UF UNIVERSITY of FLORIDA
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HS1156

2013 Florida Blueberry Integrated Pest Management Guide[1]

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This publication was adapted for Florida from the Southeast Regional Blueberry Integrated Management Guide, available at http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2006/12Jan06BlueberrySprayGuide.pdf. Thus, major contributions were made by the original editors: Gerard Krewer, Phil Brannen, Mark Czarnota, Dan Horton, Paul Guillebeau, and Paul Sumner (University of Georgia); Bill Cline, Hannah Barrack, Katie Jennings, Wayne Mitchem, and David Monks (North Carolina State University); Frank Hale and David Lockwood (University of Tennessee); and Powell Smith and Bob Bellinger (Clemson University).

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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 application 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 supersedes any information contained in this guide, and it is the legal document referenced for application standards.

Pesticide Emergencies

Poisonings: 1-800-222-1222

This number automatically connects you with a local Poison Control Center from anywhere in the United States.

Pesticide spills or other emergencies: 1-800-424-9300 (24 hours) CHEMTREK.

Be prepared—visit www.chemtrek.com now for a listing of the information you will be asked to provide in a chemical spill emergency.

Spills on public roads: In many cases, you can call CHEMTREK at 1-800-424-9300, or call 911 or the Florida Hazardous Material Planning Section, 1-800-320-0519 (cell: call *FDCA)

Environmental emergencies (contamination of waterways, fish kills, bird kills, etc.): Florida Department of Community Affairs Response Team, 1-800-320-0519

1. This document is HS1156, one of a series of the Horticultural Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date March 2009. Revised November 2012. Visit the EDIS website at http://edis.ifas.ufl.edu.

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Pesticide Safety and Label Interpretation Resources:

- *Federal Regulations Affecting Use of Pesticides* (http://edis.ifas.ufl.edu/pi168)
- *Interpreting Pesticide Label Wording* (http://edis.ifas.ufl.edu/pi071)
- *Toxicity of Pesticides* (http://edis.ifas.ufl.edu/pi008)

Sprayer Calibration: Sprayer calibration is very important. Sprayers should be calibrated often to guard against accidentally using excess pesticides because of nozzle wear, speed increases, and other calibration problems. Failing to calibrate often costs money, may cause crop damage, and is unsafe.

- *Calibration of Herbicide Applicators* (http://edis.ifas.ufl.edu/wg013)
- *Calibration of Airblast Sprayers* (http://edis.ifas.ufl.edu/ae238)
- *Pesticide Calibration Formulas and Information* http://edis.ifas.ufl.edu/wg067

Blueberry Integrated Management Guide (Insect and Disease Control)

Establishment

Root rots – Blueberry root rots can be particularly problematic immediately after transplanting and until plants are well established. Even in well-drained soils, root rots have been observed in bark-amended beds, and root rots are particularly damaging in high-density bark beds, even when using new bark. Though cost is an issue, replanting into old bark (high-density plantings) is not a good practice; disease-causing organisms build up in the bark, and they can make reestablishment very difficult. It is recommended that phosphite-containing materials (Aliette®, ProPhyt®, Agri-Fos®, etc.) be used on nonbearing plants after establishment (for bedded and high-density bark plantings). These materials are applied to leaves; therefore, leaf tissue must be fully expanded for them to be taken up by plants. In the initial year of planting, a minimum of four applications (spaced approximately 30 days apart) is advisable. In general, phosphite materials are acidic, and they should not be applied with acidifiers or acidic water (pH < 6).

Excessive application or application intervals shorter than those dictated by the label will injure plants. These phosphite materials also suppress Septoria leaf spot and anthracnose, which are major foliar diseases of young plants. Some phosphonate materials are labeled for use as drenches or chemigation, but information on the success of these methods in southern blueberry production is limited.

In high-density bark beds, Ridomil Gold® EC also provides good control of Pythium and Phytophthora root rots; however, using Ridomil Gold® EC in field plantings is very expensive and difficult since the product has to be taken up by the roots for activity. Where possible, rotating Ridomil Gold® EC and phosphites is a good resistance-management practice. Do not exceed label recommendations.

Postestablishment

Blueberry gall midge – The blueberry gall midge is a tiny fly whose larvae feed on vegetative and floral buds. On rabbiteye cultivars, the blueberry gall midge occurs frequently, but it normally only causes economic levels of damage on susceptible cultivars. Blueberry gall midge can become a major problem on some rabbiteye cultivars. Feeding injury destroys floral and vegetative buds before the bud scales open in the spring. In southern highbush blueberries (SHB), blueberry gall midge is observed less frequently than on rabbiteye, but SHB may show symptoms on new growth. Gall midges lay eggs on warm winter days and at any time during the growing season when the plants are making new flushes of growth. For control, apply Delegate® or diazinon (if labeled for use on your site) as needed for gall midge between flower bud stages 1 and 2, when the most mature buds first show slight scale separation. Repeat sprays during warm spells if necessary. Bud scale separation may occur as early as 15 December in north Florida. In rabbiteye, 'Premier' is often particularly attractive to the gall midge and is a good sentinel variety to monitor. Gall midge sprays can also suppress a prebloom thrips population.

Flower thrips – These are small insects (1/16 of an inch in length) with yellowish to orange coloration and fringed wings. Flower thrips damage blueberry flowers in two ways. Larvae and adults feed on all parts of the flowers, including ovaries, styles, petals, and developing fruit. This feeding damage can reduce the quality and quantity of the fruit. Females damage the fruit when they lay their eggs inside flower tissues. The newly hatched larvae bore holes in the flower tissues when they emerge. White, blue, and yellow sticky traps can be used to monitor thrips. White traps are preferred over blue and yellow because the thrips show up best against a light background and because the white traps do not attract as many beneficial insects as yellow traps. Another technique for monitoring thrips involves gently tapping the flowers and allowing the thrips to fall onto

a white sheet of paper below for counting. An economic injury level (EIL), the lowest number of thrips that can cause economic damage in blueberries, has been developed for two popular rabbiteye cultivars, 'Tifblue' and 'Climax'. During bloom, when thrips numbers reach approximately 68 thrips per trap for 'Tifblue' and 75 thrips per trap for 'Climax' in a week, insecticide applications should be considered. It is recommended that growers use Delegate® WG at 6 oz. per acre to manage flower thrips populations in Florida blueberries (rabbiteye and southern highbush).

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 well-established blueberries in Florida. Bud mite injury is often confused with frost damage and may become more visible in late spring. In early spring, infested plants exhibit stunted, succulent, fleshy, closely packed, reddish rosetted buds, which may dry up and often fail to open. Bloom on infested plants is reduced. Affected berries are small and rough and may have small, reddish pimples or blisters on the fruit surface. 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 aid in control.

Imported fire ants – Ant baits employed in early spring as a broadcast treatment usually eliminate most but not all fire ant mounds within treated areas. Under high ant pressure, treating a second time in the fall provides better fire ant control. Most ant baits are slow acting and require up to 8 weeks to control active mounds. Worker ants must be attracted to baits so that they will carry the baits back to their colonies. Most ant baits interfere with reproduction, causing a gradual colony die-off. 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).

Ant baits work best when the soil is moist but not wet. Active ant foraging is essential. Ideally, temperatures should be warm and sunny. Avoid applying ant baits when conditions are expected to be cold, overcast, rainy, or very hot. *Individual mound treatments are most effective when used as-needed for the occasional colony that survives broadcast treatments*. Mound treatments using insecticide baits should be applied in a circle 3–4 feet from the mound. Do not disturb mounds or place bait directly on top of mounds.

Mummy berry – Mummy berry is currently not identified as an important disease of southern highbush blueberry in Florida. The disease is a major issue in production areas north of Florida. Florida growers concerned about potential mummy berry problems are encouraged to contact county Extension for diagnostic confirmation and additional information.

Phytophthora root rot – Root rot is generally a problem of low-lying, poorly drained sites. To avoid root rot, provide adequate drainage by constructing raised beds *before planting*. Site selection and/or proper bedding operations are essential cultural practices for disease control. Treatment with fungicides is not effective for reversing root rot damage on plants with severe symptoms. Preventative fungicide treatments in pine bark beds and poorly drained sites may be warranted since the beds are often saturated with water either by irrigation or rainfall.

