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# 1. Table of Active Ingredients with their Common Names, Mode of Action, Toxicity and Use

| Common name or chemical name or other name used | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                     |
|-------------------------------------------------|------------------|----------------------------------------------|-------------------------------------------------|
| <i>Botanicals (natural products)</i>            |                  |                                              |                                                 |
| <b>1 Bacillus thuringiensis</b>                 | St               | non-toxic to mammals                         | caterpillars                                    |
| <b>1.1 Derries see Rotenone</b>                 |                  |                                              |                                                 |
| <b>1.2 Nicotine sulfate</b>                     | C, V             | 50–60                                        | plant lice                                      |
| <b>2 Pyrethrum</b>                              | C                | 1500                                         | sucking and biting insects on ornamental plants |
| <b>3 Rotenone</b>                               | St, C            | 132–1500                                     | biting and sucking insects in seed-beds         |
| <b>4 Ryania</b>                                 | St               | 750–1200                                     | boring caterpillars                             |
| <b>4.1 Sabadilla</b>                            | C                | 2000                                         | sucking insects                                 |
| <i>Synthetical pyrethrines</i>                  |                  |                                              |                                                 |
| <b>5 Allethrin</b>                              | C                | 680–1000                                     | sucking and biting insects on ornamental plants |
| <b>6 Barthrin</b>                               | C, St            | very slight                                  | sucking and biting insects on ornamental plants |
| <b>6.1 Cyclethrin</b>                           | C                | very slight                                  | sucking and biting insects on ornamental plants |
| <b>6.2 Dimethrin</b>                            | C                | very slight                                  | sucking and biting insects on ornamental plants |
| <b>6.3 Furethrin</b>                            | C                | very slight                                  | sucking and biting insects on ornamental plants |
| <b>6.4 Phthalthrin</b>                          | C                | very slight                                  | sucking and biting insects on ornamental plants |

## Explanation of abbreviations:

\* St = Feeding or stomach poison

S = Systemic

C = Contact poison

P = Contact poison with local penetration properties

V = Vapour (fumigant)

A = Rodenticide which acts as “anticoagulant”. The active ingredient prevents the blood from clotting by stopping Prothrombin-forming which is necessary for clotting.

\*\* The DL 50 (lethal dosis) is the average dosage in milligramme of the compound, i.e. active ingredient per 1 kilogramme animal weight, needed to kill 50 per cent of animals (rats), when treated orally with this active ingredient.

| Common name or chemical name or other name used                             | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                                                                                       |
|-----------------------------------------------------------------------------|------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <i>Synthetic-organic insecticides: Chlorinated hydrocarbons</i>             |                  |                                              |                                                                                                                   |
| <b>7 Aldrin</b>                                                             | C, St, V         | 67                                           | pests in soil<br>(grubs, wireworms)                                                                               |
| <b>8 Alodan</b><br>(Chlorbicyclen)                                          | C                | 15000                                        | pests in stored crops and livestock insects                                                                       |
| <b>9 BHC</b> (Hexachloro-cyclohexane)                                       | C, St, V         | 600–1250                                     | biting and sucking insects<br>(Note: effect on taste of crops)                                                    |
| <b>9.1 Bromedan</b>                                                         | C, St            | 12 900                                       | biting insects                                                                                                    |
| <b>9.2 Bulan</b> see <b>Dilan</b>                                           |                  |                                              |                                                                                                                   |
| <b>10 Chlordane</b>                                                         | C, St, V         | 457–590                                      | pests in soil                                                                                                     |
| <b>10.1 Chlorbicyclen</b><br>see <b>Alodan</b>                              |                  |                                              |                                                                                                                   |
| <b>10.2 Chlordecone</b><br>(Kepone)                                         | St, C            | 95–140                                       | ants, flies, cockroaches                                                                                          |
| <b>10.3 Decachlorotetracyclo-<br/>decanone</b> see <b>Chlor-<br/>decone</b> |                  |                                              |                                                                                                                   |
| <b>11 DDD</b> (TDE)<br>(Rothane)                                            | C, St            | 3400                                         | caterpillars; hornworms<br>on tomato and tobacco                                                                  |
| <b>12 DDT</b><br>(Dichloro diphenyl<br>trichloroethane)                     | C, St            | 250                                          | most insect pests in agri-<br>culture with the exception<br>of plant-lice, mealybugs,<br>coccids and spider mites |
| <b>13 Dieldrin</b>                                                          | C, St            | 87                                           | see DDT                                                                                                           |
| <b>14 Dilan</b> (Bulan)<br>(Prolan)                                         | St, C            | 475–8073                                     | Mexican bean beetle and<br>salt marsh caterpillar                                                                 |
| <b>14.1 Endosulfan</b><br>see <b>Thiodan</b>                                |                  |                                              |                                                                                                                   |
| <b>15 Endrin</b>                                                            | St, C            | 3–45                                         | biting insects                                                                                                    |
| <b>15.1 gamma-BHC</b><br>see <b>Lindane</b>                                 |                  |                                              |                                                                                                                   |
| <b>16 Heptachlor</b>                                                        | C, St            | 90–130                                       | insects in soil<br>(seed dressing)                                                                                |
| <b>16.1 Hexachlorocyclo-<br/>hexane</b> see <b>BHC</b>                      |                  |                                              |                                                                                                                   |
| <b>16.2 Isobenzan</b><br>see <b>Telodrin</b>                                |                  |                                              |                                                                                                                   |

| Common name or chemical name or other name used |                                  | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                                   |
|-------------------------------------------------|----------------------------------|------------------|----------------------------------------------|---------------------------------------------------------------|
| <b>16.3</b>                                     | <b>Isodrin</b>                   | C, St            | 7-17                                         | biting insects                                                |
| <b>16.4</b>                                     | <b>Kepone</b><br>see Chlordecone |                  |                                              |                                                               |
| <b>17</b>                                       | <b>Lindane</b><br>(gamma-BHC)    | C, St, V         | 125                                          | pests in stored crops                                         |
| <b>18</b>                                       | <b>Methoxychlor</b>              | C, St            | 6000                                         | insects on fruits and vegetables (similar to DDT-insecticide) |
| <b>18.1</b>                                     | <b>Mirex</b>                     | C, St            | 235-702                                      | biting insects                                                |
| <b>19</b>                                       | <b>Perthane</b>                  | C, St            | 6600                                         | biting insects on vegetables (caterpillars) and fruit flies   |
| <b>19.1</b>                                     | <b>Prolan</b> see Dilan          |                  |                                              |                                                               |
| <b>19.2</b>                                     | <b>Rothane</b> see DDD           |                  |                                              |                                                               |
| <b>19.3</b>                                     | <b>Strobane</b>                  | C, St            | 200-250                                      | biting insects                                                |
| <b>19.4</b>                                     | <b>TDE</b> see DDD               |                  |                                              |                                                               |
| <b>20</b>                                       | <b>Telodrin</b> (Isobenzan)      | C, St            | 7                                            | biting and sucking insects; insects in soil                   |
| <b>21</b>                                       | <b>Thiodan</b><br>(Endosulfan)   | C, St            | 30-79                                        | biting and sucking insects on various crops                   |
| <b>22</b>                                       | <b>Toxaphene</b>                 | C, St            | 40-283                                       | biting insects on fruits and vegetables                       |

