

Dixie Blueberry News

Georgia Blueberry Growers Association Newsletter

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Organic Production Meeting

Bacon and Appling Co., GA
Tuesday, March 29, 2005
Tentative Program

9:00-9:30 a.m.	Registration
9:30 a.m.	Welcome: Mr. Danny Stanaland, Bacon Co. Ext. Director, Alma, GA
Morning Speakers:	Ms. Relinda Walker, GA. Organics, Inc. Dr. Bill Sciarappa, Rutgers University, Organic Blueberry Production in New Jersey D. Gerard Krewer, UGA, Organic Rabbiteye Blueberry Experiments in GA Dr. Harold Scherm, UGA, Organaic Mummyberry and Fungus Control Marketing, TBA Lunch (included with registration)
PM	Welcome: Mr. James Clark, Appling Co., Ext. Director, Baxley, GA Mr. Alan Miles, Miles Blueberry Farm, Field Tour of Organic Transitional Field

Registration cost is \$20 for Georgia Organics members, \$30 for non-members.

EARLY BIRD SPECIAL: receive a 50% discount if you call or send in your registration by
Friday, March 18.

*Make checks out to "Georgia Organics" and mail your registration to:
Georgia Organics, P.O. Box 8924, Atlanta, GA 31106.
To register by phone or for more information, call 770-993-5534.*

Woody control in Rabbiteye Blueberries (*Vaccinium ashei* Reade)

by Mark Czarnota¹, Scott NeSmith¹, and Danny Stanaland²

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Many growers are often faced with controlling unwanted woody plants in their blueberry orchards. Woody plants such as oaks (*Quercus spp.*), wax myrtle (*Myrica cerifera* L.), pines (*Pinus spp.*), and wild cherries (*Prunus spp.*) are often found growing amongst blueberry plants. Unfortunately, there are no registered herbicides that can be used over the top of blueberries to remove these plants. Growers often resort to pruning out this unwanted vegetation, but most of these plants re-sprout and continue to be a weed problem. Growers could avoid much of this re-growth if herbicides were applied to the cut stems of these unwanted woody plants. There are many herbicides that could easily control these unwanted woody plants, but many of these products could possibly leach from treated plant or be transferred via root grafts to blueberries causing damage. In order to understand this better, a study was designed to evaluate several products for control and damage to blueberry plants.

A site was chosen in Alma, Georgia that contained planting of Tifblue rabbiteye blueberry (*Vaccinium ashei* Reade).

The blueberry orchard was established in the early 1980's, and average plant height was approximately 8 to 10 feet. The primary woody problem was wax myrtle (*Myrica cerifera* L.) (Figure 1.). On December 12, 2002, the study was initiated. The test was designed as a randomized complete block with 3 replications, and each treatment consisted of 3 blueberry plants. All unwanted woody growth was cut to a height of 18 inches with loppers or a chainsaw. Herbicides were then painted onto the cut stem so as to coat the entire cut surface, making sure to coat the cambium area (bark / wood union area). All herbicides were applied at 50% formulated strength, using distilled water to dilute. No cut stem was over 3 inches in diameter. Five herbicides were included in the trial, and consisted of Vanquish 4L (dicamba), Roundup UltraMax 5L (glyphosate), Tordon K 2L



Figure 1. Wax myrtle (*Myrica cerifera* L.) (A) infestation in Rabbiteye blueberries (*Vaccinium ashei*)

(picloram), Chopper 2L (imazapyr), and Garlon 3L (triclopyr). Control and injury ratings were taken for wax myrtle control and blueberry injury at 4 and 8 months after treatment (MAT). Weed control ratings were on a 0 to 100 scale, and numerical values represented the following:

Value	Control
0	No control as compared to the check
10 to 30	Very poor control as compared to the check. Regrowth from the cut stem was 90 to 70 % of the control. Some chlorosis and necrosis evident in emerged leaves.
40 to 60	Poor weed control as compared to the control. Regrowth from the cut stem was 60 to 40 % of the check. More noticeable injury or stunting to emerged leaves More pronounced chlorosis and/or necrosis to the leaf area of emerged leaves.
70 to 90	Fair to good weed control. Regrowth from the cut stem was 30 to 10 % of the control. Emerged leaves severely injured or dead. Greater than 50% of leaf surface showing signs of chlorosis and necrosis.
90 to 99	Excellent weed control. Regrowth from the cut stem was 10 to 1% of the control. Emerged leaves mostly dead and/or severely injured (chlorotic and/or necrotic).
100	No evidence of regrowth to the cut stem or treated plant.

Plant injury was taken on a (0-100 scale) and numbers represented the following:

Value	Plant Symptoms
0	No visual injury present

10-30	Minimal injury to desirable plant. Less than 10% of the plant leaf surface area showing chlorosis and necrosis.
40-70	More noticeable plant injury or stunting. Greater than 50% of the leaf area showing symptoms of chlorosis and/or necrosis.
80-90	Plants severely injured. Most of the leaves and leaf surface showing signs of chlorosis and necrosis.
100	Plant appears dead. No signs of regrowth.

Data were analyzed using analysis of variance and means were exposed to Fisher's least significant difference (LSD) test with a significance level of $p=0.05$. Ratings are presented below:

Table 1. Ratings of wax myrtle (*Myrica cerifera* L.) control and Rabbit-eye blueberry (*Vaccinium ashei* Reade) injury*.

Treatment	Active ingredient	Blueberry injury April 15, 2003 (4 MAT)	Blueberry injury August 04, 2003 (8 MAT)	Wax Myrtle Control April 15, 2004 (4 MAT)	Wax Myrtle Control August 04, 2004 (8 MAT)
Vanquish	dicamba	76.7 ab	30.0 a	93.3 a	96.7 a
Roundup UltraMax	glyphosate	0.0 c	30.0 a	70.0 a	83.3 a
Tordon K	picloram	60.0 b	16.7 a	93.3 a	96.7 a
Chopper	imazapyr	80.0 a	33.3 a	86.7 a	90.0 a
Garlon	triclopyr	6.7 c	0.0 a	93.3 a	96.7 a
Check	N/A	0.0 c	0.0 a	0.0 b	0.0 b
LSD (P=0.05)		19.27	64.06	26.50	16.16

*Means followed by the same letter do not significantly differ ($P=0.05$, LSD)

Control of the wax myrtle was greater than 70% with all treatments during both rating dates. As expected, however, injury with Vanquish, Tordon K, and Chopper was significant (> 60%) at the April rating. No significant injury was noted during the August ratings for Garlon treatments, but injury was still visually apparent with Vanquish, Roundup UltraMax, Tordon K, and Chopper.

