

Arkansas *Small Fruit Management Schedule*

2009



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COVER PHOTOS: Blueberries and grapes (Scott Bauer, USDA Agricultural Research Service, www.forestryimages.org), Blackberries (Chris Evans, University of Georgia, www.forestryimages.org), Strawberries (www.pick-your-own.org.uk/strawberries.htm)

Arkansas Small Fruit Management Schedule – 2009

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Information for this publication was taken from MP44, *Recommended Chemicals for Weed and Brush Control (2009)*; MP144, *Insecticide Recommendations for Arkansas (2009)*; MP154, *Arkansas Plant Disease Control Products Guide (2009)*; and *Midwest Commercial Small Fruit and Grapes Spray Guide (2009)*.

Warning

Many crop protection products may be poisonous, especially in concentrated form. The United States Environmental Protection Agency has established a Poison Control System throughout the United States. Each Center can determine the toxic compounds in commercial products, respond to calls from physicians or individuals and provide supportive or antidotal treatment.

THE POISON CONTROL CENTER FOR ARKANSAS IS:

Arkansas Poison & Drug Information Center
College of Pharmacy, University of Arkansas for Medical Sciences
4301 W. Markham, Mail Slot 522-2
Little Rock, AR 72205

POISON CONTROL HOTLINE – TOLL-FREE PHONE NUMBER

1-800-376-4766

PESTICIDE SPILLS – OFFICE OF EMERGENCY SERVICES

1-800-322-4012

Disclaimer

The information in this publication was current as of January 1, 2009, and applies only to Arkansas. It may not be appropriate for other states or locations. The listing of any product in this publication does not imply endorsement of that product or discrimination against any other product by the University of Arkansas Division of Agriculture. Every effort was made to ensure accuracy, but the user of any crop protection product must read and follow the most current label for any product. For further assistance and information, contact the local Cooperative Extension Service office.

GRAPES – Commercial Growers

See also *Weed Control recommendations at the end of Grapes (Commercial) section.*

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Dormant	November-February February-March	<ul style="list-style-type: none"> Take soil samples. Prune to reduce overwintering inoculum for pests. Flag vines that have grape scale. Set out new plants. Spray lime sulfur. Determine weed management programs. 	<ul style="list-style-type: none"> Eutypa (E) Black Rot (BR) Phomopsis (P) Anthracoese (A) 	<ul style="list-style-type: none"> (A), (E), (BR), (P), Lime Sulfur, Nu-Cop 50DF
Bud Swell - Bud Break	March March-April	<ul style="list-style-type: none"> Apply preemergent herbicides. Fertilize. Check 100 buds on top wire in each of several vineyard locations for damage by cutworms or grape flea beetle (historically the same sites year after year). Spray insecticide if there are more than 2% of buds damaged. Repeat as needed. Apply 2% superior oil to flagged vines to control grape scale. On 1 April, set out three grape berry moth pheromone traps from edge of woods next to vineyard and check for moths twice weekly. Begin to accumulate degree-days (DD) above 47°F after first trap catch and spray insecticide to perimeter vines at 500 DD (see postbloom). 	<ul style="list-style-type: none"> Grape Flea Beetle (GFB) Grape Scale (GS) Climbing Cutworm (CC) Grape Berry Moth (GBM) 	<ul style="list-style-type: none"> (GFB), (CC), (GS), Sevin 80S, Superior Oil, Danitol 2.4EC, Baythroid 2E (GBM), Pheromone Traps
3- to 6-Inch Shoot Growth		<ul style="list-style-type: none"> Start disease management program. Apply herbicides for weed control. Irrigate if necessary. 	<ul style="list-style-type: none"> Black Rot (BR) Powdery Mildew (PM) Phomopsis (P) Angular Leaf Scorch (ALS) Downy Mildew (DM) Dead Arm (DA) 	<ul style="list-style-type: none"> (PM), Abound 2.08FL, Sovran 50WG, Flint 50WG (not Concord types), Nova 40WG, Rubigan, Procure 50WS, Elite 45DF, Tebuzol 45DF, Adament 50WG, Pristine, Quintec, Gavel 75DF (P), (ALS), (DM), (BR), (DA), Captan 50WP, Mancozeb 75DF, Ziram 76DF, Abound 2.08FL, Sovran 50WG, Flint 50WG (not Concord types), Pristine, Aliette, Scala, Rovral, Gavel 75DF

GRAPES – Commercial Growers (continued)

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
10- to 12-Inch Shoot Growth		<ul style="list-style-type: none"> Continue previously started disease management strategies. Train new plants. Irrigate if necessary. 	<ul style="list-style-type: none"> Black Rot (BR) Powdery Mildew (PM) Phomopsis (P) Downy Mildew (DM) Dead Arm (DA) 	<ul style="list-style-type: none"> (BR), (DM), (PM), (P), (DA), Same as for 3- to 6-inch shoot growth.
Immediate Prebloom		<ul style="list-style-type: none"> Check clusters for rose chafer feeding. Spray if significant cluster damage noted. 1st generation, check leaves for presence of grape leafhopper nymphs. Treatment threshold is 20 nymphs per leaf. Check grape scale-infested canes for presence of yellow crawlers on double sticky tape wrapped around infested canes. On grape phylloxera-susceptible cultivars (especially Norton, Cayuga, White, Seyval, Vignoles, Chambourcin and Chardonnay), look for galls on 1st to 5th developed leaves, open galls and look for crawlers. Time foliar spray to susceptible cultivars once crawlers appear in May or mid-June for Vignoles. Check disease management protocol to determine whether protectant application is needed. Irrigate if necessary. 	<ul style="list-style-type: none"> Rose Chafer (RC) Grape Leafhopper (LH) Grape Scale (GS) Grape Phylloxera (GP) (leaf form) Downy Mildew (DM) Powdery Mildew (PM) Phomopsis (P) Dead Arm (DA) 	<ul style="list-style-type: none"> (DM), (PM), (P), (DA), Same as for 10- to 12-inch shoot growth. (RC), (LH), (GP), (GS), Sevin 80S Danitol 2.4EC Assail 30SG
Bloom	May	<ul style="list-style-type: none"> Row-middle management herbicides. Continue previously started disease management strategies. Train new plants. Irrigate if necessary. 	<ul style="list-style-type: none"> Black Rot (BR) Powdery Mildew (PM) Phomopsis (P) Downy Mildew (DM) Botrytis Bunch Rot (BBR) Dead Arm (DA) 	<ul style="list-style-type: none"> (DM), (PM), (P), Same as for 10- to 12-inch shoot growth. (BBR), (DA), Rovral 50WP, Vanguard 75WG, Elevate 50WG, Botran 75W, Pristine, Gavel 75DF (BR), Same as for 3- to 6-inch shoot growth except for Mancozeb 75DF (66 day PHI).
Postbloom – or – Second Postbloom	May-early June	<ul style="list-style-type: none"> Scout perimeter of vineyards for grape rootworm – usually lower leaves have small holes (rarely cause economic damage) – and for rose chafer feeding on clusters at bloom or shortly after. From 1 to 20 May (500 to 700 DD), grape berry moth larvae attack pea-size berries. Make weekly checks of 300 clusters in perimeter row for larvae and tunneling damage. Spray perimeter vines with insecticide if you see signs of larvae entering berries. Continue disease management strategy, if applicable. Remove leaves around cluster (of tight cluster cultivars) to open up the cluster for aeration and for Botrytis bunch rot management. By 900 DD, move 3 grape berry moth traps to vineyard interior. Weekly check traps for moths, and berries for larval damage. If > 5 acre vineyard, apply mating disruption pheromone ties for grape berry moth before 2nd generation flight begins by 900 DD (15 to 25 May). Irrigate if necessary. 	<ul style="list-style-type: none"> Grape Rootworm (GR) Grape Berry Moth (GBM) Black Rot (BR) Powdery Mildew (PM) Phomopsis (P) Downy Mildew (DM) Botrytis Bunch Rot (BBR) Leafhopper (LH) Dead Arm (DA) 	<ul style="list-style-type: none"> (DM), (PM), (P), (BBR), (DA), Same as for 10- to 12-inch shoot growth. (GBM), (GR), Endosulfan 3EC Endosulfan 50W Sevin 80S Danitol 2.4EC Pyrellin EC Imidan 70W Pyramite Provado Solupak (GBM), Isomate-GBM mating disruption ties (400 ties/A) (BR), Same as for bloom.

