

# Suggestions for Organic Blueberry Production in Georgia

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## **Abstract**

Organic food production is a niche market that is increasing at about 15-20% each year. It now constitutes over \$11 billion in retail U.S. food sales. Organic blueberries often sell for a premium of about 20% or more over conventional blueberries. Organic farmers are required to follow an ecological soil management program and are restricted in their use of chemicals to naturally derived fertilizers and pesticides. Organic certification and recording keeping is required for the crop to be marketed as organic. There is a three year transition period before the crop can be sold as “organic” during which premiums are low or nonexistent. Because most of Georgia has low blueberry maggot pressure and the bulk of our crop ripens ahead of the organic producers in Michigan and Oregon, Georgia may have good potential for organic blueberry production. The rabbiteye type should be easier to grow organically than the southern highbush type and is the suggested type for growers to try for organic production. Weeds, blueberry maggot, thrips and mummy berry disease appear to be the main limiting factors for organic blueberry producers in Georgia.

## **Markets for Organic Blueberries:**

Organic foods are only occasionally seen in rural Georgia markets so many people do not realize this market exists. However, in the cities and high income areas of the country there are many grocery stores devoted to the selling of organically grown foods. In addition, many Europeans like to purchase organically grown foods. Another significant market is to up scale restaurants. Many gourmet chefs like to cook with organic produce.

## **Greater Atlanta Markets**

In Georgia, Atlanta is a significant organic market. Chains such as Whole Foods carry organic produce. There is also a Saturday curb market know as the Morningside Market where producers can sell organic produce directly to the public.

### **National Markets and Prices**

A survey conducted by the Organic Farming Research Foundation indicates organic blueberry growers received between \$1.00 and \$ 3.50 per pound for their fresh berries in 1997. Average selling price was \$1.50 per pound (Anonymous<sup>3</sup>, 1999). Since 1999 prices has increased significantly. Wholesale prices for fresh organic blueberries are typically 20-100% higher than conventional depending on supply and demand. “In transition” berries typically sell for 20-30% higher than conventional (McInery, 1999). However, the availability of premium prices for “in transition” fresh blueberries is somewhat unclear. A realistic premium for fresh organic blueberries at this time is probably 20-60% above conventional blueberries (Klackle, 1999; Bocock 2003). Growers are more likely to receive a premium for organic blueberries when prices are low than high.

There is excellent potential for marketing frozen organic blueberries. Frozen organic blueberry prices parallel the conventional market, but are typically higher by at least 10-15 cents per pound (Morr, 1999). In general, processed organic produce sells for 20-30% higher than conventional. It appears there is no premium received in the processed market for “in transition” berries, so growers of processed berries would have to “bite the bullet” until the three year transitional period is finished. More information on this subject appears later in this publication.

### **Organic Farming-What is it?**

Organic farming is growing crops with an ecological soil management program designed to improve the soil. Cultivar selection, sanitation, tillage, and various naturally derived, organically approved compounds are used to control pests. Fertilization is provided by cover crops, manures, and natural ground rock compounds. Organic certification is required for the crop to be marketed in organic channels and receive top dollar.

### **Organic Certification Program**

Since organic farming is based on the development of the soil, growers are required to monitor the soil organic matter level annually until it reaches 2%. When it reaches 2%, it must be monitored every five years. The objective is to prevent “mining” of the soil organic matter. Organic matter can be increased in blueberries by the addition of mulches, manures for fertilization, and the growing of cover crops which is discussed later in this publication. An Organic Farm Plan is required of each grower to outline their plans for soil improvement and crop management. The materials which can be used in organic production are very restricted and governed by the Organic Materials Review Institute (OMRI) and Federal Organic Standards (FOS). Georgia

Organics is the organic organization in Georgia providing guidance and educational materials.

Organic production in Georgia is regulated by the Georgia Dept. Of Agriculture. Mr. Vernon Mullins is the program manager for organic production (1-800-786-0175). Organic growers must register with the Georgia Department of Agriculture. Certification can be obtained from any state or private certifiers that are accredited through the USDA National Organic Program and registered with the Ga. Dept. Of Agriculture. Organic producers are also required to register with the Ga. Dept. Of Agriculture. This registration is free.