Commonly Recognized Stages of Flower Bud Development for Southern Highbush Blueberry

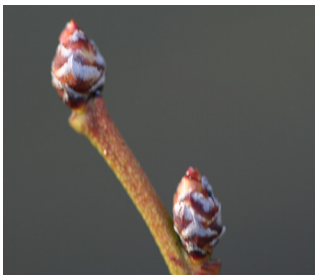

Figure 1. Flower bud stage 1
Credits: Jeff Williamson

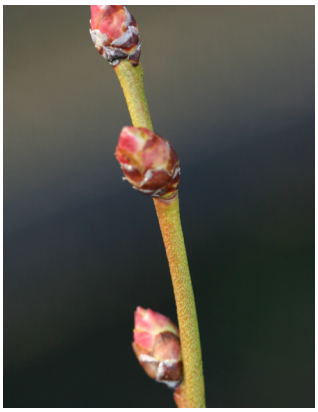

Figure 2. Flower bud stage 2
Credits: Jeff Williamson

Figure 3. Flower bud stage 3
Credits: Mark Longstroth (Michigan State University Extension)

Figure 4. Flower bud stage 4
Credits: Mark Longstroth (Michigan State University Extension)

Figure 5. Flower bud stage 5
Credits: Mark Longstroth (Michigan State University Extension)

Figure 6. Flower bud stage 6
Credits: Jeff Williamson

Figure 7. Flower bud stage 7
Credits: Jeff Williamson

Table 1. Management strategies for pest and disease problems of dormant blueberry plants

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Phytophtora root rot	Mefenoxam (Ridomil Gold® 4EC)	3.6 pt.	++++	48 h	0 days	*Established plantings:* Apply 1/4 pt./1000 linear feet of row (3.6 pt. per acre broadcast basis) in a 3-foot band over the row before the plants start growth in the spring. *New plantings:* Apply 3.6 pt. per acre (broadcast rate) at or after planting. An 18-inch band over the row is recommended. Do not apply more than 0.9 gal. per acre broadcast during the 12 months before plants bear 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) **Prebloom use only.**	2 gal./100 gal. water/acre or 2 fl. oz./1 gal. of water	+++++	4 h	12 h (no later than delayed dormant)	Oil may be applied dormant or delayed dormant. Apply as needed for scale infestations. Do not apply oil when temperatures are expected to exceed 85°F or be lower than 40°F within 24 hours. Do not use within 14 days of lime-sulfur.
Imported fire ants	Malathion (Malathion 57 EC)	1 pt.	++	12 h	1 day	Malathion is a modestly effective foliar rescue treatment. May be applied to plants 1 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 postharvest imported fire ant controls to suppress these pests in blueberries.
	Diazinon (Diazinon AG500)	1 pt./100 gal.	++++	24 h	7 days	Mound drench. Slowly apply 1 gal. of diluted mixture over and 6 inches around each mound. Apply gently to avoid disturbing ants.
	Pyriproxyfen (Esteem® Ant Bait)	1.5–2.0 lb. (2–4 tbsp./mound)	++++	12 h	24 h	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 imported fire ant treatments for 7–10 days. May need to reapply if heavy, flooding rains occur within 7 days.
	Methoprene (Extinguish® Professional Fire Ant Bait 0.5%)	1–1.5 lb. (3–5 tbsp./ 1000 sq. ft.) (3–5 tbsp./ mound)	+++	4 h	0 days	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.

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Gall midge	Diazinon (Diazinon AG500)	1 pt.	++++	24 h	7 days	Diazinon is the material of choice for early gall midge sprays. Do not apply diazinon within 5 days of bloom because its residues may injure pollinators.
	Delegate® WG	6 oz.	+++	4 h	3 days	Delegate® WG is the material of choice near bloom and should be applied as needed just before bloom for gall midge and/or thrips. Delegate® WG is toxic to bees until it is thoroughly dry (3 hours), but thereafter it is relatively nontoxic to bees. Delegate® WG should be applied in early morning or late evening during bloom.
	Malathion (Malathion 57 EC)	2 pt.	++++	12 h	1 day	Malathion may be applied for gall midge at stage 1 to 2 of bud development. Do not apply malathion within 24 hours of bloom.

Table 2. Management strategies for pest and disease problems in blueberry plants from prebloom through green tip (leaf buds) and pink bud (flower buds)

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least + = to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
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. Blueberries are a pollination-sensitive crop, and careless use of insecticides and subsequent bee kill can easily impair pollination and ruin fruit set. Only selected insecticides (Delegate®) should be used during bloom. If Delegate® is used, the insecticide should be applied early morning or late evening and be given 3 hours of drying time before bees are allowed to forage on the crop. To measure treatment thresholds for southern highbush and rabbiteye blueberries: Begin sampling bloom clusters as soon as the flower begins to open. Sample four to five areas in a 1-acre block by placing a white sheet under a flower cluster and tapping lightly. Count the number of flowers and count the number of thrips dislodged from the flower cluster. If you average more than four thrips (southern highbush) or three thrips (rabbiteye) per flower, some type of management is recommended. Alternatively, two white sticky traps could be used to monitor a 5-acre block (one on the border and one in the center). If you have more than 80–100 thrips (southern highbush) or 60–70 thrips (rabbiteye), then some type of management tactic is needed. Assail® is the material of choice until 5 days prebloom and from 5 days prebloom until first bloom.						
Phomopsis cane and twig blight	Pyraclostrobin + boscalid (Pristine® WG)	18.5–23 oz.	+++	24 h	0 days	No more than two 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.
	Fenbuconazole (Indar® 75 WSP)	2.0 oz.	++++	12 h	30 days	Do not make more than four applications per acre per year. Apply at 8- to 14-day intervals. This product has been reported to make ripe rot more severe when used alone during bloom. Tank mix Indar® with Captan to help prevent this problem.

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least + = to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Gall midge	Diazinon (Diazinon AG500)	1 pt.	++++	24 h	7 days	Do not apply within 5 days of bloom.
	Delegate® WG	6 oz.	+++	4 h	3 days	Delegate® WG may be applied as needed just before bloom for gall midge and/or thrips. Delegate® WG is toxic to bees until it is thoroughly dry (3 hours), but thereafter it is relatively nontoxic to bees. Delegate® WG should be applied in early morning or late evening during bloom. Bloom (organic formulation of Delegate® WG) may be applied as needed just before bloom for gall midge and/or thrips.
	Spinosad (Entrust® 80%) Labeled for organic use	1.25–2 oz.	+++	4 h	3 days	Entrust® is toxic to bees until it is thoroughly dry (3 hours), but thereafter it is relatively nontoxic to bees. Entrust® should be applied in early morning or late evening during bloom.
	Malathion (Malathion 57 EC)	2 pt.	+++	12 h	1 day	Malathion has low toxicity to bees and beneficial insects.

Table 3. Management strategies for pest and disease problems in blueberry plants from 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 that are needed for adequate pollination and fruit set.**						
Pest/problem	**Management options**	**Amount of formulation per acre**	**Effectiveness (Least = + to most = +++++)**	**Restricted entry interval (REI)**	**Postharvest Interval (PHI)**	**Comments**
Flower thrips	Delegate® WG	6 oz.	+++	4 h	3 days	Insecticide applications during bloom are typically very damaging to pollinators. Delegate® WG is toxic to bees for 3 hours following treatment. Do not apply Delegate® WG if bees are foraging on the plants. To minimize risk to bees, spray Delegate® WG in the late evening after bees are active or early morning before bees are active. Do not apply Delegate® WG more than three times in a 30-day period.
	(Entrust® 80%)	1.25–2 oz.	+++	4 h	3 days	Entrust is toxic to bees until it is thoroughly dry (3 hours), but thereafter it is relatively nontoxic to bees. Entrust should be applied in early morning or late evening during bloom.
	Assail® 70WP	2.4 oz.	++++	12 h	7 days	Do not apply Assail® during bloom. It is an excellent prebloom spray. Application can be made 7 days prior to bloom. Assail® may negatively affect pollinating bees; therefore, application should be made late evening. Do not make more than four applications per season.

Do not use insecticides during bloom. Spraying with insecticides may kill or repel wild bees and honey bees that are needed for adequate pollination and fruit set.						
Pest/problem	**Management options**	**Amount of formulation per acre**	**Effectiveness (Least = + to most = +++++)**	**Restricted entry interval (REI)**	**Postharvest Interval (PHI)**	**Comments**
Botrytis flower blight	Cyprodinil + fludioxonil (Switch® 62.5WG)	11–14 oz.	+++++	12 h	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.
	Fenhexamid (Elevate® 50 WDG)	1.5 lb.	+++++	12 h	0 days	Begin application at 10% bloom. Applications should be made every 7 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 (Captevate® 68 WDG)	3.5–4.7 lb.	+++++	72 h	0 days	Captevate® is a combination 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	+++++	24 h	0 days	No more than two 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 h	~30 days	Do not apply later than 3 weeks after full bloom.
	Captan (Captan 50WP)	5 lb.	++	72 h	0 days	Do not apply more than 70 lb. per acre per crop year.
	Captan (Captec 4L®)	2 qt.	++	72 h	0 days	Do not apply more than 35 qt. per acre per crop year.

