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# Insecticide Suggestions to Control Greenhouse and Floriculture Pests in 1978



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# Insecticide Suggestions to Control Greenhouse and Floriculture Pests in 1978

Do not use after 1978

The major crops and their major pests are:

- African violets .....Cyclamen mites, also spider mites, Pritchard mealybugs, occasionally aphids
- Azaleas .....Spider mites, cyclamen mites, whiteflies, greenhouse thrips, leaf miners, leaf rollers
- Begonias .....Cyclamen mites probably most serious, thrips
- Cacti (succulent plants) .....Mealybugs, scale insects
- Camellias .....Aphids, thrips, leaf miners, spider mites
- Carnations .....Aphids, thrips, spider mites
- Chrysanthemums .....Aphids, leaf miners (*Phytomyza atricornis*)
- Cyclamens .....Cyclamen mites, spider mites, aphids
- Foliage plants .....Root aphids, foliar aphids, scale insects, mealybugs, spider mites, whiteflies
- Geraniums .....Aphids, whiteflies, plume moths (*Platyptilia pica*)
- Lilies .....Aphids
- Orchids .....Orchid flies (*Eurytoma orchidearum*), slugs
- Poinsettias .....Mealybugs, whiteflies, spider mites, scale insects, root aphids
- Roses .....Spider mites, thrips, aphids, midges, leaf rollers
- Snapdragons .....Spider mites, aphids, cyclamen mites, whiteflies

The following abbreviations appear throughout this publication:

- W. P.—Wettable Powder
- E. C.—Emulsifiable Concentrate
- S. P.—Soluble Powder

| Pest | Pesticide                   | Dosage per 100 gal. spray unless otherwise stated | Remarks   |
|------|-----------------------------|---|---|
| Ants | SPRAYS OR DUSTS<br>diazinon | 1 to 2 lb. 50% W.P.                               | Apply 1 lb. of dust or 1 gal. spray per 1,000 sq. ft. soil along walks.<br>Do not apply to foliage. |

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Certain pesticides may be marketed under brand names other than those listed and are acceptable as long as generic content is the same.

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| Pest   | Pesticide            | Dosage per 100 gal. spray unless otherwise stated   | Remarks  |  |
|--------|----------------------|---|--|--|
| Aphids | AEROSOLS and VAPORS  |   | Be sure foliage is dry at time of treatment.   |  |
|        | dichlorvos (Vapona)  | 6 oz. smoke generator for 10,000 cu. ft.; 1 oz. 81% E.C. per 10,000 cu. ft. on steam pipes. | Can be used on cucumbers, tomatoes, and lettuce in greenhouses. Close greenhouse vents for 2 hrs. after treatment. Do not use on mum varieties Pink Champaign and Nightengale or on Shasta lily. May be phytotoxic to tomatoes.                            |  |
|        | naled (Dibrom)       | 1 fl. oz. 8 lb. E.C. per 10,000 cu. ft. on steam pipes.                                     | Can be used on cucumbers and tomatoes in greenhouse. Close greenhouse vents for at least 2 hrs. after treatment. May injure rose varieties White Butterfly and Golden Rapture, Pink Champaign mums, Green Wandering Jew, poinsettias, and Dutchman's Pipe. |  |
|        | parathion            | 10% aerosol using 1 lb. per 50,000 cu. ft.  | Causes leathery leaves on gardenias; not recommended on asters and white cyclamen. Can be used on vegetables in the greenhouse. For use by commercial growers only.  |  |
|        | sulfotepp (Dithio)   | Smoke or 5% aerosol bomb using 1 lb. per 50,000 cu. ft.                                     |  |  |
|        | nicotine             | Smoke generator. Check label for amount to use and additional precautions.                  | Can be used on vegetables in the greenhouse. May damage tender plants or tender portions of plants. Do not use on mum varieties Iceberg and Albatross. For use by commercial growers only.   |  |
|        | SPRAYS               |   |  |  |
|        | endosulfan (Thiodan) | 1 lb. 50% W.P. or 1 qt. 24% E.C.  | Also may use 3% dusts. Can be used on tomatoes in the greenhouse. May injure chrysanthemum varieties Bonnafon Deluxe, Fred Shoemith, and White Knight, and also some geranium varieties.   |  |
|        | malathion            | 2 lb. 25% W.P. or 1½ pt. 57% E.C.   | Dosage doubled for scale insects. May injure some crassula, cucurbit, fern,  |  |

