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2002 Blueberry And Cranberry Pest Control Recommendations For New Jersey

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RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY
NEW BRUNSWICK

2002
BLUEBERRY AND CRANBERRY PEST CONTROL RECOMMENDATIONS FOR NEW JERSEY

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CONTENTS PAGE

In some instances we have found it advisable to use trade names to avoid using long and complicated chemical names. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

BLUEBERRY INSECT AND DISEASE CONTROL

All spray formulations are presented in amount of formulated product per acre. Apply sprays so that good foliage coverage is achieved without excessive runoff. Not all pesticide treatments recommended here are necessary to manage insect and disease problems in every field. Always use local scouting information on insects and diseases in arriving at insecticide and fungicide spray decisions. **Follow all label instructions when using pesticides**.

PESTS	WHEN TO TREAT	MATERIALS	RATE/A
DORMANT			
Scale Insects	Dormant to 0.25 inch leaf opening.	Lime sulfur, OR Superior oil	5.0 gal 3.0 gal
	Remarks: For effective scale control, use 75 to 100 gal/A and ensure thorough coverage. (See Note 8 for minimum specifications for oil.) Pruning out old canes prevents heavy scale infestations. Use lime sulfur when *Phomopsis* as well as scales is a problem.* (See Notes 8 and 16) *DO NOT tank mix other insecticides or fungicides with lime sulfur.		
***Botrytis*, Anthracnose**	Remarks: Pruning out old canes and cleaning out small twiggy wood with hand shears reduces Anthracnose severity. Heavy nitrogen fertilization induces higher disease incidence. (See Notes 10, 11, and 12)		
Phomopsis twig blight (See Note 11)	At delayed dormant.	Lime sulfur	5.0 gal
	Remarks: Use lime sulfur only once in early spring. DO NOT use within 14 days of an oil spray or when temperature is above 75°F. May be used again in autumn where *Phomopsis* is a problem. Weymouth, Berkeley, Coville, and Jersey varieties are particularly susceptible to Phomopsis twig blight.		
BUDBREAK			
Cranberry weevil	When leaf buds show green; blossom buds show white and are separating in the cluster.	Asana XL, OR Guthion 50WP, OR Guthion 2L, OR Imidan 70WSB	6.0 to 8.0 fl oz 1.0 to 1.5 lb 2 to 3.0 pt 1.33 lb
Blueberry thrips (See Note 24)	Apply when blossom buds show white and are separating in the cluster.	SpinTor 2SC	4.0 to 6.0 fl oz
Phytophthora root rot (See Note 20)	Before plants begin active growth.	Aliette 80WDG, OR Ridomil Gold EC, OR	In a 3 ft band: 5.0 lb 0.25 pt/1000 lin ft
Mummy berry (See Note 9)	Prior to mummy cup formation, about March 20.	Disk between rows and rake, sweep, and hoe under plants. Also aids in control of blossom weevils, cranberry fruitworms, and plum curculio.	
	Apply when leaf buds show green and repeat twice at 10-day intervals.	See current recommendations for Section 18 materials.	

PESTS	WHEN TO TREAT	MATERIALS	RATE/A
PRE-BLOOM			
Cranberry weevil	Just before early blossoms open.	Asana XL, OR	6.0 to 8.0 fl oz
		Azinphos-M 50W, OR	1.0 to 1.5 lb
		Guthion 2L, OR	2.0 to 3.0 pt
		Guthion 50WP, OR	1.0 to 1.5 lb
		Imidan 70WSB	1.33 lb
Blueberry thrips (See Note 24)	Just before early blossoms open.	SpinTor 2SC	4.0 to 6.0 fl oz
Leafrollers, spanworms, Gypsymoth (See Note 23)		Confirm 2F, OR	8.0 to 16.0 fl oz
		Crymax, OR	1.0 to 1.5 lb
		DiPel DF, OR	1.0 lb
		Javelin DWG, OR	1.0 lb
		SpinTor 2SC	4.0 to 6.0 fl oz
Mummy berry Primary infection	Make the last application at pink bud stage. Do not make more than three applications.	See current recommendations for Section 18 materials. (See Note 9)	
Botrytis blossom blight	Green tip. Repeat at 7- to 10-day intervals through petal fall.	Captan 50WP, OR	5.0 lb
		Captan 80WP, OR	3.1 lb
		Captec 4L, OR	2.5 qt
		Rovral	1.0 to 2.0 lb
MID-BLOOM			
Leafrollers, spanworms, Gypsymoth (See Notes 4, 15, and 23)		Confirm 2F, OR	8.0 to 16.0 fl oz
		Crymax, OR	1.0 to 1.5 lb
		DiPel DF, OR	1.0 lb
		Javelin DWG	1.0 lb
	Remarks: During bloom, to control leafrollers, only *Bacillus thuringiensis* products and Confirm 2F should be used. These insecticides will not cause harm to bees.		
***Botrytis*, Anthracnose** (See Notes 12, 21, 22)	Apply at mid-bloom. Repeat in 7 to 10 days.	Abound, OR	6.2 to 15.4 fl oz
		Captan 50WP, OR	5.0 lb
		Captan 80WP, OR	3.1 lb
		Captec 4L, OR	2.5 qt
		Ziram 76DF	4.0 lb
Mummy berry Secondary infection (See Notes 9 to 13)		Use Captan if *Botrytis* is the only problem. If mummy berry is also a problem, use Benlate. (See Note 13)	