Do not use insecticides during bloom. **Spraying with insecticides may kill or repel wild bees and honey bees that are needed for adequate pollination and fruit set.**						
Pest/problem	**Management options**	**Amount of formulation per acre**	**Effectiveness (Least = + to most = +++++)**	**Restricted entry interval (REI)**	**Postharvest Interval (PHI)**	**Comments**
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 pale green larvae and damage. Early varieties, such as 'Climax', are normally infested first. Infestations should be caught as the first or second berry in a cluster ripens for sprays to control this pest.						
Ripe (anthracnose) and/or Alternaria rots	Azoxystrobin (Abound®)	6.2–15.4 fl. oz.	+++++	4 h	0 days	Subsequent applications can be made at 7- to 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 qt. per acre per season.
	Cyprodinil + fludioxonil (Switch® 62.5WG)	11–14 oz	+++++	12 h	0 days	Applications can be made at 7- to 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 h	0 days	No more than two 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 h	0 days	No more than two 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 h	~30 days	Do not apply later than 3 weeks after full bloom.
	Captan (Captan 50 WP)	5 lb.	+++	72 h	0 days	Do not apply more than 70 lb. per acre per crop year.
	Captan (Captec 4L®)	2 qt.	+++	72 h	0 days	Do not apply more than 35 qt. per crop year.

Table 4. Management strategies for pest and disease problems in blueberry plants from petal fall until 1 month after bloom

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Cranberry fruitworm, cherry fruitworm, and plum curculio – Review field histories and scout fields for fruitworms and plum curculio to determine if and when spraying is needed. In Florida production areas, plum curculio has not been found to be a pest of southern highbush and rabbiteye blueberries. Fields with a history of infestation should be sprayed at least twice on a 7-to 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 spot** – Septoria and anthracnose leaf spot can cause premature defoliation, resulting in poor bud development and subsequent loss of yield. Fungicide timing for leaf spots varies across the state and by specific disease. Septoria can occur prior to harvest through late spring. Anthracnose leaf spots generally start postharvest and persist through summer.						
Ripe (anthracnose) and/or Alternaria rots	Azoxystrobin (Abound®)	6.2–15.4 fl. oz.	+++++	4 h	0 days	Subsequent applications can be made at 7- to 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 qt. per acre per season.
	Cyprodinil + fludioxonil (Switch® 62.5WG)	11–14 oz.	+++++	12 h	0 days	Applications can be made at 7- to 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 h	0 days	No more than two 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.
Phytophthora root rot	Fosetyl-Al (Aliette® WDG)	5 lb.	+++	12 h	0 days	Apply Aliette® as a foliar spray after leaves have emerged. Subsequent applications can be made at 14- to 21-day intervals. Do not exceed four applications per acre per year. **Do not tank mix with copper and foliar fertilizers, and do not apply in acidic water or add acidifying agents because these practices could damage foliage and fruit.** When tank-mixing this product with others, test the mix on a small area to make sure that phytotoxicity does not occur.
	Potassium phosphite (Prophyt®)	4 pt.	++++	4 h	0 h	Apply as a foliar spray for Phytophthora and Pythium after leaves have emerged. Also effective against Septoria and anthracnose leaf spots. **Do not tank mix with copper and foliar fertilizers, and do not apply in acidic water or add acidifying agents because these practices could damage foliage and fruit.** When tank-mixing this product with others, test the mix on a small area to make sure that phytotoxicity does not occur.
	Mono- and dipotassium salts of phosphorous acid (Agri-Fos®)	2.5 qt.	++++	4 h	0 h	Apply as a foliar spray for Phytophthora and Pythium after leaves have emerged. Also effective against Septoria and anthracnose leaf spots. **Do not tank mix with copper and foliar fertilizers, and do not apply in acidic water or add acidifying agents because these practices could damage foliage and fruit.** When tank-mixing this product with others, test the mix on a small area to make sure that phytotoxicity does not occur.

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Ripe (anthracnose) and/or Alternaria rots	Pyraclostrobin + boscalid (Pristine® WG)	18.5–23 oz.	+++++	24 h	0 days	No more than two 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 h	~30 days	Do not apply later than 3 weeks after full bloom.
Cranberry fruitworm	Malathion (Malathion 57 EC)	2.8–3.2 pt.	+++	12 h	1 day	Spray fruitworms when one bush in five has infested fruit clusters.
	Esfenvalerate (Asana® XL 0.66 EC)	4.8–9.6 fl. oz.	++++	12 h	14 days	Some users may be allergic to Asana®; discontinue use if skin or eyes become inflamed.
	Esfenvalerate (Adjourn® 0.66 EC)	4.8–9.6 fl.oz.	++++	12 h	14 days	Some users may be allergic to Adjourn®; discontinue use if skin or eyes become inflamed.
	Phosmet (Imidan® 70WP)	1.3 lb.	+++++	24 h	3 days	Imidan®, applied for blueberry maggot, provides excellent control of fruitworms.
	Phosmet (Imidan® 70W)	1.3 lb.	+++++ (for fruitworms) ++++++++ (for plum curculio)	24 h	3 days	Imidan® produces 7–10 days of residual control. Begin spraying after petal fall.
	Carbaryl (Sevin® 80WSP)	1.9–2.5 lb.	+++ (for fruitworms)	12 h	7 days	Sevin® gives only moderate control of fruitworms.
	Tebufenozide (Confirm® 2F)	16 fl. oz.	+++++ (for fruitworms)	4 h	14 days	Confirm® gives very good control for cranberry fruitworms. Confirm needs to be ingested to be effective; therefore, timing is critical. Apply Confirm® while fruitworms are still small. Confirm® conserves natural enemies.

Table 5. Management strategies for pest and disease problems in preharvest blueberries

Pest/Problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Alternaria and ripe rots	Azoxystrobin (Abound®)	6.2–15.4 fl. oz.	+++++	4 h	0 days	Subsequent applications can be made at 7- to 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 qt. per acre per season.
	Cyprodinil + fludioxonil (Switch® 62.5WG)	11–14 oz.	+++++	12 h	0 days	Applications can be made at 7- to 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 h	0 days	No more than two sequential applications of Cabrio® should be made before alternating with fungicides that have a different mode of action. Do not make more than four applications of Cabrio® per acre per crop year.
	Pyraclostrobin + boscalid (Pristine® WG)	18.5–23 oz.	+++++	24 h	0 days	No more than two sequential applications of Pristine® should be made before alternating with fungicides that have a different mode of action. Do not make more than four applications of Pristine® per acre per crop year.
	Metconazole (Quash®)	2.5 oz.	?	12 h	7 days	Do not make more than three applications per acre per crop year. Alternate with a fungicide with another mode of action.

NOTE: Products that contain pyraclostrobin (Cabrio® and Pristine®) have undergone recent label changes and growers should carefully check labels of these products in particular to ensure blueberries are on the label and for any tank-mixing restrictions. Always read and follow pesticide label instructions.