| Pest                  | Pesticide                        | Dosage per 100 gal. spray unless otherwise stated  | Remarks   |
|-----------------------|----------------------------------|--|---|
| Aphids (continued)    | malathion (continued)            |  | petunia, orchid, sweet pea, saint paulia, violet, gloxinia, red carnation, and rose varieties. Phytotoxicity greatest with E.C. Dusts also may be applied. Do not use for green peach aphid. Can be used on vegetables in the greenhouse.   |
|                       | acephate (Orthene)               | ⅓ lb. 75% S.P.   | For use on roses, carnations, and chrysanthemums. Do not apply more than once every 28 days to carnations and chrysanthemums. Has injured chrysanthemum varieties Show Off, Iceberg, Albatross, Bonnie Jean, and Statesman. Phytotoxicity may occur on other mum varieties. Spray a few plants and observe for 2 weeks before treating entire crop. |
|                       | Enstar 5E                        | 10 oz. 65% E.C. when aphids first noted or 20 oz. for heavy populations.                                     | Should be applied in pre-bloom stage. May injure bracts of some poinsettia varieties.   |
|                       | pirimicarb (Pirimor)             | 4 to 8 oz. 50% W.P.  | Approved on chrysanthemums. Do not apply more than four times.  |
|                       | demeton (Systox)                 | 1 to 1½ pt. 25% E.C.   | May injure Croft lilies. Effective on foliar nematodes. For use by commercial growers only.   |
|                       | oxydemetonmethyl (Meta-Systox-R) | 1 to 1½ pt. 25% E.C.   | May injure mum varieties Hurricane, Iceberg, Whitetop, and Pennant; also Easter lilies.   |
| <b>SOIL TREATMENT</b> |                                  |  |   |
|                       | oxydemetonmethyl (Meta-Systox-R) | 1½ pt. 25% E.C. Apply ½ cup of the mixture per 6- to 8-in. pot, or use 1 Tbsp. in 3 gal. for 100 6-in. pots. | Causes leaf scorch on Easter Lily; injury noted on mum varieties Hurricane, Iceberg, Whitetop, and Pennant.   |
|                       | aldicarb (Temik)                 | 30 to 40 oz. Temik 10 G/ 1,000 sq. ft. on soil surface.  | Should give 6 weeks' protection; approved on mums, gerberas, roses, carnations, Easter lilies, and snapdragons. For use by commercial growers only.   |

| Pest   | Pesticide   | Dosage per 100 gal. spray unless otherwise stated   | Remarks   |
|--|---|---|---|
| Aphids<br>(continued)                                      | dimethoate<br>(Cygon)   | 6 fl. oz. 30.5% E.C.<br>diluted in enough water to<br>treat 1,000 sq. ft. of bench.                   | For use on carnations.  |
|  | demeton<br>(Systox)   | 1 to 1½ pt. 25% E.C. Apply<br>1 pt. of the mixture per<br>sq. ft. of bench or ¼ pt.<br>per 6-in. pot. | May injure African violets,<br>Cibotium ferns, and Croft<br>lilies. For use by<br>commercial growers only.  |
| Caterpillars   | SPRAYS  |   |   |
| (corn borer,<br>leaf roller, loopers,<br>army worms, etc.) | carbaryl<br>(Sevin)   | 2 lb. 50% W.P. or 1¼<br>lb. 80% sprayable.  | Except for older stages<br>of cabbage looper. May<br>injure Boston ivy and<br>Maidenhair fern.  |
|  | methoxychlor  | 2 lb. 50% W.P.  | Preferred for sensitive<br>foliage. Can be used on<br>lettuce, cucumbers, tomatoes,<br>and radishes in the<br>greenhouse.   |
|  | trichlorfon<br>(Dylox, Proxol)                                  | 20 to 30 oz. 80% S.P.<br>or 2 to 3 pt. 40.5% E.C.   | Some injury to certain<br>varieties of carnation,<br>zinnia, and hydrangia.   |
|  | <i>Bacillus thuringiensis</i><br>(Dipel, Biotrol,<br>Thuricide) | ½ to 1 lb. W.P.   | May take 2 to 3 days before<br>mortality results. Can be<br>used on vegetables in the<br>greenhouse.  |
|  | AEROSOLS and VAPORS   |   |   |
|  | naled<br>(Dibrom)   | 1 fl. oz. 8 lb. E.C. per<br>10,000 cu. ft. on steam<br>pipes.   | For use against leaf rollers.<br>Can be used on cucumbers<br>and tomatoes in greenhouse.<br>Close greenhouse vents for<br>at least 2 hrs. after<br>treatment. May injure<br>rose varieties White<br>Butterfly and Golden<br>Rapture, Pink Champaign<br>mums, Green Wandering<br>Jew, poinsettias, and<br>Dutchman's Pipe. |
|  | dichlorvos<br>(Vapona)  | 6 oz. smoke generator for<br>10,000 cu. ft.; 1 oz. 81%<br>E.C. per 10,000 cu. ft. on<br>steam pipes.  | Can be used on cucumbers,<br>tomatoes, and lettuce in<br>greenhouse. Close greenhouse<br>vents for 2 hrs. after<br>treatment. Do not use on<br>mum varieties Pink<br>Champaign and Nightengale<br>or on Shasta lily. May<br>be phytotoxic to tomatoes.  |