Organic certification in Georgia is currently provided by several organizations including the Georgia Crop Improvement Association (phone: 706-542-2351 - Mr. Terry Hollifield-Athens and Mr. Johnny Luke-Fitzgerald) and Quality Certification Services (QCS - phone: 352-377-0133 or [www.qcsinfo.org](http://www.qcsinfo.org)). QCS is the certification program affiliated with FOG, the Florida Certified Organic Growers and Consumers, Inc. and follows the guidelines for production established by the OMRI (Organic Materials Research Institute). OMRI is a non-profit organization that specializes in the review of substances for use in organic production, processing and handling. It interprets the USDA National Organic Program rules with respect to generic materials and specific brand name products and provides guidance on the suitability of material inputs. Manufacturers can submit their products for review on a voluntary basis, and an OMRI review panel evaluates its compliance with USDA NOP rules.

OMRI has several excellent manuals listing all the materials that are cleared for organic use. (Phone: 541-343-7600 or [www.omri.org](http://www.omri.org)). QCS is ISO (International Organization for Standardization) Guide 65 accredited. Check with your broker or buyer before deciding which certification organization to use for your farm. Other certification organizations with international recognition are Oregon Tilth, Quality Assurance International (QAI), or Oregon Growers and Buyers Association (OGBA).

For QCS certification fees are as follows. Currently the cost is \$25 for the manual and \$50 for first time QCS application fee. Base farm application is \$150 annually for 0-100 acres. For 101-500 acres an annual fee of \$175 charged. In addition to the annual fee, a farm inspection is required. This is variable and based on inspector's fee for service plus expenses incurred by inspector. There is also an assessment of 1/2% of gross sales.

Packers and processors of organic blueberries must also be certified by QCS. If the processing facility is on farm, the cost is \$50 for gross sales under \$50,000, \$100 for gross sales between \$50,001-\$100,000 and \$150 for gross sales over \$100,001. The processing facility must be cleaned between runs of conventional and organic berries, so normally organic berries are run the first thing in the morning in facilities where both types are being packed.

### **Conversion From Conventional to Organic Blueberry Production**

A period of three years of organic management without the use of synthetic chemicals is required for the crop to be certified as "organic". However, any grower

who meets all of the provisions for organic certification excepting the passage of the chemical-free time period may market their crop using the words “in transition”, providing at least one year has elapsed since the last application of any synthetic chemical/pesticide to the land. Unfortunately there is not an “organic” market for processed berries during the transition phase. They must be “organic” for three years before organic processors will use the crop. One option would be to find a buyer who sells both conventional and organic produce and develop a relationship with this buyer during the transition phase (Johnson, 1999).

In the fresh market, berries may be sold as “transition year one”, “transition year two”, or “transition year three”. However, even in the fresh market, the potential to sell “in transition” fruit for a premium may be limited by the market situation. If there is an abundance of “organic” blueberries on the market, it might be hard to sell “transition” berries for a premium. If “organic” berries are in short supply it might be possible to receive a 20-30% premium for “in transitional” over conventional (McInerny, 1999). There are some organic berries in California and New Jersey, but most of the fresh organic berries are from Oregon, Washington, and Michigan. Georgia should have an excellent market window for fresh organic berries before the crops ripen in these states.

Growers have the option of starting new fields and growing the crop organically from the start or converting to organic production after the fields are established. Since weed control is a significant problem in young blueberry fields, and larger bushes are much more tolerant of weeds than small bushes, converting conventional established fields to organic production may be more feasible on some Georgia farms with heavy weed pressure than growing the bushes organically from year one. Prior to conversion to organic production be sure to eliminate as many perennial weeds as possible, especially bermuda grass and blackberries.

