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Pesticides for Ornamentals

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PESTICIDES

for ornamentals

Commercial Recommendations for 1978

for nurseries, garden centers, parks, roadsides

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IMPORTANT NOTICE

The Federal Environmental Pesticide Control Act (FEPCA) now in force states that the use of **any pesticide inconsistent with the instructions on the container label is illegal**, except when special regulations allow its use at a lower rate than the label recommendations. Hence, persons using a pesticide should familiarize themselves with the label information, as they assume full responsibility for its proper use.

1. Disease Control for Trees and Shrubs

Prepared By Franklin Laemmle

Host	Disease	Material per 100 gallon water	Comments
Ash, Maple, Oak	Anthrachnose	Dodine 1 1/2 lb; Captan. 2 lb, Zineb 2 lb	Apply at bud break with a second and third application made at 10-day intervals if average temperatures are below 55°F. Recommended for young trees only.
Crab apple Hawthorn Mountain ash	Scab, other leafspots	Mancozeb, 1 1/2 lb (80%); Captan, 2 lb; Dodine, 1/2 lb; Benomyl, 1/2 lb; Folpet (75%), 1 lb; maneb, 1 1/2 lb	2-4 sprays applied at green tip and at 10-14 days through July.
Cotoneaster, Japanese quince, Mountain ash, Hawthorn, Spirea, Flowering crab, or Pear	Fireblight	Streptomycin (50-100 ppm); Bordeaux mixture, 2-6-100	Apply first at pink bud and at 7-14 days until dry weather or shoot elongation stops. Prune out cankered limbs in winter only.
Dogwood	Anthrachnose	Benomyl, 1/2 lb; Mancozeb, 1 1/2 lb (80%)	As needed starting at bud break. Apply at 7- to 14-day intervals.
Douglas fir	Swiss Needlecast	Maneb. 2 1/2 lb; Mancozeb, 2 1/2 lb Benomyl, 1 lb	Begin about May 31 (3-4) to early August at 21-day intervals (thorough wetting of the tree is important).
Douglas fir	Rhabdocline Needlecast	Benomyl, 1 lb	Apply on same schedule as for swiss needlecast control.
Elm	Black Leaf spot	Dichlone, 1 lb; Zineb, 2 lb; Ferbam, 2 lb; Bordeaux, 4-4-100; Mancozeb, 2 lb	Apply 3 sprays beginning in mid-May at 14-21 day intervals. Destroy diseased leaves in Fall.
Elm	Dutch elm	Benomyl, 2 lb	Remove diseased trees. Apply in spring when trees approach full leaf. Injection or foliar spray may be used. Recommended for preventative use only.
		MBC-P (Correx), 1 qt per 4 gals water	Inject 2 gals of solution per each 4" of tree diam. See package label for details.
		TB-H (Arbotect 20-S), 1-4 fl oz per 40-160 fl oz water, respectively	Inject 40-160 fl oz of solution per each 5 inches of tree diameter. See package label for details.
Flowering peach	Leaf curl	Bordeaux (4-3-100); Lime sulfur (liquid) 8 gal; Ferbam, 1 1/2 lb	Apply while trees are dormant, usually in spring or late winter.
Garden beds	Root rots, nematodes, insects	Ethylene dibromide (capsule), 15 in apart and 5 in deep	10 days before planting at soil temperature 50°F or above. May also be applied in fall to prepare soil for early spring planting.
Hawthorn	Leaf blight	Cycloheximide 5 (380 mg) tablets; Captan, 2 lb; Benomyl, 1/2 lb; Mancozeb, 2 lb	Apply at bud break and thereafter as needed to maintain control.
Hawthorne, Crab apple, etc.	Rusts	Ferbam 2 lbs (75%); Zineb 1 1/2-2 lbs (75%) Mancozeb 1 1/2-2 lbs	3-4 sprays starting when flower buds open or when orange rust masses appear on juniper.
Honeysuckle	Leaf blight	Mancozeb, 1 1/2 lb (80%)	Apply, starting in May, at 7-10 day intervals as needed to maintain control.
Horse chestnut, Buckeye	Leaf blotch	Zineb, 1 1/2 lb (75%); Mancozeb, 1 1/2 lb	Apply 3 times, at bud swelling, bud break, and 10 days later.
Juniper	Twig blight	Benomyl, 1/2-1 lb (apply with spreader-sticker)	Apply 2-3 sprays. Start when new growth appears. Prune out severely diseased tissues.

1. Disease Control for Trees and Shrubs (cont'd)

Host	Disease	Material per 100 gallon water	Comments
Juniper	Rusts (spring)	Cycloheximide 50 (380 mg) tablets or 3 lb (0.0027%) or 2 T/gal; Zineb, 2 lb; Mancozeb, 2 lb	Apply as soon as orange rusts masses appear in spring to destroy spore masses. Prune out galls before spore discharge.
Juniper	Rust (fall)	Ferbam, 2 lb; Mancozeb, 2 lb	First application when apple, hawthorn, etc. rust spots mature. Repeat twice at 21-day intervals.
Maple, Willow	Tar spot	Zineb, 2 lb; Captan, 2 lb; Ferbam, 2 lb; Bordeaux, 8-8-100; or Mancozeb 2 lb	1-2 sprays at 14 days, at and following bud break. Destroy diseased leaves in fall.
Oak	Leaf blister	Bordeaux (4-3-100); Lime sulfur (liquid) 8 gal; Ferbam, 1½ lb	Apply while trees are dormant, usually in spring or late winter.
Ornamentals (general)	Powdery mildew	Benomyl, ½ lb; Dinocap, ½ lb, Wettable sulfur, 2 lb; Acti-dione PM, 6¼ lb	Apply at first sign of disease and thereafter as needed.
Pine	Needlecast	Maneb, 2½ lb; Chlorothalonil, 2½ lb (75%), or 3½ pt (54%)	2 sprays if light; 3 sprays if heavy infection. Apply Aug 1 and Sept 1; or July 25, Aug 15, Sept 10.
Pine, Spruce Douglas fir	Tip blight	Fixed copper (50%), 4 lb; Bordeaux mixture 8-8-100	Apply first spray at bud swell stage and second 10 days later.
Pine and fir species	Seed decay Seed blight	TBZ slurry, 0.5 fl oz in 1.33 qt water; TBZ 3 lb/acre	Allow seeds and material to dry before planting.
Spruce	Needlecast	Bordeaux 8-8-100	First application June 5-10 and again 21 days later.
Sycamore	Anthrachnose	Dodine, 1½ lb; Zineb, 2 lb; Mancozeb, 2 lb; Bordeaux, 4-4-100*	Apply 1 to 3 sprays at bud break and at 10-day intervals if average temperature remains below 55°F. Recommended for young trees only.
Walnut	Leafspot	Zineb, 2 lb; Benomyl, ½ lb; Maneb, 2 lb; Dodine, ½ lb; Mancozeb, 2 lb	Make 3 applications starting at bud break, then 10 days later and again when leaves are fully developed.
All ornamentals	Fungus wound rots	Thiram 1% paint as wound dressing. Bordeaux mixture plus linseed oil (homemade)	Apply as a thick paint.