On February 26, 2004, a second study was initiated in at the same location. The study was identical to the 2002 test, but due to injury caused in the previous study, Vanquish, Tordon K, and Chopper were dropped from the protocol. Three herbicides were included in the trial, and consisted of Roundup UltraMax 5L (glyphosate), Garlon 4L (triclopyr), and Lontrel 3L (clopyralid). Ratings were taken for wax myrtle control and blueberry injury 5 months after treatment. Data were analyzed using analysis of variance and means were exposed to Fisher's least significant difference (LSD) test with a significance level of $p=0.05$. Ratings are presented below:

Table 2. Ratings for wax myrtle (*Myrica cerifera* L.) control and Rabbiteye blueberry (*Vaccinium ashei* Reade) injury*.

Treatment	Active ingredient	Blueberry injury July 22, 2004 (5 MAT)	Wax Myrtle Control July 22, 2004 (5 MAT)
Roundup UltraMax	glyphosate	20.0 ab	73.3 a
Garlon	triclopyr	0.0 b	43.3 b
Lontrel	clopyralid	40.0 a	66.7 ab
Check	N/A	0.0 b	0.0 c
LSD ($P=0.05$)		29.78	26.43

*Means followed by the same letter do not significantly differ ($P=.05$, LSD)

Significant damage with (40 %) Lontrel was noted after 5 months, and although not significant, damage was also noted with Roundup UltraMax. All treatments provided significant control of wax myrtle and ranged from 43 to 73%.

Making sense of it all:

In South Georgia, growers are in need of a dependable herbicide that will prevent the regrowth of woody plant material from a cut stem. There are many products that are available for woody weed control, but in blueberries, only glyphosate (Roundup UltraMax) is labeled. The other products were tried for comparison. From this study, it is apparent that woody weed control could be achieved with Garlon (triclopyr) and Roundup UltraMax (glyphosate) with minimal damage to the blueberry plants. Although minimal, it was surprising to see damage with glyphosate. However, as the Roundup UltraMax label indicates, plants growing in close proximity to treated plants may share root grafts, which could lead to transfer of glyphosate to untreated plants. It would be expected that blueberry plant damage would increase with an increase in treated stems. This factor was not considered with the current study. Although no damage to established blueberries was seen in this study with Garlon, the use of Garlon for woody weed control in blueberry is currently not labeled and therefore the herbicide should not be used.

2005 Southeast Regional Blueberry Integrated Management Guide

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Recommendations are based on information from the manufacturer's label and performance data from research and extension field tests.

Because environmental conditions and grower application methods vary widely, suggested use does not imply that performance of the pesticide will always conform to the safety and pest control standards indicated by experimental data.

This publication is intended for use only as a guide. Specific rates and applications methods are on the pesticide label, and these are subject to change at any time. Always refer to and read the pesticide label before making any application! The pesticide label supercedes any information contained in this guide, and it is the legal document referenced for application standards.

Blueberry Integrated Management Guide (Insect and Disease Control)

Dormant (before flower or leaf buds break)

Blueberry gall midge – The blueberry gall midge is a tiny fly. Blueberry gall midge maggots typically feed on vegetative buds. On most varieties, vegetative feeding does little harm. On rabbiteye cultivars, flower feeding strains of blueberry gall midge occur sporadically. If present, gall midges which feed on flower buds constitute a serious threat. Feeding injury destroys flower buds before bud scales open in the spring. Orchard sanitation in the form of a herbicide program to chemically mow the entire orchard floor or light cultivation, as for mummy berry suppression, may offer helpful suppression. Producers are cautioned not to institute pre-bloom insecticide control programs for blueberry gall midge until its presence as a pest has been confirmed on or near your production area. Gall midge lay eggs on warm winter days. **Apply diazinon as-needed for gall midge between flower bud stages 1 and 2, as the most mature buds first show slight separation of scales.** Repeat sprays during warm spells. Separation of bud scales may occur as early as 15 December in south Georgia. Premier is often particularly attractive, and it is a good sentinel variety to monitor. Gall midge applications also provide a helpful degree of pre-bloom thrips suppression.

Bagworm – remove and dispose of bagworm cases, some of which contain eggs, prior to April.

Blueberry bud mite – The blueberry bud mite is an eriophyid mite, so tiny (1/125 inch long) that it cannot be seen without magnification. Blueberry bud mite is an occasional pest in blueberries in Georgia, but is a common pest on certain cultivars in North Carolina. Injury may be more visible in late spring. **Infested plants are recognized by a clustering or rosetting of buds, which may be abundant. Infested buds become succulent, fleshy, closely packed, form clusters or rosettes on stems, and they may redden.** Bloom on infested plants is reduced. Affected berries are small, roughened and may have small reddish pimples or blisters on the fruit surface. Blueberry bud mite numbers increase during late summer and early fall. Next year's flower and leaf buds are infested. **Sanitation by aggressive, timely pruning of infested branches can be helpful. Mechanical topping (mowing off old fruiting twigs) immediately after harvest greatly reduces bud mite incidence the following year.** Never propagate from bushes that may be infested with blueberry bud mite. **Horticultural oil applications immediately after harvest will aid in control.**

Mummy berry – Raking mummified berries to the row middles, followed by deep burial of mummies to a depth of at least one inch, will help to reduce the primary mummy berry inoculum source. This activity needs to be conducted prior to mid-January in the most southern blueberry regions. **Use caution; excessive amounts of dirt mounded on top of blueberry roots and stems can result in injury or plant death.**

Phytophthora root rot – Root rot is generally a problem of low, poorly drained sites. Provisions for adequate drainage must be made prior to planting! Site selection and/or proper bedding operations are essential cultural practices for control of this disease. It also is very problematic in pine bark beds for southern highbush varieties. Treatment with fungicides is not effective for reversing root rot damage on plants with severe symptoms. Preventative treatments in pine bark beds may be warranted, since the beds are often saturated with water through either irrigation or rainfall.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Mummy berry	Rake mummies to row centers and bury 1" deep		*****			Burying mummies helps to prevent primary infections. However, it is difficult to insure that all mummies will be buried, so chemical control is also necessary.