PESTS	WHEN TO TREAT	MATERIALS	RATE/A
FIRST POST-POLLINATION - Remove bee hives before spraying.			
May 25 to June 7:			
Cranberry fruitworm,		Azinphos-M 50W, OR	1.0 to 1.5 lb
Blueberry leafminer,		Confirm 2F, OR	8.0 to 16.0 fl oz
Leafrollers (See Note 23)		Diazinon 50W, OR	2.0 lb
		Diazinon AG600, OR	25.5 fl oz
		Guthion 50WP, OR	1.0 to 1.5 lb
		Guthion 2L, OR	2.0 to 3.0 pt
		Imidan 70WSB, OR	1.33 lb
		Lannate 90SP, OR	0.5 to 1.0 lb
		Lannate LV, OR	1.5 to 3.0 pt
		SpinTor 2SC	4.0 to 6.0 fl oz
	Remarks: See Note 22 regarding phytotoxicity of diazinon and captan formulations.		
Early June:			
Sharp-nosed leafhoppers		Diazinon 50W, OR	2 lb
Blueberry aphids (See Note 17)		Diazinon AG600, OR	25.5 fl oz
Plum curculio (See Note 19)		Lannate LV, OR	1.5 pt
		Malathion 8F	1.5 to 2.5 pt
	Remarks: See Notes 21 and 22 for mixing insecticides and fungicides.		
Anthracnose		Abound, OR	6.2 to 15.4 fl oz
(See Notes 10, 12, 13, 21, and 22)		Captan 50WP, OR	5.0 lb
		Captan 80WP, OR	3.1 lb
		Captec 4L, OR	2.5 qt
		Ziram 76DF	4.0 lb
	Remarks: 24(c) for New Jersey only.		
LATER POST-POLLINATION SPRAYS			
Sharp-nosed leafhopper,	7 to 10 days after first cover	Azinphos-M 50W, OR	1.0 to 1.5 lb
Cranberry fruitworm,		Diazinon 50W, OR	2 lb
Blueberry leafminer,		Diazinon AG600, OR	25.5 fl oz
Leafroller		Guthion 2L, OR	2.0 to 3.0 pt
		Guthion 50WP, OR	1.0 to 1.5 lb
		Imidan 70WSB, OR	1.33 lb
		Lannate 90SP, OR	0.5 to 1.0 lb
		Lannate LV, OR	1.5 to 3.0 pt
		Sevin 80WSP, OR	1.8 to 2.5 lb
		SpinTor 2SC	4.0 to 6.0 fl oz
	Remarks: If blueberry aphids are a problem, Diazinon, Malathion, or Lannate should be applied at rates specified under the first post-pollination spray.		
Anthracnose (See Notes 12, 21, and 22)		Abound, OR	6.2 to 15.4 fl oz
		Captan 50WP, OR	5.0 lb
		Captan 80WP, OR	3.1 lb
		Captec 4L, OR	2.5 qt
		Ziram 76DF	4.0 lb
	Remarks: 24(c) for New Jersey only.		

PESTS	WHEN TO TREAT	MATERIALS	RATE/A
FRUIT MATURATION (July and August)			
Blueberry maggot (See Note 1)	Treatments should be initiated 10 days after the first maggot adult catch in the traps. Repeat every 10 days through harvest.	Diazinon 50W, OR Diazinon AG600, OR Imidan 70WSB, OR Lannate LV, OR Malathion 8F, OR Malathion 8Aquamul, OR Sevin 4F	2.0 lb 25.5 fl oz 1.33 lb 0.75 to 1.5 pt 1.5 to 2.5 pt 1.5 to 2.0 pt 3.0 to 4.0 pt
	Remarks: *Use of Aircraft* - For aircraft sprays, apply at least 5 gal/A of spray mix.		
Blueberry maggot, Leafroller, Leafminer, Fall Webworm (See Notes 1 to 6)		Azinphos-M 50W, OR Diazinon 50W, OR Diazinon AG600, OR Guthion 50WP, OR Guthion 2L, OR Imidan 70WSB, OR Lannate LV, OR Malathion 8F	1.0 to 1.5 lb 2.0 lb 25.5 fl oz 1.0 to 1.5 lb 2.0 to 3.0 pt 1.33 lb 1.5 to 3.0 lb 1.5 to 2.5 pt
	Remarks: When spraying for blueberry maggot alone, note that Lannate LV is applied at the lower rate of 0.75 to 1.5 pt.		
Japanese beetle (See Note 18) and **other scarab beetles**		Sevin 80WSP, OR Sevin 4F	1.25 to 2.5 lb 3.0 to 4.0 pt
	Remarks: The use of Sevin may be detrimental to aphid predators, allowing aphid population to increase.		
Anthracnose (See Notes 12, 21, and 22)		Abound, OR Aliette 50WDG, OR Captan 50WP, OR Captan 80WP	6.2 to 15.4 fl oz 5.0 lb 5.0 lb 3.1 lb
POST-HARVEST			
Scarab grubs		See Note 7	
Blueberry bud mite (See Note 16)	September 15 to 30.	Phaser 50WSB, OR Superior oil, OR Thiodan 3EC, OR Thiodan 50W	3.0 lb 3.0 gal 2.0 qt 3.0 lb
	Remarks: Use oil spray where Putnam scale is also a problem. Use Thiodan spray where bud mite is the only concern. Pruning out old canes and twiggy wood helps reduce bud mite populations and assists in Anthracnose control.		
Sharpnosed leafhopper		Imidan 70WSB, OR Lannate LV, OR Malathion 8E, 8F, OR Malathion 8Aquamul	1.33 lb 1.5 pt 1.5 to 2.5 pt 1.5 to 2.0 pt
Phomopsis twig blight	Late October or when 2/3 of leaves drop on Weymouths and Berkeleys.	Benlate 50WP, OR Lime sulfur	1.0 lb 5.0 gal