*4-4-100 or 8-8-100 indicates lb of copper sulfate-lb of lime-gal of water.

CONVERSION TABLE FOR SMALL GALLONAGE AMOUNTS FOR FUNGICIDES LISTED ABOVE

CHEMICAL	Material per 100 gal	Material per gal equivalent	CHEMICAL	Material per 100 gal	Material per gal equivalent
Benomyl 50%	1 lb.	1 Tbsp.	Dodine 65%	1 lb.	2 tsp.
Bordeaux	1-1-100	⅓ Tbsp.- 1 Tbsp.-1 gal.	Ferbam 75%	1 lb.	1 ¼ Tbsp.
Captan 50%	1 lb.	1 Tbsp.	Folpet 50%	2 lbs.	2 Tbsp.
Chlorothalonil 54%	3½ pts.	1 Tbsp.	Maneb 80%	1 lb.	½ Tbsp.
Copper sulfate 100%	1 lb.	1 tsp.	Streptomycin	½ lbs./100 = 100 ppm	
Cycloheximide	3 lb. 2 oz. (0.027%) = 1ppm	2 Tbsp.	Sulfur (wetttable)	1 lb.	½ Tbsp.
Dichlone 50%	1 lb.	2 tsp.	Thiram 95%	1 lb.	¾ Tbsp.
Dinocap 48% E.C.	4 fl. oz.	2 tsp./3 gal.	Zinc-ion maneb 80%-(Mancozeb)	2 lbs.	1 ½ Tbsp.
			Zineb 75%	2 lbs.	1 ½ Tbsp.

2. Disease Control for Turfgrasses

Prepared By J. M. Vargas, Jr.

Disease	Host	Cultural Control	Chemical Control
Brown patch (<i>Rhizoctonia solani</i>)	Bentgrass, bluegrass (July-Aug)	Avoid high nitrogen fertilizers. Increase air circulation.	Daconil 2787, Dyrene, Acti-dione Thiram, Tersan LSR, Fore, Proturf Fung. III.
Dollar Spot (<i>Sclerotinia homeocarpa</i>)	Bentgrass, bluegrass, fescue (May-Nov)	Increase nitrogen. Remove dew (Guttation).	Daconil 2787, Proturf DSB, Tersan 1991, Dyrene, Acti-dione Thiram, Cleary's 3336, Fungo, Spot-Kleen, Bromosan.
Fairy ring (Many <i>Basidiomycetes</i>)	All turf areas (April-Nov)	Removal of infested sod and soil and replacing with clean soil and reseed or sod.	Soil Fumigants: Methyl bromide, Chloropicrin, Vapam, Vorlex.
<i>Fusarium</i> blight, Nematodes (<i>Tylenchorhynchus dubius</i> + <i>Cricoides</i> spp) Interacting with <i>Fusarium roseum</i> and <i>F. tricinctum</i>	All grasses, most commonly found on Kentucky bluegrass (May-Oct)	Light frequent waterings during periods. Fungicides MUST be drenched to be effective. Avoid heavy nitrogen fertility in the Spring.	Tersan 1991, Spot Kleen, Fungo, Cleary's 3336.
<i>Fusarium</i> patch (Pink snow mold) <i>Fusarium nivale</i>	Bentgrass, bluegrass, fescue (Sept-May)	Avoid fall nitrogen fertilization that leads to lush growth.	Tersan 1991, Fore, Fungo, Cleary's 3336, Spot Kleen.
Melting Out, Fading Out, Leaf Spot (<i>Helminthosporium</i> spp)	Bentgrass, bluegrass, fescue (April-Nov)	Remove clippings. Raise cutting height. Resistant Kentucky bluegrass cultivars: Baron, majestic, Adelphi, Touchdown, parade, Cheri.	Fore, Daconil 2787, Acti-dione, Thiram, Dyrene, Tersan LSR, Proturf F + F II.
Powdery mildew (<i>Erysiphe graminis</i>)	Kentucky bluegrass, (shaded areas) (July-Nov)	Reduce shade. Resistant cultivars. Nuggett, Warren's A-34.	Tersan 1991.
Pythium blight (<i>Pythium</i> spp.)	Bentgrass, bluegrass, ryegrass (July-Aug)	Improve soil drainage. Increase air circulation.	Tersan SP, Koban, Proturf Fung. II.
Red thread (<i>Corticium fuciforme</i>)	All grasses but mostly fescues. Manhattan ryegrass (Sept-Nov)	Increased nitrogen.	Daconil 2787, Fungo, Cleary's 3336.
Stripe smut (<i>Ustilago striiformis</i>)	Bluegrass, Kentucky bluegrass (mostly Merion and Windsor) (April-Nov)	Blends of resistant cultivars. Fungicide MUST be drenched and applied while turf is dormant. <i>Helminthosporium</i> control is also needed.	Tersan 1991, Spot Kleen. Fungo, Cleary's 3336.
<i>Typhula</i> blight (Gray Snow mold) (<i>Typhula itoana</i>)	Bentgrass, bluegrass (Under snow)	Avoid fall nitrogen fertilization that leads to lush growth.	Calo Clor, Calo Gran, Tersan SP, Terraclor, Proturf F & F II

*Unless specified, Bluegrass refers to both annual bluegrass (*Poa annua*) and Kentucky bluegrass (*P. pratensis*).

Note: See small gallonage conversion table on page 2.