Blueberry (continued)

Dormant (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Phytophthora root rot	fosetyl-Al (Aliette WDG)	5 lb	+++	12 hrs	0 days	Apply Aliette as a foliar spray. Subsequent applications can be made on 14-21 day intervals. Do not exceed 4 applications per acre per year.
	mefenoxam (Ridomil Gold 4EC)	3.6 pt	++++	48 hrs	0 days	Established plantings: Apply ¼ pt/1000 linear feet of row (3.6 pt/A broadcast basis) in a 3 ft band over the row before the plants start growth in the spring. New plantings: Apply 3.6 pt/A (broadcast rate) at or after the time of planting. An 18 in band over the row is recommended. Do not apply more than 0.9 gal/A broadcast during the 12 months before bearing harvestable fruit, or illegal residues may result. For both new and established plantings, one additional application may be made to coincide with periods most favorable for root rot development.
Scale	Superior Oil (70 second)	2 gal/100 gal water/acre or 2 fl ozs/1 gal of water	+++++	12 hrs	12 hrs	Oil may be applied dormant or delayed dormant. Apply as needed for scale infestations. Do not apply oil when temperatures are expected to be higher than 85°F or lower than 40°F within 24 hours. Do not use within 14 days of lime-sulfur.
Gall midge	diazinon (Diazinon AG500)	1 pt	+++++	24 hrs	7 days	Diazinon is the material of choice for earlier gall midge sprays. Do not apply diazinon within 5 days of bloom, as its residual may injure pollinators.
	spinosad (SpinTor 2SC)	4-8 oz	+++	4 hrs	3 days	SpinTor is the material of choice near bloom, and should be applied as-needed just before bloom. SpinTor is quite toxic to bees until it is thoroughly dry (3 hrs).
	malathion (Malathion 57EC)	2 pt	++++	12 hrs	1 day	Malathion may be applied for gall midge at stage one bud development. Do not apply malathion within 24 hours of bloom.

Blueberry (continued)

Pre-bloom through green tip (leaf buds) and pink bud (flower buds)

Mummy berry – If mummy berry disease becomes established in your planting, fungicides are very important in pre-bloom sprays (for cultivars that show leaf bud break before flower bud break). Start spraying when green tip occurs on the leaf buds or 1-5% open bloom (stage 6) occurs on the flower buds, whichever comes first. Continue sprays till all blooms have fallen. In recent years, most states have obtained Section 18 Emergency Exemptions from the US EPA for the use of Indar (fenbuconazole) to control mummy berry. Check with your county extension office or department of agriculture for information on emergency measures for pest control.

Flower thrips – Flower thrips can be very damaging to flower buds and blooms. Thrips numbers typically increase dramatically as corollas open and bloom progresses. Determining when or if blueberries should be treated for thrips is difficult. Treatment thresholds, thrips counts which indicate the need for an insecticide application, do not presently exist. **Blueberries are a pollination sensitive crop, and careless use of insecticides and subsequent bee kill can easily impair pollination and ruin fruitset.** Insecticides should not be applied during bloom. Some very provisional thrips treatment threshold concepts follow.

(1) Begin sampling bloom clusters for thrips at stage 3. Place flower bud clusters in sealed plastic bags and incubate them in a warm room or on a windowsill. Less than 2 thrips per individual bloom during stage 3 is probably insignificant. However, 6 thrips per bloom is almost certain to destroy a flower.

(2) If thrips are found in blooms at stage 3, begin sampling two to three times a week. Take a minimum of five bags of bloom clusters per block each time. If more than 2 thrips per individual bloom are found, and if the numbers are increasing, apply an insecticide. Diazinon is the material of choice until 5 days pre-bloom. From five days pre-bloom until first bloom, the material of choice is SpinTor.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Mummy berry (shoot blight phase)	pyraclostrobin + boscalid (Pristine WG)	18.5-23 oz	+++++	24 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Pristine per acre per crop year.
Phomopsis cane and twig blight	pyraclostrobin + boscalid (Pristine WG)	18.5-23 oz	+++	24 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Pristine per acre per crop year.

Blueberry (continued)

Pre-bloom through green tip (leaf buds) and pink bud (flower buds) (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Gall midge	diazinon (Diazinon AG 500)	1 pt	+++++	24 hrs	7 days	Do not apply within 5 days of bloom.
	spinosad (SpinTor 2SC)	4-8 oz	+++	4 hrs	3 days	SpinTor may be applied as-needed just before bloom. SpinTor is quite toxic to bees until it is thoroughly dry (3 hrs).
	malathion (Malathion 57EC)	2 pt	++++	12 hrs	1 day	Malathion may be applied at flower bud stage one. Do not apply malathion within 24 hours of bloom.
10-20% bloom until 80-90% bloom						
DO NOT USE INSECTICIDES DURING BLOOM – Spraying with insecticides may kill or repel wild bees, and honey bees are needed for adequate pollination and fruit set.						
Flower thrips	spinosad (SpinTor 2SC)	6 oz	++++	4 hrs	3 days	Insecticide applications during bloom are typically very damaging to pollinators. Outbreak flower thrips populations may be sprayed as needed at night with minimal risk to bees. Spray early in the evening to minimize risk.
Botrytis flower blight	cyprodinil + fludioxonil (Switch 62.5WG)	11-14 oz/acre	+++++	12 hrs	0 days	Make the first application during early bloom. Subsequent applications should be made every 7-10 days during bloom. Do not apply more than 56 oz. of product per acre per year. Make no more than two sequential applications before using another fungicide with a different mode of action.