PESTICIDE USE RESTRICTIONS

PESTICIDE	RE-ENTRY TIME	PRE-HARVEST INTERVAL	IMPORTANT NOTES
Abound	4 hrs	0 days	3 applications maximum; utilize resistance management strategies
Aliette	12 hrs	0 days	4 applications maximum; DO NOT mix with copper compounds
Benlate	1 day	21 days	
Bravo	48 hrs	42 days	maximum 15 pt/A per growing season
Captan*	4 days	0 days	
Confirm 2F	4hrs	14 days	maximum of 64 fl oz/A per season
Crymax	4 hrs	0 days	
Diazinon	24 hrs	7 days	DO NOT tank mix with any Captan formulations
Dipel	4 hrs	0 days	
Guthion	72 hrs	7 days	3 applications maximum; 10-day intervals
Imidan	24 hrs	3 days	
Javelin	4 hrs	0 days	
Lannate	48 hrs	3 days	4 applications maximum
Malathion	12 hrs	1 day	
Oil	dry	pre-bloom	
Phaser	24 hrs	7 days	post harvest only
Ridomil	12 hrs	pre-bloom/post harvest	
Rovral	24 hrs	0 days	4 applications maximum
Sevin	12 hrs	7 days	
SpinTor	4 hrs	3 days	maximum 29 fl oz or 6 site applications per acre per season
Thiodan	24 hrs	---	post harvest only
Ziram	24 hrs	14 days	

*No more than 70 lb of the 50WP or 43.75 lb of the 80WP can be applied during 1 crop cycle. Do not mix with oil or solvent based pesticides.

BLUEBERRY PEST CONTROL NOTES

1. **Malathion resistance**—Malathion still gives good control of blueberry maggot. However, some fringe insects that were formerly well suppressed by the malathion treatments to control maggots have now developed resistance to it. These insects include leafminer, leafrollers, and fall webworm. Where these insects have become a problem, a switch to Lannate may be necessary in the maggot sprays.

2. **Impact of mechanical harvesting on insect control**—Fringe insects that do not cause significant crop damage have become pests where mechanical harvesters are employed. The insects are vibrated off the bushes into the mass of blueberries where they may become trapped and end up in the fresh blueberry pints. Where the berries are run over a belt preliminary to packaging, the insects can be eliminated, but when picking is done directly into pints, they may go to the consumer in the packaged blueberries. Where this type of harvesting is contemplated, the fringe insects (leafrollers, leafminer, and fall webworm) must be controlled. Malathion is no longer effective against these insects and Lannate should be substituted for it in the maggot treatments where the fringe insects have become problems.

3. **Caution in the use of Guthion**—The use of Guthion during the harvest season requires the utmost caution in the observance of safety precautions and label requirements. Exact records must be kept of dates and time of spray of the various blocks so that the grower may know when the proper interval has elapsed before harvesting. Protective clothing and respirators and other safety precautions must be used in the application of Guthion. Regardless of the formulation used, only three Guthion sprays per season are allowed. Guthion has a 7 day pre-harvest interval and 48 hours re-entry time.

4. **Leafrollers**—At least five species of leafrollers attack blueberries. The most abundant of these are the oblique-banded leafroller and red-banded leafroller. Both insects feed on a wide variety of plants commonly found around blueberry fields. Red-banded leafroller and oblique-banded leafroller, sometimes become numerous enough to cause problems, especially where mechanical harvesters are used. Where red-banded leafroller or oblique-banded leafroller is abundant, it may be necessary to use a bacterial insecticide or Confirm 2F during mid-bloom to control the early hatching leafrollers. At the time of the post-pollination spray, many leafrollers may be too thoroughly webbed up to be controlled.

5. **Leafminer**—This insect (*Gracilaria vacciniella*) is both a leafminer and leafroller. In the early larval instars, it is a true leafminer, feeding between the upper and lower epidermis of the leaf. It then migrates out of the mine and becomes a leafroller, forming a neat triangular tent within which it feeds. (This tent resembles a tepee, which has suggested the name of "tepeemaker" for this insect.) There is no feeding on blueberries, but the triangular "tepee" is easily vibrated off the bush during mechanical picking. There are three generations a year and by autumn tremendous numbers of these insects can be found in some fields. Ordinarily, the blueberry can sustain a very high population of these insects without appreciable reduction of the crop potential. The tendency of the larvae to get into the pints makes it a problem. As with leafrollers, passage of berries over a cleaning belt is recommended. Diazinon is the preferred insecticide when leafminer is the main problem in the post pollination spray.

6. **Fall webworm**—Although these insects cause unsightly messes, they have rarely caused significant damage. They present a problem only in mechanically-harvested fields where berries are not passed over a cleaning belt.

7. **Scarab grubs**—Scarab grubs, the larvae of scarab beetles such as the oriental beetle and Asiatic garden beetle, have become more common in fields in recent years. They feed on the roots of weeds and blueberry plants. Currently, no effective control measurers are available. To help avoid problems with scarab grubs, fields should be allowed to lie fallow at least one year before planting, with repeated diskings in hot weather to destroy all living roots.