3. Woody Ornamental Insect Control

Prepared by M. Keith Kennedy

Host	Pest	Material/100 Gal.	Remarks
Arbovitae	Arbovitae Leafminer	Spectracide 0.5 Aerosol	Apply in mid-May.
	Bagworms	Diazinon 4/lbs/gal EC, 1 pt; Sevin 50% WP, 2 lb	Treat when bags are small in mid to late June.
	Spider Mites	Kelthane 35% WP, 1½ lb; Mores-tan 25% WP, ½-1 lb	Treat when mites appear in May and repeat as needed.
Ash	Aphids	Malathion 57% EL, 1½ pts; Meta-systox-R 25% SC, 1-1½; Dursban 2 lbs/gal EC, 1 pt	Treat when aphids first appear and repeat as necessary.
	Ashborer	Dursban 2 lbs/gal EC, 2 qts; Lindane 20% EC, 3 qts	Trunk and large branches should be treated in late August-early September to control egg laying adults or newly hatched larvae.
	Ash Flower Gall Mite	Sevin 80% S, 1¼ lb; Sevimol 4 lbs/gal EC, 1 qt	Apply when blossoms first begin to form or use dormant oil before bud break.
	Oystershell Scale	Ethion + 70 Sec Oil, 2-3 G; Guthion 50% WP, 1 lb; Cythion 57% EC, 1 pt	Apply oil as a dormant spray; use others as a crawler spray, May 25-30.
	Plant bugs	Sevin 80% S, 1¼ lbs; Sevin 50% WP, 2 lbs	Apply when nymphs are small in early spring and repeat as needed.
Birch	Aphids	Cythion 57% EL, 1½ pt; Meta-systox-R 25% SC, 1.5 pt; Diazinon 50% WP, 1 lb; Temik 10G, 1-2 oz/one inch diameter of trunk at soil line	Apply during May or late in summer when aphid population becomes excessive.
	Birch leafminer	Imidan 50% WP, 1½ lb; Di-Syston 15G, 2.5 oz per inch of trunk diameter; Metasystox-R 25% SC, 1½ pt; Temik 10G, 1-2 oz/ per inch of trunk diameter at soil line; Cygon 2 lbs/gal EC, 2 qts	Any of these materials can be used in early to mid-May when adults are present or mines are tiny. Use MS-R after mines enlarge.
	Bronze Birch Borer	Lindane 20% EC, 2 pts	Apply to all bark surfaces especially in upper-most part of tree in late May-early June to control egg-laying adults and newly hatched larvae.
Cotoneaster	Lacebugs	Cythion 57% EL, 1 pt; Sevin 50% WP, 1 lb; Guthion 2 lbs/gal EC, 1½ pts	Thorough coverage on leaf undersides is essential. Control when population is small, and repeat as needed.
	Pear Slug	Sevin 80% S, 1¼ lb; Sevin 50% WP, 2 lb	Spray when larvae are small. Several applications throughout the season may be necessary.
	Spider Mites	Kelthane 30% WP, 1½ lb; Mores-tan 25% WP, ½-lb	Treat when mites are first seen and repeat in 10 days.
Douglas Fir	Cooley Spruce Gall Aphid	Diazinon 50% WP, 1 lb; Diazinon 4 lbs/gal EC, 1 pt; Sevimol 4 lbs/gal EC, 1 qt; Dursban 2 lbs/gal EC, 1 pt	Apply sprays before bud break in spring or in late September to early October. No galls are produced in this host.

Note—see abbreviations on page 9.

3. Woody Ornamental Insect Control (cont'd)

Host	Pest	Material/100 Gal.	Remarks
Elm	Bark Beetle	Methoxychlor 25% EC, 1-2 qt	See your Ag Agent for details.
	Elm Leafbeetle	Sevin 80% S, 1¼ lbs; Sevimol 4 lbs/gal EC, 1 qt; Methoxychlor 25% EC, 1-2 qt	Treat when larvae first appear, usually when leaves are ¾'s expanded. Repeat in July.
	European Elm Scale	Ethion + 70 Sec Oil, 2-3 G; Sevin 80% S, 1¼ lbs	Apply as a dormant treatment in spring or fall. Use others as crawler spray in late June-early July.
Euonymus	Euonymus Scale	Ethion + 70 Sec Oil, 2-3 G; Cythion 57% EL, 1½ pt; Guthion 50% WP, 1 lb; Cygon 2 lbs/gal EC, 2 qts	Use Ethion-oil as dormant spray. Use others against crawlers in late May-early June, mid-late July. Two applications at 10 day intervals may be needed.
Flowering Fruit Trees (Ornamentals)	Aphids	Cythion 57% EL, 1½ pt; Diazinon 4 lbs/gal EC, 1 pt; Metasystox-R 25% SC, 1½ pt	Treat when aphids are present and repeat as needed.
	Borers (general)	Lindane 20% EC, 3 qts; Thiodan 50% WP, 1½ lbs; Dursban 2 lbs/gal EC, 2 qt	Trunk should be treated in late May-early June. May be repeated at 3-week intervals for 2-3 applications.
	Peach tree borer	Thiodan 50% WP, 1½ lbs	Spray should thoroughly cover tree trunk and soil at base of tree. Apply mid July followed by 2 applications spaced 20-25 days apart.
	Pear Slug	Sevin 50% WP, 2 lbs	Spray when larvae are small and repeat as needed.
	Scales	70 Sec Oil, 2 gal	Use dormant oil in spring or fall.
	Eastern Tent Caterpillar	Dipel WP, ½-1 lb	Prune web or spray when larvae are small, late April-early May.
	Leafrollers	Sevin 50% WP, 2 lb	Treat as needed.
Hawthorn	Lace bugs	Cythion 57% EL, 1 pt; Sevin 50% WP, 1 lb; Di-Syston 15G, 2.5 oz/ inch of trunk diameter	Treat when nymphs are small. Coverage of leaf undersides is essential for control.
	Leafminers	Diazinon 4 lbs/gal EC, 1 pt	Treat when adults are active—June.
	Pear Slug	Sevin 50% WP, 2 lbs	Treat when larvae are small.
	Eastern Tent Caterpillar	Dipel WP, ½-1 lb	Prune out web or spray when larvae are small, late April-early May.
Holly	Leafminer	Diazinon 50% WP, 1 lb; Dylox 80% SP, 20-30 oz; Temik 10G, 1-2 oz/one inch diameter of trunk	Treat when adults are active, mid-May.
Honey Locust	Honey Locust Spider Mite	Kelthane 35% WP, 1½ lb; Metasystox-R 25% SC, 1½ pt; Guthion 50% WP, 1 lb; Di-Syston 15G, 2.5 oz/one inch of trunk diameter	Treat when mite build-up is first noticed. Repeat at 10-14 day intervals as needed.
	Honey Locust Plant Bug	Sevin 80% S, 1¼ lb; Sevin 50% WP, 2 lb; Sevimol 4 lbs/gal EC, 1 qt	Spray when bugs are numerous on foliage in early summer.
	Honey Locust Leafhopper	Dursban 2 lbs/gal EC, 1 qt; Guthion 50% WP, 2-3 lbs; Metasystox-R 25% SC, 1½ pt; Sevin 80% S, 1¼ lb	Apply when leafhoppers are numerous especially in May and June.

Note—see abbreviations on page 9.