Blueberry (continued)

10-20% bloom until 80-90% bloom (continued)

Cranberry fruitworm – Scout fields for cranberry fruitworm to determine if and when spraying is needed. Check for fruitworm twice a week from full bloom until 4 weeks after petal fall. Examine fruit clusters for tiny pin-sized holes in berries, with frass and premature ripening in more mature fruit. Break berries open to look for larvae and damage. Early varieties such as 'Climax' are normally infested first. Infestations should be caught in the 1st or 2nd berry in a cluster for sprays to give the needed control of this pest.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Botrytis (continued)	fenhexamid (Elevate 50WDG)	1.5 lb/acre	+++++	12 hrs	0 days	Begin application at 10% bloom. Applications should be made every seven days when conditions favor disease. Do not make more than two consecutive applications without switching to a fungicide with a different mode of action. Do not apply more than 6.0 lb product per acre per year.
	captan + fenhexamid (CaptEstate 68WDG)	3.5-4.7 lb/acre	+++++	72 hrs	0 days	CaptEstate is a combination product of Captan plus Elevate. Do not make more than two consecutive applications before switching to a fungicide with a different mode of action. Do not apply more than 21.0 lb/acre/season.
	pyraclostrobin + boscalid (Pristine WG)	18.5-23 oz/acre	+++++	24 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Pristine per acre per crop year.
	ziram (Ziram 76DF)	3 lb	++	48 hrs	~30 days	Do not apply later than 3 weeks after full bloom.
	captan (Captan 50WP)	5 lb	++	72 hrs	0 days	Do not apply more than 70 lb per acre per crop year.
	captan (Captec 4L)	2 qt	++	72 hrs	0 days	Do not apply more than 35 quarts per acre per crop year.
Mummy berry (blossom infection stage)	pyraclostrobin + boscalid (Pristine WG)	18.5-23 oz/acre	+++++	24 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Pristine per acre per crop year.

Blueberry (continued)

10-20% bloom until 80-90% bloom (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Ripe (anthracnose) and/or Alternaria rots	azoxystrobin (Abound)	6.2-15.4 fl oz	+++++	4 hrs	0 days	Subsequent applications can be made on 7-14 day intervals. Do not apply more than two sequential applications before switching to a fungicide with another mode of action (e.g. Captan). Do not apply more than 1.44 quarts per acre per season.
	cyprodinil + fludioxonil (Switch 62.5WG)	11-14 oz	+++++	12 hrs	0 days	Applications can be made on a 7-10 day interval when conditions warrant. Do not apply more than 56 oz of product per acre per year. Make no more than two sequential applications before using another fungicide with a different mode of action.
	pyraclostrobin (Cabrio EG)	14 oz	++++	24 hrs	0 days	No more than 2 sequential applications of Cabrio should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Cabrio per acre per crop year.
	pyraclostrobin + boscalid (Pristine WG)	18.5-23 oz	+++++	24 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Pristine per acre per crop year.
	ziram (Ziram 76DF)	3 lb	++	48 hrs	~30 days	Do not apply later than 3 weeks after full bloom.
	captan (Captan 50WP)	5 lb	+++	72 hrs	0 days	Do not apply more than 70 lb per acre per crop year.
	captan (Captec 4L)	2 qt	+++	72 hrs	0 days	Do not apply more than 35 quarts per crop year.

Blueberry (continued)

Petal fall until one month after bloom

Cranberry fruitworm, Cherry fruitworm, Plum curculio – Review field histories and scout fields for fruitworms and plum curculio to determine if and when spraying is needed. Fields with a history of infestation should be sprayed at least twice on a 7-14 day interval, beginning immediately after bloom. Check for fruitworms twice a week from full bloom until 4 weeks after petal fall. Examine fruit clusters for tiny pin-sized holes in berries, with frass and premature ripening in more mature fruit. Break berries open to look for larvae and damage. Early varieties are normally infested first. Control will be best when these insects are sprayed early in the infestation period.

Septoria and anthracnose leaf spots – Septoria and anthracnose leaf spot pathogens can cause premature defoliation, resulting in poor bud development and subsequent loss of yield. Fungicide timing for leaf spots varies across the Southeastern region. For example, North Carolina blueberries generally require leaf spot control as soon as green leaves have unfolded (10-14 days after bloom), whereas in Georgia, infections do not occur until mid-May or early June, without regard to the stage of leaf development. Materials applied for rot control will also often have leaf spot activity. Consult with your local county agent for recommendations in your area.

Blueberry Stunt – Bushes infected with this disease become visible when leaves mature in May. Stunt is a devastating disease of blueberry in North and South Carolina, and has also been reported from Arkansas. Symptoms include shortened internodes, small, cupped leaves and loss of productivity. Control relies on removal of infected bushes (including roots) and control of the insect vector (the sharpnosed leafhopper) that carries the disease from bush to bush. Stunt is rarely seen on rabbiteye cultivars but is common on highbush and Southern highbush cultivars in southeastern NC.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Ripe (anthracnose) and/or Alternaria rots	azoxystrobin (Abound)	6.2-15.4 fl oz	+++++	4 hrs	0 days	Subsequent applications can be made on 7-14 day intervals. Do not apply more than two sequential applications before switching to a fungicide with another mode of action (e.g. Captan). Do not apply more than 1.44 quarts per acre per season.
	cyprodinil + fludioxonil (Switch 62.5WG)	11-14 oz	+++++	12 hrs	0 days	Applications can be made on 7-10 day intervals when conditions warrant. Do not apply more than 56 oz of product per acre per year. Make no more than two sequential applications before using another fungicide with a different mode of action.
	pyraclostrobin (Cabrio EG)	14 oz	++++	24 hrs	0 days	No more than 2 sequential applications of Cabrio should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Cabrio per acre per crop year.