8. **Superior oil specifications**—The minimum specifications of a 70-second and a 100-second spray oil include:

Specification	70 Second	100 Second
Viscosity	66 to 74 seconds	90 to 120 seconds
Gravity (A.P.I. degrees)	33 to 34	32 minimum
Unsulfonatable residue	92% or higher	92%

Do not spray oil on very cold days when spray will freeze before drying.

9. **Mummy berry control**—Cultivation and ground treatments of urea reduce overwintering mummies. In fields where this disease is usually severe, fungicide should be used. Currently, no fungicides are registered for this disease. However, check for annual Section 18 emergency exemptions. Approved fungicides provide excellent control of the primary stage of mummy berry which infects the leaves and flowers as well as secondary infection which infects the fruit and causes the mummy berry.

10. **Botrytis control**—Botrytis fruit and cluster blight can be extremely severe in wet years. The common name of the disease is Gray Mold, and it is a problem on many crops. The fungus overwinters on dead twigs and organic matter in the duff. The fungus is present every year but causes serious economic loss only during years when the weather is cool and damp for several consecutive days.

    The most critical period for infection is during bloom. Frost-injured blossoms are particularly susceptible to infection.

    Chemical control should be directed towards preventing infection of the flower petals. Since bloom occurs over an extended period several sprays may be needed for satisfactory control. The first application should be made at mid-bloom, with subsequent sprays on a 7- to 10-day interval through petal fall.

11. **Phomopsis**—*Phomopsis* is a fungus which attacks the wood of fruiting laterals, the stem of flower and fruit clusters, and more rarely, the wood of large canes. The disease is most prevalent after severe winters, especially when there is little snow cover, or after winters during which mild spells of weather are interspersed with extreme cold temperatures. The most common symptom is the drying up of fruit and flowers as the wood below turns brown, cutting off moisture and nutrients. Weymouth, Earliblue, and Berkeley often have severe infections and are rarely entirely free of this disease, whereas Jersey is occasionally moderately damaged by it. Thorough pruning out of all small twiggy wood is very helpful in controlling *Phomopsis* as well as the other fungal problems of blueberry.

12. **Anthracnose**—This fungus causes the salmon or "rusty" colored rot of berries which greatly despoil quality. Berkeley, Coville, and Bluecrop are the most susceptible, but the disease can occur on all varieties when conditions are favorable. Pruning out old canes and small twiggy wood with hand shears reduces the severity of the disease. Heavy nitrogen fertilization and failure to harvest ripe fruit promptly may increase the amount of anthracnose. Start early.

13. **Fungal disease control**—No one fungicide controls adequately all four fungus diseases of blueberry. In some situations where more than one disease is active, more

than one fungicide will be needed. The labeled blueberry fungicides and the diseases they control are:

Abound	Anthracnose, *Alternaria*
Aliette	*Phytophthora*, anthracnose, *Alternaria*
Bravo	Anthracnose, mummy berry
Funginex	Primary mummy berry infection
Benlate	*Botrytis* and secondary mummy berry infection, *Phomopsis*
Captan	*Botrytis* and anthracnose
Lime Sulfur	*Phomopsis* and anthracnose
Ridomil	*Phytophthora*

14. **Stunt and other virus diseases in non-bearing fields** — Stunt symptoms are most noticeable during mid-June and late-September. Growers should inspect fields at these times and remove all infected plants. Prior to removal of plants, the fields should be treated with an insecticide. Both the June and September applications are necessary to qualify fields for certification by the NJDA.

15. **Gypsy moth control**—Gypsy moth has become a problem in some Ocean, Burlington, and Atlantic County fields where oak trees are prominent along edges. The normal blueberry schedule has controlled most infestations, but in certain heavily infested areas, larvae, which are blown into fields at flowering time, may cause a problem. Since the larvae feed in the blossom cluster and especially on the main stem of the cluster, they can be very destructive. If the larvae are abundant, *Bacillus thuringiensis* or Confirm 2F spray during bloom is necessary to prevent significant damage.

16. **Putnam scale and blueberry bud mite**—Recently, pruning styles have changed to accommodate the mechanical harvester. The retaining of older canes is making conditions more favorable for Putnam scale and blueberry bud mite. Heavy Putnam scale infestations requiring oil sprays are now appearing in some Bluecrop blocks. The retention of old canes is also likely to cause an increase in the amount of *Phomopsis*, *Botrytis*, and anthracnose.

17. **Aphid control**—Aphids have recently become abundant in some fields. This is probably the result of the destruction of natural enemies by Guthion and the poor coverage of very low volume airplane spraying. Where aphids are a problem, Lannate, Malathion, or Diazinon should be used. These insecticides are also effective against blueberry maggot, and sharp-nosed leafhopper.

18. **Oriental and other scarab beetles**—These insects can be a problem in weedy fields. The larvae (white grubs) feed mostly on the roots of blueberries, grasses, and other weeds. The adult oriental beetles do not feed and consequently do not cause any crop damage. The adult Japanese beetles emerge at blueberry harvest time and feed on blueberry fruit as well as leaves. These beetles sometimes end up in packages. They are more of a threat in mechanical harvesting since they are easily vibrated off the bushes into the berry mass. A more careful watch at the cleaning belt is needed. Malathion in the maggot sprays is not effective against these beetles. Either Guthion or Sevin must be used where these insects are abundant.