3. Woody Ornamental Insect Control (cont'd)

Host	Pest	Material/100 Gal.	Remarks
Juniper	Bagworms	Cygon 2 lbs/gal EC 1 qt; Diazinon 50% WP, 1 lb; Sevin 80% S, 1¼ lb; Trithion 4 lbs/gal EC, 2 pt; Dipel WP, 1 lb	Hand pick or spray when bags are small, early to mid June.
	Juniper Scale	Ethion + 70 Sec Oil, 2 gal; Baytex 4 lbs/gal EC, 1 qt	Oil or Ethion + oil as a dormant spray is best. Others can be used in May to mid June at 10-day intervals.
	Juniper Webworm	Diazinon 50% WP, 1 lb; Sevimol 4 lbs/gal EC, 1 qt; Dylox 80% SP, 20-30 oz	Apply in late April-early May or in October.
	Spider Mites	Kelthane 35% WP, 1 lb; Moresstan 25% WP, 1 lb; Tedion 1 lb/gal EC, 1 qt; Trithion 4 lbs/gal, 2 pt; Metasystox-R 25% SC, 1½ pt	Treat when mites first begin to build up in early summer and repeat at 10-14 day intervals as necessary.
Lilac	Lilac Borer	Thiodan 50% WP, 1-2 lb; Lindane 20% EC, 3 pts; Dursban 2 lbs/gal EC, 4 qts	Treat trunk & stems thoroughly in late May and early June.
	Oystershell Scale	Ethion + 70 Sec Oil, 2-3 gal; Trithion 4 lbs/gal EC, 2 pt; Diazinon 4 lbs/gal EC, 1 pt	Oil or Ethion + oil may be used as dormant spray. Others should be used against crawlers in late May and a second treatment 2 weeks later.
Linden	Aphids	Same as Ash	See Remarks for Ash
	Cankerworms	Marlate 50% WP, 2-3 lbs; Sevin 80% S, 1¼ lbs; Dipel WP, ¼-½ lb	Apply sprays when larvae are small—early to mid May.
	Fall Webworm	Dipel WP, ¼-½ lb; Sevin 80% S, 1¼ lb	Prune web or treat when web is small.
Locust	Locust Borer	Lindane 20% EC, 3 qts	Trunks should be thoroughly sprayed in early September for egg-laying adults. When golden rod is in bloom.
Maple	Aphids	Same as Ash	See Remarks for Ash
	Borers	Lindane 20% EC, 3 qt	Spray trunk and lower branches in late May, June, and July.
	Cankerworms	Same as Linden	See Remarks for Linden
	Cottony Maple Scale	70 Sec Superior Oil 2-3 gal; Ethion + 70 Sec Oil, 2-3 gal; Sevimol 4 lbs/gal EC, 1 qt; Sevin 80% S, 1¼ lb	Use oils with caution on Maple. Use others for control of crawlers on leaf undersides in early July and repeat in 10-14 days. Crawler sprays as late as September should be effective.
	Maple Bladder Gall Mite	Sevimol 4 lbs/gal EC, 1½ qt	Apply when leaves are just expanding.
	Oystershell Scale	Same as Lilac	See Remarks for Lilac
Mountain Ash	Mountain Ash Sawfly	Sevin 50% WP, 2 lbs	Treat when larvae are small and repeat in 10 days if necessary.
Oak	Aphids	Same as Ash	See remarks under Ash
	Borers	Same as Maple	See remarks under Maple

Note—see abbreviations on page 9.

3. Woody Ornamental Insect Control (cont'd)

Host	Pest	Material/100 Gal.	Remarks
	Galls	No chemical registered	These do not harm the tree and control is not recommended.
	Golden Oak Scale	Ethion + 70 Sec Oil, 2-3 gal; Sevin 80% S, 1¼ lb	Use oil as a dormant treatment in spring or fall. Use other as a crawler spray in mid-late May and mid-June, mid-July, mid-August.
	Leafminers	Diazinon 4 lbs/gal EC, 1 pt; Dylox 80% SP, 20-30 oz; Dibrom 8 lbs/gal EC, 1 pt	Apply after leaves are beginning to expand to control egg-laying adults.
	Kermes Scale	Ethion + 70 Sec Oil, 2-3 gal; Diazinon 4 lbs/gal EC, 1 pt; Sevin 80% S, 1¼ lbs	Use dormant oil in spring or fall. Use others for crawlers in late May.
	Oak Lacebug	Methoxychlor 25% EC, 2 qts; Sevin 80% S, 1¼ lbs; Cythion 57% EL, 1 pt; Systox 2 lbs/gal EC, 1½-2 pts	Treat when nymphs are small. Complete coverage of leaf underside is essential.
	Spider Mites	Same as Juniper	See remarks for Juniper
	Sawfly	Sevin 80% S, 1¼ lbs	Apply foliar spray when larvae are small. Repeat as needed.
Pine	Aphids	Azodrin 3.2 lbs/gal EC, 1½ pt; Cygon 2 lbs/gal EC, 2 qt; Diazinon 50% WP, 1 lb; Trithion 4 lbs/gal EC, 1½-2 pts	A foliar spray in mid-May should prevent aphids from building up.
	Eriophyid Mites	Sevin 80% S, 1¼ lbs; Sevimol 4 lbs/gal EC, 1 qt	Apply in spring after candles have elongated but before needle growth starts.
	European Pine Shoot Moth	Cygon 2 lbs/gal EC, 2 qts; Diazinon 4 lbs/gal EC, 1 pt	Apply in mid-late April to control caterpillars moving from overwintering sites to new shoots. Foliar sprays in early July may control hatching larvae.
	European Pine Sawfly	Sevin 80% S, 1¼ lbs; Sevimol 4 lbs/gal EC, 1 qt	Treat when larvae first appear. Early-mid May.
	Pine Bark Aphids	Cygon 2 lbs/gal EC, 2 qts; Diazinon 4 lbs/gal EC, 1 pt; Sevin 4 lbs/gal F, 1 qt; Trithion 4 lbs/gal EC, 1½-2 qt	Treat when aphid build-up is first noticed, usually mid-late May.
	Pine Needle Scale	Ethion + 70 Sec Oil, 2-3 G; Diazinon 4 lbs/gal EC, 1 pt; Supracide 2 lbs/gal EC, 2 qts; Dursban 2 lbs/gal EC, 2 qts; Metasystox-R 25% SC, 2 pt	Use Ethion + oil as a dormant treatment. Use others against crawlers in late May (when lilacs are in bloom) and again in mid-late July.
	Spider Mites	Dibrom 8 lbs/gal EC, 1 pt; Ethion 25% WP, 1 lb; Morestan 25% WP, 1 lb; Kelthane 35% WP, 1 lb; Diazinon 4 lbs/gal EC, 1 pt; Cythion 57% EL, 1½ pt	Treat when mite activity is obvious and repeat every 10-14 days as needed.
	Spittlebugs	Dursban 2 lbs/gal EC, 1 pt; Dibrom 8 lbs/gal EC, 1 pt	Apply when spittle masses are evident.
	Thrips	Diazinon 4 lbs/gal EC, 1 pt; Sevin 80% S, 1¼ lb; Sevimol 4 lbs/gal EC, 1 qt	Treat when Thrips are first noticed.
	Zimmerman Pine Moth	Cygon 2 lbs/gal EC, 2 qt; Dibrom 8 lbs/gal EC, 1 pt; Thiodan 50% WP, 1.5 lb	Apply with pressure to bark of branches and trunk between April 5 and 20th, and again in early September for larval control.

Note—see abbreviations on page 9.