Blueberry (continued)

Petal fall until one month after bloom

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Ripe (anthracnose) and/or Alternaria rots (continued)	pyraclostrobin + boscalid (Pristine WG)	18.5-23 oz	+++++	24 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Pristine per acre per crop year.
	ziram (Ziram 76DF)	3 lb	++	48 hrs	~30 days	Do not apply later than 3 weeks after full bloom.
	captan (Captan 50WP)	5 lb	+++	72 hrs	0 days	Do not apply more than 70 lb per acre per crop year.
	captan (Captec 4L)	2 qt	+++	72 hrs	0 days	Do not apply more than 35 quarts per crop year.
Cranberry fruitworm, cherry fruitworm, and plum curculio	malathion (Malathion 57EC)	2.8-3.2 pt	+++	12 hrs	1 day	Spray fruitworms when 1 bush in 5 has infested fruit clusters.
Sharpnosed leafhopper	esfenvalerate (Asana 0.66 EC)	4.8-9.6 fl oz	++++	12 hrs	14 days	Some users may be allergic to Asana; discontinue use if skin or eyes become inflamed.
	phosmet (Imidan 70WP [24 (c) label for cranberry fruitworm in GA, AR, SC, MS, and AL; for plum curculio in SC and LA])	1-1.5 lbs	+++++	24 hrs	3 days	Imidan, applied for blueberry maggot, provides excellent control of fruitworms and plum curculio.

Blueberry (continued)

Petal fall until one month after bloom

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Sharpnosed leafhopper (continued)	azinphos-methyl (Guthion 2L)	2-3 pt	+++++ (for fruitworms) +++++ (for plum curculio)	48 hrs/ 4 days	7 days	Azinphos-methyl is extremely toxic to applicators and field laborers. REI is 48 hours for mowing, irrigation, and scouting only; four days for all other purposes. Do not make more than three applications per crop season. Allow at least 10 days between applications. Application by backpack or hand wand is prohibited.
	carbaryl (Sevin 80WSP)	1.875-2.5 lb	+++ (for fruitworms)	12 hrs	7 days	Sevin is a poor choice if plum curculio is a problem in your area.
	tebufenozide (Confirm 2F)	16 fl oz	+++++ (for fruitworms)	4 hrs	14 days	Confirm does not control plum curculio. Confirm needs to be ingested to be effective; therefore, timing is critical. Apply Confirm while fruitworms are still small. Confirm conserves natural enemies.

Pre-harvest

Fire ants – Fire ants can be very important pests in orchards, vineyards or fields. Ant baits employed in a spring and fall broadcast treatment regime should eliminate most, but seldom all, fire ant mounds within treated areas. Ant baits are slow acting; they are ineffective when employed as curative treatments to ‘clean up’ active infestations. Worker ants must be attracted to baits, so they can carry back them to their colonies. Ant baits interfere with reproduction, which causes a gradual die-off of colonies. Colony elimination should not be expected until 4 to 8 weeks after application. Extinguish Professional Fire Ant bait (0.5% methoprene) is labeled for use on all ‘crop land’ sites. It is effective, but somewhat slower acting than Esteem Ant Bait (0.5% pyriproxyfen) which is labeled in blueberries and figs, but not in other small fruits.

Optimal control programs for fruit should include spring and fall broadcast applications. Ant baits work best when soil is moist, but not wet. Active ant foraging is essential. Ideally, temperatures should be warm and sunny. Avoid application of ant baits when conditions are expected to be cold, overcast, rainy or very hot. In the first year of ant control, it may be best to make 2 applications in spring or fall to assure the desired reduction of mounds within plantings.

Individual mound treatments are most effective when used as-needed for the occasional colony that survives broadcast treatments. Mound treatments should be applied in a circle, 3 to 4 feet from the mound. Do not disturb mounds or place bait directly on top of mounds.

Blueberry (continued)

Pre-harvest (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Imported fire ants	pyriproxyfen (Esteem Ant Bait)	1.5-2.0 lbs (2-4 tbsp/mound)	++++	12 hrs	24 hrs	Esteem Ant Bait should be applied during the spring, and if needed, again in the fall. Apply on sunny days when the soil temperature is at least 60 F, and the soil is moist. Baits are slow acting but effective. Allow 4 weeks to work. Do not make other fire ant treatments for 7-10 days. May need to reapply if heavy, flooding rains occur within 7 days.
	malathion (Malathion 57EC)	1 pt	++	12 hrs	1 day	Malathion is a modestly effective foliar rescue treatment. May be applied to plants one day before harvest to discourage ants from foraging on the plants. This is a stopgap treatment to get ants off the plants. Rely on aggressive post-harvest imported fire ant controls to suppress these pests in blueberries.
	diazinon. Diazinon AG 500	1 pt/100 gal	++++	24 hrs	7 days	Mound drench. Slowly apply 1 gal of diluted mixture over and 6 inches around each mound. Apply gently to avoid disturbing ants.
	methoprene (Extinguish Professional Fire Ant Bait 0.5 %)	1-1.5 lb (3-5 tbsp/1000 sq ft) (3-5 tbsp/mound)	+++	4 hrs	4 hrs	Extinguish Professional Fire Ant Bait (0.5% methoprene) is legal for use on 'crop land.' Caution, Extinguish baits with methoprene plus hydramethylnon are not labeled for use on crop land. Application during the heat of the day or when rain is expected within 6 hours of application will reduce the effectiveness of this product. In areas of heavy infestation, repeat applications may be necessary 10-12 weeks after the initial application.
Alternaria and Ripe rots	azoxystrobin (Abound)	6.2-15.4 fl oz	+++++	4 hrs	0 days	Subsequent applications can be made on 7-14 day intervals. Do not apply more than two sequential applications before switching to a fungicide with another mode of action (i.e. Captan). Do not apply more than 1.44 quarts per acre per season.