### **Leaf and Soil Sampling**

Leaf and soil samples are very useful tools in blueberry fertilization. Leaf samples should be collected from mature leaves in the mid-portion of current season’s growth the first two weeks after harvest. A double fist full of leaves should be harvested from across the field, washed in tap water, dried and taken to your county extension office. The computer print out you will receive from your county agent is based on what nutrient levels should be during this time period (Table 1). Generally highbush blueberries have a higher nutrient sufficiency range than rabbiteye blueberries.

Soil and leaf samples will not always have perfectly matching results. An element may be medium in the soil and low in the leaves, etc. Nevertheless they are useful in gaining a picture of what is happening in your fields and where the fertility program may need to be changed. One element that produces unreliable leaf results is iron. Plants growing at a pH above 5.3 will show iron deficiency but still have normal iron levels in the leaves. The iron is in an unavailable form in the leaf.

Table 1: Suggested critical nutrient levels in highbush and rabbiteye blueberry leaves

ELEMENT	DEFICIENCY BELOW	STANDARD RANGE FOR		EXCESS ABOVE
		Minimum	Maximum	
		HIGHBUSH AND (RABBITEYE)		
Nitrogen(N)	1.70 %	1.80(1.20)	2.10(1.70)	2.50
Phosphorus(P)	0.10	0.12(0.08)	0.40(0.17)	0.80
Potassium(K)	0.30	0.35(0.28)	0.65(0.60)	0.95
Calcium(Ca)	0.13	0.40(0.24)	0.80(0.70)	1.00
Magnesium(Mg)	0.08	0.12(0.14)	0.25(0.20)	0.45
Sulfur(S)	0.10	0.12(NA)	0.20(NA)	NA
Manganese(Mn)	23 ppm	50(25)	350(100)	450
Iron(Fe)	60	60(25)	200(70)	400
Zinc(Zn)	8	8(10)	30(25)	80
Copper(Cu)	5	5(2)	20(10)	100
Boron(B)	20	30(12)	70(35)	200
NA = not available				

Soil test levels can change with the season so sample each field at the same time of the year, if possible, so results from year to year can be compared. Generally, pH will be lower in the summer than the winter. Soil samples should be collected using a soil tube if possible or shovel if necessary. Sample depth for blueberries should be eight inches. A composite soil sample should be collected from each field or each five acre block of blueberries. If the field has variation in soil type or history sample these areas separately.

The samples or cores should be taken at random from the entire sampling area, and should be representative of the entire area. When all the cores have been collected they should be thoroughly mixed together. Samples bags are available at no charge from your county extension office.

## Fertilization Program for Organic Blueberries

Fertilization is very important for obtaining high yields in most Georgia soils. With annual crops it is common to grow a green manure crop with the manure and then incorporate it in the soil for the human food crop. However, with perennial crops such as blueberries direct application of manure, composted manure, pasteurized manure or animal by-products or nature mined materials is commonly used. Manures must be used in reasonable amounts. Also some marketing organizations do not allow use of fresh or composted manure, only pasteurized manure. **Check with your marketing organization before using manure.**

Organic cotton seed meal is another good blueberry fertilizer. Winter cover crops can also be grown using manure and then cut in the early spring to provide mulch under the blueberries and some nutrients as it decomposes. Because fresh manure can carry human pathogens it is required that fresh manure be applied to the crop at least 90 days prior to harvest and be incorporated into the soil. Properly composted manure can be applied without incorporation, but correct composting on farm is not so easy. Pasturized manure can also be applied without incorporation.

To calculate the rate of organic fertilizer application, consult the regular fertilizer recommendations for blueberries. Organic sources can be more efficient because they are less subject to leaching, so in theory you may not need quite as much organic nitrogen as chemical nitrogen. However, since weed growth is likely to be greater in the organic production system it is advisable to start with adequate nitrogen. Many organic fertilizers are also “slow release” and some of the nitrogen will not be available until the second year. As a guideline, mature rabbiteye blueberries require about 60 pounds of nitrogen per year on light, sandy soil.