3. Woody Ornamental Insect Control (cont'd)

Host	Pest	Material/100 Gal.	Remarks
Spruce	Aphids	Same as Pine	See remarks under Pine.
	Cooley Spruce Gall Aphid	Sevin 80% S, 1¼ lb; Sevimol 4 lbs/gal EC, 1 qt; Diazinon 4 lbs/gal EC, 1 pt; Thiodan 3 lbs/gal EC, ⅔ qt	Apply from mid to late April to control overwintering nymphs or just after galls open in late July.
	Eastern Spruce Gall Aphid	Same as Cooley Spruce gall aphid	Apply in mid to late April to control overwintering nymphs or in early October.
	Pine Needle Scale	Sevimol 4 lbs/gal EC, 1 qt	Treat for crawlers in early July.
	Spruce Spider Mite	Acaraban 4 lbs/gal EC, ½-¾ pt; DiBrom 8 lbs/gal EC, 1 pt; Tri-thion 4 lbs/gal EC, 1½-2 pt; Kelthane 35% WP, 1⅓ lb; Mores-tan 25% WP, ½-1 lb; Guthion 50% WP, 1 lb; Metasystox-R 25% SC, 1½ pt	Apply controls in spring when mite activity is noticed. Repeat at 10-day intervals as needed.
Sycamore	Aphids	Same as Ash	See remarks under Ash.
	Lacebug	Cythion 57% EC, 1 pt; Guthion 50% WP, 1 lb; Sevin 80% S, 1¼ lb; Systox 2 lbs/gal EC, 1½-2 pts; Methoxychlor 2 lbs/gal EC, 1-2 qt	Apply as soon as eggs hatch, generally late May or as needed.
	Plantbug	Sevin 80% S, 1¼ lbs; Sevimol 4 lbs/gal EC, 1 qt; Zectran 2 lbs/gal EC, 1 qt	Treat when nymphs are first noticed in late spring. Early control is essential to preserve appearance of tree.
Willow	Aphids	Same as Ash	See remarks under Ash.
	Leafbeetles	Sevin 80% S, 1¼ lbs; Sevin 50% WP, 2 lbs	Control when leaf feeding is initially noticed, early June. Early control is suggested.
	Spider Mites	Same as Juniper	See remarks under Juniper.
Yews (Taxus)	Black Vine Weevil	Thiodan 50% WP, 2 lbs; Lin-dane 20% EC, 1 qt	Direct sprays to foliage and soil beneath in-fested plants in early June. Repeat at 14-day intervals as needed.
	Fletcher Scale	70 Sec Superior Oil, 2 gal; Cythion 57% EL, 2 pt; Sevin 80% S, 1¼ lbs	Use oil for dormant treatment in spring or fall. Use others for crawler control in late June.
	Mealybugs	Cythion 57% EL, 1½ pt; Durs-ban 2 lbs/gal EC, 1 qt; Sevin 80% S, 1¼ lbs; Systox 2 lbs/gal EC, 1½ pt	Drench plant thoroughly in mid May and again in two weeks to control developing nymphs.
	Spider Mites	Morestan 25% WP, 1 lb; Ethion 25% WP, 1 lb; Cythion 57% EL, 1½ pt; Di-syston 15G, 2.5 oz/one inch trunk diameter; Kethane 35% WP, 1⅓ lb	Treat when mites are present and repeat at 10-day intervals as needed.
	Taxus Bud Mite	Thiodan 50% WP, 1 lb; Thiodan 3 lbs/gal EC, ⅔ qt	Treat when mites are present and repeat at 10-day intervals as needed.

E = Emulsifiable
EC = Emulsifiable Concentrate
EL = Emulsifiable Liquid

F = Flowable
G = Granular
LS = Liquid Solution
S = Sprayable

SC = Spray Concentrate
SP = Soluble Powder
WP = Wettable Powder

4. Turfgrass Insect Control

Prepared by: M. Keith Kennedy

Pest	Chemical	Formulation†	Amount of Formulation to apply		Remarks
			1000 ft ²	acre	
Ants	Diazinon	4 lbs/gal EC	4 oz	5.5 qts	Make spot treatments when necessary. Read the label for specific instructions.
		40% WP	5 oz	13.6 lbs	
		50% WP	4 oz	10.9 lbs	
	Dursban	2 lbs/gal EC	1½ oz	2 qts	
		4 lbs/gal EC	¾ oz	1 qt	
	Sevin	4 lbs/gal F	8 oz	10.9 qts	
		80% SP	4 oz	10.9 lbs	
		50% WP	6.4 oz	17.4 lbs	
		10% DUST	1 lb	43.5 lbs	
Armyworms	Diazinon	4 lbs/gal EC	4 oz	5½ qts	Apply controls at first sign of feeding damage. Read the label for specific directions.
		40% WP	5 oz	13.6 lbs	
		50% WP	4 oz	10.9 lbs	
	Dursban	2 lbs/gal EC	1½ oz	2 pts	
		4 lbs/gal EC	¾ oz	1 qt	
	Dylox	4 lbs/gal LS	4-6 oz	5½ - 8.2 qts	
	Sevin	80% S	4 oz	10.9 lbs	
		50% WP	6.4 oz	17.4 lbs	
		10% DUST	1 lb	43.5 lbs	
Bluegrass Billbug	Diazinon	4 lbs/gal EC	4 oz	5½ qts	Apply at first sign of adult beetles, mid May to early June. Read label for specific instructions.
		40% WP	5 oz	13.6 lbs	
		50% WP	4 oz	10.9 lbs	
		14% G	1 lb	43.5 lbs	
	Sevin	80% S	4 oz	10.9 lbs	
		50% WP	6.4 oz	17.4 lbs	
Chinch Bugs	Aspon	6 lbs/gal EC	3.6-4.8 oz	4.9-6.5 qts	Apply treatment in early June. A second application may be required in 2-3 weeks.
		5% G	3½ lbs	152.5 lbs	
	Diazinon*	4 lbs/gal EC	2-3 oz	2.7-4.1 qts	
			or 3-6 oz	or 4.1-8.2 qts	
		40% WP	2.5-3.5 oz	6.8-9.5 lbs	
			or 3.5-7 oz	or 9.9-19 lbs	
		50% WP	2-3 oz	5.5-8.2 lbs	
	Dursban		or 3-6 oz	or 8.2-16.4 lbs	
		14% G	½-1 lb	21.8-43.5 lbs	
	Ethion	4 lbs/gal EC	6 oz	7½-10 qts	
		8 lbs/gal EC	2.7-4 oz	3¾-5 qts	
	Sevin	5% G	5 lbs	217.5 lbs	
		4 lbs/gal F	8 oz	10.9 qts	
		80% S	4 oz	10.9 lbs	
		50% WP	6.4 oz	17.4 lbs	
	Trithion	10% DUST	1 lb	43.5 lbs	
		4 lbs/gal EC	5.3 oz	7.2 qts	
		8 lbs/gal EC	2.7 oz	3.7 qts	

*Use higher rate in dense turf Note—see abbreviations on page 12.