*Synthetic-organic insecticides: Phosphorous esters*

|             |                                                                             |          |           |                                             |
|-------------|-----------------------------------------------------------------------------|----------|-----------|---------------------------------------------|
| <b>22.1</b> | <b>Abate</b>                                                                | C, St    | 1000-3000 | sucking and biting insects                  |
| <b>22.2</b> | <b>Alamos</b> (Slam)                                                        | C, St    | > 1500    | sucking and biting insects                  |
| <b>22.3</b> | <b>Aphidan</b>                                                              | C, St, S | 86 (Mice) | sucking insects                             |
| <b>22.4</b> | <b>Azinphos(ethyl)</b><br>see Ethyl-Azinphos                                |          |           |                                             |
| <b>22.5</b> | <b>Azinphos(methyl)</b><br>(Guthion)<br>(Gusathion)                         | C, St, P | 7-18      | sucking and biting insects and spider mites |
| <b>22.6</b> | <b>Azodrin</b> see Dimethyl phosphate of 3-hydroxy-N-methyl-cis-crotonamide |          |           |                                             |
| <b>23</b>   | <b>Baitex</b> (Entex)<br>(Fenthion)<br>(Lebaycid)                           | C, St    | 200-250   | fruit flies                                 |
| <b>23.1</b> | <b>Bidrin</b><br>see Dicrotophos                                            |          |           |                                             |



| Common name or chemical name or other name used |                                                                    | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                                              |
|-------------------------------------------------|--------------------------------------------------------------------|------------------|----------------------------------------------|--------------------------------------------------------------------------|
| <b>23.2</b>                                     | <b>Bomyl</b>                                                       | C                | 31–33                                        | sucking and biting insects and spider mites                              |
| <b>23.3</b>                                     | <b>Bromophos (ethyl)</b>                                           | C                | 3745–6100                                    |                                                                          |
| <b>23.4</b>                                     | <b>Butonate</b>                                                    | C                | 1050                                         | household insects                                                        |
| <b>23.5</b>                                     | <b>Carbicion</b><br>see <b>Dicrotophos</b>                         |                  |                                              |                                                                          |
| <b>23.6</b>                                     | <b>Carbophenothion</b><br>see <b>Trithion</b>                      |                  |                                              |                                                                          |
| <b>23.7</b>                                     | <b>2-Chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate</b>      | C, St            | 12–56                                        | sucking and biting insects                                               |
| <b>23.8</b>                                     | <b>2-Chloro-1-(2,4,5-trichlorophenyl)vinyl dimethyl phosphate</b>  | C, St            | 4000–5000                                    | sucking and biting insects                                               |
| <b>24</b>                                       | <b>Chlorthion</b>                                                  | C, St, P         | 625                                          | sucking insects on vegetables and fruits                                 |
| <b>24.1</b>                                     | <b>Cidial (Phenthoate)</b>                                         | C, St            | 200–300                                      | biting and sucking insects and spider mites                              |
| <b>24.2</b>                                     | <b>Ciodrin</b>                                                     | C                | 125                                          | pests on domestic animals                                                |
| <b>24.3</b>                                     | <b>Co-Ral</b><br>see <b>Coumaphos</b>                              |                  |                                              |                                                                          |
| <b>24.4</b>                                     | <b>Coumaphos (Co-Ral)</b><br>(Resitox)<br>(Muscatox)               | S                | 13–963                                       | ectoparasites on livestock                                               |
| <b>24.5</b>                                     | <b>Coumithoate (Dition)</b>                                        | C                | 67                                           | biting and sucking insects and spider mites                              |
| <b>24.6</b>                                     | <b>Cyanthoate</b>                                                  | C                | 2–4                                          | sucking and biting insects and spider mites                              |
| <b>24.7</b>                                     | <b>Cyolane</b> see <b>Diethoxyphosphinothioyl-imine dithiolane</b> |                  |                                              |                                                                          |
| <b>24.8</b>                                     | <b>Cythioate (Proban)</b>                                          | C, St, S         | 160                                          | sucking insects and pests on animals                                     |
| <b>25</b>                                       | <b>DDVP = Dichlorvos</b>                                           | C, St, V         | 56–80                                        | sucking and biting insects and spider mites, hygiene pests               |
| <b>26</b>                                       | <b>Demeton (Systox)</b><br>(Mercaptophos)                          | S, St, C, V      | 9                                            | sucking insects, especially plant lice and spider mites                  |
| <b>27</b>                                       | <b>Diazinon</b>                                                    | C, St, P, V      | 220–270                                      | biting and sucking insects, spider mites on various crops. Pests in soil |
| <b>27.1</b>                                     | <b>Dicrotophos</b><br>(Bidrin, Carbicion)                          | C, St, S         | 27–45                                        | biting and sucking insects                                               |

| Common name or chemical name or other name used                                           | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                                        |
|-------------------------------------------------------------------------------------------|------------------|----------------------------------------------|--------------------------------------------------------------------|
| <b>28 Dimethoate</b> (Rogor)                                                              | C, St, S, P, V   | 155–500                                      | sucking insects and fruit flies, also mining larvae                |
| <b>29 Dibrom</b> (Naled)                                                                  | C                | 430                                          | caterpillars, leafhoppers, aphids, mites                           |
| <b>29.1 Dicapthon</b> (Isochlorthion)                                                     | C, St, P         | 330–400                                      | sucking insects on vegetables and fruits                           |
| <b>29.2 Dichlorvos</b> see DDVP                                                           |                  |                                              |                                                                    |
| <b>29.3 Diethoxyphosphinothioylimine dithiolane</b> (Cyolane)                             | C, St, S         | 29                                           | biting and sucking insects and spider mites                        |
| <b>29.4 Diethyl trichloropyridyl thiophosphate</b> (Dursban)                              | V, S             | 135–163                                      | soil pests                                                         |
| <b>29.5 Dimecron</b> see Phosphamidon                                                     |                  |                                              |                                                                    |
| <b>30 Dimefox</b> (Hanane)                                                                | C, St, S         | 3–5                                          | sucking insects and mites                                          |
| <b>30.1 Dimethyl phosphate of 3-hydroxy-N-methyl-cis-crotonamide</b> (Azodrin) (Nuvacron) | C, St, S         | 21                                           | biting and sucking insects and spider mites                        |
| <b>30.2 Dimethyl p-(methylthio)phenyl phosphate</b>                                       | C, St, S         | 7                                            | sucking and biting insects and spider mites                        |
| <b>30.3 Dipterex</b> see Dylox                                                            |                  |                                              |                                                                    |
| <b>30.4 Disulfoton</b> (Thiosystox) (Disyston S) (Thiodemeton) (Solvirex)                 | C, St, S         | 4                                            | sucking insects, also mining larvae                                |
|                                                                                           | C, St, S, P, V   | 12.5                                         | sucking insects, mites, also mining larvae, as granule application |
| <b>30.5 Disyston S</b> see Disulfoton                                                     |                  |                                              |                                                                    |
| <b>30.6 Dition</b> see Coumithoate                                                        |                  |                                              |                                                                    |
| <b>30.7 DMTP</b> see Baytex                                                               |                  |                                              |                                                                    |
| <b>30.8 Dursban</b> see Diethyl trichloropyridyl thiophosphate                            |                  |                                              |                                                                    |
| <b>31 Dylox</b> (Trichlorfon) (Dipterex)                                                  | C, St, S, P      | 450–699                                      | caterpillars, houseflies, livestock-pests                          |
| <b>31.1 Endothion</b>                                                                     | St, S            | 23                                           | various sucking insects                                            |
| <b>31.2 Entex</b> see Baitex                                                              |                  |                                              |                                                                    |