19. **Plum curculio** infestations are increasing, especially in some areas in Atlantic County. Plum curculio infestations are more common in weedy fields. Weymouth, Earliblue, and Bluetta are the only varieties heavily attacked. In these varieties, the curculio larvae may be present in ripe fruit at harvest time. Later varieties are very rarely infested and when they are, the berries usually drop to the ground before harvest.

20. **Phytophthora root rot** is rare on well drained soils. Before beginning a fungicide control program, get an accurate diagnosis. If *Phytophthora* is present, improve drainage in the field before applying fungicides. Aliette is labelled for both root and fruit rots; however, a maximum of 20 lb/A per year is allowed.

21. **Compatibility of pesticides in tank-mixtures**—Confirm physical compatibility of tank-mix partners by employing a jar test. Using a quart jar, add proportionate amounts of each product to 1 quart of water. After thoroughly mixing, let stand for at least 5 minutes. If the combination remains mixed or can be readily mixed, the products are compatible.

22. **Phytotoxicity of insecticide and fungicide tank-mixtures**—Pesticide mixtures that are physically compatible may still cause crop injury. New chemicals and formulations should always be evaluated for crop safety in a small area, prior to spraying on a larger area. Mixing formulations of diazinon with captan or captec may cause crop injury. Therefore, diazinon and captan formulations should not be tank-mixed.

23. **Use of Confirm 2F**—This is a new selective insecticide effective against most caterpillar pests. It has no activity against honeybees and therefore can be used safely during pollination period.

24. **Use of SpinTor 2SC**—This is a new selective insecticide effective against thrips and most caterpillar pests. SpinTor 2SC is toxic to bees. DO NOT apply this insecticide during bloom or within 5 days of placing the commercial bee hives.

CRANBERRY INSECT AND DISEASE CONTROL

Amounts of spray materials are given in amount of formulated material per acre unless stated otherwise. Not all pesticide treatments recommended here are necessary to manage insect and disease problems in every field. Always use local scouting information on insects and diseases in arriving at insecticide and fungicide spray decisions. **Follow all label instructions when using pesticides.**

PESTS	WHEN TO TREAT	MATERIALS	RATE/A
GENERAL	Remove winter flood in early to mid-April		
	Remarks: Early drawing helps avoid spring oxygen deficiency and generally increases crop by lengthening growing season. Earlier coloration of berries provides an earlier start on harvesting.		
	Recent data suggests that tipworm is much less a problem on April drawn bogs than on May-drawn bogs. Early drawing, however, increases populations of fruitworms and fireworms. Early drawn bogs are also more difficult to pollinate and may require more honeybee hives.		
	Remove winter flood in early May.		
	Remarks: Growers with no sprinkler frost protection should hold flood until early May. This will also reduce fireworm and cranberry fruitworm populations. The rapid lush growth of bogs drawn in May encourages infestations of tipworm.		
NEW GROWTH SPRAY			
Blossom worm, Cranberry tipworm, Spotted fireworm, Sparagnothis fruitworm, Gypsymoth, False armyworm, Spanworm	When new growth is 1/4 to 1/2 inch long.	Azinphos-M 50W, OR Confirm 2F, OR Diazinon AG600 WBC, OR Diazinon 50W, OR Guthion 50WP, OR Guthion 2L, OR Imidan 70W, OR Lorsban 4E, OR Orthene 97, OR SpinTor 2SC	1.0 to 2.0 lb 16.0 fl oz 54.5 fl oz 4.0 lb 1.0 to 2.0 lb 2.0 to 4.0 pt 3.5 to 4.0 lb 1.5 to 3.0 pt 1.0 lb 4.0 to 10.0 fl oz
	Remarks: For best control results, do not delay application beyond the 1/2 inch new-growth stage. Keep bees off bogs until 7 days after spraying except for Confirm 2F application. Sanding helps to control tipworm, Sparganothis, and cranberry girdler.		
Upright dieback	When new growth is 1/4 to 1/2 inch long.	Bravo Weather Stik, OR Bravo Ultrex, OR Champ Formula 2, OR Maneb 75DF	4.0 to 7.0 pts 3.8 to 6.3 lb 0.66 gal 4.8 to 6.0 lb
	Start applications at early bloom and repeat at 7 to 10 day intervals as required.	Dithane M-45	3 to 6 lb

PESTS	WHEN TO TREAT	MATERIALS	RATE/A
PRE-POLLINATION SPRAY			
Blunt-nosed leafhopper, Cranberry tipworm	Dangle stage but before bloom.	Azinphos-M 50W, OR	1.0 to 2.0 lb
		Diazinon AG600 WBC, OR	54.5 fl oz
		Diazinon 50W, OR	4.0 lb
		Guthion 50WP, OR	1.0 to 2.0 lb
		Guthion 2L, OR	2.0 to 4.0 pt
		Lorsban 4E	1.5 to 3.0 pt
Root rot	When spore numbers rise or reservoir temperatures reach 15 to 18°C.	Ridomil 2E, OR	4 to 7 pt
		Ridomil 5G, OR	20 to 35 lb
		Ridomil Gold EC, OR	1.0 to 1.75 pt
		Ridomil Gold GR, OR	20 to 35 lb
		Ridomil Gold WSP	1.0 to 1.5 lb
EARLY BLOOM SPRAY			
Fungal fruit rots	Just after scattering of bloom. When about 5 to 10% of flowers are open.	Ground or Aerial Spray:	
		Bravo 720 (see list of additional trade names) (re-entry 48 hrs), OR	4 to 7 pt
		Ferbam 76WP	6 lb
	Start applications at early bloom and repeat at 7 to 10 day intervals as required.	Dithane M-45	3 to 6 lb
MID-BLOOM SPRAY			
Blossom worm, Spanworm, False armyworm, Gypsy moth, Blackheaded fireworm		Confirm 2F, OR	16.0 fl oz
		Crymax, OR	1.0 to 1.5 pt
		DiPel ES, OR	1.0 to 2.5 lb
		DiPel DF	1.0 to 1.5 lb
SECOND FRUIT ROT SPRAY			
Fungal fruit rots	50 to 70% bloom.	Ground or Aerial Spray:	
		Bravo 720 (re-entry 24 hrs), OR	4 to 7 pt
		Ferbam 76WP, OR	6.0 lb
		Mancozeb 80WP	3.0 lb
	Start applications at early bloom and repeat at 7 to 10 day intervals as required.	Dithane M-45	3 to 6 lb
	Remarks: **DO NOT** apply any insecticide in the mid-bloom spray because of possible bee kill.		