GRAPES – Commercial Growers (continued)

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Pea-Size Berries	June	<ul style="list-style-type: none"> • Comb vines. • Monitor for stink bug – NOT USUALLY MUCH OF A PROBLEM. • From 31 May to 24 June (1200 to 1700 DD), second larval grape berry moth hatch enters berries. Make weekly checks of 300 clusters in perimeter row for larvae and tunneling damage (purplish discolor of skin). Spray whole vineyard with insecticide if you see larvae in berries. • By 15 June, place two grape root borer pheromone traps in interior of each vineyard. Check traps every other week for moths. If you caught more than 50 moths per trap last year or you noticed 50% or more of vines had pupal skins, you may need to consider applying insecticide to soil 2 weeks after first trap catch to kill larvae entering soil on way to roots, or mass trap adults with one GRB pheromone trap per acre. Keep infested vines well irrigated and fertilized to overcome root pruning by GRB. • Continue disease management strategy, if applicable. • Remove leaves for Botrytis bunch rot management. • Train new plants. • Irrigate if necessary. 	<ul style="list-style-type: none"> • Black Rot (BR) • Powdery Mildew (PM) • Downey Mildew (DM) • Botrytis Bunch Rot (BBR) • Dead Arm (DA) • Grape Berry Moth (GBM) • Grape Root Borer (GRB) 	<ul style="list-style-type: none"> • (BR), (PM), (DM), (BBR), (DA), Same as for postbloom. • (GBM), See postbloom for grape berry moth control. • (GRB), Lorsban 4E applied to 2-foot band of soil under vines (Note: 35 day PHI)
	July	<ul style="list-style-type: none"> • Continue disease management, if applicable. • 1 July to harvest (> 2200 DD), the 3rd and 4th generations of grape berry moth enter berries. Make weekly checks of 300 clusters in perimeter row for larvae and tunneling damage. Spray whole vineyard with insecticide if you see larvae in berries. • 2nd generation, check leaves for presence of grape leafhopper nymphs. Treatment threshold is 15 to 20 nymphs per leaf. • Train new plants. • Take leaf petiole sample for micronutrient analysis. • Irrigate if necessary. • Use Surround (kaolin particle film). It will make the plants appear white and is hard to get off fruit, but significantly reduces foliar and fruit feeding by Japanese Beetle. • Check ripening fruit for Green June Beetle feeding. 	<ul style="list-style-type: none"> • Black Rot (BR) Can stop BR control when berries (fruit) change color. • Powdery Mildew (PM) • Downy Mildew (DM) • Botrytis Bunch Rot (BBR) • Leafhopper (LH) • Grape Berry Moth (GBM) • Dead Arm (DA) • Japanese Beetle (JB) • Green June Beetle (GJB) 	<ul style="list-style-type: none"> • (BR), (PM), (DM), (BBR), (LH), (DA), Same as pea-size berries. • (GBM), See postbloom for grape berry moth control. • (JB), (GJB), Sevin 80S • (JB), Danitol 2.4EC, Surround (25-50 lb/A. Reapply if rain washes it off.
Harvest	July-August	<ul style="list-style-type: none"> • Map percent weed cover and species present under and between rows. • Evaluate disease and insect management programs. • Train new plants. • Irrigate if necessary. 		
	September-November	<ul style="list-style-type: none"> • Map percent weed cover and species present under and between rows. • Evaluate disease and insect management programs. 		
	December-January	<ul style="list-style-type: none"> • Prune. • Build trellis. • Winterize equipment. 		

GRAPES – Commercial Growers – Weed Control

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
GRAPES – Preemergence				
diuron @ 2 lb or 1 lb/A	Annual weeds and some perennials.	Karmex 80DF 2.5 lb (1.25 lb after second year)	Early spring before weeds emerge.	Apply in 4-ft band centered under the trellis to soil free of trash and weeds. Use lower rate on sandy soils. Do not use on 1- and 2-year-old plantings. May be tank mixed with Sinbar or Surflan.
flumioxazin @ 0.19 to 0.38 lb/A	Annual broadleaf and grass weeds.	Chateau 6 to 12 oz/A	Preemergence, dormant applications preferred or use shielded sprayer.	Apply as a directed spray to dormant vines or use a shielded sprayer. Do not apply to vines established less than 2 years unless they are protected from spray contact by nonporous wraps, grow tubes or waxed containers. Combine with a labeled postemergence herbicide for control of emerged weeds.
isoxaben @ 0.5 to 1.0 lb/A	Annual broadleaf weeds.	Gallery 75DF 0.66 to 1.33 lb/A	Preemergence	Use on nonbearing grapes only. Do not apply until soil has settled after transplanting. Tank mix with Surflan for grass control.
pendimethalin @ 2 to 4 lb/A	Annual broadleaf and grass weeds.	Prowl H₂O 2 to 4 qt/A	Preemergence. Apply only to dormant plants. Do not apply after bud swell.	Use on nonbearing plantings only. Allow soil to settle around vines before applying. Do not apply overtop vines.
oxyfluorfen @ 1.25 to 2.0 lb/A	Annual broadleaf weeds.	Goal 2 XL 5 to 8 pts/A	Use only on dormant grapes for preemergence or postemergence control of weeds.	Direct spray to base of plant. Do not apply after buds begin to swell or when foliage or fruit is present. Do not apply to grapes established less than 3 years unless vines are on a trellis wire at least 3 ft above the ground.
oryzalin @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	Surflan 4 AS 2 to 4 qt/A Use low rate for short-term (4 months) weed control and high rate for 6 to 8 months weed control.	Apply to weed-free soil. Mix any weed residues or trash thoroughly into soil before application.	Sprayer must have thorough agitation and avoid spray drift to foliage. See label for further details. Surflan may be tank mixed with Karmex or Princep as recommended individually to broaden spectrum of control. See label for details.
norflurazon @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	Solicam 80DF 2.5 to 5 lb/A Use low rate on light soils.	Fall to early spring. Do not apply to sandy loam soils after bud break.	Do not use on sandy or gravelly soils. Vines must be established for 2 years. Do not use on nursery stock.

GRAPES – Commercial Growers – Weed Control (continued)

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
GRAPES – Preemergence (cont.)				
napropamide @ 2 to 4 lb/A	Small-seeded broadleaf weeds and annual grasses.	Devrinol 50DF 4 to 8 lb/A		Do not harvest within 35 days of treatment. Apply as a tank mix with a knockdown herbicide if vegetation has emerged at the time of application.
dichlobenil @ 4 to 6 lb/A	Annuals and many perennials.	Casoron 4G 100 to 150 lb/A	In early winter and not later than mid-February.	Granular form preferred. Apply in early spring. Incorporate lightly for best results. May be used in vineyards in first year after transplanting after vines are established. Do not apply immediately after transplanting.
pronamide 50% ai	Annual and perennial grasses and some broadleaves.	Kerb 50WP 2-8 lb in 40-50 gal of water	In fall after harvest or early winter.	Apply as a directed spray in the fall after harvest prior to soil freeze-up, or early winter when temperatures are below 55°F. Rainfall or irrigation is required to activate. Restricted use pesticide.
isoxaben+trifluralin 2.5% ai	Annual grasses and some broadleaves.	Snapshot 2.5TG 100-200 lb		May only be used on crops that will not be harvested within one year of application. Rainfall or irrigation of 0.5 inches required within 3 days of application.
simazine 4 lb ai/gal	Annual grasses and broadleaves.	Princep 4L at 2-4.8 qt in 25-40 gal of water	Early spring before emergence.	Apply to soil under trellis between harvest and early spring before weeds emerge. May be tank mixed with Roundup or Gramoxone. Maximum of one application per year. Vineyards must be at least 3 years old.
GRAPES – Postemergence				
glyphosate @ 0.75 to 1.5 lb/A	Annual weeds, bermudagrass and johnsongrass.	Glyphosate (4 lb/gal formulations) See table on page 23 of MP44 for specific glyphosate conversions and surfactants. 1 to 2 qt/A	Apply to actively growing weeds.	Direct to base and avoid contact with green bark or foliage. Do not apply to vines less than 3 years old or within 14 days of harvest. See label.
clethodim @ 0.09 to 0.25 lb/A	Annual and perennial grasses.	Select 2EC 6 to 16 oz/A	Postemergence to grasses.	Use on nonbearing crop only. Do not apply within one year of harvest. Effective for annual bluegrass control.