| Common name or chemical name or other name used |                                                                            | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                                                                                   |
|-------------------------------------------------|----------------------------------------------------------------------------|------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>32</b>                                       | <b>EPN</b> (O-ethyl-O-p-nitrophenyl phenylphosphonothioate)                | C, St            | 12-40                                        | biting and sucking insects and mites                                                                          |
| <b>33</b>                                       | <b>Ethion</b> (Nialate)                                                    | C                | 86-107                                       | aphids, scale insects, mites                                                                                  |
| <b>33.1</b>                                     | <b>Ethyl-azinphos</b>                                                      | C, St, P         | 7-18                                         | biting and sucking insects and mites                                                                          |
| <b>33.2</b>                                     | <b>Famphur</b> (Famophos)                                                  | S                | 35-62                                        | pests on livestock                                                                                            |
| <b>33.3</b>                                     | <b>Fenchlorphos</b> (Ronnel)                                               | S, C             | 1000-3000                                    | pests on livestock                                                                                            |
| <b>33.4</b>                                     | <b>Fenitrothion</b> (Folithion) (Sumithion)                                | C, St, S         | 250-673                                      | sucking and biting insects (stemborers)                                                                       |
| <b>33.5</b>                                     | <b>Fensulfothion</b>                                                       | C, V             | 2-11                                         | insects and nematodes                                                                                         |
| <b>33.6</b>                                     | <b>Fenthion</b> see Baitex                                                 |                  |                                              |                                                                                                               |
| <b>33.7</b>                                     | <b>2-Fluoroethyl mercaptophenylacetate, O,O-diethyl phosphorodithioate</b> | C                | 5                                            | sucking and biting insects and spider mites                                                                   |
| <b>33.8</b>                                     | <b>Folithion</b> see Fenitrothion                                          |                  |                                              |                                                                                                               |
| <b>33.9</b>                                     | <b>Formocarbam</b>                                                         | C, St, S         | 400                                          | sucking and biting insects and spider mites                                                                   |
| <b>33.10</b>                                    | <b>Formothion(iso)</b> (Anthio)                                            | C, St, S, P      | 375-535                                      | sucking insects, fruit flies, mining larvae and mites                                                         |
| <b>33.11</b>                                    | <b>Fostion</b> see Prothoate                                               |                  |                                              |                                                                                                               |
| <b>33.12</b>                                    | <b>GS 13005</b> see Supracid                                               |                  |                                              |                                                                                                               |
| <b>33.13</b>                                    | <b>Gusathion</b> see Azinphosmethyl                                        |                  |                                              |                                                                                                               |
| <b>34</b>                                       | <b>Guthion</b> see Azinphosmethyl                                          |                  |                                              |                                                                                                               |
| <b>34.1</b>                                     | <b>Hanane</b> see Dimefox                                                  |                  |                                              |                                                                                                               |
| <b>34.2</b>                                     | <b>Imidan</b>                                                              | C                | 147-216                                      | biting and sucking insects and spider mites                                                                   |
| <b>34.3</b>                                     | <b>Isochlorthion</b> see Dicapthon                                         |                  |                                              |                                                                                                               |
| <b>34.4</b>                                     | <b>Lebaycid</b> see Baitex                                                 |                  |                                              |                                                                                                               |
| <b>35</b>                                       | <b>Malathion</b> (Mercaptothion)                                           | St, C, V         | 1400                                         | biting and sucking insects on various crops and pests in stored crops. Ectoparasites on human beings and peds |

| Common name or chemical name or other name used |                                                                              | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                 |
|-------------------------------------------------|------------------------------------------------------------------------------|------------------|----------------------------------------------|---------------------------------------------|
| 35.1                                            | <b>Mecarbam</b><br>(Murfotox)                                                | C                | 15–35                                        | sucking and biting insects and spider mites |
| 35.2                                            | <b>Menazon</b>                                                               | C                | 1200–1600                                    | plant lice                                  |
| 35.3                                            | <b>Mercaptophos</b><br>see Demeton                                           |                  |                                              |                                             |
| 35.4                                            | <b>Mercaptothion</b><br>see Malathion                                        |                  |                                              |                                             |
| 35.5                                            | <b>Methidathion</b><br>see Supracide                                         |                  |                                              |                                             |
| 35.6                                            | <b>Methyl-azinphos</b><br>see Guthion                                        |                  |                                              |                                             |
| 36                                              | <b>Methyl-demeton</b><br>(Oxydemetonmethyl)                                  | St, S, C, V      | 138                                          | saw wasps, see also Demeton                 |
| 37                                              | <b>Methyl-parathion</b>                                                      | C, St, P, V      | 9–42                                         | biting and sucking insects on various crops |
| 38                                              | <b>Methyl-trithion</b>                                                       | C, St            | 182                                          | biting and sucking insects and spider mites |
| 38.1                                            | <b>Mevinphos</b><br>see Phosdrin                                             |                  |                                              |                                             |
| 38.2                                            | <b>Morphothion(iso)</b>                                                      | C, St, S         | 200                                          | biting and sucking insects and spider mites |
| 38.3                                            | <b>Murfotox</b><br>see Mecarbam                                              |                  |                                              |                                             |
| 38.4                                            | <b>Muscatox</b><br>see Coumaphos                                             |                  |                                              |                                             |
| 38.5                                            | <b>Naled</b> see Dibrom                                                      |                  |                                              |                                             |
| 38.6                                            | <b>Narlese</b>                                                               |                  |                                              |                                             |
| 38.7                                            | <b>Nemacide</b> (O-2,4-dichlorophenyl O,O-diethyl phosphorothioate)          | C, St, V, P      | 270                                          | insects, spider mites, nematodes            |
| 38.8                                            | <b>Nialate</b> see Ethion                                                    |                  |                                              |                                             |
| 38.9                                            | <b>Nuvacon</b> see Dimethyl phosphate of 3-hydroxy-N-methyl-cis-crotonamide  |                  |                                              |                                             |
| 38.10                                           | <b>O-(2-chloro-1-(2,5-dichlorophenyl)vinyl) O,O-diethyl phosphorothioate</b> | C, St            | 146                                          | biting and sucking insects                  |

| Common name or chemical name or other name used                          | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                               |
|--------------------------------------------------------------------------|------------------|----------------------------------------------|-----------------------------------------------------------|
| <b>38.11 O-ethyl-O-p-nitro-phenyl phenyl-phosphonothioate</b><br>see EPN |                  |                                              |                                                           |
| <b>38.12 Ompa</b> see Schradan                                           |                  |                                              |                                                           |
| <b>38.13 O-p-cyanophenyl O,O-dimethyl phosphorothioate</b>               | C, St            | 18-238                                       | biting and sucking insects                                |
| <b>38.14 Oxydemetonmethyl</b><br>see Methyl-demeton                      |                  |                                              |                                                           |
| <b>39 Parathion</b>                                                      | C, St, P, V      | 3-30                                         | biting and sucking insects, spider mites on various crops |
| <b>39.1 Pestox III</b><br>see Schradan                                   |                  |                                              |                                                           |
| <b>39.2 Phenthoate</b> see Cidial                                        |                  |                                              |                                                           |
| <b>40 Phorate</b> (Thimet)                                               | C, St, S         | 4                                            | biting and sucking insects                                |
| <b>40.1 Phosalone</b>                                                    | C, St            |                                              | biting and sucking insects                                |
| <b>41 Phosdrin</b><br>(Mevinphos)                                        | C, St, S, V      | 13                                           | biting and sucking insects                                |
| <b>42 Phosphamidon</b><br>(Dimecron)                                     | C, St, S         | 17-30                                        | biting and sucking insects, spider mites                  |
| <b>43 Phostex</b>                                                        | C                | 2500                                         | scale insects, spider mites                               |
| <b>44 Potasan</b>                                                        | C, St, V         | 19                                           | biting insects (beetles)                                  |
| <b>44.1 Proban</b> see Cythioate                                         |                  |                                              |                                                           |
| <b>44.2 Prolate</b>                                                      |                  |                                              |                                                           |
| <b>44.3 Prothidathion</b>                                                | C, St            |                                              | biting and sucking insects                                |
| <b>44.4 Prothoate</b> (Fostion)                                          | C                | 14-25                                        | biting and sucking insects                                |
| <b>45 Resitox</b><br>see Coumaphos                                       |                  |                                              |                                                           |
| <b>45.1 Rogor</b> see Dimethoate                                         |                  |                                              |                                                           |
| <b>45.2 Ronnel</b><br>see Fenchlorphos                                   |                  |                                              |                                                           |
| <b>45.3 Ruelene</b>                                                      | C, S             | 950-1000                                     | pests on livestock                                        |
| <b>46 Schradan</b> (Ompa)<br>(Pestox III)                                | C, St, S         | 10                                           | sucking insects and spider mites                          |
| <b>46.1 Slam</b> see Alamos                                              |                  |                                              |                                                           |