If you are using broiler litter, take a sample to your local county extension office for testing. It varies widely in nitrogen content. Let's say the report comes back that it contains 1.4% nitrogen. Divide 60 lbs./ nitrogen per acre by 1.4 (% of N in broiler litter). The number obtained is 42.8. This means that 42.8 one hundred pound units (or 4280 pounds) of broiler litter required to supply 60 pounds of nitrogen. However, broiler litter typically has a nitrogen release rate of 70% in year one and 30% in year two, so additional nitrogen from another sources may be needed. Poultry litter may raise soil pH slightly, so it is not adviseable to use much poultry litter is the pH is high or almost too high for blueberries (above 5.3).

Poultry litter varies in analysis, but often is in the range of 2%N-2.5% K<sub>2</sub>O – 3% P<sub>2</sub>O<sub>5</sub> analysis. Broiler litter may be sufficient to supply the phosphorus and potassium requirements of the blueberry planting if medium or above levels of potassium and phosphorus are present in the soil.

An application of about two tons per acre could be made in late February prior to shallow incorporation in the row with a rotary hoe (Weed Badger) or Friday plow or covered with fresh mulch. Poultry litter could be shallow incorporated in the aisles with a rotovator, however only limited amounts of blueberry roots are in this zone. Be sure

to not cut too deep and damage the blueberry root system. Composted manure can be applied without incorporation, but it must reach a temperature of 131-170 degrees for 15 days and be turned five times during the composting process. Microstart 60 is pasturized, pelletized chicken litter with a 4-2-3 % analysis. Since it is pasturized it can be applied without incorporation, a major advantage in many situations. In this case, 1000 pounds per acre of 4-2-3 % would supply 40 pounds per acre of nitrogen. However, according to the company this material is released over a period of three years with about 40% in year one, 40% in year two and 10% in year three. **It is very important to check with your organic certifier before applying the manure. There are limits to the amount that can be applied.**

Supplemental potassium can be applied as mined potassium sulfate.

Supplemental phosphorus can be supplied by bone meal (1-11-0).

Balanced fertilizers such as Nature Safe 8-5-5 and McGeary Organics Production Prince 5-3-4 have been used with success in Georgia organic blueberry production. These balanced fertilizers vary in composition between brands but may contain meat meal, feather meal, blood meal or legumes as a nitrogen source, mined minerals for potassium and bone meal or mined minerals for phosphorus. Nature Safe has about a two month nitrogen release pattern.

#### *Possible organic fertilizer program for young irrigated rabbiteye blueberries*

Apply 1 ounce of 8-5-5 or 2 ounces of 5-3-4 per plant at bud break. Repeat in May, July and September (skip September in north Georgia). Spread the fertilizer evenly in a circle 24 inches in diameter with the plant in the center. **Do not pile the fertilizer around the base of the bush.**

#### **Succeeding Years-Standard hand applied rabbiteye fertilizer program with two to four applications per year**

If you are obtaining good growth (a foot or more per year) increase your fertilizer amount in accordance with Table 2. However, base your application on plant size, not age. It is very important not to over fertilize small size plants. On second year plants fertilize at bud break, May, July, and September (skip Sept. in North Georgia). On bushes three years and four years old which are in production, fertilize at bud break, May (optional) and after harvest in August. On bushes five years old and older, fertilize at bud break and after harvest in August. Diameter of the fertilized area should be increased by about one foot in diameter for each additional year of age. By the fifth year, apply the fertilizer in a large circle or continuously in the row (banded application).

When the plants are six years old, or six feet high, they are considered to be mature and you should be at your peak fertilization rate.