GRAPES – Commercial Growers – Weed Control (continued)

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
GRAPES – Postemergence (cont.)				
carfentrazone @ 0.008 to 0.025 lb/A	Annual broadleaf weeds.	Aim 2EC	Postemergence to weeds less than 4 inches tall or rosettes less than 3 inches across.	Apply post directed using a hooded sprayer. Will burn crop foliage if contact is made. Add crop oil concentrate (1%) or surfactant (0.5%). Coverage is essential for control. Does not control grasses. Do not use on newly transplanted vines.
paraquat @ 0.25 to 0.5 lb/A	Annual weeds and foliage of perennials.	Gramoxone Inteon 1 to 2 pt/A (large coreopsis may need 4 to 4.5 pt/A)	Apply in spring with preemergence herbicide. If needed, repeat throughout the growing season as required to contain weeds.	Direct spray to weed foliage, avoiding vines. Do not graze treated areas.
sethoxydim @ 0.3 to 0.5 lb/A	Annual and perennial grasses including johnsongrass and bermudagrass.	Poast 1.5EC 1.5 to 2.5 pt/A	Use low rate on annual grasses up to 6 inches tall; high rate on annual grasses up to 12 inches tall and perennial grasses. Broadleaf weeds and nutsedge(s) will not be controlled by Poast.	Do not apply within 50 days of harvest. Apply as a directed spray using 5 to 20 gal water/acre and 40 to 60 psi pressure. Use flat fan nozzle tips. Always use a nonphytotoxic oil concentrate (1 qt/acre).
glufosinate @ 0.75 to 1.25 lb/A	Annual weeds.	Rely 1L 3 to 5 qt/A	Postemergence to actively growing weeds.	Apply as a directed spray to emerged weeds in a minimum of 20 gal water per acre with a minimum of 30 psi spray pressure when weeds are 1 to 6 inches high. For spot application, use 1.5 to 4 oz per gal of water and spray to wet but not runoff. Do not allow spray to contact desirable foliage or green bark. Do not apply within 14 days of harvest. See label for specific rates. Rely can also be used for sucker control – see label for directions.
fluazifop-P @ 0.19 lb/A	Annual and perennial grasses including johnsongrass and bermudagrass.	Fusilade DX 2EC 1.5 pt/A	Make application to johnsongrass – 12 to 18 inches tall; bermudagrass – 3 inches tall or with 4- to 6-inch runners; annual grasses – 2 to 8 inches tall. Broadleaf and nutsedge(s) will not be controlled by Fusilade.	Apply to NONBEARING vines that will not be harvested within 1 year of application. Apply as a directed spray using 25 gal water/acre and 30 to 60 psi pressure. Use flat fan nozzle tips and DO NOT contact foliage. Always use a crop oil concentrate (1 qt/25 gal water/acre) or a nonionic surfactant (0.5 pt/25 gal water/acre).

BLUEBERRIES – Commercial Growers

See also Weed Control recommendations at the end of Blueberries (Commercial) section.

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Dormant	January-February	<ul style="list-style-type: none"> • Prune to reduce overwintering inoculum for pests listed here, and check for presence of scale. • Mulch. • Determine weed management programs, apply preemergent. • Start disease management. • Take soil samples/fertilize. 	<ul style="list-style-type: none"> • Phomopsis (P) • Bacterial Blight (BB) • Mummyberry (MB) • Stem Canker (SC) • Scale (S) • Phytophthora Root Rot (PRR) 	<ul style="list-style-type: none"> • (P), (MB), (SC), Lime Sulfur, Sulfurix • (BB), Bordeaux, copper oxychloride • (S), Apply Dormant Oil if scale present. • (PRR), Ridomil Gold EC, Phosphorous Acid (Fosphite, for example), Aliette 80WDG
Bud Swell - Bud Break	Mid-Late March	<ul style="list-style-type: none"> • Set out new plants. • Start disease management program. • Apply prebloom insecticides to control virus vectors. • Check 100 buds at top of plants in each of several locations for damage by cutworms or grape flea beetle (historically the same sites year after year). Spray insecticide if there is more than 2% of buds damaged. Repeat as needed. • Monitor for eastern tent caterpillars in wild cherry trees adjacent to planting. Remove nest and destroy caterpillars before they disperse to bordering blueberry plants and feed on buds and blooms. • Apply herbicides. • Irrigate if necessary. • Fertilize. 	<ul style="list-style-type: none"> • Mummyberry (MB) • Phytophthora Root Rot (PRR) • Stem Canker (SC) • Stem Blight (SB) • Alternaria Leaf Spot/Fruit Rot (AL/FR) • Phomopsis (P) • Powdery Mildew (PM) • Climbing Cutworm (CC) 	<ul style="list-style-type: none"> • (MB), (SC), (SB), (AL/FR), (P), (PM), Captan 50WP, Ziram 76DF, CaptEstate 68WDG, Abound 2.08FL, Cabrio 20EG, Pristine, Indar 75WSP, Switch 62.5WG. Abound, Tilt, Cabrio and Pristine are strobilurin fungicides – do not use more than 4 per season combined and no more than 2 sequential sprays before changing to a different type of fungicide to prevent resistance. • (PRR), Ridomil Gold EC, Aliette 80 WDG • (CC), Sevin 80S, Sevin XLR
Bloom - Postbloom	Late April	<ul style="list-style-type: none"> • Apply fungicides if needed. • Insecticides (wait until after bloom to avoid killing bees). • Second fertilization late April-early May. • Place bee hives when 10% blossoms are open. • Cultivate or mow middles. • Irrigate as needed. 	<ul style="list-style-type: none"> • Secondary Mummyberry Infection (MB) • Anthracnose (A) • Botrytis (B) • Stem Canker (SC) • Stem Blight (SB) • Alternaria Leaf Spot/Fruit Rot (AL/FR) • Phomopsis (P) • Powdery Mildew (PM) • Phytophthora Root Rot (PRR) 	<ul style="list-style-type: none"> • (MB), (A), (SC), (SB), (AL/FR), (P), (PM), Captan 50WP, Ziram 76DF, Abound 2.08FL, Cabrio 20EG, Pristine 38WG, CaptEstate 65EDG, Tilt • (B), CaptEstate 65EDG, Elevate 50WG, Switch 62.5WG • (PRR), Ridomil Gold EC, Aliette 80 WDG
Fruit Development	May	<ul style="list-style-type: none"> • Cultivate or mow middles. • Irrigate as needed. • Check berries weekly for signs of fruitworm larvae entering fruit. • Install bird netting. • Apply fungicides if weather is conducive for disease. • Fertilize. • Submit leaf petiole/tissue for nutritional analysis. 	<ul style="list-style-type: none"> • Anthracnose (A) • Botrytis (B) • Fruitworm (FW) 	<ul style="list-style-type: none"> • (A), (B), Same as postbloom. • (FW), Imidan 70W, Lannate LV, Malathion 5EC, Malathion 8F, Sevin 80S, Confirm 2F needs to be applied at first sign of larvae.

BLUEBERRIES – Commercial Growers (continued)

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Harvest	Late May for Highbush June for Southern Highbush July for Rabbiteye	<ul style="list-style-type: none"> Harvest. Irrigate. Mow middles. Fertilize From 1 June to 15 August in areas north of Ft. Smith, watch for first flight and foliar damage by Japanese Beetle. At first feeding, spray upper third of canopy to kill adults. Use Surround (kaolin particle film). It will make plant appear white and is hard to get off fruit, but significantly reduces foliar and fruit feeding by Japanese Beetle. From 1 to last July, watch for Green June Beetles attacking berries. 	<ul style="list-style-type: none"> Anthracnose (A) Stem Canker (SC) Stem Blight (SB) Japanese Beetle (JB) Green June Beetle (GJB) 	<ul style="list-style-type: none"> (A), (SC), (SB), Same as fruit development. (JB), (GJB), Sevin 80S (JB), Danitol 2.4EC, Surround (25-50 lb/A). Reapply if rain washes it off.
Postharvest	August-October	<ul style="list-style-type: none"> Cultivate to control weeds. Irrigate as needed. Remove bird netting. 	<ul style="list-style-type: none"> Stem Canker (SC) Stem Blight (SB) 	<ul style="list-style-type: none"> (SC), (SB), Captan 50WP
Dormant	September-December	<ul style="list-style-type: none"> Equipment maintenance. Mulch plants. 		