PESTS	WHEN TO TREAT	MATERIALS	RATE/A
FIRST POST-POLLINATION SPRAY - Remove bees before spraying.			
Fungal fruit rots	Apply 10 to 14 days after mid-bloom.	Ground or Aerial Spray:	
		Bravo 720 (re-entry 48 hrs), OR	4 to 7 pt
		Ferbam 76WP, OR	6.0 lb
		Mancozeb 80WP	3.0 lb
	Start applications at early bloom and repeat at 7 to 10 day intervals as required.	Dithane M-45	3 to 6 lb
Fruitworms, Sparganothis fruitworm, Blunt-nosed leafhopper, Spotted fireworm		Azinphos-M 50W, OR	1.0 to 2.0 lb
		Confirm 2F, OR	16.0 fl oz
		Diazinon AG600 WBC, OR	54.5 to 82.0 fl oz
		Diazinon 50W, OR	4.0 lb
		Guthion 50WP, OR	1.0 to 2.0 lb
		Guthion 2L, OR	2.0 to 4.0 pt
		Lorsban 4E, OR	1.5 to 3.0 pt
		Orthene 97, OR	1.0 lb
		SpinTor 2SC	4.0 to 10 fl oz
	Remarks: Unfortunately, there is still some open bloom when this treatment must be made. Waiting until all blossoms have dropped may result in heavy fruitworm infestation and poor leafhopper control.		
FOURTH FRUIT ROT SPRAY			
	10 to 14 days after second fruit rot spray.	Same Fungicides as listed in Second Fruit Rot Spray.	
SECOND POST-POLLINATION SPRAY			
	Remarks: This application will not always be needed. Monitor fields for insect activity and consult the Plant and Pest Advisory Newsletter - Cranberry Edition for pesticide recommendations.		
Fireworms, Fruitworms, Sparganothis fruitworm, Blunt-nosed leafhopper,		Insecticides same as above	
Cranberry girdler		Diazinon 14G	21 lb
	Remarks: Girdler may also be controlled by a 7-day reflow after harvest.		
Fairy ring	June-July.	Carbamate WDG	9lbs/1000 gal. Apply 1 gal/ft^2 in an area 3 ft in front and 2 ft behind the ring of dying vines

PESTS	WHEN TO TREAT	MATERIALS	RATE/A
SECOND POST-POLLINATION SPRAY (cont.)			
Phytophthora root rot	At least 45 days before harvest.	Ridomil 2E, OR Ridomil 5G, OR Ridomil Gold EC, OR Ridomil Gold GR, OR Ridomil Gold WSP	4 to 7 pt 20 to 35 lb 1.0 to 1.75 pt 20 to 35 lb 1.0 to 1.5 lb
NEW BOG SPRAY			
Cranberry flea beetle, Blunt-nosed leafhopper	Early July.	Guthion 50WP, OR Lorsban 4E, OR Sevin 4F	1.0 to 2.0 lb 1.5 to 3.0 pt 2.0 to 4.0 pt
Leaf dropping fungi		Bravo 720, OR Mancozeb 80WP	4 to 7 pt 4 lb
	Remarks: Apply only on newly planted, non-bearing bogs. Flea beetles prevent rapid vine establishment. Leaf dropping fungi cause severe damage and delay the vine coverage of the bog. Three or four fungicide applications at 3-week intervals beginning when one inch of new growth is showing may be needed to control leaf drop and runner death.		
POST-HARVEST			
Phytophthora root rot	Immediately following harvest but before soil temperatures decline below 15°C.	Ridomil 2E, OR Ridomil 5G, OR Ridomil Gold EC, OR Ridomil Gold GR, OR Ridomil Gold WSP	4 to 7 pt 20 to 35 lb 1.0 to 1.75 pt 20 to 35 lb 1.0 to 1.5 lb
GIRDLER FALL REFLOW			
Cranberry girdler	Last week of September.	Reflow for 7 days	
	Remarks: Sanding help bogs recover from girdler injury.		