4. Turfgrass Insect Control (cont'd)

Cutworms	Diazinon	4 lbs/gal EC 40% WP 50% WP	4 oz 5 oz 4 oz	5½ qts 13.6 lbs 10.9 lbs	Treat in early June and in early to mid-August. Read the label for specific instructions.
	Dursban	2 lbs/gal EC 4 lbs/gal EC	1½ oz ¾ oz	2 qts 1 qt	
	Dylox	4 lbs/gal LS 80% SP	4-6 oz 2½-3¾ oz	5½-8.2 qts 6.8-10.2 lbs	
	Sevin	80% S 50% WP 10% DUST	4 oz 6.4 oz 1 lb	10.9 lbs 17.4 lbs 43.5 lbs	
White grubs (general)	Diazinon	4 lbs/gal EC 14% G	4 oz 1 lb	5.5 qts 43.5 lbs	Apply in early fall or early summer. Read the label for specific instructions.
	Dylox	4 lbs/gal LS 80% SP 5% G	6 oz 3¾ oz 3¾ lbs	8.2 qts 10.2 lbs 163.4 lbs	
Japanese Beetle	Chlordane	4 lbs/gal EC 8 lbs/gal EC 10% DUST	3.6-7.2 oz 1.8-3.6 oz 1.2-2.2 lbs	10-20 pts 5-10 pts	Apply in early fall or early summer. Read the label for specific instructions.
	Dasanit	15% G	6.25 oz	17 lbs	
	Diazinon	4 lbs/gal EC 14% G	6 oz 1 lb	8.2 qts 43.5 lbs	
	Dursban	2 lbs/gal EC 4 lbs/gal EC	3-6 oz 1½-3 oz	4.1-8.2 qts 2-4.1 qts	
	Milky Spore Disease	DUST	7½ oz	20 lbs	
European Chafer	Diazinon	4 lbs/gal EC 14% G	4 oz 1 lb	5.5 qts 43.5 lbs	Apply in early fall or early summer. Read the label for specific instructions.
	Dursban	2 lbs/gal EC 4 lbs/gal EC	3-6 oz 1½-3 oz	4.1-8.2 qts 2-4.1 qts	
	Sevin	80% S 50% WP	4 oz 6.4 oz	10.9 lbs 17.4 lbs	
Green June Beetle	Sevin	80% S 50% WP	4 oz 6.4 oz	10.9 lbs 17.4 lbs	Same as European Chafer
Leafhoppers	Diazinon	4 lbs/gal EC 50% WP	1¼ oz 1¼ oz	1.7 qt 3.4 lbs	Apply controls when necessary, spring through fall. Read the label for specific instructions.
	Sevin	4 lbs/gal F 80% S 50% WP 10% DUST	8 oz 4 oz 6.4 oz 1 lb	10.9 pts 10.9 lbs 17.4 lbs 43.5 lbs	
Millipedes	Diazinon	4 lbs/gal EC 50% WP	8 oz 8 oz	10.9 qts 21.8 lbs	Apply controls when millipedes are numerous. Read the label for specific instructions.

Note—see abbreviations on page 12.

4. Turfgrass Insect Control (cont'd)

Pest	Chemical	Formulation†	Amount of Formulation to apply		Remarks
			1000 ft²	acre	
Millipedes	Sevin	4 lbs/gal F	8 oz	10.9 qts	Apply controls in early-mid June (1st generation) and early-mid August (2nd generation). See label for specific instructions.
		80% S	4 oz	10.9 lbs	
		50% WP	6.4 oz	17.4 lbs	
		10% DUST	1 lb	43.5 lbs	
Sod Webworm	Baygon	1.5 lbs/gal EC	11 oz	15 qts	
		70% WP	2¾ oz	7½ lbs	
		5% G	2½ lbs	108.9 lbs	
	Diazinon	4 lbs/gal EC	4 oz	5½ qts	
		40% WP	5 oz	13.6 lbs	
		50% WP	4 oz	10.9 lbs	
	Dursban	2 lbs/gal EC	1½ oz	2 qts	
		4 lbs/gal EC	¾ oz	1 qt	
	Dylox	4 lbs/gal LS	4-6 oz	5½-8.2 qts	
		80% SP	2½-3¾ oz	6.8-10.2 lbs	
		5% G	2½ lbs	108.9 lbs	
	Ethion	4 lbs/gal EC	6 oz	7-10 qts	
		8 lbs/gal EC	2.7-4 oz	3.7-5.5 qts	
		5% G	5 lbs	217.8 lbs	

† EC = Emulsifiable concentrate LS = Liquid solution
 F = Flowable S = Sprayable
 G = Granular SP = Soluble powder

5. Nematode Control

Prepared By George W. Bird

Control of plant-parasitic nematodes associated with ornamental plants can usually be achieved through the use of sound horticultural practices. Production of high quality nematode-free nursery stock is essential. Nursery stock should never be produced in nematode-infested soil. Soil to be used for nursery production should always be checked for the presence of plant-parasitic nematodes prior to its use. Nematode-infested nursery stock should not be purchased. Plants not known to be nematode-free or produced in nematode-free sites should be analyzed for the presence of detrimental nematodes. It is much easier to prevent nematode problems than alleviate them once present. Every year too many acres of Michigan ornamentals have to be quarantined because of nematode problems. They can not be sold until nematodes can no longer be detected. The most common nematode problem associated with ornamentals is the northern root-knot nematode (*Meloidogyne hapla*). In some cases plants infected with this pest have to be destroyed.

If it is necessary to use a nematicide in the production of ornamental plants, it is far better to reduce nematode populations through the use of a preplant soil treatment than to rely on at-planting or post-planting treatments.

Material	Rate	Limitations, Directions
Preplant Soil Treatment		
1, 3-D (D-D, Telone II)	15-20 gal/acre broadcast, or 8 oz/100 linear ft	Wait at least 21 days after application before planting.
1, 3-D + Chloropicrin (Terr-o-cide-30-D, Terr-o-cide 15-D, Telone C	20 gal/acre broadcast, or 8 oz/100 linear ft	Wait at least 21 days after application before planting.
EDB Soilbrom-40	18 gal/acre broadcast, or 7 oz/100 linear ft	Do not use on soil to be used for growing lilies, or amaryllis. Wait at least 21 days after application before planting.
Soilbrom-85	6 gal/acre broadcast, or 3 oz/100 linear ft	Do not use one soil to be used for growing lilies, or amaryllis. Wait at least 21 days after application before planting.