BLUEBERRIES – Commercial Growers – *Weed Control*

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
BLUEBERRIES – Preemergence				
simazine @ 2 to 4 lb/A	Annual broadleaf and grass weeds.	Princep 4L 2.2 to 4.4 lb/A of 90WDG. 2 to 4 qt/A of 4L	In spring before bud break and in fall after harvest.	Follow label directions for blueberries.
dichlobenil @ 4 to 6 lb/A	Annuals and many perennials.	Casoron 4G 100 to 150 lb/A	In early winter and not later than mid-February.	Low rate only for blackberries and raspberries. Apply only to plants established one year or more.
terbacil @ 0.4 to 1.6 lb/A	Some perennials.	Sinbar 80W 0.5 to 2 lb/A	In spring or after harvest in fall.	Apply only to plants established one year or more. Do not use in sandy soils with less than 3% organic matter.
paraquat @ 0.25 to 0.5 lb/A	Contact kill of green foliage.	Gramoxone Inteon 1 to 2 pt/A	Before new canes emerge.	Apply as a directed spray in 50 to 200 gal spray mix to weeds before new canes emerge. Avoid paraquat contact with new canes, as injury will occur. Direct spray with low pressure to produce a coarse spray. Add a nonionic surfactant at a rate of 16 to 32 oz/100 gal of spray mix, or 1 gal approved crop oil concentrate per 100 gal spray mix.
glyphosate @ 1 to 5 lb/A	Most annual broadleaf and grass weeds and most perennial weeds.	Glyphosate (4 lb/gal) 1 to 5 qt/A	Apply as preplant or directed spray.	DO NOT SPRAY GREEN CANES, BARK OR FOLIAGE. Apply preplant or as a directed spray to base of established plants. Do not apply within 14 days of harvest. Wiper applications may also be used. See label for specific rates.
oryzalin @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	Surflan 4 AS 2 to 4 qt/A	Do not apply while fruit is present.	Do not apply when fruit is present. This treatment may be used on first-year plants. Do not apply Surflan to lowbush blueberries.
dichlobenil @ 4 to 6 lb/A	Most annuals, fescue, dandelions, dock and other herbaceous perennials.	Casoron 4G 100 to 150 lb/A	Apply granules in late winter to early spring.	Shallow incorporation may improve weed control. Do not apply within 4 weeks after transplanting. Residual activity is short. Do not apply more than 4 lbs to blackberries or raspberries. Do not apply during new shoot emergence.
napropamide @ 4.0 lb/A	Annual grasses and certain broadleaf weeds.	Devrinol 50DF 8 lb/A	Preemergence	Apply to a weed-free surface or tank mix with an appropriate postemergence herbicide. May be applied to newly planted and established crops. Must be incorporated by overhead irrigation or rainfall within 24 hours for maximum results.
diuron @ 1.2 to 1.6 lb/A	Annual broadleaf and grass weeds.	Karmex 80DF 1.5 to 2 lb/A	Preemergence or early postemergence	Use only in fields that have been established for one year. Apply as a band treatment at base of the bushes. Add surfactant for improved control. Use caution on sandy, gravelly soils with low organic matter.

BLUEBERRIES – Commercial Growers – Weed Control (continued)

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
BLUEBERRIES – Preemergence (cont.)				
hexazinone @ 1 to 2 lb/A	Most annual broadleaf and grass weeds and many perennials.	Velpar L 0.5 to 1 gal/A	In late winter or early spring before blueberry leaf emergence.	For blueberries only. Apply as a directed spray to soil and weeds before blueberry leaf emergence. Apply at least 90 days before harvest. Do not use on first-year plantings. Use lower rates on poorly drained or sandy soils. Before widespread use, trial use on a few plants is a good idea.
norflurazon @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds and some seedling perennials.	Solicam 80DF 2.5 to 5 lb/A	Early spring while plants are dormant.	Apply as a directed spray from fall to early spring when the plants are dormant and before weeds emerge. Make only one application per year. May be used on newly planted crops; however, on newly planted blackberries and raspberries, use only the lowest labeled rate. Application of SOLICAM may result in temporary bleaching or chlorosis of the leaves from which the plant will recover.
napropamide @ 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	Devrinol 50DF 8 lb/A	Early spring or after harvest.	Apply to weed-free soil surface either in the spring or anytime after harvest. Enough irrigation or rainfall to wet the soil to a depth of 4 inches is necessary within 1 week of application. Apply as a directed spray to the base of the plants. May be used on first-year plantings. NOTE: Use only half this rate the first year if root pieces are planted.
BLUEBERRIES – Postemergence				
sethoxydim @ 0.3 to 0.5 lb/A	Annual and perennial grasses.	Poast 1.5EC 1.5 to 2.5 pt/A	Postemergence to grasses.	Check label for specific rates and timings. Use crop oil at a rate of 1 qt per acre. May be used on bearing blueberries or raspberries but not within 30 or 45 days, respectively, of harvest.
clethodim @ 0.09 to 0.25 lb/A	Annual and perennial grasses.	Select 2EC 6 to 16 oz/A	Postemergence to grasses.	Use on nonbearing crop only. Do not apply within one year of harvest. Effective for annual bluegrass control.
glufosinate @ 0.75 to 1.5 lb/A	Most annuals and a few perennials.	Rely 1 SL 3 to 5 qt/A	Postemergence	For blueberries only. Apply as a directed application in a minimum of 10 gallons of water per acre. Do not allow spray to contact blueberries. Contact with green bark may cause injury. Do not apply within 14 days of harvest.
fluazifop @ 0.25 to 0.38 lb/A	Annual and perennial grasses.	Fusilade DX 2EC 16 to 24 oz/A	Postemergence to grasses.	NONBEARING ONLY. Check label for specific rates and timings. Do not apply within 1 year of the first harvest. Use of a crop oil or surfactant will be necessary.

STRAWBERRIES – Plasticulture – Commercial Growers

See also Weed Control recommendations at the end of Strawberries (Commercial) section.

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Dormant	January	<ul style="list-style-type: none"> Irrigate if necessary. 		
	February	<ul style="list-style-type: none"> Remove dead leaves before new growth from crowns. Roll back row covers if used. Hook up drip irrigation. 		
Prebloom	March	<ul style="list-style-type: none"> Burn down cover crop. Monitor for disease. At first bloom, check twice weekly 100 flowers in several sites for severed stems from feeding strawberry clipper or tap flowers over a paper plate and look for very small strawberry clippers with a narrow snout. In perennial strawberry plantings, overwintering strawberry rootworm adults emerge in early spring and cause shot-holing of the leaves. If adults are found on yellow sticky cards during early spring or late summer, an insecticide application will help reduce the number of eggs laid. Larvae damage strawberry roots. Not usually a problem in annual plantings. 	<ul style="list-style-type: none"> Anthrachnose (A) Powdery Mildew (PM) Strawberry Clipper (SC) Strawberry Rootworm (SRW) 	<ul style="list-style-type: none"> (A), (PM), Cabrio 20EG, Pristine, Abound, Tilt (SC), Sevin 80S, 74F (SRW), No pesticides labeled.
Bloom	Late March-April	<ul style="list-style-type: none"> Fertilize with first nitrogen injection. Put overhead irrigation in place in case of low temperatures. Submit leaf/petiole tissue for nutrient analysis every 1-2 weeks. Monitor for disease. Check weekly for tarnished plant bug adults and nymphs feeding on the developing achenes (seeds) during and after bloom, and on the receptacle of the developing fruit leading to small, seedy strawberries that fail to mature (button berries). Check weekly for mites and green spittle bugs on leaves. Treat if you find an average of 2.5 mites/leaf and less than one predator mite/leaf. 	<ul style="list-style-type: none"> Botrytis Blossom Blight/ Fruit Rot (BB/FR) Leaf Spot (LS) Scorch (Sch) Blight (BL) Leather Rot (LR) Tarnished Plant Bug (TPB) Spittlebug (S) Mites (M) 	<ul style="list-style-type: none"> (BB/FR), (LS), (Sch), (BL), Captan 50WP, Switch 62.5WG, Scala, Rovral, Tilt (BB/FR), Thiram 65WP, Elevate 50WG (LR), Aliette 50WDG, Ridomil Gold EC (TPB), (S), Endosulfan EC, Sevin, 80S, Thiodan (M), Brigade WSB, Vendex, Kelthane 35W, Danitol 2.4EC, Agri-Mek 0.15EC, Savey
Harvest begins	April	<ul style="list-style-type: none"> Irrigate as needed. Scout for insects and foliar diseases. Submit leaf/petiole tissue for nutrient analysis every 1-2 weeks. 	<ul style="list-style-type: none"> Botrytis Fruit Rot (BFR) 	<ul style="list-style-type: none"> (BFR), Elevate 50WG, Topsin M 70WSB

STRAWBERRIES – Plasticulture – Commercial Growers (continued)

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Harvest	May	<ul style="list-style-type: none"> Harvest. Irrigate as needed. 		
	June	<ul style="list-style-type: none"> Destroy plants when harvest ends (Roundup). Incorporate lime when existing beds are broken down. Begin soil preparations for rotation crop such as cucurbits or pumpkins. 		
	July	<ul style="list-style-type: none"> Begin soil preparations for strawberries at different site. Take soil samples for incorporating fertilizer. 		
	August	<ul style="list-style-type: none"> Have fumigants delivered. 		Fumigation is now pretty much a commercial option only (have to hire it done) due to EPA regulations.
	September	<ul style="list-style-type: none"> Fertilize with N-P-K. Prepare raised beds. Fumigate. Lay irrigation drip lines. Lay plastic. Overseed with cover crop such as wheat. 		
	October	<ul style="list-style-type: none"> Transplant new plants. Monitor for disease. Irrigate. 	<ul style="list-style-type: none"> Leaf Spot (LS) Scorch (Sch) Blight (BL) Leather Rot (LR) Red Stele (RS) 	<ul style="list-style-type: none"> (LS), (Sch), (BL), Captan 50WP, Thiram 65WP, Topsin M 70WSB, Syllit 65WP (LR), (RS), Ridomil Gold EC, Aliette
	Late November-December	<ul style="list-style-type: none"> Lay row covering if used. Irrigate. Remove runners as needed starting 6 weeks after transplanting to create 8-inch diameter plants by mid-December. 		