PESTICIDE USE RESTRICTIONS

PESTICIDE*	RE-ENTRY TIME	PRE-HARVEST INTERVAL	IMPORTANT NOTES
Azinphos-M 50W	96 hrs	21 days	3 applications maximum, 14-day intervals
Champ Formula 2	48 hrs		3 applications maximum
Chlorothalonil	48 hrs	50 days	3 applications maximum
Confirm 2F	4 hrs	30 days	4 applications maximum
Crymax	4 hrs	0 days	
Diazinon	24 hrs	7 days	
DiPel	4 hrs	0 days	
Ferbam (Carbamate WDG)	24 hrs	28 days post mid-bloom	5 applications maximum
Guthion	4 days	21 days	3 applications maximum, 14-day intervals
Lorsban	24 hrs	60 days	2 applications maximum
Mancozeb	24 hrs	30 days	See label for maximum allowable rates
Orthene	24 hrs	75 days	2 applications maximum
Ridomil	12 hrs	45 days	3 applications maximum
Sevin	12 hrs	7 days	
SpinTor 2SC	4 hrs	3 days	maximum 29 fl oz or 6 site applications per acre per season
Supanil 720	48 hrs	50 days	3 applications maximum

*Additional trade names:

Chlorothalonil: Bravo 90DG, Bravo 720, Bravo Ultrex, Ensign 720, Supanil 720, Terranil 6L, Terranil 90DF.

Mancozeb: Dithane DF, Dithane F-45, Dithane M-45, Manex II, Manzate DF, Penncozeb DF or WP, Maneb 75DF, Maneb 80, Maneb + Zinc F4.

BLUEBERRY WEED CONTROL

These recommendations are for use on "Blueberry Soils." If you have less than 6% organic matter, consult with your Agricultural Agent.

Clethodim: 0.09 to 0.25 lb/A. Apply 6 to 16 fl oz/A of SELECT 2EC to actively growing grasses before tillering (annuals) and/or seedhead formation (perennials). DO NOT apply when target weeds are under stress, or poor control may result. Consult the label for additional information on recommended size of grasses for treatment. Add oil concentrate according to label directions. Labeled for nonbearing fruit crops ONLY.

Spot treatment: Add 0.66 to 1.33 fl oz of Select 2EC and 1.25 fl oz of oil concentrate per gal of water and spray to wet.

Dichlobenil: 4 to 6 lb/A. Use 100 to 150 lb/A of the 4% granular CASORON or NOROSAC 4G. Apply from mid-November to early March. Controls certain perennial weeds and winter annuals.

Diuron: 2 to 4 lb/A. Apply 2.5 to 5.0 lb/A of KARAMAX DF to weed-free soil beneath blueberry plants in early to mid-spring at least 60 days before harvest. Direct spray beneath foliage. Use half the full rate for the soil texture and organic matter when tank-mixing with another herbicide for residual grass control such as NORFLURAZON, NAPROPAMIDE, or ORYZALIN.

Fluazifop-P-butyl: 0.125 to 0.2 lb/A. Apply 16 to 24 oz/A of FUSILADE 2000 for control of annual and perennial grasses. For non-bearing only. Treat when grasses are small. Add oil concentrate.

Glyphosate: Apply ROUNDUP, ROUNDUP ULTRA, or PROTOCOL at the rate listed on the label for your weed species. Use as a preplant broadcast or as a directed spray in established plantings or as a wiper application postplanting. Do not allow the herbicide solution to contact any part of the crop.

Napropamide: 4 lb/A. Apply 8 lb/A of DEVRINOL 50DF in spring to weed-free soil surface. Safe on newly planted and established plants.

Norflurazon: 2 to 4 lb/A. Apply 2.5 to 5 lb/A of SOLICAM 80DF in the fall or very early spring. Should be combined with or followed by a broadleaf herbicide. Can be used on newly planted or established plants.

Oryzalin: 2 to 4 lb/A. Apply 2 to 4 qt of SURFLAN 4AS in early spring. May be tank mixed with KARMEX, SINBAR, or PARAQUAT.

Paraquat: 0.5 to 1 lb/A. Apply 2 to 3 pt/A of GRAMOXONE EXTRA in spring before bud break. DO NOT apply during growing season. The higher rate should be used when perennial weeds are present. If applied to young shoots, they will be injured. Paraquat is a contact weed killer and will not stop germination of weed seeds. Therefore, a residual type herbicide such as KARMEX or PRINCEP must be used for residual weed control.

Pronamide: 1 to 2 lb/A. Apply 2 to 4 lb/A of KERB 50WP in a band under the established blueberry bushes in late fall to control many perennial grasses, including quackgrass, ryegrass, bluegrass, and certain winter annual broadleaf weeds. Use the maximum rate to control the perennial grasses.

Sethoxydim: 0.18 to 0.28 lb/A. Apply 1 to 1.5 pt/A of POAST for control of annual and perennial grasses. For non-bearing only. Add oil concentrate.

Simazine: 2 to 4 lb/A. Apply 2.2 to 4.4 lb of PRINCEP 90DF to weed-free soil beneath blueberry plants before bud break. Use half the full rate for the soil texture and organic matter when tank-mixing with another herbicide for residual grass control such as NORFLURAZON, NAPROPAMIDE, or ORYZALIN.

Sulfosate: Apply TOUCHDOWN at the rate listed on the label for your weed species. Use as a preplant broadcast or as a directed spray and on established nonbearing plantings as a spray or as a wiper application. DO NOT allow herbicide solution to contact any part of the crops. Labeled for nonbearing crop ONLY.

Terbacil: 0.8 to 2.0 lb/A. Apply 1.0 to 2.5 lb/A of SINBAR 80DF. Use lower rate on sand or loamy sand soils. DO NOT apply to sandy soils having less than 3% organic matter. Apply in spring on fields established one year, directing spray to ground under bushes.