Table 6. Management strategies for pest and disease problems in harvest blueberries

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Blueberry maggot fly (BBM) – Blueberry maggot is only a problem for growers north of the Lake City and Live Oak areas. Growers in Gainesville and south of Gainesville should not experience any problems with blueberry maggot. Blueberry maggot is a late-season pest. If berries are infested with BBM, a whitish maggot will appear in the fruit at harvesting. The adult fly that lays the eggs can be monitored by hanging yellow sticky traps (baited with ammonium acetate) within the bush canopy, at least one per cultivar. Trap catches indicate when adults are present. Traps should be hung in the planting when berries begin to turn from full green to the greenish-pink stage. See your county agent for identification pictures and further reference. If your planting has a history of BBM infestation, spray as soon as adults are trapped. 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. All growers in Florida who are shipping blueberries to Canada or the United Kingdom must comply with appropriate guidelines for scouting, spraying, and postharvest inspection of berries, including a protocol for cooking samples of harvested fruit to test for the presence of the maggot in berries. The Canadian protocol states that blueberries must be certified maggot free to enter Canada. **Spotted wing drosophila (SPD)** is a relatively new pest for Florida. Flies were caught in six Florida counties, namely Suwannee, Columbia, Alachua, Levy, Putnam, and Hardee, in 2011. They have been caught in other counties since then and could be a problem in any part of the state. Adults lay eggs in ripening blueberries, and larvae develop inside the berry, making the fruits soft and unmarketable. Adults can be monitored by placing traps in blueberry bushes. Traps can be made from plastic cups and baited with apple cider vinegar. Traps should be placed within the canopy of the blueberry bush. A number of insecticides have recently been registered for control of spotted wing drosophila. (See *Spotted Wing Drosophila in Florida Berry Culture* at http://edis.ifas.ufl.edu/in839.) **Fruit rots** – Fungicides alone do not provide adequate control; proper harvesting and handling are essential. Pre- and postharvest rots can be greatly reduced by timely, complete harvest of all ripe fruit on the bush, followed by rapid postharvest 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. Postharvest 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 maggot	Phosmet (Imidan® 70W)	1.3 lb.	++++	24 h	3 days	Imidan® is the material of choice for managing BBM. BBM sprays should protect berries from the start of oviposition until the last berries are harvested. Imidan® provides 10–14 days residual control. Do not apply more than twice per season.
	Carbaryl (Sevin® 80S)	1.9–2.5 lb.	+++	12 h	7 days	BBM sprays should protect berries from the start of oviposition until the last berries are harvested. Sevin® provides 5–7 days of residual effectiveness.
	Malathion (Malathion 57 EC)	1.5 pt.	+++	12 h	1 day	BBM sprays should protect berries from the start of oviposition until the last berries are harvested. Malathion provides 5–7 days of residual control.
	Diazinon (Diazinon AG500)	1 pt./100 gal.	++++	24 h	7 days	Allow 14 days between applications.
	Delegate® WG	3–6 oz.	+++	4 h	3 days	Delegate® WG is toxic to bees until it is thoroughly dry.

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Spotted wing drosophila	Mustang Max™	4 oz.	++++	12 h	24 h	Use a minimum spray volume of 20 gal. by ground.
	Delegate® WG	6 oz.	+++	4 h	3 days	Delegate® WG is toxic to bees until it is thoroughly dry.

Table 7. Management strategies for pest and disease problems in postharvest plant management

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Blueberry bud mites – This is an occasional pest of blueberries in Florida. Use high-volume (300 gal. per acre), high-pressure (200 psi) applications of a postharvest insecticide/miticide and horticultural oils. In blocks infested with blueberry bud mite, make two postharvest 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 bud mite is a tiny eriophyid mite, best visible with a dissecting microscope. In early ripening cultivars, sanitation in the form of postharvest hedging and cutting back into one- and two-year-old wood should be the primary management response for mite-infested blocks. Postharvest application(s) of endosulfan may be helpful to augment this critical cultural practice. **Imported fire ants** – Imported fire ants can be very important pests in orchards, vineyards, or fields. Ant baits employed after harvest into fall as a broadcast treatment should eliminate most, but seldom all, fire ant mounds within treated areas. When ant populations are high, use a dormant or early spring broadcast application in addition to the postharvest application to get better fire ant control. Ant baits are slow acting. They require up to 8 weeks to control active mounds. Worker ants must be attracted to baits so that they will carry the baits back to their colonies. Most ant baits interfere with reproduction, which causes a gradual colony die-off. Extinguish® Professional Fire Ant Bait (0.5% methoprene) is labeled for use on all crop land sites. It is effective, but since it is an insect growth regulator, it is somewhat slower acting than Esteem® Ant Bait (0.5% pyriproxyfen). Ant baits work best when soil is moist but not wet. Active ant foraging is essential. Ideally, temperatures should be warm and sunny. Avoid applying ant baits when conditions are expected to be cold, overcast, rainy, or very hot. Individual mound treatments are most effective when used as needed for the occasional colony that survives broadcast treatments. Mound treatments using insecticide baits should be applied in a circle 3–4 feet from the mound. Do not disturb mounds or place bait directly on top of mounds. **Chilli thrips** - Adults and larvae feed on young leaves and fruit, causing bronzing, leaf curl stunting, and fruit scarring. Adult chilli thrips have a pale yellow body with dark wings and are less than 1/16 of an inch in length. Females insert their eggs into blueberry tissues, and newly hatched larvae pass through two larval stages that feed on blueberry tissues and fruit. Chilli thrips can be monitored with white or yellow sticky cards placed within the canopy of the blueberry bush.						

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Blueberry bud mite	Endosulfan (Thionex® 3 EC)	2qt./300 gal.	++++	24 h	Postharvest only	Blueberry bud mite infestations are very site specific and only affect certain varieties. Bud mites may be spread via propagation. A postharvest application, followed by another in August, is the general recommendation. Consult with an entomologist to ensure proper timing of these applications. Do not apply more than 4 qt. of Thionex® 3 EC per acre per year **(for postharvest use only).**
	Endosulfan (Endosulfan 3EC)	2 qt./300 gal.	++++	24 h	Postharvest only	
	Horticultural oil (JMS Stylet-Oil®)	3–6 qt./100 gal.	++	4 h	0 days	Blueberry bud mite 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 h	0 days	
Yellownecked caterpillars	Malathion (Malathion 57 EC)	1.5 pt.	+++	12 h	1 day	Foliage-feeding caterpillars become more difficult to control as they mature.
Azalea caterpillar	Bacillus thuringiensis [BT] (DiPel® DF)	0.5–1.0 lb.	++	4 h	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 h	14 days	Confirm® is very effective if applied to small, early stage caterpillars.
	Esfenvalerate (Asana® 0.66 EC)	4.8–16 oz.	++++	12 h	14 days	Esfenvalerate should be used as a salvage treatment for large caterpillars. It is very effective, but if used often it encourages scale and mite buildup.
	Esfenvalerate (Adjourn® 0.66 EC)	4.8–9.6 fl. oz.	++++	12 h	14 days	Some users may be allergic to Adjourn®; discontinue use if skin or eyes become inflamed.

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Imported fire ants	Diazinon (Diazinon AG500)	1 pt./100 gal.	++++	24 h	7 days	Mound drench. Slowly apply 1 gal. of diluted mixture over and 6 inches around each mound. Apply gently to avoid disturbing ants.
	Pyriproxyfen (Esteem® Ant Bait)	1.5–2.0 lb. (2–4 tbsp./ mound)	++++	12 h	24 h	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 imported fire ant treatments for 7–10 days. May need to reapply if heavy, flooding rains occur within 7 days.
	Methoprene (Extinguish® Professional Fire Ant Bait 0.5%)	1–1.5 lb. (3–5 tbsp./ 1000 sq. ft.) (3–5 tbsp./ mound)	+++	4 h	0 days	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.
Flea beetles	Carbaryl (Sevin® 80S)	1–2 lb.	+++	12 h	7 days	Sevin® is also effective against small to medium-sized caterpillars.
	Diazinon (Diazinon AG500)	1 pt./100 gal.	++++	24 h	7 days	Diazinon is also effective against small to medium-sized caterpillars.
	Mustang Max™	4 oz.	++++	12h	24h	Use a minimum spray volume of 20 gal. by ground.
	Assail® 70WP	2.4 oz.	+++	12h	7 days	Do not make more than four applications per season.
White grubs (Grubs of Asiatic garden beetle, European and masked chafer, and Oriental beetle)	Admire® Pro	10 fl. oz.	+++	12 h	7 days	Soil application. Chemigation into root zone through low-pressure drip, trickle, or microsprinkler. It is important to moisten the soil (1/2–1 inch of water) prior to application or shortly after application.

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Chilli thrips	Delegate® WG	6 oz.	+++	4 h	3 days	Delegate® WG may be applied as needed. Delegate® WG should be applied in early morning. It is toxic to bees in the surrounding areas for the first 3 hours after application.
	Assail® 70WP	2.4 oz.	+++	12 h	7 days	Do not make more than four applications per season. Toxic to bees until spray is dry (approximately 3 hours).
	Malathion (Malathion 57 EC)	2 pt.	+++	12 h	1 day	Malathion should be applied early morning or late evening to reduce the disruption of beneficial insects.
	Entrust® 80% (labeled for organic use)	1.25–2 oz.	+++	4 h	3 days	It is toxic to bees in the surrounding areas for the first 3 hours after application.