| Common name or chemical name or other name used |                                                            | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                                  |
|-------------------------------------------------|------------------------------------------------------------|------------------|----------------------------------------------|--------------------------------------------------------------|
| 46.2                                            | <b>S,S'-benzylidene-(O,O-dimethyl phosphorodithioate)</b>  | C, St            | 280                                          | biting and sucking insects                                   |
| 46.3                                            | <b>Sulfotepp</b>                                           | C                | 5                                            | aphids and mites on fruits, vegetables and forage crops      |
| 46.4                                            | <b>Sumithion</b><br>see <b>Fenitrothion</b>                |                  |                                              |                                                              |
| 46.5                                            | <b>Supracid</b> (Ultracid)<br>(GS 13005)<br>(Methidathion) | C, St, P         | 25-48                                        | biting and sucking insects and spider mites                  |
| 46.6                                            | <b>Systox</b> see <b>Demeton</b>                           |                  |                                              |                                                              |
| 47                                              | <b>Tepp</b>                                                | C                | 0.5-2                                        | aphids and mites on fruits, vegetables, forage crops         |
| 47.1                                            | <b>Thimet</b> see <b>Phorate</b>                           |                  |                                              |                                                              |
| 47.2                                            | <b>Thiocron</b>                                            | C                | 600-660                                      | biting and sucking insects                                   |
| 47.3                                            | <b>Thiodemeton</b><br>see <b>Disulfoton</b>                |                  |                                              |                                                              |
| 48                                              | <b>Thiometon</b><br>(Ekatin)                               | C, St, S         | 125                                          | sucking insects and spider mites                             |
| 48.1                                            | <b>Thionazin</b><br>see <b>Zinophos</b>                    |                  |                                              |                                                              |
| 48.2                                            | <b>Thiosystox</b><br>see <b>Disulfoton</b>                 |                  |                                              |                                                              |
| 48.3                                            | <b>Trichlorfon</b> see <b>Dylox</b>                        |                  |                                              |                                                              |
| 48.4                                            | <b>Trichloronate</b>                                       | C, St            | 16-35                                        | sucking and biting insects                                   |
| 49                                              | <b>Trithion</b><br>(Carbophenothion)                       | C, St, P         | 28-100                                       | biting and sucking insects and spider mites on various crops |
| 49.1                                            | <b>Ultracid</b> see <b>Supracid</b>                        |                  |                                              |                                                              |
| 49.2                                            | <b>Vamidothion</b>                                         | C                | 64-100                                       | biting and sucking insects                                   |
| 49.3                                            | <b>Zinophos</b><br>(Thionazin)                             | C                | 9-16                                         | insects and nematodes                                        |
| 49.4                                            | <b>Zytron</b>                                              | C, St, S         | 270                                          | sucking and biting insects                                   |

*Synthetic-organic insecticides: Carbamates*

- 49.5 **Aminocarb** see **Matacil**  
 49.6 **Arprocarb** see **Unden**  
 49.7 **Baygon** see **Propoxur**

| Common name or chemical name or other name used                      | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                                 |
|----------------------------------------------------------------------|------------------|----------------------------------------------|---------------------------------------------|
| <b>49.8 Butacarb</b>                                                 | C                |                                              | ectoparasites on animals                    |
| <b>49.9 Carbaryl see Sevin</b>                                       |                  |                                              |                                             |
| <b>49.10 2,3-Dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate</b> | C, St, S         |                                              | sucking and biting insects and nematodes    |
| <b>50 Dimetan</b>                                                    | C, St            | 150                                          | plant lice and flies                        |
| <b>51 Dimetilan</b>                                                  | St, C            | 60–70                                        | plant lice and flies (houseflies)           |
| <b>52 Isolan</b>                                                     | C, St, S, V      | 17                                           | plant lice                                  |
| <b>52.1 Matacil (Aminocarb)</b>                                      | St               | 30–50                                        | biting insects on crops                     |
| <b>52.2 Mercaptodimethur see Mesurol</b>                             |                  |                                              |                                             |
| <b>52.3 Mesurol (Mercaptodimethur) (Methiocarb)</b>                  | C, St            | 87–135                                       | biting and sucking insects and spider mites |
| <b>52.4 Methiocarb see Mesurol</b>                                   |                  |                                              |                                             |
| <b>52.5 Minacide</b>                                                 | C, St, V         | 39–247                                       | biting and sucking insects                  |
| <b>52.6 Propoxur (Baygon)</b>                                        | C, St            | 100–150                                      | cockroaches and other hygiene pests         |
| <b>53 Sevin (Carbaryl)</b>                                           | C, St            | 500–700                                      | biting and sucking insects                  |
| <b>53.1 5,6,7,8-Tetrahydro-1-naphthyl methylcarbamate</b>            | C, St            | 470                                          | biting and sucking insects                  |
| <b>53.2 3,4,5-Trimethylphenyl methylcarbamate</b>                    | C, St            | 178                                          | biting and sucking insects                  |
| <b>53.3 Unden (Arprocarb)</b>                                        | C, St            | 95–128                                       | biting and sucking insects                  |
| <b>54 Zectran</b>                                                    | C, St, S         | 15–63                                        | biting and sucking insects                  |

*Synthetic-organic insecticides: Carbazoles*

|                              |    |             |                                 |
|------------------------------|----|-------------|---------------------------------|
| <b>55 Tetranitrocarbazol</b> | St | very slight | caterpillars (selective effect) |
|------------------------------|----|-------------|---------------------------------|