#### **Table 1. Rabbiteye blueberry hand applied fertilization with 8-5-5 or similar**

**materials. Years two through six.**

Age of Plant Plant Diameter	Plant Height	Amount of fertilizer per plant per application-use soil test to determine which material to use	Applications Per Year
1st Year	— 1 foot	(See previous recommendations)	
		8-5-5 5-3-4	
2nd year 24"	— 2 feet	1.5 oz 2.4oz.	3 or 4
3rd year 30"	— 3 feet	3.0 oz. 4.8 oz.	2 or 3
4th year 36"	— 4 feet	4.5 oz. 7.2oz.	2 or 3
5th year 42"	- 5 feet	6 oz. 9.6oz.	2
6th year 48"	— 6 feet	8 oz. 12.8 oz.	2

Composts an probably be use as a fertilizer source for blueberries, but as soil amendmets they should be used with caution. We tested three inches of compost mixed with the soil for blueberry production. However, it raised the pH of the soil excessively and held too much water. A trial is suggested before wide spread use.

Some suitable nitrogen sources could be:

Blood meal- **13%** nitrogen-2% phosphate-1% potash

Broiler litter -average :**1.4%** -1.85% - 1.55%

Feather meal **12%**-0-0

Fish meal-**10%**-4%-0%

Soybean meal

Organic cotton seed meal-**6%**-3%-1%

Not recommended is layer manure (contains high level of calcium), cow manure in

large amounts (high pH), or horse manure in large amounts (high pH). Cotton seed meal can not be used unless it is from organic cotton.

Some suitable phosphorus sources are:

Bone meal: 0%-**28%**-0%

Broiler litter-average: 1.4%-**1.85%**-1.55%

Rock phosphate: 3 to 26 % available phosphorus

Some suitable potassium sources are:

Broiler litter: 1.4%-1.85%-**1.55%**

Potassium sulfate, mined, non-synthetic: 0%-0%-**50%**

Potassium magnesium sulfate, AKA Langbeinite, AKA Sulfate of potash magnesia:  
0%-0%-**22%**

Seaweed powder

## **Pest Control**

Compounds for pest control are divided into two categories. "Allowed" compounds can be used if you follow the recommendations. "Regulated" compounds may be used only with certain restrictions. Several regulated materials are discouraged in organic production, and they may be used only if no alternatives are feasible.

## **Weed Control**

### **Outline of two weed control programs**

Two potential different weed control general programs could be used.

1). Cultivation or 2). Mulching. Cultivation has the advantage that rotary hoes (i.e. in-out hoe, Friday plow or Weed Badger) could be used at reasonable cost to clean up the area under the bushes each winter. In most Georgia fields, cultivation only under the bushes would be recommended. In the aisle, a winter crop of rye could be grown. This would be mowed down in early spring. In the early spring a preemergent application of corn gluten could be applied in a band under the plants. Corn gluten supplies nitrogen and also has some preemergent weed control (see below). During the summer, the worst weeds would be pulled, hand hoed, weed "wacked", cut with mower head attached to a rotary hoe, or cut with an under cutter blade attached to a rotary hoe. There are now several postemergent "burn down" herbicides cleared for organic use and OMRI approved. These materials are expensive, but could be used for spot sprays of problem weeds. Information on these materials is listed below.

Extreme caution must be used in operating a rotary hoe with teeth around young bushes, since it is easy to damage the root system by cutting the roots and bumping the

plant. On older bushes, use of a rotary hoe during fruit season is usually not recommended because the canes are laying in the aisles and possible root damage. If you are using a rotary hoe with teeth during the summer, wait until after harvest and set the depth control very shallow (about one inch) to minimize root damage.

The blueberry field on a fairly flat, well drained site could also be planted on the “square”(6' x 12') and cross cultivated during the end of the dormant season with a rotovator or harrow with good depth control. The cultivation would need to be extremely shallow near the plants, no more than one or two inches. A winter cover crop of rye could be planted during the fall. With a narrow wheel base (4') tractor this might be an option. If a standard tractor (6' wide) is used, the distance between the bushes in the row could be increased to 8' feet. Cross cultivation would only work well on sites with good drainage where no bedding is required. A water drainage furrow could be installed on the last pass. See the section below on **aisle maintenance** for cover crop options. All drip irrigation lines would need to be buried at least eight inches deep. Overhead irrigation risers would need to be placed near the bush. During the summer, close mowing could be done in both directions.