Table 8. Late-season and postharvest blueberry foliage management

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
During fruit maturation and/or immediately following harvest, fungicide applications may be warranted for control of leaf spot and suppression of dieback diseases and root rots. Start applications as soon as leaf spots are first observed. **Dieback diseases of southern highbush varieties** – Most southern highbush varieties are hedged immediately after harvest. Hedging cuts can serve as an entry point for many stem pathogens. At the end of each day of hedging, application of broad-spectrum fungicides such as Captan mixed with Prophyt® may help reduce infection. **Blueberry rust –** Rust is a problem in all Florida production areas. On susceptible varieties, rust can prematurely defoliate plants. Where leaves are not dropped in winter, rust can carry over on the previous year's foliage and can cause rust problems in early spring as well. Bravo Weather Stik® is labeled for control of both rust and Septoria leaf spots; this chlorothalonil product makes an excellent rotation partner for the strobilurin-containing products, Cabrio® and Pristine®. However, Bravo Weather Stik® can only be used after harvest because chlorothalonil will damage fruit.						
Septoria and anthracnose leaf spots and Phytophthora root rot	Fosetyl-Al (Aliette® WDG)	5 lb.	++++	12 h	12 h	Apply Aliette® as a foliar spray for Phytophthora and Pythium root rots and Septoria leaf spot. Subsequent applications can be made at 14- to 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 four applications per acre per year. **Do not tank mix with copper and foliar fertilizers, and do not apply in acidic water or add acidifying agents because these practices could damage fruit or foliage.** When tank-mixing this product with others, test the mix on a small area to make sure that phytotoxicity does not occur.
	Potassium phosphite (Prophyt®)	4 pt.	++++	4 h	0 h	Apply as a foliar spray for Phytophthora and Pythium. Also effective against Septoria and anthracnose leaf spots. **Do not tank mix with copper and foliar fertilizers, and do not apply in acidic water or add acidifying agents because these practices could damage fruit or foliage.** When tank-mixing this product with others, test the mix on a small area to make sure that phytotoxicity does not occur.
	Mono- and dipotassium salts of phosphorous acid (Agri-Fos®)	2.5 qt.	++++	4 h	0 h	Apply as a foliar spray for Phytophthora and Pythium. Also effective against Septoria and anthracnose leaf spots. **Do not tank mix with copper and foliar fertilizers, and do not apply in acidic water or add acidifying agents because these practices could damage fruit or foliage.** When tank-mixing this product with others, test the mix on a small area to make sure that phytotoxicity does not occur.
Septoria and anthracnose leaf spots only	Azoxystrobin (Abound®)	6.2–15.4 fl. oz.	++++	4 h	0 days	Subsequent applications can be made at 14-day intervals. Apply immediately after harvest. Two or three fungicide applications after 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 qt. 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.

Pest/problem	Management options	Amount of formulation per acre	Effectiveness (Least = + to most = +++++)	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Septoria leaf spot only	Cyprodinil + fludioxonil (Switch® 62.5WG)	11–14 oz.	+++	12 h	0 days	Applications can be made at 7- to 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.
Septoria and rust leaf spots only	Chlorothalonil (Bravo Weather Stik®)	3–4 pt.	++++	12 h (with restrictions) 6.5 days (w/o)	42 days	Apply only as a postharvest fungicide for Septoria and rust. Do not combine with other pesticides, surfactants, or fertilizers.
	Fenbuconazole (Indar® 75 WSP)	2.0 oz.	+++++	12 h	30 days	Do not make more than four applications or apply more than 8 oz. of Indar® 75 WSP (0.38 lb. active) per acre per year. Indar® 75 WSP belongs to the sterol demethylation inhibitor (DMI) class of fungicides. Alternation with fungicides of different classes is recommended.
	Propiconazole (Orbit® 3.6 E)	6.0 fl. oz.	+++++	24 h	30 days	Orbit®, another DMI fungicide, may be applied by ground or aerial application (see label). Do not apply more than 30 fl. oz. per acre per season. Orbit® is more effective when it dries ahead of a rain.
Septoria, anthracnose, and rust leaf spots	Pyraclostrobin (Cabrio® EG)	14 oz.	++++	24 h	0 days	No more than two 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 h	0 days	No more than two 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.

Table 9. Efficacy of selected fungicides against blueberry diseases

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	++	NA	+++++	++	+++++	++++	++++	???
Captan (Captan, Captec)	NA	+	++	++	++	+++	++	+++	NA
Chlorothalonil (Bravo®)	NA Do not use before harvest.	NA Do not use before harvest.	NA Do not use before harvest.	NA Do not use before harvest.	NA Do not use before harvest.	NA Do not use before harvest.	++++ Do not use before harvest.	??? Do not use before harvest.	+++ Do not use before harvest.

Fungicide	Phytophthora root rot	Mummy berry	Botrytis (gray mold)	Alternaria rot	Phomopsis twig blight	Ripe rot (anthracnose)	Septoria leaf spot	Anthracnose leaf spot	Rust
Cyprodinil + fludioxonil (Switch®)	NA	++	+++++	+++++	+++	+++++	+++	++++	???
Fenbuconazole (Indar®)* *During mummy berry applications, tank mix with captan products to prevent rots	NA	+++++	NA	NA	NA	NA	++++	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
Mono- and dipotassium salts of phosphorous acid (Agri-Fos®)	+++	NA	NA	NA	NA	NA	++++	++++	NA
Mono- and dipotassium salts of phosphorous acid (K-Phite®)	+++	NA	NA	NA	NA	NA	++++	++++	NA
Potassium phosphite (ProPhyt®)	+++	NA	NA	NA	NA	NA	++++	++++	NA
Pyraclostrobin (Cabrio®)	NA	NA	NA	++++	+++	++++	++++	+++++	+++++
Pyraclostrobin + boscalid (Pristine®)	NA	++++	+++++	+++++	+++	+++++	+++++	+++++	+++++
Ziram (Ziram)	NA	+	++	+	+++	+++	???	++	???

NA = no significant activity, ??? = unknown activity, + = very limited activity, ++ = limited activity, +++ = moderate activity, ++++ = good activity, +++++ = excellent activity

Table 10. Fungicide classes with moderate to high risk of resistance development (generally single sites of action)

Fungicide class	Trade name and chemical name
Anilopyrimidines	Switch® (cyprodinil; one component of a two-part mixture)
Carboximide	Pristine® (boscalid; one component of a two-part mixture)
Demethylation inhibitors (DMIs) or sterol inhibitors	Indar® (fenbuconazole), Orbit® (propiconazole)
Hydroxyanelides	Elevate® (fenhexamid)
Phenylamides	Ridomil Gold® (mefanoxam)
Phenylpyrroles	Switch® (fludioxanil; one component of a two-part mixture)
Strobilurins or QoI (quinone outside inhibitors)	Abound® (azoxystrobin), Cabrio® (pyraclostrobin)

Table 11. Fungicide classes with low risk of resistance development (generally multiple sites of action)

Fungicide Class	Trade Name and Chemical Name
Coppers	Coppers (numerous formulations)
Dithiocarbamates	Ziram (ziram)
Phthalimides	Captan (Captan or Captec)
Phthalonitriles	Bravo® (Chlorothalonil)
Phosphonates	Aliette® (Fosetyl-Al), Agri-Fos® (Mono- and dipotassium salts of phosphorous acid), K-Phite® (Mono- and dipotassium salts of phosphorous acid), ProPhyt® (Potassium phosphite)

Table 12. 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	Preharvest[d]	Postharvest foliage management
Disease controlled (Fungicides)	Twig blight (Pristine® or Indar®)	Twig blight (Pristine®, Indar®[b] + Captan, or Orbit®) Botrytis (Captevate, Elevate®, Pristine®, or Switch®	Alternaria and ripe rots (Abound®, Cabrio®, Pristine®, or Switch®)[c]	Alternaria and ripe rots (Abound®, Cabrio®, Pristine®, or Switch®)	Alternaria and ripe rots (Abound®, Cabrio®, Pristine®, or Switch®)	Alternaria and ripe rots (Abound®, Cabrio®, Pristine®, or Switch®) Septoria leaf spot (Abound®, Aliette®, Cabrio®, Pristine®, or Switch®)[e]	Septoria leaf spot and rust (Abound®, Orbit®, Agri-Fos®, Aliette®, Bravo®, Cabrio®, Pristine®, Prophyt®, Switch®, or Indar®)[f] anthracnose (Agri Fos®, Aliette®, Cabrio®, Pristine®, or Prophyt®)

[a]Bloom times vary because of varietal differences and the environment. Bloom sprays should provide protection against the primary bloom pathogens for the entire bloom period. The number of applications required for bloom may vary from one to three, depending on the season and the variety.