Blueberry (continued)

Pre-harvest (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Alternaria and Ripe rots (continued)	cyprodinil + fludioxonil (Switch 62.5WG)	11-14 oz	+++++	12 hrs	0 days	Applications can be made on 7-10 day intervals when conditions warrant. Do not apply more than 56 oz. of product per acre per year. Make no more than two sequential applications before using another fungicide with a different mode of action.
	pyraclostrobin (Cabrio EG)	14 oz	++++	24 hrs	0 days	No more than 2 sequential applications of Cabrio should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Cabrio per acre per crop year.
Alternaria and Ripe rots (continued)	pyraclostrobin + boscalid (Pristine WG)	18.5-23 oz	+++++	24 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Pristine per acre per crop year.

HARVEST

Blueberry maggot fly (BBMs) – BBMs are established in some plantings and are potentially serious mid-and late-season fruit pests. BBMs may go undetected at harvest, so one can easily ship infested fruit. Thorough field-by-field scouting is needed to detect egg-laying adult flies early and minimize loss. Monitor by hanging yellow, sticky traps (baited with ammonium carbonate), at least one per cultivar. Trap catches indicate when adults are present. **Traps should be hung in orchards by mid-May.** See your County Agent for ID pictures and further reference. **If your orchard has been damaged by a BBM infestation before, spray as soon as adults are trapped. If your orchard has not been damaged by a BBM infestation before, and adults are trapped, either:** (1) spray immediately, or (2) accept more risk, begin daily examination of fruit for larval infestation, and **spray immediately** if any larval injury is found. Once spraying for BBM begins it is very important to **spray every 7-14 days until all the fruit has been harvested.** Materials and spray intervals are listed below. Growers shipping fruit to Canada must comply with Canadian guidelines for scouting, spraying and post-harvest inspection of berries, including a protocol for cooking samples of harvested fruit to test for the presence of maggot larvae in berries.

Fruit rots – Fungicides alone do not provide adequate control; proper harvesting and handling is essential. Pre- and post-harvest rots can be greatly reduced by timely, complete harvest of all ripe fruit on the bush, followed by rapid post-harvest cooling. For hand-harvested highbush and southern highbush cultivars, harvest all ripe berries on the bush every 7 days or less. Rabbiteye cultivars should be clean-harvested every 10-14 days. Post-harvest cooling is critical and is best accomplished through the use of partial-vacuum or forced-air systems that use fans to pull cold air through stacks of palletized fruit.

Blueberry (continued)

HARVEST (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Blueberry maggot	phosmet (Imidan 70W [24C label in GA, AR, SC, AL])	1.3 lb	+++++	24 hrs	3 days	Imidan is the material of choice. BBM sprays should protect berries from the start of egg lay until the last berries are harvested. Imidan provides 10-14 days residual control. Do not apply more than 2 times.
	carbaryl (Sevin 80S)	1.875-2.5 lb	+++	12 hrs	7 days	BBM sprays should protect berries from the start of egg lay until the last berries are harvested. Seven provides 5-7 days residual effectiveness.
	carbaryl (Sevin 80WSP)	1.875-2.5 lb	+++	12 hrs	7 days	
	malathion (Malathion 57EC)	1.5 pt	++++	12 hrs	1 day	BBM sprays should protect berries from the start of egg lay until the last berries are harvested. Malathion provides 5-7 days residual control.
	azinphos-methyl (Guthion 2L)	2-3 pt	+++++	48 hrs/4 days	7 days	Azinphos-methyl is extremely toxic to applicators and field laborers. REI is 48 hours for mowing, irrigation, and scouting only; four days for all other purposes. Do not make more than three applications per crop season. Allow at least 10 days between applications. Application by backpack or hand wand is prohibited.
	diazinon (Diazinon AG500)	1 pt/100 gal	++++	24 hrs	7 days	Allow 14 days between applications.
Japanese beetle	carbaryl (Sevin 80S)	1.25-2.5 lb	+++	12 hrs	7 days	Japanese beetles can be abundant enough to require multiple applications. Do not apply more than 12.5 lb of Sevin 80 S or Sevin 80 WSP per acre per crop. Repeat applications as necessary up to a total of 5 times but not more often than once every 7 days.
	carbaryl (Sevin 80WSP)	1.25-2.5 lb	+++	12 hrs	7 days	
	imidacloprid (Provado 1.6F)	6-8 fl oz	++++	12 hrs	3 days	Do not apply prior to bloom or during bloom.

Blueberry (continued)

Post-harvest

Blueberry bud mites – This is a rarely seen, occasional pest in Georgia, but is quite common on certain cultivars in North Carolina. Use high volume (300 gal/A), high pressure (200 psi) applications of a post-harvest insecticide/miticide and horticultural oils. **In blocks infested with blueberry bud mite make two post-harvest applications of endosulfan.** Pruning and removing or destroying old blueberry canes can help reduce bud mite populations. Summer topping or hedging immediately after harvest is a common practice used to manage bush height; this practice also greatly reduces bud mite by removing old, infested fruiting twigs.

Blueberry stem borer -- *Oberea myops*, is a longhorn beetle borer that also attacks rhododendron and azalea. This pest can be minimized by removing the infested portion of canes, often brown and wilted, as soon as larvae are detected in the summer. Cut the stems well below their brown, hollowed section, where the stem is still green and not hollow. Promptly destroy each wilted cane containing a larva. This insures that the larva does not migrate into the crown of the plant.

Sharpnosed leafhopper –The sharpnosed leafhopper is the vector (carrier) of blueberry stunt, a disease caused by a phytoplasma that results in severe stunting and loss of productivity in affected bushes. Stunt can be quite severe in North and South Carolina and has been reported from Arkansas. The disease is common on highbush and southern highbush cultivars, but rare on rabbiteye cultivars. Growers should be aware of the symptoms of stunt and be ready to spot-spray and remove infected bushes, followed by vector (leafhopper) control using insecticide sprays timed to coincide with population peaks of the leafhopper. In North Carolina, critical leafhopper control times are May, July and late September.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Blueberry bud mite	endosulfan (Endosulfan 3EC)	2qt/300 gal	++++	24 hrs		A post-harvest application, followed by another in August, is the general recommendation. Consult with an entomologist to insure proper timing of these applications. Do not apply more than 4 qt Endosulfan 3EC per acre per year (for postharvest use only).

