But many people have questions about pesticides and other chemical residues in the food supply. Here are answers to ease many common concerns.

Q: Do pesticides and other chemicals in food increase cancer risk?

A: The scientist who reviewed over 4,500 research studies from around the world to develop AICR's report, *Food, Nutrition and the Prevention of Cancer: a Global Perspective*, found no convincing evidence that eating foods containing trace amounts of chemicals such as fertilizers, pesticides, herbicides and drugs used on farm animals changes our risk for cancer. Exposure to all manufactured chemicals in air, water, soil and food is believed to cause less than 1% of all cancers.

Q: How are limits on pesticides set?

A: The U.S. Environmental Protection Agency looks to animal studies to project the maximum amount of a pesticide residue that a person could consume daily during a 70-year life span without suffering harm. Once determined, the EPA sets the legal limit at a small fraction of that amount - generally 100 times lower.

In 1996, Congress passed the Food Quality Protection Act which is requiring the EPA to reassess all existing tolerances over a period of 10 years, starting with those believed to be most dangerous.

Q: Does buying organic eliminate pesticides?

A: Organic farming restricts or eliminates the use of chemical pesticides, fertilizers, herbicides and fungicides, resulting in lower pesticide residue levels in products. However, even crops grown by organic farming methods may contain some chemical residues. Foods may be exposed to contaminated rain water, irrigation water, soil or to chemicals carried from farm to farm by wind. In a recent test of over 1,000 pounds of produce, 25% of organic fruits and vegetables contained residues, compared with 77% of conventionally-grown.

Q: Are pesticides in food more toxic to children than to adults?

A: The Food Quality Protection Act (FQPA) requires that a pesticide must be shown to be safe for infants and children before used on crops. When effects on children are not known, only one-tenth of the amount

that is considered safe for adults is used, as added protection.

Q: Are imported fruits and vegetables safe?

A: In 1996, 38% of fruits and 12% of vegetables consumed in the U.S. were imported. Imports must meet the same standards as produce grown in this country, but inspection is often less than stringent. Take the same precautions with imported fruits and vegetables - tips are below - that you would with those grown domestically.

Q: What can I do to reduce chemical residues in the foods I eat?

A: Several simple measures can make produce even safer:

- Wash and scrub all fresh fruits and vegetables thoroughly under running water, removing the outer leaves of leafy vegetables.
- Choose produce that is free of hole or punctures where residue could have entered.
- Consider buying fresh and processed organic foods. Look for those marked "certified organic" - foods certified by a public or private certification agency to be grown with few or no man-made chemicals.
- Eat a variety of foods. The more kinds of food you eat, the less your exposure to any one pesticide.

## PREPARING FOR THE 2006 BLUEBERRY PLANTING

*By Dr. Richard Funt, Horticulture & Crop Science, Ohio State University*

Soil and site preparation before planting is one of the most important aspects of establishing highbush blueberries. Making the best choices during the preparation year and the year of planting sets the stage for the next 10 to 20 years of production. With investments in land, labor, plants, irrigation, and equipment, the establishment costs can reach \$6,000 per acre. In today's competitive global economy, considerable planning, thinking, and decision making are essential for success.

Highbush blueberries require a site that has at least a 160-day growing season. They require 750 to 1000 hours of chilling during the fall and winter. Flower buds can tolerate -15° F (-26.1° C) in midwinter; woody tissue can sustain -20° F (-28.9° C). Certain highbush blueberry cultivars may sustain a 24° to 28° F (-4.4° to -2.2° C) during full bloom. They grow best in warm sunny summers. Hot summers decrease flavor and firmness.

Blueberries grow best in well-drained, acid, sandy loam soils with an organic matter content between .4 and 7%. Organic matter can be increased by adding compost or peat moss to the row before or at planting. A pH of 4.5 to 5.5, if the organic matter is

high, is suggested. If the pH is high, it can be reduced easily in sandy soils with sulfur. Lowering the pH in clay soils can be difficult, particularly if they are saturated with calcium above 2,000 pounds per acre.

Avoid soils having a water table or poor internal drainage in the upper 14 to 18 inches of soil. Raised beds of 8 inches high and 48 inches wide are suggested for most Ohio soils. Raised beds should be prepared in the fall before spring planting.

Supplemental irrigation (trickle or microirrigation) is nearly always essential for maximizing production especially on raised beds. A water supply containing unchlorinated water with low salt and a low pH (below 6.0) is most desirable.

Reprinted: Northland Berry News, Summer 98.

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### **ANTIOXIDANTS AND BLUEBERRIES CONTINUE TO BE A HOT TOPIC**

As results of recent research concerning the antioxidant capacity of blueberries near publication, consumer and media interest in the healthful properties of blueberries continue to grow.

When tested for total antioxidant activity, in studies conducted at the USDA Human Nutrition Research Center on Aging at Tufts University, blueberries recorded the highest overall antioxidant score of some 40 fresh fruits and vegetables. Anthocyanin, the pigment that makes blueberries blue, are thought

to be the major contributor to the high antioxidant activity levels observed.

To illustrate the health potential of blueberries, Dr. Ronald Prior, director of the research, explains that just ½ cup of blueberries can provide as much antioxidant power as 5 servings of other nutritious fruits and vegetables such as peas, carrots, apples, squash and broccoli. “Of course”, he adds, “these foods supply other essential nutrients, so variety is still the key to a healthful diet”. To express it another way, the same ½-cup of blueberries packs the antioxidant punch of about 1000-mg vitamin C, a vitamin well known for its antioxidant prosperities.

Says Dr. Prior, “this research is still in its infancy; the ultimate goal is to see if people are protected from chronic diseases by eating blueberries. The animal studies that are underway show very promising results. In the meantime”, says Prior, “I’m eating blueberries everyday”.

Research findings to date from the USDA Human Nutrition Research Center are expected to be published in the Journal of Agricultural and Food Chemistry later this summer. Reprinted: The Calyx, August 1998, Vol. 5.3