[b]When using Indar® during bloom, always tank-mix with Captan. Captan provides additional mummy berry control, and it has some activity against twig blight, Botrytis, and fruit rots. However, it mainly prevents rots when used with Indar®, and it also provides resistance management.

[c]Many of the fungicides registered for rot control may also have activity against twig dieback organisms, such as *Phomopsis* spp.

[d]In wet years, preharvest and postharvest rots may be a potential problem. Under these conditions, one to two applications of a preharvest material may be necessary for rot control.

[e]Septoria leaf spot is generally controlled with two to four fungicide applications. This disease is more problematic on highbush blueberry varieties, but some rabbiteye varieties may experience premature defoliation from Septoria as well. For leaf spot, Aliette® and other phosphites (ProPhyt®, Agri-Fos®, etc.) are best used after harvest since they are not as efficacious against fruit rots, and they serve as a resistance management tool.

[f]Rust is problematic on some blueberry varieties, especially in Florida and south Georgia, and it can result in complete, premature defoliation on susceptible varieties. Scout for rust in mid to late July. Two to three applications of fungicides from August to mid-September will generally result in good rust management. Some varieties may require yearly rust control.

Table 13. Preemergence chemical weed control for blueberry

Common name lb. a.i. / A	(Trade name) formulation amount of product / A	Weeds controlled
Dichlobenil, MOA 20 4–6 1.96–3.9	(Casoron®) 4 G 100–150 lb. (Casoron®) 1.4 CS 1.4–2.8 gal.	Annual and some perennial weeds

Remarks: Apply to bearing and nonbearing bushes. Casoron® 1.4 CS must be applied to well-established plantings and not until at least 1 year after transplanting. Casoron® 4 G can be applied 4 weeks after transplanting. Higher rates may be required to control perennial weed species. Consult label for herbicides that can be tank mixed to broaden spectrum of weed control. Casoron® 4 G REI 12 hours and Casoron® 1.4 CS REI 24 hours.

Common name lb. a.i. / A	(Trade name) formulation amount of product / A	Weeds controlled
Diuron, MOA 7 1.2–1.6	(Diuron, Karmex®, Karmex® XP) 80 WDG 1.5–2.0 lb. (Direx®) 4 L 1.2–1.6 qt.	Annual broadleaf and grass weeds
Remarks: Apply to bearing and nonbearing bushes, established at least 1 year from transplanting. Direct spray solution to the base of the bush to minimize contact with leaves, flowers, and fruits. Diuron may be applied as a single application in the spring (1.2–1.6 lb. a.i./A) and another application (1.2–1.6 lb. a.i./A) in the fall. Read labels for restrictions on soil type. REI 12 hours.		
Flumioxazin, MOA 14 0.188–0.38	(Chateau®) 51 WDG 6–12 oz.	Annual broadleaf and grass weeds
Remarks: Apply to bearing and nonbearing bushes. Direct spray solution to the base of the bush. Do not apply to bushes less than 2 years old unless protected by a nonporous wrap, grow tubes, or waxed cylinders. Do not apply between bud break and final harvest. Do not apply more than 12 oz. in a 12-month period. Do not apply more than 6 oz. per application to bushes less than 3 years old in soils with sand plus gravel content greater than 80%. Do not allow Chateau® to come in contact with any green tissue, or injury may occur. Chateau® may be applied in sequential applications, but not within 30 days of each other. Consult label for herbicides that can be tank mixed to broaden spectrum of weed control. REI 12 hours.		
Hexazinone, MOA 5 1–2	(Velpar®) 2 L 4–8 pt. (Velpar®) 75 DF 1.3–2.6 lb.	Broadleaf and grass weeds
Remarks: Apply to bearing bushes. Crop must be established for 3 or more years. Apply in the spring before leaves are fully expanded. Direct spray solution to the base of the bush to minimize contact with leaves, flowers, and fruits. Do not apply to soils with greater than 85% sand. Use lower rates in sandy soil; consult label for quantity based on soil type. Do not apply within 90 days of harvest. REI 48 hours.		
Isoxaben, MOA 12 0.5–1.0	(Gallery®, Gallery® TandV) 75 DF 0.66–1.33 lb.	Certain broadleaf weeds
Remarks: Apply to nonbearing bushes. Allow 60 days between applications and do not apply more than 4 lb. product within a 12-month period. Consult label for herbicides that can be tank mixed to broaden spectrum of weed control. REI 12 hours.		
Isoxaben, MOA 12 **+ Oryzalin**, MOA 3 2.0–4.0 + 0.5–1	(Snapshot®) 2.5 TG 100–200 lb.	Certain broadleaf and annual grass weeds
Remarks: Apply to nonbearing bushes. A single rainfall or sprinkler irrigation of 0.5 in. is necessary within 3 days of application for optimum weed control. Allow 60 days between applications of 150 lb. product/A or greater. Do not apply more than 600 lb./A product within a 12-month period. Do not apply to bushes that have wet foliage from rainfall or dew. REI 12 hours.		

Common name lb. a.i. / A	(Trade name) formulation amount of product / A	Weeds controlled
Mesotrione, MOA 27 0.09–0.19	(Callisto®) 4 L 3–6 fl. oz.	Annual broadleaf weeds
Remarks: Apply to bearing and nonbearing bushes. Apply before prebloom, or illegal residues may occur. Can be applied as a split application of 3 oz. followed by 3 oz. with no less than 14 days between applications. Limit contact with green foliage and stems, or injury may result. Include a crop oil concentrate at 1% v/v. Consult label for herbicides that can be tank mixed to broaden spectrum of weed control. The University of Florida has conducted limited testing; thus, any application should be made on a small acreage first to determine cultivar tolerance. REI 12 hours.		
Napropamide, MOA 15 4	(Devrinol®) 50 DF 8 lb. (Devrinol®) 10 G 40 lb.	Small-seed broadleaf and annual grass weeds
Remarks: Apply to bearing and nonbearing bushes. Do not apply within 1 year of planting. Direct spray solution to the base of the bush to minimize contact with foliage and fruit. Applications should be made to a weed-free surface. Napropamide should be cultivated or irrigated to a depth of 2 in. within 24 hours of application. REI 24 hours.		
Norflurazon, MOA 12 2–4	(Solicam®) 80 WDG 2.5–5.0 lb.	Small-seed broadleaf and annual grass weeds
Remarks: Apply to bearing and nonbearing bushes. Consult label for amount of formulation based on soil texture. Do not apply within 6 months of planting. Rainfall or irrigation is required within 4 weeks of application. Consult label for herbicides that can be tank mixed to broaden spectrum of weed control. Do not apply within 60 days of harvest. REI 12 hours.		
Oryzalin, MOA 3 2–4	(Oryzalin, Surflan®) 4 AS 2–4 qt. (Surflan®) 85WDG 2.4 – 4.7 lb.	Certain broadleaf and annual grass weeds
Remarks: Apply to bearing and nonbearing bushes. Irrigation or rain event of 0.5–1 in. is required within 1 week of application. Consult label for herbicides that can be tank mixed to broaden spectrum of weed control. REI 24 hours.		
Pronamide, MOA 3 1–2	(Kerb®) 50 W 2–4 lb.	Certain annual and perennial broadleaf and grass weeds
Remarks: Apply to bearing and nonbearing bushes. Apply in the fall or early winter when temperature is less than 55°F for maximum efficacy. Do not apply to newly planted bushes; wait for root establishment. Immediately follow application with rainfall or irrigation for additional weed control. Do not apply more than 4 lb. product/A or more than one application in 1 year.		
Simazine, MOA 5 2–4	(Princep® Simazine) 90 WDG 2.2–4.4 lb. (Princep® Simazine) 4 L 2–4 qt.	Annual broadleaf and grass weeds
Remarks: Do not apply more than 1 lb. a.i./A on plantings less than 6 months old. Apply half the maximum in the spring before bud break and half in the fall. REI 48 hours.		

Common name lb. a.i. / A	(Trade name) formulation amount of product / A	Weeds controlled
Terbacil, MOA 5 0.4–1.6	(Sinbar®) 80 WP 0.5–2 lb.	Annual broadleaf and grass weeds
Remarks: Apply to bearing and nonbearing bushes. Only apply to bushes that have been planted for 1 year or longer. Do not use in soils with less than 3% organic matter. Use in the spring or after harvest before weeds emerge or shortly after. REI 12 hours.		