CRANBERRY WEED CONTROL

Dichlobenil: Apply up to 100 lb/A of CASORON 4G or NOROSAC 4G in the spring prior to bud break. Effective rate will vary with target weed. Fall applications are discouraged. Use lowest effective rate possible and avoid continual use to prevent yield losses due to stress. Aerial application not suggested due to chance of overlap. Applications under sand or on weak vines may cause injury. Avoid application during temperatures higher than 60°F. Dichlobenil needs to be watered in as soon as possible after application to avoid volatilization. By regulation, applications must be 12 months apart. Will control most grasses, sedges, and broadleaf weeds. Established woody perennials may not be controlled.

Glyphosate: (ROUNDUP, PROTOCOL, ROUNDUP ULTRA)—Add 1 part glyphosate to 4 parts water to produce a 20% solution. Use a wick or wipe applicator to wipe over the tops of weeds. DO NOT allow solution to drip onto vines. Use of a food safe dye in the mixture is recommended to mark where you have wiped. Solutions should be mixed daily and stored out of the sun for maximum effectiveness. Warm humid conditions are optimal for control. DO NOT apply when target weed is under stress as this will result in poor control. More than one application per year is allowed. DO NOT use, mix, or store in a galvanized container. Rainfall or irrigation within 6 hours after application may reduce effectiveness. Rain fastness for ROUNDUP ULTRA is 1 to 2 hours. Motorized wipe equipment should be operated at 3 MPH, slower for hard to control weeds or where weeds are dense. For improved control, make two applications in opposite directions. Control of hardhack, leatherleaf, maple, and sweet pepperbush will be minimal. Application can be made up to 30 days before harvest.

Napropamide: Apply 60 to 90 lb/A of DEVRINOL 10G to weed-free surface in early spring. Fall applications are discouraged. Napropamide is a germination inhibitor and will not control established weeds. Use air or ground application. Material should be watered in through rain or irrigation within 4 days of application. For best results, water in immediately after application. Effective against most grasses, nutsedge (Cyperus dentatus), and some broadleaf weeds.

Norflurazon: Apply 40 to 120 lb/A of EVITAL 5G in fall at least 2 weeks before winter flood or, if drainage is excellent, in early spring after winter flood has been removed and before weed growth begins. Injury may occur in areas where water puddles for several days after flooding or heavy rains. Aerial application is not recommended due to chance of overlap. Only 1 application per 12 months. Stevens and McFarlins are sensitive varieties. Use lower rates where one or more of the following exists: open areas, sanded, well maintained, sandy soils, young weeds, and stressed vines. Higher rates can be used under the following conditions: mat of vines and weed stems, no irrigation, peat soils, established perennials, and vigorous vines. For control of grasses, rushes, and sedges.

2,4-D: WEEDAR-64, the dimethylamine salt of 2,4-D, is available for use in NJ through a Special Local Need 24C label. Use only the liquid amine form as a wipe. Mix 1 part WEEDAR-64 to 4 parts water to make a 20% solution. Wipe mixture over the top of tall weeds. DO NOT touch vines. Use of a crop safe dye in the mixture is recommended to mark where you have wiped. DO NOT apply material in hot humid weather or when an air inversion exists as vine and blossom injury can occur. For best results, use in late June and July. Controls three square, hardhack, loosestrife, morning glory, leatherleaf, pitchforks, sweet pepperbush, and possibly other woody and broadleaf weeds.

NONBEARING CRANBERRIES ONLY:

Clethodim: 0.09 to 0.25 lb/A. Apply 6 to 16 fl oz/A of SELECT 2EC to actively growing grasses before tillering (annuals) and/or seedhead formation (perennials). DO NOT apply when target weeds are under stress, or poor control may result. Consult the label for additional information on recommended size of grasses for treatment. Add oil concentrate according to label directions. Labeled for nonbearing fruit crops ONLY.

Spot treatment: Add 0.66 to 1.33 fl oz of SELECT 2EC and 1.25 fl oz of oil concentrate per gal of water and spray to wet.

Sethoxydim: Apply POAST at 0.5 to 2.5 pt/A. Consult label for optimal growth stage and rate for specific grass type. Add crop oil concentrate at 2 pt/A or DASH HC at 1 pt/A. Maximum of 5 pt POAST per year. Minimum 14 days between applications, aerial or ground applications.

Spot Treatment: Add 1.25 fl oz POAST and 1.25 fl oz crop oil. Add water to make 1 gal of solution.

Sulfosate: For use as a wipe. Mix 2 quarts TOUCHDOWN in 2 gallons water. No more than 1 application is allowed per year. DO NOT apply more than 5.3 pt/A within 12 months. See glyphosate for other recommendations. However, glyphosate 30 day PHI does not apply to sulfosate.

SOIL FUMIGANTS FOR BOG RENOVATION: DO NOT APPLY TO GROWING CROPS:

Dazomet: BASAMID Granular at 300 lb eradicates all weed types.

VAPAM and BASAMID can cause fish kills. DO NOT contaminate pond, stream, or ditch waters. Before and during application, soil temperature in the treatment zone should between 50 and 80°F for BASAMID and 40 to 90°F for VAPAM. Above-ground vegetation should be burned off or otherwise removed before treatment. Sand for planting should then be applied. VAPAM and BASAMID should be thoroughly watered in to

avoid evaporation of the product. For best results, rototill before and after application. This is particularly true for BASAMID. DO NOT contaminate treated soil by mixing lower layers in to the upper soil layer. See labels for specifics on the number of days to wait before planting. These materials have had variable results.

Vapam: VAPAM water soluble liquid at 50 to 60 gal eradicates herbaceous weeds. 100 gal eradicates woody weeds.