| Pest                   | Pesticide                   | Dosage per 100 gal. spray unless otherwise stated | Remarks  |
|------------------------|-----------------------------|---|--|
| Centipedes, symphylids | lindane                     | 10 oz. 25% W.P. per 1,000 sq. ft.                 | Work into soil. Steam sterilization also is advised.   |
| Cutworms               | carbaryl (Sevin)            | 2 lb. 50% W.P., 1¼ lb. 80% W.P., or 5% bait.      | Apply to soil and base of plant. May injure Boston ivy and Maidenhair fern.  |
|                        | trichlorfon (Dylox, Proxol) | 20 to 30 oz. 80% S.P. or 2 to 3 pt. 40.5% E.C.    | Some injury to certain varieties of carnation, zinnia, and hydrangia. Apply to soil and base of plant.   |
| Cyclamen mites         | dicofol (Kelthane)          | 1½ lb. 35% W.P. or 1 pt. 18.5% E.C.               | Incompatible with sulfur. Make 2 or 3 applications at 2-week intervals. Use sanitation and isolation during clean-up period.   |
|                        | endosulfan (Thiodan)        | 1 lb. 50% W.P. or 1 qt. 24% E.C.                  | Can be used on tomatoes in the greenhouse. May injure chrysanthemum varieties Bonnafon Deluxe, Fred Shoemsmith, and White Knight; also some geranium varieties. Make 2 or 3 applications at 2-week intervals. Use sanitation and isolation during clean-up period. |
| Fungus gnats           | malathion                   | 4% dust or 1½ to 2 pt. 57% E.C.                   | Look under "Aphids" for malathion cautions. Malathion can be used on vegetables in the greenhouse.   |
|                        | lindane                     | 10 oz. 25% W.P. per 1,000 sq. ft.                 | Drench soil for best larval control. Treat soil weekly until infestation is controlled. Surface dusting controls adults. Dichlorvos (Vapona) for aphids also will control fungus gnat adults. Can be used on cucumbers, tomatoes, and lettuce in the greenhouse.   |
|                        | resmethrin                  | 1% bomb using 1 lb. for 3,000 sq. ft.             | For fungus gnat adults. Effectiveness reduced in sunlight and at temperatures above 72° F.   |
| Grasshoppers           | carbaryl (Sevin)            | 2 lb. 80% W.P.                                    | May injure Boston ivy and Maidenhair fern.   |