Table 14. Postemergence chemical weed control in blueberry

Common name lb. a.i. / A	(Trade name) formulation amount of product / A	Weeds controlled
Carfentrazone, MOA 14 0.016–0.031	(Aim®) 2 EC 1–2 fl. oz. (Aim®) 1.9 EW 1–2 fl. oz.	Broadleaf weeds
Remarks: Direct spray solution to the base of the bush to minimize contact with green stems, leaves, flowers, and fruits. Consult label for herbicides that can be tank mixed to broaden spectrum of weed control. Coverage is essential; use a minimum of 20 gal. of spray solution per acre. Include a nonionic surfactant, methylated seed oil, or crop oil concentrate; see label for rate. Do not apply more than 0.031 lb. a.i./A during the dormant stage, 0.064 lb. a.i./A during the growing stage, and more than 0.096 lb. a.i./A per crop season. REI 12 hours.		
Clethodim, MOA 1 0.07–0.13	(Select Max®) 2 EC 9–16 fl. oz. (Arrow®, Select®) 2EC 9-16 fl. oz.	Annual and perennial grass weeds
Remarks: SelctMax® is registered in bearing and nonbearing bushes. Arrow®, Select®, and other clethodim formulations registered in nonbearing only. Consult the label for appropriate nonionic surfactant or crop oil concentrate. Do not apply within 14 days of harvest. REI 24 hours.		
Diuron, MOA 7 1.2–1.6	(Diuron, Karmex®, or Karmex® XP) 80 WDG 1.5–2 lb. (Direx®) 4 L 1.2–1.6 qt.	Annual broadleaf and grass weeds
Remarks: Apply to bearing and nonbearing bushes established at least 1 year from transplanting. Direct spray solution to the base of the bush to minimize contact with leaves, flowers, and fruits. Diuron may be applied as a single application in the spring (1.2–1.6 qt./A) and another application (1.2–.6 qt./A) in the fall. Read labels for restrictions on soil type. Include surfactant at 0.25% v/v or crop oil concentration at 1.0% v/v to improve postemergence weed control. REI 12 hours.		
Diquat, MOA 22 0.7–0.9	(Diquat) 2 L 1.5–2.0 pt.	Broadleaf and grass weeds
Remarks: Nonbearing bushes. Direct spray to the base of the bush to minimize contact with green stems and foliage. Include a nonionic surfactant at 0.06%–0.5% v/v. REI 24 hours.		

Common name lb. a.i. / A	(Trade name) formulation amount of product / A	Weeds controlled
Fluazifop, MOA 1 0.25–0.375	(Fusilade® DX) 2 EC 16–24 fl. oz.	Annual and perennial grass weeds
Remarks: Apply to nonbearing bushes. Include nonionic surfactant at 0.25%–0.5% v/v or crop oil concentrate at 1% v/v. REI 12 hours.		
Glufosinate, MOA 10 1.0–1.5	(Rely® 280) 2.34 SL 48–82 fl. oz.	Broadleaf and grass weeds
Remarks: Apply to bearing and nonbearing bushes. Does not control goosegrass. Efficacy is reduced when temperatures are cool or when weeds are under drought stress. Direct spray solution to the base of the bush to minimize contact with leaf, flower, and fruit tissue. Do not apply to green or noncallused stems unless protected by nonporous wraps, grow tubes, or waxed containers. Do not apply more than 3 lb. a.i./A. Consult label for preemergence herbicides that can be tank mixed to broaden spectrum of weed control. Do not apply within 14 days of harvest. REI 12 hours.		
Glyphosate, MOA 9 0.5–1.5	(Various formulations)	Broadleaf and grass weeds
Remarks: Direct spray solution to the base of the bush to minimize contact with green stems, leaves, and fruits. Do not apply within 14 days of harvest. Consult label for preemergence herbicides that can be tank mixed to broaden spectrum of weed control. REI 4 hours.		
Mesotrione, MOA 27 0.09–0.19	(Callisto®) 4 L 3–6 fl. oz.	Annual broadleaf weeds
Remarks: Apply to bearing and nonbearing bushes. The University of Florida has conducted limited testing; thus, any application should be made on a small acreage first to determine cultivar tolerance. Apply before prebloom, or illegal residues may occur. Can be applied as a split application of 3 oz. followed by 3 oz. with no less than 14 days between applications. Include a crop oil concentrate at 1% v/v. Limit spray contact with green foliage and stems, or injury may result. Consult label for herbicides that can be tank mixed to broaden spectrum of weed control. Can be tank mixed with burndown herbicides. REI 12 hours.		
Paraquat, MOA 22 0.56–1	(Gramoxone Inteon®) 2 SL 2–4 pt. (Firestorm®) 3 SL 1.3–2.7 pt.	Broadleaf and grass weeds
Remarks: Direct spray to the base of the stem. Use a coarse spray and hooded sprayer to minimize contact with foliage. New canes or shoots can be injured. Include a nonionic surfactant at 0.125%–0.25% v/v or crop oil concentrate at 1% v/v. REI 12 hours.		
Pelargonic Acid 3%–10% v/v	(Scythe®)	Broadleaf and grass weeds
Remarks: Bearing and nonbearing bushes. Contact herbicide that should be applied with a shielded sprayer and direct spray to the base of the bush to minimize contact with foliage and green bark. Apply before new growth or crop emerges from the soil. Should be tank mixed with preemergence herbicide to broaden spectrum of weed control. REI 12 hours.		

Common name lb. a.i. / A	(Trade name) formulation amount of product / A	Weeds controlled
Sethoxydim, MOA 1 0.3–0.5	(Poast®) 1.5 EC 1.5–2.5 pt.	Annual and perennial grass weeds
Remarks: Apply to bearing and nonbearing bushes. Consult label for exact rate to control specific grass species. Include a crop oil concentrate at 1 qt./A. Multiple applications may be necessary to control perennial grasses, such as bermudagrass. Do not apply within 30 days of harvest. REI 12 hours.		

Table 15. Efficacy of preemergence and postemergence herbicides for annual and perennial broadleaf weed control

	Annual														Perennial		
	Chickweed	Galinsoga	Geranium, Carolina	Common groundsel	Henbit	Lambsquarter	Morningglory, annual	Nightshades	Pigweed	Radish, wild	Ragweed	Prickly sida	Smartweed	Spotted spurge	Dandelion	Smilax	Virginia creeper
Preemergence																	
Dichlobenil (Casoron®)	G	F	G	G	G	G	F	F	G	G	G	-	G	G	G	N	N
Diuron (Karmex®)	G	-	-	-	F	G	G	-	E	F	E	F	F	-	N	N	N
Flumioxazin (Chateau®)	G	G	G	-	E	E	E	E	E	G	E	G	G	E	G	N	N
Hexazinone (Velpar®)	G	-	-	E	F	E	-	-	G	G	E	-	G	-	E	-	-
Isoxaben (Gallery®)	G	G	G	G	G	G	F	G	G	G	G	G	G	G	G	N	N
Mesotrione (Callisto®)	-	-	-	-	-	G	F	G	G	-	F	N	G	-	N	N	N
Napropamide (Devrinol®)	G	F	G	G	G	G	P	P	G	G	G	-	G	G	P	N	N
Norflurazon (Solicam®)	E	G	-	F	G	F	F	G	P	G	G	E	G	F	G	N	N

	Annual														Perennial		
	Chickweed	Galinsoga	Geranium, Carolina	Common groundsel	Henbit	Lambsquarter	Morningglory, annual	Nightshades	Pigweed	Radish, wild	Ragweed	Prickly sida	Smartweed	Spotted spurge	Dandelion	Smilax	Virginia creeper
Oryzalin (Surflan®)	G	N	-	F	F	E	F	P	E	P	P	P	P	F	P	N	N
Pronamide (Kerb®)	G	P	-	-	G	E	G	G	G	F	-	-	F	-	P	N	N
Simazine (Princep®)	G	G	F	F	G	E	F	G	G	E	G	F	G	P	P	N	N
Terbacil (Sinbar®)	E	-	G	F	E	E	-	G	-	E	G	-	G	-	F	N	N
Postemergence																	
Carfentrazone (Aim®)	E	-	-	G	E	E	E	E	E	-	G	-	-	-	N	N	N
Clethodim (Select®)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Fluazifop (Fusilade®)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Glufosinate (Rely®)	G	F	F	F	F	G	E	G	G	G	G	F	G	G	G	P	P
Glyphosate (Roundup)	E	G	G	E	F	E	G	E	E	G	E	G	F	G	F	G	G
Paraquat (Gramoxone®)	G	G	F	F	F	G	G	G	G	F	G	G	G	G	P	P	P
Sethoxydim (Poast®)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