*Synthetic-organic insecticides: Phenols*

|                                     |       |         |                        |
|-------------------------------------|-------|---------|------------------------|
| <b>56 Dinitro-o-cresol</b>          | C, St | 26–65   | locusts and as ovicide |
| <b>56.1 Dinitrobutylphenol</b>      | C     | 50      | locusts and as ovicide |
| <b>56.2 PCP = Pentachlorophenol</b> | C     | 125–210 | locusts and as ovicide |

| Common name or chemical name or other name used                                                 | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against               |
|-------------------------------------------------------------------------------------------------|------------------|----------------------------------------------|---------------------------|
| <i>Synthetic-organic insecticides: Miscellaneous compounds</i>                                  |                  |                                              |                           |
| <b>56.3 Lethane 384</b>                                                                         | C                | 90–250                                       | flies (household-insects) |
| <b>56.4 Thanite</b> (Terpinyl thiocynoacetate)                                                  | C                |                                              | flies (household-insects) |
| <i>Inorganic insecticides</i>                                                                   |                  |                                              |                           |
| <b>57 Calcium arsenate</b>                                                                      | St               | 20                                           | biting insects            |
| <b>58 Cryolite</b> (Na-alum-fluoride)                                                           | St               | 200                                          | biting insects            |
| <b>59 Lead arsenate</b>                                                                         | St               | 100                                          | biting insects            |
| <b>59.1 Thallium acetate</b>                                                                    | St               |                                              | biting insects            |
| <b>59.2 Thallium sulfate</b>                                                                    | St               |                                              | biting insects            |
| <i>Mineral oils</i>                                                                             |                  |                                              |                           |
| <b>60 White oils</b><br><b>various types of</b><br><b>vaseline-oils:</b><br>(dormant spray oil) | C                | too high to measure                          | scale insects             |

| Common name or chemical name or other name used | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Acute vapour toxicity<br>in ppm | Use |
|-------------------------------------------------|------------------|----------------------------------------------|---------------------------------|-----|
|-------------------------------------------------|------------------|----------------------------------------------|---------------------------------|-----|

*\*Fumigants (Vapour effect) Miscellaneous compounds*

|                                                |   |         |      |                                        |
|------------------------------------------------|---|---------|------|----------------------------------------|
| <b>60.1 Bromomethane</b><br>see Methyl bromide |   |         |      |                                        |
| <b>60.2 Carbon bisulfide</b>                   | V |         | 200  | as space fumigant                      |
| <b>61 Ethylene dibromide</b>                   | V | 108–170 | 200  | as soil fumigant                       |
| <b>62 Ethylene dichloride</b>                  | V | 670–890 | 1000 | as space fumigant                      |
| <b>63 Ethylene oxide</b>                       | V |         | 500  | as space fumigant                      |
| <b>63.1 Ethyl formate</b>                      | V | 4290    | 330  | as space fumigant                      |
| <b>63.2 Hydrogen cyanide</b>                   | V |         | 40   | as soil fumigant<br>and space fumigant |
| <b>64 Methyl bromide</b><br>(Bromomethane)     | V |         | 200  | as soil fumigant<br>and space fumigant |
| <b>64.1 Methylene chloride</b>                 | V |         | 5000 | as space fumigant                      |
| <b>64.2 Methyl chloroform</b>                  | V |         | 1000 | as space fumigant                      |



| Common name or chemical name or other name used           | Mode of action * | Acute oral toxicity **<br>DL 50<br>(mg/kg rats) | Acute vapour toxicity<br>in ppm | Use               |
|-----------------------------------------------------------|------------------|-------------------------------------------------|---------------------------------|-------------------|
| <b>64.3 Methyl isothiocyanate</b><br>(Methyl mustard oil) | V                | 100                                             |                                 | as soil fumigant  |
| <b>64.4 Naphthalene</b>                                   |                  |                                                 |                                 | as space fumigant |
| <b>65 Paradichlorobenzene</b>                             | V                | 500–5000                                        | 500                             | as space fumigant |
| <b>66 Potassium cyanide</b>                               | V                | 1                                               |                                 | as space fumigant |
| <b>66.1 Propargyl bromide</b>                             | V                | 53–85                                           | 120                             | as soil fumigant  |
| <b>66.2 Propylene oxide</b>                               | V                |                                                 | 3000                            | as space fumigant |
| <b>67 Sulfur dioxide</b>                                  | V                | 2–3                                             | 40                              | as space fumigant |
| <b>67.1 Sulfuryl fluoride</b>                             | V                |                                                 | 400                             | as space fumigant |
| <b>67.2 Tetrachloroethene</b>                             | V                | 2200–5000                                       | 1000                            | as space fumigant |
| <b>67.3 Tetrachloromethane</b>                            | V                | 5730–9770                                       | 300                             | as space fumigant |
| <b>67.4 Tetrachloro-thiophene</b>                         | V                | 780                                             |                                 | as soil fumigant  |

| Common name or chemical name or other name used                               | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use            |
|-------------------------------------------------------------------------------|------------------|----------------------------------------------|----------------|
| <i>Synthetic-organic acaricides: Chlorinated hydrocarbons</i>                 |                  |                                              |                |
| <b>68 Chlorobenzilate</b>                                                     | C                | 4850                                         | as mite-killer |
| <b>68.1 Chloropropylate</b>                                                   | C                | > 5000                                       | as mite-killer |
| <b>68.2 Dicofol see Kelthane</b>                                              |                  |                                              |                |
| <b>69 Dimite</b>                                                              | C                | 926–1390                                     | as mite-killer |
| <b>70 Kelthane (Dicofol)</b>                                                  | C                | 575–1330                                     | as mite-killer |
| <i>Synthetic-organic acaricides: Phosphorous esters</i>                       |                  |                                              |                |
| <b>71 Delnav (Dioxathion)</b>                                                 | C                | 110                                          | as mite-killer |
| <b>71.1 Dinobuton</b>                                                         | C                | 100–155                                      | as mite-killer |
| <b>71.2 Dioxathion see Delnav</b>                                             |                  |                                              |                |
| <b>71.3 Dursban</b>                                                           | C                | 97–276                                       | as mite-killer |
| <b>71.4 Isopropyl mercapto-phenylacetate, O,O-dimethyl phosphorodithioate</b> | C                | 400–500                                      | as mite-killer |

| Common name or chemical name or other name used                                        | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use                                                                   |
|----------------------------------------------------------------------------------------|------------------|----------------------------------------------|-----------------------------------------------------------------------|
| <b>71.5 O-ethyl S-phenyl ethylphosphono-dithioate</b>                                  | C                | 16                                           | as mite-killer                                                        |
| <b>72 Phenkapton</b>                                                                   | C                | 182                                          | as mite-killer                                                        |
| <i>Synthetic-organic acaricides: Carbamates</i>                                        |                  |                                              |                                                                       |
| <b>72.1 Temik</b> (2-Methyl-2-(methylthio) propionaldehyde O-methylcarbamoyl)-oxime    | C, St, S         | 0.93                                         | as mite-killer<br>(also effective against soil insects and nematodes) |
| <b>72.2 Tranid</b> (5-Chlor-6-oxo-2-norbornane-carbonitrile O-(methyl-carbamoyl)-oxime | C, St, S         | 19-26                                        | as mite-killer<br>(also with insecticidal effect)                     |
| <i>Synthetic-organic acaricides: Sulfur compounds</i>                                  |                  |                                              |                                                                       |
| <b>72.3 Animert</b> see <b>Tetrasul</b>                                                |                  |                                              |                                                                       |
| <b>73 Aramite</b>                                                                      | C                | 3900                                         | as mite-killer                                                        |
| <b>73.1 Chlorbenside</b> (Chlorocide) (Mitox)                                          | C                | 2000-10000                                   | as mite-killer                                                        |
| <b>73.2 Chlorfenson</b> see <b>Ovex</b>                                                |                  |                                              |                                                                       |
| <b>73.3 Chlorocide</b> see <b>Chlorbenside</b>                                         |                  |                                              |                                                                       |
| <b>74 Fenson</b> (PCPBS) (Trifenson)                                                   | C                | 1000                                         | as mite-killer                                                        |
| <b>74.1 Fluorbenside</b>                                                               | C                |                                              | as mite-killer                                                        |
| <b>75 Genite</b>                                                                       | C                | 1400-1870                                    | as mite-killer                                                        |
| <b>75.1 Miticide</b> see <b>Ovex</b>                                                   |                  |                                              |                                                                       |
| <b>75.2 Mitox</b> see <b>Chlorbenside</b>                                              |                  |                                              |                                                                       |
| <b>76 Ovex</b> (Chlorfenson) (Miticide) (Ovotran) (Trichlorfenson)                     | C, P             | 2000                                         | as mite-killer and ovicide                                            |
| <b>76.1 Ovotran</b> see <b>Ovex</b>                                                    |                  |                                              |                                                                       |
| <b>76.2 PCPBS</b> see <b>Fenson</b>                                                    |                  |                                              |                                                                       |
| <b>77 Sulphenone</b>                                                                   | C                | 1400                                         | as mite-killer                                                        |
| <b>78 Tedion</b> (Tetradifon)                                                          | C, P             | 14700                                        | as mite-killer, ovicide                                               |