5. Nematode Control (cont'd)

Material	Rate	Limitations, Directions
EDB + Chloropicrin (Terr-o-cide-30, Terr-o-cide-15)	15 gal/acre broadcast, or 4 oz/100 linear ft	Wait at least 21 days after application before planting. See other limitations for EDB.
Methyl Bromide and Chloropicrin (Dowfume MC-2, Brom-O-Gas)	2 lb/100 sq ft	Commercial use only. Apply under a plastic cover, removing cover 48 hr before seeding or 4 days prior to transplanting. Do not use on soil to be planted to bromine sensitive plants. Effective against many weed seeds, soil fungi, insects, and bacteria as well as nematodes.
MIC (Vorlex)	25-50 gal/acre broadcast, or 15 oz/100 sq ft	Wait at least 21 days after application before planting. High rates are effective against soil fungi and some weeds as well as nematodes.
Oxamyl (Vydate L)*	3-10 gal/acre in a minimum of 20 gal water	For professional application only and for use only in commercial plantings. Thoroughly incorporate to a depth of 4-8 in immediately after application.*
VPM (Vapam)	32 oz/100 sq ft	Wait at least 14 days after application before planting. Tarp treated area for best results. Effective against some weed seeds & soil fungi, as well as nematodes.

Preplant Root Dips

Oxamyl (Vydate L)*	2-4 pt/100 gal water (1 1/2 T/5 gal)	Root, corm or bulb dip. For professional application only. For use only in commercial operations. Place plant material in solution for 1 to 30 minutes. Use higher rates and longer soaking times for more severe nematode infestation.*
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At Planting or Post Planting Nematicides

Aldicarb (Temik 10G)	50-60 lb/12,000 linear ft of row. 4-6 lb/1,000 linear ft of row.	For control of nematodes associated with bulbs. For professional application only. For use only in commercial operations. Registered for use as a nematicide only on lilies and bulbs.
Fensulfothion‡ (Dasanit 15G)	1 lb actual/1,000 sq ft 6.7 lb of 15% G 0.03 oz actual/ft³	Treatment of beds and benches. Apply dosage evenly over area and work thoroughly into soil 4-6 in. Do not apply to newly seeded areas. For commercial use only. Must be applied by a professional applicator. See recommended plants listed below.‡ Potting soil. Mix material thoroughly with soil. do not treat peony, begonia, hydrangea, and <i>Aucuba</i> spp. do not use in or near human dwellings. For commercial use only. Must be applied by a professional applicator. See recommended plants listed below.‡
Oxamyl (Vydate L)*	Soil mix treatment: 2 3/4 oz/10 gal water Foliar treatment: 2-8 pt/100 gal water Liquid drench: 1 pt/100 gal water	Spray 2 1/2 to 10 gal of the dilute mix onto one cubic yard of soil while tumbling in a soil mixer. For professional application only. for use only in commercial operations. Spray on foliage to run-off. Make 4 applications on 2 to 3 week schedule. For professional use only. for use only in commercial operations. Apply drench at rate of 4-8 oz/6 in pot., or 2-4 oz/4 in pot. For professional application only. for use only in commercial operations.

*Registered only for azalea, bird's nest fern, boxwood, chrysanthemum, croton, dieffenbachia, picta, dracaena, gardenia, gladiolus, Hindu rope, leather leaf fern, maranta, peony, peperomia, philodendron, rose, sansevieria and snapdragon.

‡Registered for use as a nematicide on FLOWERING SHRUBS: azalea, blue mist camellia, Chinese hibiscus, gardenia, honeysuckle, jasmine, jungleflame, metrosideros, pyracantha, Surinam cherry, roses and viburnum. PERENNIAL FLOWERS: aloe, butterfly iris, century plant, chrysanthemum, cyclamen, Easter lily, gladiolus and gloxinia. VINES: Bougainvillea. OTHER SHRUBS: ardisia, boxwood, croton, dwarf yaupon, euonymus, eurya, gallberry, holly, holly leaf osmanthus, Japanese yew, juniper, privet, natal plum, red leaf barberry and yew.

6. Weed Control for Ornamentals

Prepared By Alan R. Putnam

Always check the label for ornamental species that will tolerate each herbicide

Problem	Material	Amount/A	Amount/ 1,000 sq ft	Time of Application and comments
Transplanted Flowers and Ground Covers				
Annual weeds	Eptam 7-E Eptam 2.3G	5¾ pt	4 T 5 lb	Apply to soil prior to transplanting and rototill into soil to a depth of 2-3 in. Granules may also be raked or water in. Granules can be applied after transplanting but must be applied before the weeds come up.
	Treflan 4EC Treflan 5G	1-2 pt 10-20 lb	¾-1½ T 3½-7 oz	Apply to soil prior to transplanting and rototill into soil to a depth of 2-3 in. Granules may also be raked or watered in. Granules can be applied after transplanting but must be applied before the weeds come up. Use the lower rate on sandy soils and the higher rate on clay loam soils.
	Enide 50W	8-12 lb	3-4½ oz	Apply to the soil surface after transplanting. Irrigation after spraying will increase the effectiveness of the herbicide. Use the lower rate on sandy soils and the higher rate on clay loam soils.
	Dacthal 75W Dacthal 5G	14-16 lb	2-5 oz 3¾-7 lb	Apply to the soil surface after transplanting. Irrigation after spraying will increase the effectiveness of the herbicide. Use the lower rate on sandy soils and the higher rate on clay loam soils.
Quackgrass (prior to planting)	Amitrol-T or Cytrol-Amitrol-T	4 qt	6 T	Apply to actively growing quackgrass. Plow and disk about 10 days after spraying. Wait a minimum of six weeks to plant flowers or ground covers.
Newly Planted Nursery Stock (Liners)				
Annual weeds	Treflan 4EC Treflan 5G	1-2 pt 10-20 lb	¾-1½ T 3½-7 oz	Apply to the soil prior to transplanting and rototill into the soil to a depth of 2-3 in. Granules may also be raked or watered in. Granules can be applied after transplanting, but should be applied before the weeds come up.
	Casoron W50 Casoron 4G	8-12 lb 100-150 lb	3-4½ oz 2½-3½ lb	Granular formulation is preferred unless the chemical is incorporated or irrigated in. Do not use until 4 weeks after transplanting. Use the lower rate on sandy soils and the higher rate on clay loam soils.
	Enide 50W	8-12 lb	3-4½ oz	Apply to the soil surface after transplanting. Irrigation after spraying will increase the effectiveness of the herbicide. Use the lower rate on sandy soils and the higher rate on clay loam soils.
	Ronstar 2G	100-200 lb	2¼-4½ lb	Apply before weed emergence. Irrigation will improve effectiveness. This herbicide may be used for container stock.
Quackgrass (prior to planting)	Amitrol-T or Cytrol-Amitrol-T	4 qt	6 T	Apply to actively growing quackgrass. Plow and disk about 10 days after spraying. Wait a minimum of six weeks to plant nursery stock.
Established* Nursery Stock				
Annual weeds	Princep 80W Princep 4G	2½-3¾ lb 50-75 lb	1¼-1¾ oz 18-27 oz	In fall or spring before weeds emerge. Use the lower rate on sandy soils and the higher rate on clay loam soils.
	Treflan 4EC Treflan 5G	1-2 pt 10-20 lb	¾-1½ T 3½-7 oz	Should be incorporated with a cultivator or rototiller or irrigated in after application. Use the lower rate on sandy soils and the higher rate on clay loam soils.
	Enide 50W	8-12 lb	3-4½ oz	Irrigation after spraying will increase the effectiveness of the herbicide. Use the lower rate on sandy soils and the higher rate on clay loam soils.
	Ronstar 2G	100-200 lb	2¼-4½ lb	Apply before weed emergence. Irrigation will improve effectiveness. This herbicide may be used for container stock.