E = Excellent, G = Good, F = Fair, P = Poor, N = No activity

Table 16. Efficacy of preemergence and postemergence herbicides for annual and perennial grass and sedge weed control

	Annual grass					Perennial grass	Sedge	
	Crabgrass	Foxtail	Goosegrass	Panicum, fall	Ryegrass, annual	Bermudagrass	Nutsedge, purple	Nutsedge, yellow
Preemergence								
Dichlobenil, (Casoron®)	G	G	G	G	G	N	N	N
Diuron, (Karmex®)	G	G	G	G	F	N	N	N
Flumioxazin, (Chateau®)	G	G	G	G	G	N	N	N
Hexazinone, (Velpar®)	E	E	G	G	E	N	N	N
Isoxaben, (Gallery®)	P	P	P	P	P	N	N	N
Mesotrione, (Callisto®)	F	P	P	P	P	N	N	N
Napropamide, (Devrinol®)	G	G	G	G	G	N	N	N
Norflurazon, (Solicam®)	E	E	E	E	E	P	P	P
Oryzalin, (Surflan®)	E	E	E	G	G	N	N	N
Pronamide, (Kerb®)	G	G	G	G	G	P	P	P
Simazine, (Princep®)	F	G	G	F	G	N	N	N
Terbacil, (Sinbar®)	E	G	-	G	E	-	F	F
Postemergence								
Carfentrazone, (Aim®)	P	P	P	P	P	N	N	N
Clethodim, (Select®)	E	E	E	E	E	E	N	N
Fluazifop, (Fusilade®)	G	G	G	G	G	E	N	N
Glufosinate, (Rely®)	F	G	G	G	G	F	F	F
Glyphosate, (Roundup)	E	E	E	E	E	F	F	F
Paraquat, (Gramoxone®)	G	G	G	G	G	P	P	P
Sethoxydim, (Poast®)	E	E	E	E	E	E	N	N

E = Excellent, G = Good, F = Fair, P = Poor, N = No activity

Table 17. Plant growth regulator use in Florida blueberry production

Problem	Management options	Amount of formulation per acre	Effectiveness or importance	Restricted entry interval (REI)	Postharvest interval (PHI)	Comments
Certain southern highbush and rabbiteye cultivars exhibit slow or delayed leaf development as they emerge from dormancy. This can result in delayed fruit ripening and cause stress to plants that set a heavy crop but have poor or delayed leaf canopy development.	Dormex™, Budpro®, or Krop-Max™ (50% hydrogen cyanamide)	Typically 1.5% (v/v)[a] Dormex™, Krop-Max™, or Budpro® plus a nonionic surfactant not to exceed 0.5% (v/v).	++++ Certain cultivars	72 hours	NA	Hydrogen cyanamide is highly toxic to humans and is a restricted-use material with very specific restrictions on its handling and application, including use of an enclosed tractor cab. Follow all label directions. Hydrogen cyanamide will damage flower buds if applied incorrectly. Applications should be made 30 or more days prior to natural flower and vegetative bud break. Application is based on stage of flower bud development, thus the time of application will vary, but it is typically applied in north central Florida between mid-December and early January. Cultivars vary in their response and sensitivity to injury. Use as a small-scale test on cultivars with unknown response to hydrogen cyanamide. Do not apply within 14 days of oil application or within 30 days of copper fungicide applications.
[a]Product label rates vary. Refer to individual labels. **Hydrogen cyanamide - additional information:** Hydrogen cyanamide is highly corrosive to equipment and requires thorough cleaning after application. Avoid drift to nontarget areas. Hydrogen cyanamide may be toxic to green plant tissue. It is also toxic to pets, wildlife, and livestock. Thorough spray coverage is needed for a consistent, uniform response. A minimum of 50 gal. per acre of spray mix is usually needed on mature southern highbush plantings. Hydrogen cyanamide advances leaf and flower bud development and may increase susceptibility to freezes. Flower buds sprayed at stage 3 or beyond (Figure 3) may be killed or injured by hydrogen cyanamide, especially at concentrations of 1.5% (v/v) or greater of formulated product. Applications of 1.5% (v/v) of formulated product to dormant plants of suitable cultivars that have received significant chilling and not progressed beyond stage 2 of flower bud development are usually effective. Rates of formulated product of 2.5% (v/v) or greater have resulted in flower bud injury in Florida. Hydrogen cyanamide should only be applied to dormant plants that have received some natural chilling. Typically, hydrogen cyanamide is applied in mid to late December or early January in Florida depending on weather and the natural progression of chilling. Refer to labels for more information on rate and timing of sprays. Cultivars that naturally leaf well may not benefit from hydrogen cyanamide applications. Certain cultivars have shown greater than average sensitivity to hydrogen cyanamide in Florida. These include 'Sharpblue', 'Windsor', 'Primadonna', and 'Jewel'. Individual cultivars vary in their response to hydrogen cyanamide and should be tested prior to large-scale use. Response to hydrogen cyanamide has been more erratic, and in some cases more flower bud injury has been observed, in central and south central Florida compared to north Florida, especially following mild winters. This may be because plants are not fully dormant at time of application and less natural chilling was accumulated at the more southern locations prior to application. Flower bud morphology may affect sensitivity to injury from hydrogen cyanamide. Cultivars that have loose bud scales (puffy appearance), such as 'Sharpblue', may be more sensitive to hydrogen cyanamide.						
Poor fruit set of rabbiteye blueberries	Gibberellic acid (ProGibb 4% liquid conc.), GibGro® 4LS, or Gibbex 4%	24–32 oz. (4% gibberellic acid) or 24–32 g gibberellic acid applied twice. Total of 48–64 oz./acre in most cases	++++	12 hours	40 days	For use on rabbiteye blueberries. Do not apply to southern highbush varieties in Florida because it can cause overfruiting. Make first application when at least 40%–50% of the blooms are open and about 10% of the flower petals have fallen. The second application should be about 10–18 days later. Use a minimum of 40 gal. of water/acre. If the spray solution is alkaline (pH 8 or greater), lower the pH with a buffering agent. Apply during slow drying conditions.

Additional Comments:

1. Gibberellic acid may increase fruit set of rabbiteye blueberry plants affected by poor pollination. It is not recommended for southern highbush in Florida because it can cause excessive fruit set, which results in plant stress and poor-quality, late-ripening berries. Poor pollination can occur for a number of reasons, including adverse weather conditions (rainy weather, high humidity, or temperature extremes during flowering), lack of suitable pollinizer cultivars, low bee populations or activity, and insect damage to flowers (especially from flower thrips). Gibberellic acid is not widely used in Florida blueberry production because Florida's industry is based primarily on early ripening southern highbush cultivars. Additional fruit set from gibberellic acid treatments tend to be smaller, have low seed counts, and ripen later than fruit set by natural pollination. In Florida, this product is limited to use on large rabbiteye plantings that suffer from inadequate natural pollination.
2. Good results have been obtained by using two applications of 24–32 oz./acre (48–64 oz./acre total) in 40 gal. of water, spraying both sides of the bush each time. Where two cultivars with different bloom dates are planted together, cultivar-directed treatments (CDT) have been successful. Using CDT, the first and second applications of gibberellic acid are directed toward the first cultivar to bloom. Some spray will reach the adjacent cultivar, helping early flowers to set. The third and fourth sprays are directed toward the later-blooming cultivar, with some spray drift reaching the later-opening flowers of the early blooming cultivar. The total amount of gibberellic acid applied during the season is normally between 48 and 64 oz. per acre.
3. Apply using a minimum of 40 gal. of water per acre. Gibberellic acid is concentration dependent. See label for rates and mixing instructions.
4. Suggested surfactants include X-77, Silwet® L-77, Kinetic®, or Flood. Follow label rates carefully. Silwet® is used at the rate of only 3.2 oz./100 gal. of spray. Although other nonionic surfactants may be suitable, caution should be used because they could burn blueberry flowers.
5. Better responses to gibberellic acid sprays are thought to occur under slow-drying conditions, such as at night, late evening, or very early morning.
6. Gibberellic acid will not completely substitute for pollination. Fruit set with a combination of gibberellic acid and some seed tends to be larger than nonpollinated (nearly seedless) berries. Natural pollination is important to optimize yield and berry size, even when using gibberellic acid.
7. Individual flowers (florets) are more receptive to fruit set from gibberellic acid at developmental stage 5 (fully elongated but not yet open) and stage 6 (open). However, fruit set with gibberellic acid and no pollination is seedless, small, and late ripening. Allow at least 40%–50% of the flowers to open and be worked by bees before making the first application. Apply a second application of gibberellic acid 10–18 days later.