STRAWBERRIES – Commercial Growers – Weed Control

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
STRAWBERRIES – Plasticulture – Preemergence				
methyl bromide	Most annual and perennial weeds.	Various (See label.)	Preplant	Inject into the soil 4 to 6 inches deep and cover with black plastic immediately. Soil moisture should be near field capacity and soil temperature should be at least 50°F at the treatment time (this may be a commercial option only now).
napropamide @ 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	Devrinol 50DF 8 lb/A	Preemergence	Apply as a banded preemergence treatment to the middles between plastic before weed emergence. Tank mixture with paraquat will provide pre- and postemergence weed control. Rainfall or irrigation within 24 hours after application is needed for optimum control. Effective on volunteer small grains (wheat, etc.) if applied before emergence.
oxyfluorfen @ 0.5 lb/A	Annual broadleaf weeds including Carolina geranium and cutleaf evening primrose and a few annual grasses.	Goal 2 XL 2 pt/A	Preemergence, at least 30 days before transplanting.	Apply to the surface of preformed beds at least 30 days before transplanting to control many broadleaf weeds that will emerge in the hole made for the crop. Incorporation is not needed but may reduce crop injury. Plastic may be applied anytime after Goal is applied. Sooner rather than later will result in better weed control.
STRAWBERRIES – Plasticulture – Postemergence				
carfentrazone @ 0.008 to 0.025 lb/A	Annual broadleaf weeds.	Aim 2EC	Postemergence to weeds less than 4 inches tall or rosettes less than 3 inches across.	Apply post directed using a hooded sprayer. Will burn crop foliage if contact is made. Add crop oil concentrate (1%) or surfactant (0.5%). Coverage is essential for control. Does not control grasses.
clethodim @ 0.125 lb/A	Annual and perennial grasses.	Select 2EC 8 oz/A	Postemergence to grasses.	Do not apply within 4 days of harvest. Do not apply more than 8 oz per acre per application. Effective for annual bluegrass control.
paraquat @ 0.25 to 0.5 lb/A	Contact kill of green foliage.	Gramoxone Inteon 1 to 2 pt/A	Postemergence	Apply as a banded treatment using shields to the middles between plastic to kill emerged weeds. Add a nonionic surfactant at a rate of 16 to 32 oz/100 gal or 1 gal approved crop oil concentrate per 100 gal spray solution. Do not apply within 21 days of harvest.

STRAWBERRIES – Commercial Growers – Weed Control (continued)

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
STRAWBERRIES – Plasticulture – Postemergence (cont.)				
clopyralid @ 0.125 to 0.187 lb/A	Broadleaf weeds including clover, vetch, sowthistle, dock and thistle.	Stinger 3EC 0.33 to 0.5 pt/A	Postemergence	Do not use surfactant or mix with other pesticides. Do not apply within 30 days of harvest.
glyphosate @ 0.5 to 0.94 lb/A	Most emerged weeds.	Roundup WeatherMax 5.5 L 11 to 22 oz/A	Postemergence	Apply as a wiper application or as a hooded or shielded spray in row middles or postharvest. To avoid severe injury, do not let the spray contact any part of the strawberry plant. Do not apply with 14 days of harvest.
sethoxydim @ 0.3 to 0.5 lb/A	Annual and perennial grasses.	Poast 1.5 EC 1.5 to 2.5 pt/A	Postemergence to grasses.	Apply as a banded preemergence treatment to the middles between plastic before weed emergence. Effective on volunteer small grains (wheat, etc.) if applied before emergence. Do not apply on the crop within 7 days of harvest.

BLACKBERRIES – Commercial Growers

See also Weed Control recommendations at the end of Blackberries (Commercial) section.

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Dormant	January-February	<ul style="list-style-type: none"> • Soil sample. • Prune to reduce overwintering inoculum for pests listed here. • If less than 5% of canes have RNCB galls, cut those galled canes off at the ground and burn galls. If more than 5% galled canes, apply spray after dark during adult emergence in May (see petal fall). • Contact herbicides. 	<ul style="list-style-type: none"> • Cane and Leaf Rust (R) • Anthracnose (A) • Red Necked Cane Borer (RNCB) 	<ul style="list-style-type: none"> • (R), (A), Lime Sulfur, Drexel Captan 50WP, Pristine • (RNCB), Prune out galls.
Bud Swell - Bud Break	March	<ul style="list-style-type: none"> • Dip roots of new plants into <i>Agrobacterium radiobacter</i> strain K84 (Galltrol). Plant new plants. • Start disease management at green tip when 3/4-inch green tissue has developed. • Preemergent weed/grass control. • Fertilize 2 weeks after planting (20-30 lb actual nitrogen per acre). 	<ul style="list-style-type: none"> • Crown Gall (CG) • Anthracnose (A) • Cane and Leaf Rust (R) 	<ul style="list-style-type: none"> • (CG), Galltrol • (A), (R), Bordeaux, copper-based products, Drexel Captan 50WP, Pristine, Tilt
6-Inch Shoot Growth before blooms open		<ul style="list-style-type: none"> • Continue disease management. • Remove and destroy any plants showing orange rust. • Irrigate if necessary. • Mow or cultivate middles. 	<ul style="list-style-type: none"> • Orange Rust (OR) • Leaf and Cane Rust (R) • Powdery Mildew (PM) • Anthracnose (A) • Septoria Leaf Spot (SLS) • Phytophthora Root Rot (PRR) 	<ul style="list-style-type: none"> • (OR), (R), (PM), (A), (SLS), Nova 40W, Cabrio EG, Pristine WG, Rovral 50WP, Drexel Captan 50W, Cabrio 20EG, Pristine, Elevate 50WG, Switch 62.5WG, Tilt • (PRR), Ridomil Gold EC, Aliette WDG
Prebloom when flower buds show white		<ul style="list-style-type: none"> • At first bloom, check twice weekly 100 flowers in several sites for severed stems from feeding strawberry clipper or tap flowers over a paper plate and look for very small strawberry clippers with a narrow snout. Also look for gall midges (rare), thrips and tarnished plant bugs in flowers. Not proven that thrips cause damage. • Continue disease management. • Irrigate if necessary. 	<ul style="list-style-type: none"> • Flower Thrips (T) • Blackberry Gall Midge (BGM) • Tarnished Plant Bug (TPB) • Strawberry Clipper (SC) • Anthracnose (A) • Cane Blight (CB) • Leaf Spot (LS) • Cane and Leaf Rust (R) • Orange Rust (OR) • Yellow Rust (YR) 	<ul style="list-style-type: none"> • (BGM), (TPB), (SC), Capture 2EC, (2 sprays/season – save one for RCB soil treatment in October), Malathion 57EC, Sevin 4F, Sevin 80S • (T), SpinTor 2SC, Pyrellin EC • (A), (CB), (LS), (R), (OR), (YR), Same as for 6-inch shoots.

BLACKBERRIES – Commercial Growers (continued)

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Early Bloom (5%-10%)	Late March-April	<ul style="list-style-type: none"> Continue disease management. Irrigate if necessary. Mow or cultivate middles. 	<ul style="list-style-type: none"> Cane and Leaf Rust (R) Orange Rust (OR) Yellow Rust (YR) Botrytis Gray Mold (B) Rosette (Double Blossom) (DB) Anthracoze (A) Spur Blight (SpB) 	<ul style="list-style-type: none"> (R), (OR), (YR), (A), Same as prebloom. (B), (SpB), Rovral WDG, Rovral 4L, Elevate 50WDG, Switch 62.5WG, Drexel Captan 50WP, Cabrio 20EG, Abound (DB), Abound FL, Pristine WG, Switch 62.5WG, Bordeaux
Full Bloom	April	<ul style="list-style-type: none"> Continue disease management. Irrigate if necessary. Mow or cultivate middles. 	<ul style="list-style-type: none"> Powdery Mildew (PM) 	<ul style="list-style-type: none"> (PM), Same as 6-inch shoot.
Petal Fall		<ul style="list-style-type: none"> From late April to harvest, stink bugs begin feeding on fruit as well as tarnished plant bugs and thrips. RNCB will continue to lay eggs until early June. Continue disease management. Irrigate if necessary. Mow or cultivate middles. If more than 5% galled canes, apply spray after dusk to lower 18 inches of cane (no spray on flowers to conserve pollinators) during RNCB adult emergence in May to kill adults and larvae during hatch (currently, no insecticide labeled). 	<ul style="list-style-type: none"> Tarnished Plant Bugs (TPB) Red Necked Cane Borer (RNCB) Flower Thrips (T) Strawberry Clipper (SC) Cane and Leaf Rust (R) Orange Rust (OR) Yellow Rust (YR) Botrytis Gray Mold (B) Rosette (Double Blossom) (DB) Anthracoze (A) Powdery Mildew (PM) Spur Blight (SpB) 	<ul style="list-style-type: none"> (T), Malathion 57EC (R), (OR), (YR), (B), (DB), (A), (PM), (SpB), Same as prebloom and bloom. (RNCB), Pyrellin
Preharvest		<ul style="list-style-type: none"> Insect control of stink bugs and sap beetles. Continue disease management. Irrigate if necessary. Mow or cultivate middles. 	<ul style="list-style-type: none"> Sap Beetle (SapB) Stink Bug (SB) Mites (M) Cane and Leaf Rust (R) Orange Rust (OR) Yellow Rust (YR) Botrytis Gray Mold (B) Rosette (Double Blossom) (DB) Anthracoze (A) Powdery Mildew (PM) 	<ul style="list-style-type: none"> (SapB), Bait Buckets (M), Capture 2EC, Savey 50DF (SB), Aza-Direct, PyGanic EC 1.4 (R), (OR), (YR), (B), (DB), (A), (PM), Same as petal fall.