| Pest                     | Pesticide                          | Dosage per 100 gal. spray unless otherwise stated  | Remarks  |
|--------------------------|------------------------------------|--|--|
| Grasshoppers (continued) | malathion                          | 2 pt. 57% E.C.   | Look under "Aphids" for cautions. Can be used on vegetables in the greenhouse.   |
| Leafhoppers              | carbaryl (Sevin)                   | 2 lb. 50% W.P. or 1¼ lb. 80% sprayable.  | May injure Boston ivy and Maidenhair fern.   |
| Leaf miners              | SPRAYS<br>malathion                | 2 lb. 25% W.P. or 1½ pt. 57% E.C.  | Look under "Aphids" for cautions. Can be used on vegetables in the greenhouse.   |
|                          | oxydemetonmethyl (Meta-Systox-R)   | 1½ pt. 25% E.C.  | Soil drench may be used as given under "Aphids." May injure mum varieties Hurricane, Iceberg, Whitetop, and Pennant; also Easter lilies.                                     |
|                          | parathion                          | 1 lb. of 25% W.P. or 1 pt. 25% E.C.  | Avoid excessive treatment of asters, gardenias, and white cyclamen. Can be used on vegetables in the greenhouse. For use by commercial growers only.                         |
|                          | trichlorfon (Dylox, Proxol)        | 20 to 30 oz. 80% S.P. or 2 to 3 pt. 40.5% E.C.   | Some injury to certain varieties of carnation, zinnia, and hydrangia.  |
|                          | SOIL TREATMENT<br>aldicarb (Temik) | 30 to 40 oz. Temik 10 G/ 1,000 sq. ft. on soil surface (⅛ tsp./6-in. pot).                             | For use by commercial growers only. Approved on mums and gerberas.   |
| Leaf rollers             | acephate (Orthene)                 | ⅔ to 1 lb. 75% S.P. Also may use any insecticides listed under "Caterpillars," at dosages recommended. | For omnivorous leaf rollers on roses.  |
| Mealybugs                | SPRAYS<br>lindane                  | ½ lb. 25% W.P. or 1½ pt. 20% E.C.  |  |
|                          | malathion                          | 3 lb. 25% W.P. or 1½ pt. 57% E.C.  | Look under "Aphids" for cautions. Do not use on cacti. Can be used on vegetables in the greenhouse.  |
|                          | parathion                          | 1 lb. 25% W.P.   | Repeat in 3 to 4 weeks. For use by commercial growers only. Can be used on vegetables in the greenhouse. Avoid excessive treatment of asters, gardenias, and white cyclamen. |



| Pest                  | Pesticide   | Dosage per 100 gal. spray unless otherwise stated  | Remarks  |
|-----------------------|---|--|--|
| Mealybugs (continued) | demeton (Systox)  | 1 to 1½ pt. 25% E.C.   | May injure Croft lilies. Effective on foliar nematodes. For use by commercial growers only.  |
| AEROSOLS and VAPORS   |   |  |  |
|                       | dichlorvos (Vapona)   | 6 oz. smoke generator for 10,000 cu. ft. 1 oz. 81% E.C. per 10,000 cu. ft. on steam pipes. | Can be used on cucumbers, tomatoes, and lettuce in the greenhouse. Look under "Aphids" for cautions.   |
|                       | malathion   | 15% bomb using 1 lb. per 50,000 cu. ft.  | Can be used on vegetables in the greenhouse. Look under "Aphids" for cautions.   |
|                       | naled (Dibrom)  | 1 fl. oz. 60% E.C. per 10,000 cu. ft. on steam pipes.                                      | Can be used on cucumbers and tomatoes in the greenhouse. Look under "Aphids" for cautions.   |
|                       | sulfotepp (Dithio)  | 15% bomb using 1 lb. per 50,000 cu. ft.  |  |
| SOIL TREATMENT        |   |  |  |
|                       | aldicarb (Temik)  | 30 to 40 oz. Temik 10 G/1,000 sq. ft. on soil surface (⅛ tsp./6-in. pot).                  | For use by commercial growers only. Approved on poinsettias.   |
| Plant bugs            | carbaryl (Sevin)  | 2 lb. 50% W.P.   | May injure Boston ivy and Maidenhair fern.   |
|                       | trichlorfon (Dylox, Proxol)   | 20 to 30 oz. 80% S.P. or 2 to 3 pt. 40.5% E.C.   | Some injury to certain varieties of carnation, zinnia, and hydrangia.  |
| Plume moth            | carbaryl (Sevin)  | 2 lb. 50% W.P. or 1¼ lb. 80% sprayable.  | Principal geranium pest. Sprays preferable to aerosols, especially on older larvae. Vapona can be used on cucumbers, tomatoes, and lettuce in the greenhouse, but may be phytotoxic to tomatoes. |
|                       | dichlorvos (Vapona)   | As recommended for mealybugs.  |  |
| Roaches               | diazinon  | 1 to 2 lb. 50% W.P.  | Apply 1 lb. dust or 1 gal. of spray per 1,000 sq. ft. soil along walks. Do not apply to foliage.   |
| Scale insects         | dichlorvos (Vapona)<br>malathion<br>parathion<br>sulfotepp (Dithio)<br>demetox (Systox) | Same as for mealybugs.   | 3 or 4 applications, but repeat as necessary. Best control when crawlers are present. Do not use parathion for soft scales.  |