| Common name or chemical name or other name used              |                                                                                              | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against                         |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------|----------------------------------------------|-------------------------------------|
| 78.1                                                         | <b>Tetradifon</b><br>see <b>Tedion</b>                                                       |                  |                                              |                                     |
| 78.2                                                         | <b>Tetrasul</b> (Animert)                                                                    | C                | 6800–14700                                   | as mite-killer                      |
| 78.3                                                         | <b>Trichlorfenson</b><br>see <b>Ovex</b>                                                     |                  |                                              |                                     |
| 78.4                                                         | <b>Trifenson</b> see <b>Fenson</b>                                                           |                  |                                              |                                     |
| <i>Synthetic-organic acaricides: Miscellaneous compounds</i> |                                                                                              |                  |                                              |                                     |
| 78.5                                                         | <b>Acracid</b><br>see <b>Binapacril</b>                                                      |                  |                                              |                                     |
| 78.6                                                         | <b>Azobenzene</b>                                                                            | C                |                                              | as mite-killer                      |
| 78.7                                                         | <b>Binapacryl</b><br>(Acracid)<br>(Morocide)                                                 | C                | 136–186                                      | as mite-killer                      |
| 78.8                                                         | <b>Dinitrobutylphenol</b><br>(Dinoseb)<br>(DNBP)                                             | C                | 50                                           | as mite-killer                      |
| 78.9                                                         | <b>Dinocap</b><br>see <b>Karathane</b>                                                       |                  |                                              |                                     |
| 78.10                                                        | <b>Dinoseb</b> see <b>Dinitrobutylphenol</b>                                                 |                  |                                              |                                     |
| 78.11                                                        | <b>DNBP</b> see <b>Dinitrobutylphenol</b>                                                    |                  |                                              |                                     |
| 78.12                                                        | <b>Eradex</b> (Thioquinox)                                                                   | C                | 3400                                         | as mite-killer                      |
| 79                                                           | <b>Karathane</b> (Dinocap)                                                                   | C                | 714                                          | as fungicide with acaricidal effect |
| 79.1                                                         | <b>Morestan</b><br>(Oxythioquinox)                                                           | C                | 3000                                         | as mite-killer<br>(Fungicide)       |
| 79.2                                                         | <b>Morocide</b><br>see <b>Binapacryl</b>                                                     |                  |                                              |                                     |
| 80                                                           | <b>Neotran</b>                                                                               | C                | 6000                                         | as mite-killer                      |
| 80.1                                                         | <b>Oxythioquinox</b><br>see <b>Morestan</b>                                                  |                  |                                              |                                     |
| 81                                                           | <b>Thioquinox</b><br>see <b>Eradex</b>                                                       |                  |                                              |                                     |
| <i>Inorganic acaricides</i>                                  |                                                                                              |                  |                                              |                                     |
| 82                                                           | <b>Sulphur</b><br>(lime-sulphur,<br>wetttable sulphur,<br>dispersible sulphur<br>and others) | C, (V)           | too high to<br>measure                       | as mite-killer<br>(Fungicide)       |

| Common name or other name used  | Mode of action * | Use                    |
|---------------------------------|------------------|------------------------|
| <i>Attractants</i> <sup>1</sup> |                  |                        |
| 82.1 Anethol                    | V                | to attract fruit flies |
| 82.2 Angelicasamenoel           | V                | to attract fruit flies |
| 82.3 Anisylacetone              | V                | to attract fruit flies |
| 83 Eugenol (Methyl)             | V                | to attract fruit flies |
| 83.1 Geraniol                   | V                | to attract fruit flies |
| 83.2 Gyplure                    | V                | to attract fruit flies |
| 84 Medlure                      | V                | to attract fruit flies |
| 84.1 Que-Lure (Q-Lure)          | V                | to attract fruit flies |
| 85 Siglure                      | V                | to attract fruit flies |
| 85.1 Trimedlure                 | V                | to attract fruit flies |
| 86 Proteinhydrolysate of yeast  | V                | to attract fruit flies |

<sup>1</sup> Attractants are compounds which attract the insects by their scent.

| Common name or chemical name or other designation for the chemical | Effective against              | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Application                                            |
|--------------------------------------------------------------------|--------------------------------|----------------------------------------------|--------------------------------------------------------|
| <i>Repellents</i> <sup>2</sup>                                     |                                |                                              |                                                        |
| 87 BEP see 2-Butyl-2-ethyl-1,3-propanediol                         |                                |                                              |                                                        |
| 88 Benzylbenzoate                                                  | fleas, ticks, mites (chiggers) | 1700                                         | Impregnation of clothing                               |
| 89 Butopyronoxyl (Indalone)                                        | flies, mosquitoes              | 7400                                         | Apply solution evenly on skin surfaces to be protected |
| 90 Butoxy poly-propylene glycol (Crag Fly Repellent)               | mosquitoes                     | 9100–11200                                   | Apply solution evenly on skin surfaces to be protected |
| 91 2-Butyl-2-ethyl-1,3-propanediol (BEP)                           | mosquitoes                     | 5040                                         | Apply solution evenly on skin surfaces to be protected |

<sup>2</sup> Repellents are compounds which prevent insects from attacking their hosts to suck blood.

| Common name or chemical name or other designation for the chemical                                                                   | Effective against                                   | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Application                                            |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------|--------------------------------------------------------|
| <b>92</b> <b>Deet</b> (N,N-diethyl-m-toluamide)                                                                                      | horse-flies,<br>mosquitoes,<br>bedbugs,<br>chiggers | 1950–2000                                    | Apply solution evenly on skin surfaces to be protected |
| <b>93</b> <b>Dibutyl succinate</b> (Tabutrex)                                                                                        | flies                                               | 8000                                         | Apply solution evenly on skin surfaces to be protected |
| <b>94</b> <b>Diethyltoluamide</b> see Deet                                                                                           |                                                     |                                              |                                                        |
| <b>95</b> <b>Dimethyl carbate</b>                                                                                                    | mosquitoes                                          | 1000                                         | Apply solution evenly on skin surfaces to be protected |
| <b>96</b> <b>Dimethyl phthalate</b> (DMP)                                                                                            | mosquitoes                                          | 6900–8200                                    | Apply solution evenly on skin surfaces to be protected |
| <b>97</b> <b>Di-n-butyl phthalate</b> (DBP)                                                                                          | fleas, ticks,<br>chiggers                           | 12000–> 20000                                | Impregnation of clothing                               |
| <b>98</b> <b>Di-n-propyl isocinchomeronate</b> (Di-n-propyl 2,5-pyridine-dicarboxylate) (MGK-Rep. 326)                               | mosquitoes                                          | 5230–7230                                    | Apply solution evenly on skin surfaces to be protected |
| <b>99</b> <b>Ethyl hexanediol</b> (Rutgers 612)                                                                                      | flies, mosqui-<br>toes, fleas,<br>mites             | 1400–2400                                    | Apply solution evenly on skin surfaces to be protected |
| <b>100</b> <b>1,5a,6,9,9a,9b-Hexahydro-4a(4H)-di-benzofurancarboxaldehyde</b> (2,3,4,5-bis(2-butylene-tetrahydrofural) (MGK-Rep. 11) | mosquitoes                                          | 2500                                         | Apply solution evenly on skin surfaces to be protected |
| <b>101</b> <b>Indalone</b> see Butopyronoxyl                                                                                         |                                                     |                                              |                                                        |
| <b>102</b> <b>N,N-diethyl-m-toluamide</b> see Deet                                                                                   |                                                     |                                              |                                                        |
| <b>103</b> <b>O-chloro-N,N-diethylbenzamide</b>                                                                                      | mosquitoes,<br>horse-flies,<br>bedbugs,<br>chiggers |                                              | Apply solution evenly on skin surfaces to be protected |
| <b>104</b> <b>2-(Octylthio)ethanol</b> (MGK-Rep. 874)                                                                                | mosquitoes                                          | 8500                                         | Apply solution evenly on skin surfaces to be protected |