BLACKBERRIES – Commercial Growers (continued)

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Commercial
Harvest	May-early July	<ul style="list-style-type: none"> • Continue disease management. • Irrigate if necessary. • Mow or cultivate middles. • From 1 June to 15 August in areas north of Ft. Smith, watch for first signs of Japanese Beetle flight and leaf feeding. At first feeding, spray upper third of canopy only to kill adults. Use Surround (kaolin particle film). It will make plants appear white and is hard to get off fruit, but significantly reduces foliar and fruit feeding by Japanese Beetle. • From 1 to last July, watch for Green June Beetles attacking berries. 	<ul style="list-style-type: none"> • Cane and Leaf Rust (R) • Orange Rust (OR) • Yellow Rust (YR) • Botrytis Gray Mold (B) • Rosette (Double Blossom) (DB) • Anthracnose (A) • Powdery Mildew (PM) • Cane Blight (CB) • Spur Blight (SpB) • Japanese Beetle (JB) • Green June Beetle (GJB) 	<ul style="list-style-type: none"> • (R), (OR), (YR), (B), (DB), (A), (PM), (CB), (SpB), Same as preharvest. • (JB), (GJB), Sevin 80WSP, Malathion 57 • (JB), Surround (25-50 lb/A). Reapply if rain washes it off.
Postharvest	August-September	<ul style="list-style-type: none"> • Continue disease management. • Irrigate if necessary. • Mow or cultivate middles. • Build trellis if used. 	<ul style="list-style-type: none"> • Leaf Spot (LS) • Orange Cane Blotch (OCB) 	<ul style="list-style-type: none"> • (LS), Drexel Captan 50W, Cabrio EG • (OCB), Copper-based products
	October-December	<ul style="list-style-type: none"> • Prune out second-year canes and weak or diseased one-year canes. • In late October, check for brown RCB eggs on underside of terminal leaves. If present, apply insecticide to base of each cane and soil around plant to control RCB larvae overwintering just under bark at base of cane. • Equipment maintenance. • Winterize irrigation equipment. • Take soil sample for nematode screen. 	<ul style="list-style-type: none"> • Raspberry Crown Borer (RCB) 	<ul style="list-style-type: none"> • (RCB), Capture 2E applied in 50 gal solution to base of canes in late October to early November to control RCB.

BLACKBERRIES – Commercial Growers – Weed Control

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
BLACKBERRIES – Preemergence				
simazine @ 2 to 4 lb/A	Annual broadleaf and grass weeds.	Princep 4L 2.2 to 4.4 lb/A of 90 WDG. 2 to 4 qt/A of 4L	In spring before bud break and in fall after harvest.	Do not apply more than 1 lb/ac/ai simazine on newly planted blackberries and raspberries.
dichlobenil @ 4 to 6 lb/A	Annuals and many perennials.	Casoron 4G 100 to 150 lb/A	In early winter and not later than mid-February.	Low rate only for blackberries and raspberries. Apply only to plants established one year or more.
terbacil @ 0.4 to 1.6 lb/A	Some perennials.	Sinbar 80W 0.5 to 2 lb/A	In spring or after harvest in fall.	Apply only to plants established one year or more. Do not use in sandy soils with less than 3% organic matter.
paraquat @ 0.25 to 0.5 lb/A	Contact kill of green foliage.	Gramoxone Inteon 1 to 2 pt/A	Before new canes emerge.	Apply as a directed spray in 50 to 200 gal spray mix to weeds before new canes emerge. Avoid paraquat contact with new canes, as injury will occur. Direct spray with low pressure to produce a coarse spray. Add a nonionic surfactant at a rate of 16 to 32 oz/100 gal of spray mix, or 1 gal approved crop oil concentrate per 100 gal spray mix.
glyphosate @ 1 to 5 lb/A	Most annual broadleaf and grass weeds and most perennial weeds.	Glyphosate (4 lb/gal) 1 to 5 qt/A	Apply as preplant or directed spray.	DO NOT SPRAY GREEN CANES, BARK OR FOLIAGE. Apply preplant or as a directed spray to base of established plants. Do not apply within 14 days of harvest. Wiper applications may also be used. See label for specific rates.
oryzalin @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	Surflan 4 AS 2 to 4 qt/A	Do not apply while fruit is present.	Do not apply when fruit is present. This treatment may be used on first-year plants.
norflurazon @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds and some seedling perennials.	Solicam 80DF 2.5 to 5 lb/A	Early spring while plants are dormant.	Apply as a directed spray from fall to early spring when the plants are dormant and before weeds emerge. Make only one application per year. May be used on newly planted crops. Application of SOLICAM may result in temporary bleaching or chlorosis of the leaves from which the plant will recover.

BLACKBERRIES – Commercial Growers – Weed Control (continued)

Crop, Situation and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
BLACKBERRIES – Postemergence				
napropamide @ 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	Devrinol 50DF 8 lb/A	Early spring or after harvest.	Apply to a weed-free surface or tank mix with an appropriate postemergence herbicide. May be applied to newly planted and established crops. Must be incorporated by overhead irrigation or rainfall with 24 hours for maximum results.
dichlobenil @ 4 to 6 lb/A	Most annuals, fescue, dandelions, dock and other herbaceous perennials.	Casoron 4G 100 to 150 lb/A	Apply granules in late winter to early spring.	Shallow incorporation may improve weed control. Do not apply within 4 weeks after transplanting. Residual activity is short. Do not apply more than 4 lbs to blackberries or raspberries. Do not apply during new shoot emergence.
diuron @ 1.2 to 1.6 lb/A	Annual broadleaf and grass weeds.	Karmex 80DF 1.5 to 2.0 lb/A	Preemergence or early postemergence.	Use only in fields that have been established for one year. Apply as a band treatment at base of the bushes. Add surfactant for improved control. Use caution on sandy, gravelly soils with low organic matter.
sethoxydim @ 0.3 to 0.5 lb/A	Annual and perennial grasses.	Poast 1.5EC 1.5 to 2.5 pt/A	Postemergence to grasses.	Check label for specific rates and timings. Use a crop oil at a rate of 1 qt per acre. May be used on bearing blueberries or raspberries but not within 45 days of harvest.
clethodim @ 0.09 to 0.25 lb/A	Annual and perennial grasses.	Select 2EC 6 to 16 oz/A	Postemergence to grasses.	Use on nonbearing crop only. Do not apply within one year of harvest. Effective for annual bluegrass control.
fluazifop @ 0.25 to 0.38 lb/A	Annual and perennial grasses.	Fusilade DX 2EC 16 to 24 oz/A	Postemergence to grasses.	NONBEARING ONLY. Check label for specific rates and timings. Do not apply within one year of the first harvest. Use of a crop oil or surfactant will be necessary.

GRAPES – Homeowners

See also Weed Control recommendations in Home Fruit Weed Control section.