| Pest               | Pesticide  | Dosage per 100 gal. spray unless otherwise stated   | Remarks  |
|--------------------|--|---|--|
| Slugs, snails      | MesuroI metaldehyde, or proprietary baits containing metaldehyde | 1 lb. 2% bait per 1,000 sq. ft., 2 oz. 15% dust per 100 sq. ft., or 1 oz. 20% E.C. to cover 100 sq. ft. | Apply once every 2 weeks to soil, using fresh material.  |
| Sowbugs (pillbugs) | malathion  | 4% dust or 1½ to 2 pt. 57% E.C.   | Look under "Aphids" for cautions. Can be used on vegetables in the greenhouse.   |
|                    | lindane  | 1 lb. 25% W.P.  |  |
| Spider mites       | SPRAYS   |   |  |
|                    | carbophenothion (Trithion)                                       | 1½ to 2 pt. 45.9% E.C.  | For use by commercial growers only. May injure crassula, some ferns, and some roses. Use caution on tender plants.   |
|                    | dicofol (Kelthane)   | 1⅓ lb. 35% W.P. or 1 pt. 18.5% E.C.   | Incompatible with sulfur. May injure roses. Some mite populations may be resistant to dicofol.   |
|                    | chlorobenzilate (Acaraben)                                       | 1 lb. 25% W.P. or 1 pt. 25% E.C.  | Not as effective when sulfur is used. Use on roses, carnations, and mums.  |
|                    | malathion  | 1½ pt. 57% E.C.   | May injure some crassula, cucurbit, fern, petunia, orchid, sweet pea, saint paulia, violet, gloxinia, red carnation, and rose varieties. Can be used on vegetables in the greenhouse. Some mite populations may be resistant to malathion. |
|                    | oxythioquinox (Morestan)   | ½ to 1 lb. 25% W.P.   | Certain rose varieties damaged.  |
|                    | propargite (Omite)   | ½ to 1 lb. 30% W.P.   | May injure new growth on roses.  |
|                    | oxydemetonmethyl (Meta-Systox-R)                                 | 1½ pt. 25% E.C.   | Soil drench may be used as given under "Aphids." May injure mum varieties Hurricane, Iceberg, Whitetop, and Pennant; also Easter lilies.   |
|                    | Pentac   | ½ lb. 50% W.P.  | May cause damage to chrysanthemum foliage. Effectiveness reduced at higher temperatures.   |
| Plictran           | 4 oz. 50% W.P.   | May cause damage to mum blossoms, poinsettia bracts, and rose foliage. May be                           |  |

| Pest                     | Pesticide            | Dosage per 100 gal. spray unless otherwise stated                                       | Remarks  |
|--------------------------|----------------------|---|--|
| Spider mites (continued) | Plictran (continued) |   | toxic to other crops at recommended rates. Check on a few plants before treating entire crop. Slow-acting with long residual. Effectiveness reduced at higher temperatures and humidities. |
|                          | tetradifon (Tedion)  | ½ lb. 50% W.P. or 1 qt. 12.3% E.C.  | Avoid treatment of White Butterfly and Cinderella roses. Other rose varieties also may be injured. Can be used on vegetables in greenhouse.  |
|                          | demeton (Systox)     | 1 to 1½ pt. 25% E.C.  | May injure Croft lilies. Effective on foliar nematodes. For use by commercial growers only.  |
|                          | Vendex               | 8 to 16 oz. 50% W.P.  | Do not repeat more than once every 28 days. Do not apply to chrysanthemums in bloom or poinsettias with bracts.  |
| AEROSOLS                 |                      |   |  |
|                          | dichlorvos (Vapona)  | 6 oz. for 10,000 cu. ft. or paint 1 fl. oz. 81% E.C. per 10,000 cu. ft. on steam pipes. | Dichlorvos (Vapona) can be used on cucumbers, tomatoes, and lettuce in the greenhouse but may be phytotoxic to tomatoes. Look under "Aphids" for cautions.                                 |
|                          | malathion            | 15% bomb using 1 lb. for 50,000 cu. ft.   |  |
|                          | parathion            | 10% aerosol using 1 lb. for 50,000 cu. ft.  | Malathion and parathion can be used on vegetables in the greenhouse. Look under "Aphids" for cautions.   |
|                          | sulfotepp (Dithio)   | 5% aerosol using 1 lb. for 50,000 cu. ft.   |  |
| VAPORS OR SMOKES         |                      |   |  |
|                          | naled (Dibrom)       | Paint 1 fl. oz. 60% E.C. per 10,000 cu. ft. on steam pipes.                             | Corrosive to metals. Look under "Aphids" for cautions. Can be used on cucumbers and tomatoes in the greenhouse.  |
|                          | sulfotepp (Dithio)   | As directed on label.   |  |
|                          | tetradifon (Tedion)  | Paint 10 oz. 50% W.P. as slurry on steam pipes for                                      | Avoid treatment of White Butterfly and Cinderella  |