| Common name or chemical name or other designation for the chemical |                                                   | Effective against                          | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Application                                            |
|--------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------------|
| <b>105</b>                                                         | <b>N-butylacetanilide (BAA)</b>                   | fleas, ticks                               | 2830                                         | Impregnation of clothing                               |
| <b>106</b>                                                         | <b>N,N-diethyl-m-toluamide see Deet</b>           |                                            |                                              |                                                        |
| <b>107</b>                                                         | <b>N,N-diethyl-o-toluamide (O-Det) (Detamide)</b> | horse-flies, mosquitoes, bedbugs, chiggers |                                              | Apply solution evenly on skin surfaces to be protected |
| <b>108</b>                                                         | <b>Rutgers 612 see Ethyl hexanediol</b>           |                                            |                                              |                                                        |
| <b>109</b>                                                         | <b>Tabutrex see Dibutyl succinate</b>             |                                            |                                              |                                                        |

| Common name or other name used      |                               | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use as              |
|-------------------------------------|-------------------------------|----------------------------------------------|---------------------|
| <i>Chemosterilants</i> <sup>3</sup> |                               |                                              |                     |
| <b>110</b>                          | <b>Apholate</b>               | 90                                           | Fertility regulator |
| <b>111</b>                          | <b>Aphomide</b>               |                                              | Fertility regulator |
| <b>112</b>                          | <b>Aphoxide (Tepa)</b>        | 126–252                                      | Fertility regulator |
| <b>113</b>                          | <b>Chlorambucil</b>           |                                              | Fertility regulator |
| <b>114</b>                          | <b>5-Fu (5-Fluorauracil)</b>  |                                              | Fertility regulator |
| <b>115</b>                          | <b>Hempa</b>                  | > 2500                                       | Fertility regulator |
| <b>116</b>                          | <b>Metepa see Metaphoxide</b> |                                              |                     |
| <b>117</b>                          | <b>Metaphoxide (Metepa)</b>   | 93–277                                       | Fertility regulator |
| <b>118</b>                          | <b>TEM see Tretamine</b>      |                                              |                     |
| <b>119</b>                          | <b>Tepa see Aphoxide</b>      |                                              |                     |
| <b>120</b>                          | <b>Tretamine (TEM)</b>        |                                              | Fertility regulator |

<sup>3</sup> Chemosterilants are compounds which sterilize the insects by contact or feeding.

| Common name or chemical name or other designation for the chemical                         |                                                                                              | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Remarks                 |
|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------|
| <i>Synthetic-organic activators<sup>4</sup> or synergists<sup>4</sup> for insecticides</i> |                                                                                              |                                              |                         |
| <b>121</b>                                                                                 | <b>Butocide</b><br>see <b>Piperonyl butoxide</b>                                             |                                              |                         |
| <b>122</b>                                                                                 | <b>N,N-di-n-butyl-p-chlorobenzene-sulfonamide (Warf)</b>                                     | 500                                          | Antiresistant for DDT   |
| <b>123</b>                                                                                 | <b>N-octyl bicycloheptene dicarboximide</b><br>(Octacide 264)<br>(MGK 264)<br>(Van Dyke 264) | 2800                                         |                         |
| <b>124</b>                                                                                 | <b>Octachloro-dipropylether</b><br>(S 421)                                                   | 2500                                         |                         |
| <b>125</b>                                                                                 | <b>Piperonal bis (2-(2-butoxyethoxy)-ethyl)acetal</b><br>(Tropital)                          | 4000                                         | Synergist for pyrethrum |
| <b>126</b>                                                                                 | <b>Piperonyl butoxide</b><br>(Butocide)                                                      | 7500                                         | Synergist for pyrethrum |
| <b>127</b>                                                                                 | <b>Propyl isome</b>                                                                          | 15000                                        | Synergist for pyrethrum |
| <b>128</b>                                                                                 | <b>Sesamex (Sesoxane)</b>                                                                    | 2000-2270                                    |                         |
| <b>129</b>                                                                                 | <b>Succinid-acid-di-n-butyl ester</b>                                                        |                                              |                         |
| <b>130</b>                                                                                 | <b>Sulfoxide</b>                                                                             | 2000                                         |                         |
| <b>131</b>                                                                                 | <b>Tropital see Piperonal bis (2-(2-butoxyethoxy)ethyl)acetal</b>                            |                                              |                         |
| <b>132</b>                                                                                 | <b>Warf see N,N-di-n-butyl-p-chlorobenzenesulfonamide</b>                                    |                                              |                         |

<sup>4</sup> Activators or Synergists are not insecticidal compounds, but improve the efficacy of insecticides when added.

| Common name or chemical name or other designation for the chemical | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against |
|--------------------------------------------------------------------|------------------|----------------------------------------------|-------------|
|--------------------------------------------------------------------|------------------|----------------------------------------------|-------------|

*Molluscocides: Miscellaneous compounds*

|     |                                 |   |                  |                  |
|-----|---------------------------------|---|------------------|------------------|
| 133 | <b>Bayluscid</b>                | C | 5000             | water snails     |
| 134 | <b>Copper</b>                   | C |                  | slugs and snails |
| 135 | <b>Lime</b> (Calcium hydroxide) | C |                  | slugs and snails |
| 136 | <b>Lime</b> (Calcium oxide)     | C |                  | slugs and snails |
| 137 | <b>Metaldehyde</b>              | C | 250–600<br>(Dog) | slugs and snails |

| Common name or chemical name or other name used | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use |
|-------------------------------------------------|------------------|----------------------------------------------|-----|
|-------------------------------------------------|------------------|----------------------------------------------|-----|