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Homeowners
Dormant	November-February February-March	<ul style="list-style-type: none"> Take soil samples. Prune to reduce overwintering inoculum for pests. Set out new plants. Spray lime sulfur. 	<ul style="list-style-type: none"> Stem Canker (SC) Fruit Rot (FR) Leaf Spot (LS) 	<ul style="list-style-type: none"> (SC), (FR), (LS), Lime Sulfur
Bud Swell - Bud Break	March March-April	<ul style="list-style-type: none"> Apply preemergent herbicides. Fertilize. Check 100 buds on top of wire in each of several vineyard locations for damage by cutworms or grape flea beetle (historically the same sites year after year). Spray insecticide if there are more than 2% of buds damaged. Repeat as needed. Apply 2% superior oil to infested vines to control grape scale. 	<ul style="list-style-type: none"> Grape Flea Beetle (GFB) Climbing Cutworm (CC) Grape Scale (GS) 	<ul style="list-style-type: none"> (GFB), (CC), (GS), Sevin, Superior Oil, Bonide Rotenone-Pyrethrins, Safer Insecticidal Soap (CC), Bonide Dipel Dust, Thuricide
3- to 6-Inch Shoot Growth		<ul style="list-style-type: none"> Start disease management program. Irrigate if necessary. 	<ul style="list-style-type: none"> Stem Canker (SC) Fruit Rot (FR) Leaf Spot (LS) Powdery Mildew (PM) 	<ul style="list-style-type: none"> (SC), (FR), (LS), (PM), High-Yield Captan 50W, Hi-Yield Bordeaux Mix, Hi-Yield Copper Fungicide, Monterey Liqui-Cop, Bonide Copper Liquid, Bonide Concentrated Fruit Tree Spray, Bonide Tomato and Vegetable 3 in 1
10- to 12-Inch Shoot Growth		<ul style="list-style-type: none"> Continue previously started disease management strategies. Train new plants. Irrigate if necessary. 	<ul style="list-style-type: none"> Stem Canker (SC) Fruit Rot (FR) Leaf Spot (LS) Powdery Mildew (PM) 	<ul style="list-style-type: none"> (SC), (FR), (LS), (PM), Same as for 3- to 6-inch shoot growth.
Immediate Prebloom		<ul style="list-style-type: none"> Continue disease management/insect control. Irrigate if necessary. 	<ul style="list-style-type: none"> Powdery Mildew (PM) Stem Canker (SC) Leaf Spot (LS) Rose Chafer (RC) Grape Scale (GS) Grape Flea Beetle (GFB) 	<ul style="list-style-type: none"> (SC), (PM), (LS), Same as for 10- to 12-inch shoot growth. (RC), (GS), (GFB), Sevin, Bonide Rotenone-Pyrethrins, Safer Insecticidal Soap

GRAPES – Homeowners (continued)

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Homeowners
Bloom	May	<ul style="list-style-type: none"> • Continue previously started disease management strategies. • Train new plants. • Irrigate if necessary. 	<ul style="list-style-type: none"> • Stem Canker (SC) • Fruit Rot (FR) • Leaf Spot (LS) • Powdery Mildew (PM) 	<ul style="list-style-type: none"> • (SC), (PM), (FR), (LS), Same as for 10- to 12-inch shoot growth.
Postbloom – or – Second Postbloom	May-June	<ul style="list-style-type: none"> • Continue disease management/insect control. • Irrigate if necessary. 	<ul style="list-style-type: none"> • Stem Canker (SC) • Fruit Rot (FR) • Leaf Spot (LS) • Powdery Mildew (PM) • Grape Berry Moth (GBM) • Leafhopper (LH) • Leafroller (LR) • Rose Chafer (RC) 	<ul style="list-style-type: none"> • (SC), (PM), (LS), (FR), Same as for 10- to 12-inch shoot growth. • (GBM), (LH), (LR), (RC), Sevin, Bonide Rotenone-Pyrethrins
Pea-Size Berries	June	<ul style="list-style-type: none"> • Comb vines. • Monitor for stink bugs feeding on berries, and grape berry moth tunneling in berries (purplish discolor of skin). • Continue disease management. • Train new plants. • Irrigate if necessary. 	<ul style="list-style-type: none"> • Stem Canker (SC) • Fruit Rot (FR) • Leaf Spot (LS) • Powdery Mildew (PM) • Grape Berry Moth (GBM) 	<ul style="list-style-type: none"> • (SC), (PM), (FR), (LS), Same as for postbloom. • (GBM), Sevin, Bonide Rotenone-Pyrethrins
	July	<ul style="list-style-type: none"> • Continue disease and insect management, if applicable. • Train new plants. • Irrigate if necessary. • Check berries or flowers for Japanese Beetle or Green June Beetle. • Use Surround (kaolin particle film). It will make the plant appear white and is hard to get off fruit, but significantly reduces foliar and fruit feeding by Japanese Beetle. 	<ul style="list-style-type: none"> • Stem Canker (SC) • Fruit Rot (FR) • Leaf Spot (LS) • Powdery Mildew (PM) • Leafhopper (LH) • Japanese Beetle (JB) • Green June Beetle (GJB) 	<ul style="list-style-type: none"> • (SC), (PM), (LS), (FR), (LH), Same as pea-size berries. • (JB), (GJB), Sevin 80S • (JB), Surround (25-50 lb/A). Reapply if rain washes it off.
Harvest	July-August	<ul style="list-style-type: none"> • Train new plants. • Irrigate if necessary. 		
	September-November			
	December-January	<ul style="list-style-type: none"> • Prune. • Build trellis. • Winterize equipment. 		

BLUEBERRIES – Homeowners

See also Weed Control recommendations in Home Fruit Weed Control section.

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Homeowners
Dormant	January-February	<ul style="list-style-type: none"> Prune to reduce overwintering inoculum or numbers for disease or pests listed here. Mulch. Start disease management. Take soil samples/fertilize. 	<ul style="list-style-type: none"> Bacterial Blight (BB) Mummyberry (MB) Stem Canker (SC) Scale (S) 	<ul style="list-style-type: none"> (MB), (SC), Lime Sulfur (BB) Bordeaux (S), Dormant Oil
Bud Swell - Bud Break	Mid-late March	<ul style="list-style-type: none"> Set out new plants. Start disease management program and check for damaged buds from cutworms. Irrigate if necessary. Fertilize. 	<ul style="list-style-type: none"> Mummyberry (MB) Stem Canker (SC) Stem Blight (SB) Climbing Cutworm (CC) Fruitworm (FW) 	<ul style="list-style-type: none"> (MB), (SC), (SB), Captan 50WP, Bonide Tomato and Vegetable 3 in 1 (CC), (FW), Sevin, Malathion, Bonide Dipel Dust
Bloom - Postbloom	Late April	<ul style="list-style-type: none"> Apply fungicides if needed. Insecticides (wait until after bloom to avoid killing bees). Second fertilization late April-early May. Place bee hives when 10% blossoms are open. Cultivate or mow middles. Irrigate as needed. 	<ul style="list-style-type: none"> Secondary Mummyberry Infection (MB) Fruit Rot (FR) Stem Canker (SC) Stem Blight (SB) Leaf Spot (LS) 	<ul style="list-style-type: none"> (MB), (SC), (SB), (FR), (LS), Captan 50WP
Fruit Development	May	<ul style="list-style-type: none"> Cultivate or mow middles. Irrigate as needed. Install bird netting. Apply fungicides if weather is conducive for disease. Fertilize. Submit leaf petiole/tissue for nutritional analysis. 	<ul style="list-style-type: none"> Leaf Spot (LS) Fruit Rot (FR) Fruitworm (FW) Japanese Beetle (JB) Green June Beetle (GJB) 	<ul style="list-style-type: none"> (LS), (FR), Same as postbloom. (FW), Same as budswell. (JB), (GJB), Malathion, Sevin
Harvest	Late May for Highbush June for Southern Highbush July for Rabbiteye	<ul style="list-style-type: none"> Harvest. Irrigate. Mow middles. Fertilize. June and July, check for Japanese Beetle and Green June Beetle feeding on leaves or fruit. Use Surround (kaolin particle film). It will make the plant appear white and is hard to get off fruit, but significantly reduces foliar and fruit feeding by Japanese Beetle. 	<ul style="list-style-type: none"> Leaf Spot (LS) Stem Canker (SC) Stem Blight (SB) Japanese Beetle (JB) Green June Beetle (GJB) 	<ul style="list-style-type: none"> (LS), (SC), (SB), Same as fruit development. (JB), (GJB), Same as fruit development. (JB), Surround (25-50 lb/A). Reapply if rain washes it off.
Postharvest	August-October	<ul style="list-style-type: none"> Cultivate to control weeds. Irrigate as needed. Remove bird netting. 	<ul style="list-style-type: none"> Stem Canker (SC) Stem Blight (SB) 	<ul style="list-style-type: none"> (SC), (SB), Captan
Dormant	September-December	<ul style="list-style-type: none"> Equipment maintenance. Mulch plants. 		

STRAWBERRIES – Homeowners

See also Weed Control recommendations in Home Fruit Weed Control section.