| Pest                     | Pesticide                           | Dosage per 100 gal. spray unless otherwise stated  | Remarks   |
|--------------------------|-------------------------------------|--|---|
| Spider mites (continued) | tetradifon (continued)              | 200,000 cu. ft.  | roses. Other rose varieties also may be injured. Can be used on vegetables in the greenhouse.   |
|                          | tetradifon 15% plus sulfotepp 12.5% | Smoke generator 6 oz. for 10,000 cu. ft.   | Check label for cautions.   |
|                          | <b>SOIL TREATMENT</b>               |  |   |
|                          | aldicarb (Temik)                    | 30 to 40 oz. Temik 10 G/1,000 sq. ft. on soil surface (1/8 tsp./6-in. pot).                        | Should control mites for 40 to 60 days. Approved on mums, poinsettias, gerberas, roses, carnations, orchids, and snapdragons. For use by commercial growers only. |
|                          | dimethoate (Cygon)                  | 6 oz. 30.5% E.C. in enough water to cover 1,000 sq. ft. of bench.                                  | Carnations only. Can also be used as a spray at 1 1/2 pt. 30.5% E.C. in 100 gal. water.   |
|                          | demeton (Systox)                    | 1 to 1 1/2 pts. 25% E.C. Apply 1 pt. of the mixture per sq. ft. of bench or 1/4 pt. per 6-in. pot. | May injure African violets, Cibotium ferns, and Croft lilies. For use by commercial growers only.   |
| Spittle bugs             | lindane                             | 1/2 lb. 25% W.P. or 1 1/2 pt. 20% E.C.   |   |
| Springtails              | <b>SOIL TREATMENT</b>               |  |   |
|                          | malathion                           | As recommended for fungus gnats.   | Can be used on vegetables in the greenhouse.  |
| Symphylids               | lindane                             | 10 oz. 25% W.P. per 1,000 sq. ft.  | Work into soil. Steam sterilization also is advised.  |
| Thrips                   | <b>SPRAYS</b>                       |  |   |
|                          | malathion                           | 1 1/2 pt. 57% E.C.   | Look under "Aphids" for cautions. Can be used on vegetables in the greenhouse.  |
|                          | dimethoate (Cygon)                  | 1 1/2 pt. 30.5% E.C.   | Carnations only.  |
|                          | methoxychlor                        | 2 lb. 50% W.P.   | Preferred for sensitive foliage. Can be used on lettuce, cucumbers, tomatoes, and radishes in the greenhouse.   |
|                          | parathion                           | 1 lb. 25% W.P. or 1 pt. 25% E.C.   | Avoid excessive treatment of asters, gardenias, and white cyclamen. Can be used on vegetables in the greenhouse. For use by commercial growers only.              |