Organic mulching has the advantage of improving the organic content of the soil and conserving moisture as well as providing significant weed control if sufficiently thick. The disadvantage is that it should not be used with cultivation, since many blueberry roots will grow into the mulch layer and mixing soil with the mulch allows for weeds to germinate. During the summer the worst weeds could be hand pulled or cut with a mower attached to a rotary hoe. Organic “burn down” materials listed below can also be used. They are expensive, but should be very useful for spot sprays of escaping weeds.

Over the last few years we have conducted several mulching trials on both young and mature on organic blueberries. Pine straw was an excellent mulch for blueberry establishment, since it provided good weed control with little or no nitrogen tie up. We did not test pine straw on the mature bushes, but weed control on mature bushes was good with course pine bark (4 inches) and wheat straw mulch (4 inches after settling). The wheat straw also enhanced blueberry shoot growth in the year of application. It deteriorate in the second year, but the mulched area had a significant reduction in weeds ever in the second year. Mulching with pine bark nuggets or pine needles will prevent many weeds from germinating. A layer at least four inches thick (after settling) is required for good results. About one inch of pine bark nuggets or two inches of pine needles will need to be added each year to maintain the mulch. Weeds that come through the mulch should be hand pulled, hoed or spot sprayed with organic “burn down” materials.

Mulching with plastic nursery ground cover if also permitted. Nursery ground cover can be used and should last for four or five years. The material can be installed with a plastic mulch laying machine or by hand. A drip irrigation tape is placed under the ground cover at the time of application. After laying the ground cover, an “X” is cut in the material, the plant set and a shovel of pine bark placed around the plant to seal the planting hole. This might be a good material for establishing new plantings.

Blueberry growth in our preliminary trial has been almost as good as pine straw. A low cost type costing only about \$.03 cents per square foot (Geotextiles, Enigma, Ga.) was used in the trial . When the material starts to deteriorate, the ground cover must be removed.

Mulching with plastic mulch like the type used in strawberry production is also feasible to help get the plants off to a good start. The primary problem with this type of mulching is the fact it limits movement of rain and fertilizers into the bed. Water must be supplied by a drip tape under the plastic. Most of the fertilizer is put down preplant, but it should be possible to inject manure teas or fish emulsion into the irrigation system after planting. White-on-black plastic or black plastic can be used, but white-on-black is a better choice since it much cooler than black during the summer. When the plastic begins to rot in a few years, it must be removed from the field. We are experimenting with a modified mulch layer that allows the grower to plant, cut the blueberry bush back to about three inches and pull white-on-black plastic over the stem. The stem pops through the plastic, leaving only a tiny gap around the base. Except for nut sedge and weeds growing up from the edge, the system provides weed free growing conditions.

### **Preemergence Weed Control**

Preemergent weed control is limited in organic systems to mulches and a compound called corn gluten sold as Dynaweed (Anonymous <sup>2</sup>, 1999). This material is applied as a granular and incorporated with mechanical equipment or rainfall. It provides some germination control of annual weeds. Corn gluten also contains about 10% nitrogen and 1% phosphorus, so nitrogen applications can be reduced if corn gluten is used. The material costs about \$ .40 to .55 per pound and is used at a rate of 436-871 pounds per broadcast acre.

### **Postemergence Weed Control**

If heavy mulching is not used, cultivation under the bushes with a rotary hoe or Friday plow can be conducted from November to March. Very shallow cultivation can also be conducted on older bushes after harvest. A mowing head can be attached to a rotary hoe to cut weeds under the bushes during the summer. Hand hoeing and weed pulling can be practiced during the summer. Weed steamers for orchards which “burn” back weeds with high temperature water are commercially available and could be used in both mulched and non-mulched situations. However, they would not be able to reach the strip between the bushes since a heavy tarp has to trail behind the steam nozzles to keep the heat in long enough to kill the burn the weeds back. In non-mulched situations, commercial weed flame throwers could probably be used. However, in our experience, this are some what dangerous to use from wildfire standpoint in blueberry fields.