Blueberry (continued)

Post-harvest (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Blueberry bud mite (continued)	horticultural oil (JMS Stylet Oil)	3-6 qt/100 gal	++	4 hrs	0 days	BBM can't be readily seen, and by the time symptoms are observed in the spring, the mites are too deep for effective treatment.
	horticultural oil (Stoller® Golden Pest Spray Oil)	2 gal (low volume) application or 2 gal/100 gal (dilute spray)	++	4 hrs	0 days	
Yellownecked caterpillars, leaf tiers, spanworms, azalea caterpillar	malathion (Malathion 57EC)	1.5 pt	+++	12 hrs	1 day	Foliage feeding caterpillars become more difficult to control as they mature.
	<i>Bacillus thuringiensis</i> [BT] (Dipel DF)	0.5-1.0 lb	++	4 hrs	0 days	Dipel is an effective microbial insecticide. However, it should be applied to small, early-stage caterpillars.
	tebufenozide (Confirm 2F)	4-8 fl oz	+++	4 hrs	14 days	Confirm is very effective if applied to small, early-stage caterpillars.
	esfenvalerate (Asana 0.66 EC)	4.8-16 oz	++++	12 hrs	14 days	Asana should be used as a salvage treatment for large caterpillars. It is very effective, but if used often, it encourages scale and mite buildup.
Flea beetles	carbaryl (Sevin 80S)	1-2 lb	+++	12 hrs	7 days	Sevin is effective against small to medium-sized caterpillars.
	diazinon (Diazinon AG500)	1 pt/100 gal	+++	24 hrs	7 days	Diazinon is effective against small to medium-sized caterpillars.
Sharpposed leafhopper	esfenvalerate (Asana 0.66 EC)	4.8-9.6 fl oz	++++	12 hrs	14 days	Some users may be allergic to Asana; discontinue use if skin or eyes become inflamed.
	malathion (Malathion 57EC)	1.5 pt	++++	12 hrs	0 days	

Blueberry (continued)

Late season and after harvest foliage management

During fruit maturation and/or immediately following harvest, fungicide applications may be warranted for control of leaf spot and suppression of dieback diseases. Start applications as soon as leaf spots are first observed.

Blueberry rust – Rust is predominantly a problem in the extreme southern blueberry production areas such as south Georgia. However, rust does occur in South Carolina and other locations. On susceptible varieties, rust can prematurely defoliate plants by late August. **Georgia currently has 24C state labels for use of Bravo Ultrex and Bravo WeatherStik for control of both rust and Septoria leaf spots; these chlorothalonil products make excellent rotation partners for the strobilurin-containing products, Cabrio and Pristine. However, Bravo Ultrex or Bravo WeatherStik can only be used after harvest, as fruit damage occurs with chlorothalonil usage. For labels and recommended rates for Georgia, contact your local county agent (for internet connections, click on these links – BRAVO ULTREX; BRAVO WEATERSTIK).**

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Septoria leaf spot (only)	Fosetyl-Al (Aliette WDG)	5 lb	++++	12 hrs	12 hrs	Apply Aliette as a foliar spray. Subsequent applications can be made on 14-21 day intervals. Two or three fungicide applications following harvest are generally sufficient to prevent major outbreaks of Septoria leaf spot. Assuming that hedging is conducted immediately following harvest, this is a good time to consider an application. Do not exceed 4 applications per acre per year.
	azoxystrobin (Abound)	6.2-15.4 fl oz	++++	4 hrs	0 days	Subsequent applications can be made on 14 day intervals. Apply immediately following harvest. Two or three fungicide applications following harvest are generally sufficient to prevent major outbreaks of Septoria leaf spot. When hedging is conducted immediately following harvest, this is a good time to consider an application. Do not exceed 1.44 quarts per acre per season, and do not apply more than two sequential applications of Abound before switching to a fungicide with another mode of action.
	cyprodinil + fludioxonil (Switch 62.5WG)	11-14 oz	+++	12 hrs	0 days	Applications can be made on 7-10 day intervals when conditions warrant. Do not apply more than 56 oz of product per acre per year. Make no more than two sequential applications before using another fungicide with a different mode of action.

Blueberry (continued)

Late season and after harvest foliage management (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Sharpnosed leafhopper	esfenvalerate (Asana 0.66 EC)	4.8-9.6 fl oz	++++	12 hrs	14 days	Some users may be allergic to Asana; discontinue use if skin or eyes become inflamed.
	malathion (Malathion 57EC)	1.5 pt	++++	12 hrs	0 days	
Septoria, anthracnose and rust leaf spots	pyraclostrobin (Cabrio EG)	14 oz	++++	24 hrs	0 days	No more than 2 sequential applications of Cabrio should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Cabrio per acre per crop year.
	pyraclostrobin + boscalid (Pristine WG)	18.5-23 oz	+++++	24 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Pristine per acre per crop year.
Sharpnosed leafhopper	esfenvalerate (Asana 0.66 EC)	4.8-9.6 fl oz	++++	12 hrs	14 days	Some users may be allergic to Asana; discontinue use if skin or eyes become inflamed.
	malathion (Malathion 57EC)	1.5 pt	++++	12 hrs	0 days	

Efficacy of selected fungicides against diseases of blueberry

Fungicide	Phytophthora root rot	Mummy Berry	Botrytis (gray mold)	Alternaria rot	Phomopsis twig blight	Ripe rot (Anthracnose)	Septoria leaf spot	Anthracnose leaf spot	Rust
Azoxystrobin (Abound)	NA ^a	++	NA	+++++	++	+++++	++++	++++	???
Captan (Captan, Captec)	NA	+	++	++	++	+++	++	+++	NA
Cyprodinil + fludioxonil (Switch)	NA	++	+++++	+++++	+++	+++++	+++	++++	???
Fenhexamid (Elevate)	NA	++	+++++	NA	NA	NA	NA	NA	NA
Fenhexamid + captan (CaptEvate)	NA	++	+++++	++	++	+++	++	???	NA
Fosetyl-Al (Aliette WDG)	+++	NA	NA	NA	+	+	++++	++++	NA
Mefenoxam (Ridomil Gold)	++++	NA	NA	NA	NA	NA	NA	NA	NA
Pyraclostrobin (Cabrio)	NA	NA	NA	++++	+++	++++	++++	+++++	+++++
Pyraclostrobin + boscalid (Pristine)	NA	+++++	+++++	+++++	+++	+++++	+++++	+++++	+++++
Ziram (Ziram)	NA	+	++	+	+++	+++	???	++	???