| Pest                  | Pesticide  | Dosage per 100 gal. spray unless otherwise stated                        | Remarks  |
|-----------------------|--|--|--|
| Thrips<br>(continued) | AEROSOLS and VAPORS  |  |  |
|                       | malathion  | 15% bomb using 1 lb. for 50,000 cu. ft.                                  | Look under "Aphids" for cautions. Can be used on vegetables in the greenhouse.   |
|                       | parathion, dichlorvos (Vapona), sulfotepp (Dithio), or tetradifon 15% plus sulfotepp 12.5% | As recommended for spider mites.   | Parathion can be used on vegetables in the greenhouse. Dichlorvos (Vapona) can be used on cucumbers, tomatoes, and lettuce in the greenhouse.                                    |
|                       | resmethrin   | 1% bomb using 1 lb. for 3,000 sq. ft.                                    | For exposed flower thrips on mums. Effectiveness reduced in sunlight and at temperatures above 72° F.  |
|                       | SOIL TREATMENT   |  |  |
|                       | aldicarb (Temik)   | 30 to 40 oz. Temik 10 G/ 1,000 sq. ft. soil surface (1/8 tsp./6-in. pot) | For use by commercial growers only. Aldicarb recommended only for thrips on chrysanthemums.  |
|                       | dimethoate (Cygon)   | 6 oz. 30.5% E.C. in enough water to cover 1,000 sq. ft. of bench.        | Carnations only.   |
| Whiteflies            | SPRAYS   |  |  |
|                       | endosulfan (Thiodan)   | 1 lb. 50% W.P. or 1 qt. 24% E.C.   | Can be used on tomatoes in the greenhouse. Also, 3% dust may be used. May injure mum varieties Bonnafon Deluxe, Fred Shoemsmith, and White Knight; also some geranium varieties. |
|                       | malathion  | 1½ pt. 57% E.C. or 2½ lb. 25% W.P.                                       | Look under "Aphids" for cautions. Can be used on vegetables in the greenhouse.   |
|                       | parathion  | 1 lb. 25% W.P. or 1 pt. 25% E.C.   | Avoid excessive treatment of asters, gardenias, and white cyclamen. Can be used on vegetables in the greenhouse. For use by commercial growers only.                             |
|                       | endosulfan plus malathion or parathion   | 1 lb. of 50% W.P. plus 2½ lb. of 25% W.P., or 1 lb. of 25% W.P.          |  |
|                       | resmethrin   | 1 pt. to 1 qt. 24.3% E.C.  |  |
|                       | Enstar 5E  | 10 oz. 65% E.C. when pest first noted or 20 oz. for heavy populations.   | Should be applied in pre-bloom stage. May injure bracts of some poinsettia varieties.  |

| Pest                      | Pesticide                           | Dosage per 100 gal. spray unless otherwise stated   | Remarks  |
|---------------------------|-------------------------------------|---|--|
| Whiteflies<br>(continued) | oxydemetonmethyl<br>(Meta-Systox-R) | 1½ pt. 25% E.C.   | May injure mum varieties Hurricane, Iceberg, Whitetop, and Pennant; also Easter lilies.  |
|                           | demeton<br>(Systox)                 | 1 to 1½ pt. 25% E.C.  | May injure Croft lilies. Effective on foliar nematodes. For use by commercial growers only.  |
| AEROSOLS and VAPORS       |                                     |   |  |
|                           | dichlorvos<br>(Vapona)              | 6 oz. for 10,000 cu. ft., or paint 1 fl. oz. 81% E.C. per 10,000 cu. ft. on steam pipes.      | Close greenhouse vents for 2 hrs. after application. Look under "Aphids" for cautions. Can be used on cucumbers, tomatoes, and lettuce in the greenhouse. May be phytotoxic to tomatoes. |
|                           | endosulfan<br>(Thiodan)             | 1 lb. 10% aerosol per 50,000 cu. ft.  | Check label for cautions. Can be used on tomatoes in the greenhouse.   |
|                           | resmethrin                          | 1% bomb using 1 lb. for 3,000 sq. ft.   | Effectiveness reduced in sunlight at temperatures above 72° F.   |
|                           | sulfotepp<br>(Dithio)               | 5% bomb using 1 lb. per 50,000 cu. ft.  |  |
|                           | malathion                           | 15% bomb using 1 lb. for 50,000 cu. ft.   | Look under "Aphids" for cautions. Can be used on vegetables in the greenhouse.   |
|                           | naled<br>(Dibrom)                   | Paint 1 fl. oz. 60% E.C. per 10,000 cu. ft. on steam pipes.                                   | Corrosive to metals. Look under "Aphids" for cautions. Can be used on cucumbers and tomatoes in the greenhouse.  |
| SOIL TREATMENT            |                                     |   |  |
|                           | aldicarb<br>(Temik)                 | 30 to 40 oz. Temik 10G/1,000 sq. ft. soil surface (¼ tsp./6-in. pot).                         | For use by commercial growers only. Should control whiteflies for 3 to 4 weeks. Approved on mums, poinsettias, and gerbera.  |
|                           | demeton<br>(Systox)                 | 1 to 1½ pts. 25% E.C. Apply 1 pt. of the mixture per sq. ft. of bench or ¼ pt. per 6-in. pot. | May injure African violets, Cibotium ferns, and Croft lilies. For use by commercial growers only.  |