Several of the most effective postemergent materials we have tested are Matran (EcoSMART Technologies, Inc.615-261-7300) and AllDown (SummerSet Products

952-820-0363). Matran contains clove oil and AllDown a combination of citric and acetic acid. Recently, the AllDown company went out of business, but a very similar material, Ground Force, is now available (763-422-0402).

In our trials, both have been quite effective on small winter weeds, but weak on mature summer crabgrass and bahia grass. Both are very expensive (about \$7 per gallon of finished spray) and are best used at a high gallonage per acre (60-80 gallons per acre if broadcast). However, they may be extremely valuable in spot spraying weeds that have broken through the mulch layer.

### **Aisle Maintenance**

Since building of organic matter is required in organic farming, continuous cultivation of the aisles would not be acceptable. However, it is best to have bare compacted soil on the orchard floor during the spring frost season. Bare, compacted (settled by rain) soil can be 4-6 degrees F warmer than heavy weed cover during a radiation freeze. A suggested aisle maintenance program would be to drill rye (not rye grass) fertilized with lightly incorporated chicken litter in the fall. In early February this could be rototilled a few inches deep into the top soil. Ryegrass would probably be difficult to completely kill with cultivation.

An alternative method of aisle maintenance would be to plant rye in the fall and mow it off very close to ground level just prior to blueberry bloom. Ryegrass could also be used in this system, but great care would need to be taken not to scatter seed under the bushes. Since ryegrass matures late in the spring it can be a significant weed if allowed to grow under the bushes. Ryegrass would also require frequent mowings to keep it short during the bloom period. However, Gulf annual ryegrass, well fertilized at a pH of 5.1, produced over 16,000 pounds fresh weight per acre and Wrens abruzzii rye, well fertilized at a pH of ca. 4.5 produced over 9,000 pounds fresh weight per acre as a cover crop in Georgia blueberry fields. Low pH sites that were not fertilized produced very poor yields of cover crops (Patten, et al. 1991). A rotary mower with a side delivery chute could be used to blow the mulch under the plants.

### **Disease Control**

Isolation is quite valuable in avoiding blueberry diseases. Outside the main blueberry belt in southeast Georgia, mummyberry is much less common. Establishing plantings in these disease free areas could be of great value. Be sure you do not bring mummyberry to the farm with plant material. Cut off any diseased shoots and make sure there are no mummyfied fruit in the nursery container. Softwood cuttings instead of hardwood cuttings are recommended for propagation to avoid stem canker.

Disease control options are very limited. Copper compounds and lime sulfur can be used if needed on organic blueberries. However, they have little or no activity on botrytis and mummyberry. Lime sulfur is recommended as a dormant spray for phomopsis in New Jersey. However, phomopsis is generally not considered a serious

problem rabbiteyes in South Georgia (Cline, 1999).

Mummyberry pressure can be reduced by burying the sclerotia (mummified berry) via rotary hoeing of the area under the plants and rotary tilling or harrowing of the aisles. This must be done before the apothecia (“mushrooms”) develop from the sclerotia in late winter. A leaf rake should be used to remove as many of the sclerotia as possible from around the base of the bush and sweep them into the aisle before incorporation in the soil. On mulched plantings, a fresh layer of mulch should be applied prior to apothecia emergence. In the event of a mummy berry outbreak, Serenade fungicide can be applied. For detailed information on organic disease control ask your county agent for a consultation with Drs. Phil Brannen or Harald Sherm at UGA.

### **Insect control**

Since blueberry maggot fly is not found in many areas of south Georgia, organic production is more feasible than in most production areas. Rotenone can also be used to control blueberry maggot fly.

If cranberry fruit worm or cherry fruit worm is a problem, *Bacillus thuringiensis* (Bt) (Biobit or Javelin) can be applied as needed.

Botanical and other natural botanical insecticides having broad-spectrum effects such as pyrethrum, sabadilla, neem, and ryania can also be used for insect control if needed. For detailed information on organic insect control ask your county agent of a consultation with Dr. Dan Horton at UGA or Dr. Oscar Liburd at UFL.

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