^aNA = no significant activity, ??? = unknown activity; + = very limited activity, ++ = limited activity, +++ = moderate activity, ++++ = good activity, +++++ = excellent activity.

Seasonal ‘at a glance’ fungicidal spray schedule options for blueberry							
Developmental Stage	Green tip	Bloom (2-3 applications)^a	Petal Fall	10-14 Days after Petal Fall	20-24 Days after Petal Fall	Pre-Harvest^d	After Harvest Foliage Management
Disease Controlled (Fungicides)	Mummy Berry (Pristine) Twig blight (Pristine)	Mummy Berry and Twig blight (Pristine);^b For serious Botrytis problems add (Switch, Elevate, CaptEbate, or Pristine); If Alternaria and Ripe Rot have been a problem add (Abound, Switch, Cabrio, or Pristine)^c	Alternaria and Ripe Rots (Abound, Switch, Cabrio, or Pristine)	Alternaria and Ripe Rots (Abound, Switch, Cabrio, or Pristine)	Alternaria and Ripe Rots (Abound, Switch, Cabrio, or Pristine)	Alternaria and Ripe Rots (Abound, Switch, Cabrio, or Pristine); Septoria Leaf Spot (Abound, Switch, Cabrio, Pristine, or Aliette)^e	Septoria Leaf Spot (Abound, Switch, Cabrio, Pristine, or Aliette); Anthracnose (Abound, Cabrio, Pristine, or Aliette); Rust (Cabrio or Pristine)^f

^aBloom times vary, due to varietal differences and the environment. Bloom sprays should provide protection against the primary pathogens of blooms for the entire bloom period. The number of applications required for bloom may vary from 1-3, depending on the season and the variety.

^bIndar may also possibly be available for mummy berry control in 2005. If so, it will be available as a Section 18 label. Check with your local county agent for an update on this fungicide. When using Indar, always tank-mix with Captan. Captan provides additional control of mummy berry, and it has some activity against twig blight, Botrytis and fruit rots. However, it is mainly of value to prevent increased rots with the use of Indar, as well as providing resistance management.

^cMany of the fungicides which are registered for rot control may also have activity against twig dieback organisms, such as *Phomopsis* species.

^dIn wet years, pre-harvest and post-harvest rots may be a potential problem. Under these conditions, 1-2 applications of a pre-harvest material may be necessary for rot control.

^eSeptoria leaf spot is generally controlled with 2-4 fungicide applications. This disease is more problematic on highbush blueberry varieties, but some rabbiteye varieties may experience premature defoliation from Septoria as well. Aliette is best utilized after harvest, since it is not as efficacious against the fruit rots, and it serves as a resistance management tool.

^fRust is problematic on some blueberry varieties, especially in far southern areas such as south Georgia, and it can result in complete, premature defoliation on susceptible varieties. Scout for rust in mid to late July. Applications of fungicides (2-3) from August to mid-September will generally result in good rust management. Some varieties may require yearly rust control.

Weed Management

Blueberry

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI (hrs)	Comments
PREPLANT/ SITE PREPARATION	Glyphosate Roundup WeatherMax 5.5 SL or Various Generic Formulations 4 SL	1.4 to 2.8 pt 1 to 2 qt	Apply 30 days prior to planting.	12	Use to kill strips through blueberry fields prior to planting. Generic formulations may require the addition of a surfactant. See label for details on controlling specific perennial weeds.
	PREEMERGENCE Annual grasses and small seeded broadleaf weeds	Napropamide Devrinol 50 WDG	8 lb	Newly planted (once soil has settled after transplanting) and established plantings.	12
Oryzalin Surflan 4 AS or FarmSaver Oryzalin		2 to 4 qt	Newly planted (once soil has settled after transplanting) and established plantings. May be used in bark bed production system.	12	Oryzalin may be tank mixed with paraquat or Rely for postemergence weed control. In established plantings tank mix with simazine for broad spectrum residual weed control.
Norflurazon Solicam 80 DF		1.25 to 5 lb	Plantings established at least 6 months. May be used in bark bed production system.	12	Tank mix with paraquat or Rely for control of emerged weeds. Tank mix with simazine or diuron for expanded residual control. Do not apply within 60 days of harvest.
Benefin + Oryzalin XL 2G		150 lb	Newly planted and non-bearing plantings. May be used in bark bed production system.	24	Apply once soil has settled after transplanting with a drop or rotary spreader. Do not apply within on year of harvest. This product will not control emerged weeds.

Blueberry Integrated Management Guide (Weed Management)

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI (hrs)	Comments
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Oryzalin Surflan 4 AS or FarmSaver Oryzalin		2 to 4 qt	Newly planted (once soil has settled after transplanting) and established plantings. May be used in bark bed production system.	12	Oryzalin may be tank mixed with paraquat for postemergence weed control. In established plantings tank mix with simazine for broad spectrum residual weed control.
Norflurazon Solicam 80 DF		1.25 to 5 lb	Plantings established at least 6 months. May be used in bark bed production system.	12	Tank mix with Rely for control of emerged weeds. Tank mix with simazine or diuron for expanded residual control. Do not apply within 60 days of harvest.
Benefin + Oryzalin XL 2G		150 lb	Newly planted and non-bearing plantings. May be used in bark bed production system.	24	Apply once soil has settled after transplanting with a drop or rotary spreader. Do not apply within on year of harvest. This product will not control emerged weeds.