## Resistance of Certain Aphids (Particularly Green Peach Aphids) and Red Spider Mites

There is no easy way to minimize the development of resistance except to minimize the use of chemicals; however, the following guidelines may be helpful:

(1) Prevent introduction of new strains from other sources by careful inspection of the plants upon receipt; preferably, isolate for a time. If an infestation is present, give a thorough treatment before permitting the plant to be mixed with the others.

(2) Keep conditions as cool and unfavorable for the aphids and mites as possible without interfering with the growing conditions of the plants. Aphids do best at temperatures of 72-75° F. and a relative humidity of about 75%. Mites do best at temperatures of 75° F. and above and low relative humidity. Therefore, you can lower temperature for aphid and mite control and raise humidity for mite control.

(3) Make each treatment thorough, but do not overtreat.

(4) Alternate insecticides if resistance is suspected. Be sure to select the replacement from a different chemical group. Chemicals and their groups are given below:

Aphids: (1) Chlorinated hydrocarbons—endosulfan (Thiodan); (2) Organophosphates—demeton (Systox), dichlorvos (Vapona), dimethoate (Cygon), malathion, naled (Dibrom), oxydemetonmethyl (Meta-Systox-R), parathion, sulfotepp (Dithio), acephate (Orthene); (3) Carbamate—aldicarb (Temik), pirimicarb (Pirimor); (4) Botanical—nicotine; (5) Insect growth regulator—Enstar 5E.

Spider Mites: (1) Chlorinated hydrocarbons—chlorobenzilate, dicofol (Kelthane), Pentac; (2) Organophosphates—carbophenothion (Trithion), demeton (Systox), dichlorvos (Vapona), dimethoate (Cygon), naled (Dibrom), oxydemetonmethyl (Meta-Systox-R), parathion, malathion, sulfotepp (Dithio); (3) Carbamate—aldicarb (Temik); (4) An organic carbonate—Morestan; (5) Sulfur compounds (not phosphates)—tetradifon (Tedion), Omite; (6) Organotin compound—Plictran, Vendex.

## Toxicity and Hazard

The hazard from insecticides is not only dependent upon the toxicity of the chemical but upon how it is used and what form of the insecticide might be contacted.

For human safety, when using aldicarb (Temik 10 G) use rubber gloves and a respirator when in an enclosure; never use treated plants for food or feed purposes; do not market potted plants within 4 weeks after treatment; wait 100 days before planting food crops in treated soil. Other chemicals also require special care. ALWAYS read the label for information on proper precautions.

The following table illustrates relative hazard differences due to the physical state (+ + + + = very hazardous, + = least hazardous.)

| Physical State         | Hazard   |              |          |
|------------------------|----------|--------------|----------|
|                        | To Lungs | Through Skin | By Mouth |
| Droplets of:           |          |              |          |
| Emulsions              | + +      | + + +        | +        |
| Wettables or flowables | + +      | + +          | +        |
| Solutions              | + +      | + + +        | +        |
| Smokes                 | + + +    | +            | +        |
| Vapors (aerosols)      | + + + +  | +            | +        |
| Dusts                  | + + +    | + +          | +        |
| Granules               | +        | + +          | + +      |

The *highly* toxic (less than 5 gram or 1/8 oz. active ingredient for a man):

|                  |                            |                    |
|------------------|----------------------------|--------------------|
| demeton (Systox) | carbophenothion (Trithion) | sulfotepp (Dithio) |
| parathion        | aldicarb (Temik)           | nicotine           |

The *moderately* toxic (1/8 oz. to 2 oz. for a man):

|                      |   |
|----------------------|---|
| lindane              | dichlorvos (Vapona)                     |
| endosulfan (Thiodan) | diazinon (oral)                         |
| Mesuroil             | naled (Dibrom)                          |
|                      | oxydemetonmethyl (Meta-Systox-R) (oral) |
|                      | pirimicarb (Pirimor)                    |



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