*Plants that are in the field at least a year.

6. Weed Control for Ornamentals

Problem	Material	Amount/A	Amount/ 1,000 sq ft	Time of Application and comments
Quackgrass and annual weeds	Casoron 4G	100-150 lb	2¼-3½ lb	Apply in November prior to snowfall for quackgrass control. Use the lower rate on sandy soils and the higher rate on clay loam soils.
	Kerb 50W	2-4 lb	¾-1½ oz	Use the higher rate for quackgrass control. Apply in November prior to snowfall.
	Princep 80W and Kerb 50W	2½ lb and 4 lb	1¼ oz and 1½ oz	Apply in November prior to snowfall. This treatment will control quackgrass and annual weeds around species that are sensitive to higher rates of Princep.
Under Established† Ornamental Trees				
Quackgrass, annuals and perennials	Amizine or Princep 80W and Cytrol Amitrol-T	7 lb 4 lb and 4 qt	2½ oz 1½ oz and 6 T	Apply when weeds are 6-8 inches high. Do not allow the spray to touch the foliage of trees.
	Princep 80W and Paraquat CL	2½ lb and 1 qt	1.2 oz and 1½ T	Apply when weeds are 6-8 inches high. Do not allow the spray to touch the foliage of trees. Add a wetting agent at 8 oz/100 gal spray.
	Casoron 50W and Casoron 4G	12 lb and 150 lb	4½ oz and 3½ lb	Apply in the fall or early spring and cover with an organic mulching material such as wood chips. The herbicide may also be pre-mixed with mulch and applied under trees. This is particularly effective for sloping sites and highway plantings.
	Princep 80W and Kerb 50W	2½ lb and 4 lb	1¼ oz and 1½ oz	Apply in November prior to snowfall. This treatment will control quackgrass and annual weeds around species that are sensitive to higher rate of Princep.

†Established in the field at least one year.

7. Weed Control for Roadsides and Ditches

Prepared By William Meggitt

Problem	Material	Amount/A	Comments
Roadside			
Brush	2, 4-D plus 2, 4, 5-T	½-2 gal/A formulation (Use 2-4 lb/A actual)	Cannot be used around water or on cropland areas.
Ditches			
Cattails	Dowpon (Dalapon) and Amitrol-T (Amitrole)	15 lb 2 lb	
Broadleaf weeds	2, 4-D	2 lb	

8. Weed Control in Turf

Problem	Material	Amount/A	Comments
Dandelion, Plantain	2, 4-D Amine	1 lb	Spring, Fall, See Bulletin E-653
Chickweed, Henbit and other hard-to-kill broadleaves	2, 4-D + 2, 4, 5-TP (Silvex)	1 lb + ¾ lb	Spring, Fall, See Bulletin E-653

8. Weed Control in Turf (con't)

Problem	Material	Amount/A	Comments
General Vegetation Control			
<i>(Industrial sites, substations, fuel holding yards, etc.)</i>			
Amizine (Amitrole + Simazine)	10 lb	Fenavar (Amitrole + Bromacil + Fenac)	3-10 lb Hyvar X-L (Bromacil) 4-12 lb Pramitol (Prometone) 10-100 lb

Pounds active ingredients per acre. Use lower rates for control of annual weeds and higher rates for deep rooted perennials.

9. Aquatic Pest Control

Prepared By Ray J. White

Algae

Planktonic	Copper sulfate,* Chelated copper, Salt of Endothall (liquid), Simazine or Aquazine†
Filamentous	Copper sulfate,* Chelated copper, Salt of Endothall (liquid), Salt of Endothall (granular), Diquat, Simazine or Aquazine†
Chara, Nitella	Copper sulfate,* Chelated copper, Salt of Endothall (liquid), Salt of Endothall (granular), Simazine or Aquazine†

Submergent macrophytes

Curly-leaf pondweed	Salt of Endothall (granular), Endothall, Diquat, Simazine or Aquazine†
Sago pondweed	Salt of Endothall (granular), Endothall, Diquat, Simazine or Aquazine†
Large-leaf pondweed	Salt of Endothall (granular), Endothall, Diquat, Simazine or Aquazine†
Naiad	Salt of Endothall (granular), Endothall, Diquat, 2, 4-D, Simazine or Aquazine†
Water buttercup	Diquat
Coontail	Salt of Endothall (granular), Endothall, Diquat, 2, 4-D, Simazine or Aquazine†
Milfoil	Salt of Endothall (granular), Endothall, Diquat, 2, 4-D, Simazine or Aquazine†
Elodea	Salt of Endothall (granular), Diquat
Wild celery	Salt of Endothall (granular)

Details on application rates and timing will be found on the product label. Follow label instructions carefully. A *DNR permit will be necessary* for application of any chemical to any body of water which is not entirely private, that is, which has public access or which is connected in any manner with a lake, pond or stream that has public access (or the shoreline of which is owned by more than one party). The DNR permit is a necessary formality and it is used as a means of recording usage and of screening out mistakes. Few applications are refused. Applicants may receive useful advice in the process. Failure to get a permit may result in penalty. Permits can be obtained via DNR district offices. Allow plenty of time for processing of the permits—several weeks at least.

The most effective time in general for application will be late spring or early summer, when the plants are in a stage of rapid new growth. **For Chara**, chemicals may be effective only during very early growth when the plants are tender and clean. Later, the plants tend to develop a crust of lime which interferes with the action of toxic chemicals.

NOTE: Herbicides are **only one** kind of control for aquatic plants. Mechanical controls are available, such as simply raking the plants out of the water. The only long-lasting control of water plants is to deprive them of nutrients. Other methods include the use of non-herbicidal chemicals to precipitate nutrients out of the water.

Emergent macrophytes

Water lily	2, 4-D
Arrow weed	2, 4-D
Cattail	Diquat, 2, 4-D
Bulrush	2, 4-D

Free-floating macrophytes

Duckweed	Diquat
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*Not recommended for fish ponds, as concentrations of copper sulfate heavy enough to kill the algae will probably be injurious to pond life—including fish and fish food organisms. Chelated copper will control algae while introducing much less toxic copper.

†In ponds only—not in lakes or streams or in waters connecting with them.

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