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Homeowners
Dormant	January	<ul style="list-style-type: none"> Take soil samples. 		
	February	<ul style="list-style-type: none"> Work up bed/fertilize. Order new plants. 		
Bud Break - Prebloom	March	<ul style="list-style-type: none"> Insect control. Set out new plants. Apply preemergent herbicides. Apply straw 2-3 inches deep. Start disease management program. Irrigate if necessary. 	<ul style="list-style-type: none"> Strawberry Clipper (SC) Tarnished Plant Bug (TPB) Spittlebug (S) Mites (M) Leaf Spot (LS) Powdery Mildew (PM) 	<ul style="list-style-type: none"> (SC), (TPB), Sevin, Bonide Rotenone-Pyrethrins, Safer Insecticidal Soap (S), Malathion, Sevin, Bonide Rotenone-Pyrethrins, Safer Insecticidal Soap (M), Kelthane, Safer Insecticidal Soap (LS), (PM), Bonide Captan Fruit and Ornamental, Bonide Tomato and Vegetable 3 in 1
Bloom	March-April	<ul style="list-style-type: none"> Frost protect new blooms on established plants with sprinklers when night temperatures get below freezing. Pinch blooms off new plants. Start disease management program. Irrigate if necessary. 	<ul style="list-style-type: none"> Botrytis Blossom Blight/Fruit Rot (BB/R) Leaf Spot (LS) Leather Rot (LR) 	<ul style="list-style-type: none"> (BB), (LS), Bonide Captan Fruit and Ornamental, Bonide Fruit Tree Spray, Bonide Tomato and Vegetable 3 in 1 (LR), Alette 50WG
Postbloom after petal fall		<ul style="list-style-type: none"> Insect control. Continue disease management. Irrigate if necessary. Weed control. 	<ul style="list-style-type: none"> Aphid (AP) Leafroller (FR) Spittlebug (S) Sowbug (SB) Mites (M) Lygus Bug (LB) Anthracnose (A) Botrytis Blossom Blight/Fruit Rot (BB/R) Leaf Spot (LS) Leather Rot (LR) 	<ul style="list-style-type: none"> (AP), (FR), (S), (SB), (LB), Same as prebloom. (A), (BB/R), (LS), (LR), Same as prebloom.
Harvest	May-early June	<ul style="list-style-type: none"> Irrigate if necessary. Weed control. 	<ul style="list-style-type: none"> Botrytis (B) 	<ul style="list-style-type: none"> (B), Same as postbloom.
Postharvest	June	<ul style="list-style-type: none"> Remove runners and plants that have grown outside a 12-inch band in the row. Apply top-dress nitrogen. Irrigate if necessary. Weed control. 	<ul style="list-style-type: none"> Leaf Spot (LS) Leather Rot (LR) 	<ul style="list-style-type: none"> (LS), (LR), Same as harvest.
	July-September	<ul style="list-style-type: none"> Irrigate if necessary. Weed control. 		
Dormant	November-December	<ul style="list-style-type: none"> Maintain equipment. 		

BLACKBERRIES – Homeowners

See also Weed Control recommendations in Home Fruit Weed Control section.

Growth Stage	Date	IPM Practices Implemented	Pests Present	Control – Homeowners
Dormant	January-February	<ul style="list-style-type: none"> Prune to reduce overwintering inoculum for diseases, and prune galled canes for RNCB. Spray lime/sulfur for listed pests. Plant new plants. Determine weed management programs. Fertilize according to soil test. 	<ul style="list-style-type: none"> Cane and Leaf Rust (C&LR) Leaf/Cane Spot (L/CS) 	<ul style="list-style-type: none"> (C&LR), (L/CS), Lime Sulfur
Bud Swell - Bud Break	March	<ul style="list-style-type: none"> Apply preemergent herbicides. Disease management program. 	<ul style="list-style-type: none"> Leaf/Cane Spot (L/CS) 	<ul style="list-style-type: none"> (L/CS), Captan, Bonide Tomato and Vegetable 3 in 1
Bloom	April	<ul style="list-style-type: none"> Disease management program. Insect management (avoid spraying insecticides during bloom to avoid killing bees). Mow middles. 	<ul style="list-style-type: none"> Leaf/Cane Spot (L/CS) Strawberry Clipper (SC) Red Necked Cane Borer (RNCB) Thrips (T) 	<ul style="list-style-type: none"> (L/CS), Captan, Bonide Tomato and Vegetable 3 in 1 (SC), Sevin (RNCB), Pyrellin (T), Malathion
Fruit set	Late April	<ul style="list-style-type: none"> Irrigate. Weed management. Mow middles. Fertilize. 	<ul style="list-style-type: none"> Stinkbug (SB) 	<ul style="list-style-type: none"> (SB), Aza-Direct, PyGanic EC 1.4
Harvest	May-mid-July	<ul style="list-style-type: none"> Irrigate. Mow middles. Check berries or flowers for feeding by Japanese Beetle or Green June Beetle. Use Surround (kaolin particle film). It will make the plant appear white and is hard to get off fruit, but significantly reduces foliar and fruit feeding by Japanese Beetle. 	<ul style="list-style-type: none"> Stinkbug (SB) Japanese Beetle (JB) Green June Beetle (GJB) 	<ul style="list-style-type: none"> (SB), Same as fruit set. (JB), (GJB), Sevin 80S (JB), Surround (25-50 lb/A). Reapply if rain washes it off.
Postharvest	Late June-August	<ul style="list-style-type: none"> Prune laterals on this season's primocanes to 4 feet. 		
	September-December	<ul style="list-style-type: none"> Prune out second-year canes and weak or diseased one-year canes. Equipment maintenance. Winterize irrigation equipment. Build trellis if used. In early October, check for Raspberry Crown Borer eggs on underside of terminal leaves. If present, purchase and apply nematodes in mid-October as a soil drench around canes, and keep soil moist for 2 weeks to allow nematodes to find, enter and kill (RCB) larvae on cane base (may kill more than 60%). 	<ul style="list-style-type: none"> Raspberry Crown Borer (RCB) 	<ul style="list-style-type: none"> (RCB), Purchase pathogenic nematodes, <i>Steinernema carpocapsae</i>, from biological control supply house.

HOME FRUIT – *Weed Control*

Many home gardeners have fruit plantings that are too large to hand weed and too small to use heavy equipment in. Hand pulling and mulching can be used to control weeds in many cases. In addition, herbicides can be used to supplement the above cultural practices to make controlling weeds easier and faster. For small areas, several chemical manufacturers (e.g., Ortho, Scott, Southern States, Security and others) sell a variety of herbicides in small quantities that are ideal for this job. These chemicals are formulated to make them more convenient and easier for the homeowner to use. For larger areas, several products can be purchased over the counter at farm chemical retail stores. For all-purpose weed knockdown, use glyphosate. These knockdown materials (postemergence) will kill many emerged weeds already growing. Remember to keep these materials off the crop plants to avoid damage.

To control germinating seedlings, several preemergence herbicides are available. General use recommendations are given below, but consult the label on each product for specific directions before application.

Strawberries

Weed control is difficult since newly set strawberries are sensitive to many of the herbicides. Dacthal is the only herbicide which can be applied to clean soil after planting strawberries. Use 4 ounces by weight of Dacthal 75% wettable powder in one gallon of water to spray 1,000 square feet. Up to three applications can be made per year with at least one-month intervals. Dacthal will be effective for 4 to 8 weeks. Devrinol can also be used on established plants. See the label for directions. Apply one-half inch of irrigation immediately after application of Devrinol for best results. Poast can be used for control of emerged annual and perennial grasses at any time except during harvest and during the period up to 30 days before harvest begins.

Small Fruits

For small fruit (raspberries, blackberries, blueberries and grapes) and orchard fruit (apples, pears, peaches, plums and nuts), a weed-free strip around the base of each plant is desirable. Mowing a grass or natural weed strip between crop plants and applying a preemergence herbicide and/or a 3-inch mulch under the crop plants is the ideal method of managing weeds in your home fruit planting. Following are general suggestions for using weed control chemicals in fruit plantings. Read the information on the container for more detailed directions.

Preemergence Herbicides

These materials are used to prevent weed germination. They must be applied as a directed spray to the base of the crop plant. Contact of the spray with the lower stems or leaves of these plants, however, will not damage them. Mixing these herbicides into the soil surface is often suggested to increase effectiveness. Watering with an inch or more of water can often be used as a substitute for incorporation around established plants.

- Casoron (dichlobenil) is available as a 2% or 4% granule. It can be used on most woody plants 30 days after transplanting. This material is excellent for control of cool-season grasses and weeds. It is best applied during the winter months.

(continued)

HOME FRUIT – *Weed Control (cont.)*

- Devrinol 50% dry flowable granules can be used on many newly planted and established fruit crops. Put 1 ounce by weight in 1 gallon water (or more) and spray uniformly over 1,000 square feet. It is best applied either in early spring or after harvest to weed-free soil.
- Princep (simazine) is available as a wettable (90 WP) powder and a liquid (4L) and can be used on many established woody plants. Do not apply to plants less than 3 years old. It is best applied either in early spring or after harvest to weed-free soil.
- Surflan is available as a liquid (4AS). Apply 2 to 4 quarts of the 4AS evenly over one acre in at least 20 gallons water or put 1 1/2 to 3 tablespoons of 4AS in 1 gallon water and spray evenly over 1,000 square feet. Surflan can be applied safely after transplanting on many woody-stemmed crops. It is best applied either in early spring or after harvest to weed-free soil.

Postemergence Herbicides

These materials are used to eliminate existing weeds. Remember to keep these materials off crop plants or damage will result.

- Roundup or Ortho Kleenup – This material is most effective on small annuals and perennials in the middle of the summer. Roundup is a slow-acting material which will completely kill the plants, including the roots of perennials. It will take 10 to 14 days for the plants to die. Since the concentration of active ingredient in these products varies, follow the mixing directions on the container. Do not use these materials during bloom or harvest periods.

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