*Nematocides: Miscellaneous compounds*

|     |                                                           |   |            |                  |
|-----|-----------------------------------------------------------|---|------------|------------------|
| 138 | <b>Agren</b>                                              | V | 240 (mice) | as soil fumigant |
| 139 | <b>Allyl alcohol</b>                                      | V |            | as soil fumigant |
| 140 | <b>Chloropicrin</b>                                       | V | 1–5        | as soil fumigant |
| 141 | <b>Chloro-bromopropan</b>                                 | V | 9          | as soil fumigant |
| 142 | <b>Dazomet</b> see <b>Mylone</b>                          |   |            |                  |
| 143 | <b>DD</b><br>(1,3-Dichloropropene<br>1,2-Dichloropropane) | V | 250–500    | as soil fumigant |
| 144 | <b>Dorlone</b><br>(Telone)<br>(EDB)                       | V |            | as soil fumigant |
| 145 | <b>EDB</b> see <b>Dorlone</b>                             |   |            |                  |
| 146 | <b>Ethylene-dibromide</b>                                 | V | 146        | as soil fumigant |
| 147 | <b>Fumazone</b><br>see <b>Nemagon</b>                     |   |            |                  |
| 148 | <b>Metham-Sodium</b><br>see <b>Vapam</b>                  |   |            |                  |
| 149 | <b>Methylbromide</b>                                      | V | 1          | as soil fumigant |
| 150 | <b>Mylone</b> (Dazomet)                                   | V | 650        | as soil fumigant |
| 151 | <b>Nemacur</b>                                            | V |            | as soil fumigant |
| 152 | <b>Nemagon</b> (Fumazone)                                 | V | 300        | as soil fumigant |



| Common name or chemical name or other name used     | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use              |
|-----------------------------------------------------|------------------|----------------------------------------------|------------------|
| <b>153</b> <b>Sistan see Vapam</b>                  |                  |                                              |                  |
| <b>154</b> <b>Telone see Dorlone</b>                |                  |                                              |                  |
| <b>155</b> <b>Trapex</b>                            | V                | 100 (mice)                                   | as soil fumigant |
| <b>156</b> <b>Vapam (Sistan)</b><br>(Metham-Sodium) | V                | 820                                          | as soil fumigant |

| Common name or other name used | Mode of action * | Acute oral toxicity **<br>DL 50 (mg/kg rats) | Use against rodents as |
|--------------------------------|------------------|----------------------------------------------|------------------------|
|--------------------------------|------------------|----------------------------------------------|------------------------|

*\*Rodenticides*

|            |                                                      |    |           |                           |
|------------|------------------------------------------------------|----|-----------|---------------------------|
| <b>157</b> | <b>Aldrin see No. 7</b>                              | C  |           | field-cover spray or dust |
| <b>158</b> | <b>Antu</b>                                          | A  | 5-9       | dust on run-ways          |
| <b>159</b> | <b>Arsenic</b>                                       | St |           | bait in stores etc.       |
| <b>160</b> | <b>Castrix</b> (Chlormethyl-dimethylamino-pyrimidin) | St | 1-2       | bait in stores etc.       |
| <b>161</b> | <b>Chlorophacinone</b>                               | A  |           | dust or bait on run-ways  |
| <b>162</b> | <b>Coumachlor</b>                                    | A  | 1000-1200 | dust or bait on run-ways  |
| <b>163</b> | <b>Crimidine</b>                                     | A  |           | dust or bait on run-ways  |
| <b>164</b> | <b>Cumtetrallyl</b>                                  | A  |           | dust or bait on run-ways  |
| <b>165</b> | <b>Diphacinon</b>                                    | A  |           | dust or bait on run-ways  |
| <b>166</b> | <b>Endrin see No. 15</b>                             | C  |           | field-cover spray or dust |
| <b>167</b> | <b>Fumarin</b>                                       | A  | 400       | dust or bait on run-ways  |
| <b>168</b> | <b>Muritan see Promuriz</b>                          |    |           |                           |
| <b>169</b> | <b>Pindone</b>                                       | A  |           | dust or bait on run-ways  |
| <b>170</b> | <b>Pival</b>                                         | A  | 1         | dust or bait on run-ways  |
| <b>171</b> | <b>Promuriz</b> (Muritan)                            | A  |           | dust or bait on run-ways  |
| <b>172</b> | <b>Shoxin-norbomide</b>                              | A  | 5-12      | dust or bait on run-ways  |
| <b>173</b> | <b>Toxaphene see No. 22</b>                          | C  |           | field-cover spray or dust |
| <b>174</b> | <b>Warfarin</b>                                      | A  | 60        | field-cover spray or dust |

## 2. Precautions

Pesticides are toxic in varying degrees; protective measures must therefore be in accordance with the toxicity of the product. Careful handling of close observation of the precautions recommended on the containers are indispensable. Disregard of the most elementary recommendations may affect human health. When handling insecticidal concentrates direct contact with the skin must be avoided. Mixing and stirring of liquid insecticides should always be done with wooden or metal rods, and never with the hands. Contact with highly toxic substances which penetrate the skin, such as Parathion, can have very serious consequences. Any insecticidal residue accidentally reaching the human skin must immediately be washed off with plenty of warm water and soap.

Sprays and dusts have to be applied down wind, so that the operator is not enveloped by the insecticide. Control measures should not be undertaken during the hot and calm hours of the day.

Drifting of pesticide sprays or dusts on to nearby crops or livestock should be avoided. Poultry, dairy or meat animals should be prevented from consuming plants or water which have been covered by drifting pesticides. When it is necessary to work in contact with plants (transplanting) which have been treated with Endrin, Demeton, Guthion or Parathion less than 5 days previously, the hands should be protected by gloves.

For application of highly toxic substances or treatment of enclosed spaces a face mask with replaceable filter should be worn. Continual handling of cigarettes by the operator can convey toxic substances through the mouth into the body. The same may happen when food is eaten with unwashed hands. After working with insecticides the body and any protecting clothing must be thoroughly washed (bath, shower).

Unused pesticides should not be left open and unsupervised; they are a danger to children and animals. Remainders, empty packing material or other objects covered with insecticides must never be thrown into either running or stagnant water, lest they poison the fish. They must be buried in trenches and well covered with earth.

### *Danger to bees, fish, birds, and wild and domestic animals*

Plants must not be sprayed, when in flower, since the majority of pesticides are toxic for bees. Bees, when collecting nectar on treated flowers, take up some active substance and are killed. They may also carry poisonous substance together with the collected pollen into the hive and thus destroy the young brood and larvae which feed on it. Dusts are particularly dangerous.

Fish are very susceptible to insecticides, particularly to substances

of the organo-chlorine group. Application near fish ponds, lakes, dams or streams must therefore be carried out very carefully. Contaminated vessels and spraying equipment should never be dipped or washed in water containing fish.

Birds and in particular farm poultry are very susceptible to insecticides. Application near poultry runs should be avoided or undertaken when the birds are absent. Care must also be taken that the birds do not feed on poisoned grass or water. The same precautions should be observed with wild and domestic animals.

In case of presumed or obvious symptoms of insecticide poisoning medical help should be sought. The doctor must be informed of the kind of toxic substance involved. If medical help is not available immediately, first aid must be given in the meantime. Information on symptoms of poisoning and adequate treatment is listed below.

### 3. First-aid Measures\* and Suggested Medical Treatment

(Data compiled by Factory Medical Department, J. R. Geigy S.A., Basle)

#### Chlorinated hydrocarbons

##### Symptoms

Headache, nausea, vomiting, anxiety, prickling sensation on the tip of the tongue, upper lip and the chin region, stiffness and pain in the jaw, in very severe cases convulsions with exitus.

##### First aid

Free the clothing, lay the patient on his side and keep him warm and quiet. Remove contaminated articles of clothing and thoroughly wash the body areas underneath with soap and water. When poisoning has been by mouth the stomach should be emptied with gastric lavage. Saline purgatives should also be given, e.g. Carlsbad salt, *but no oily purgatives or milk.*

##### Suggested medical treatment

If convulsions or tremors occur, barbiturates and possibly calcium should be given, the former preferably as 1 ccm 20% phenobarbitone sodium i.v., or  $\frac{1}{2}$ -1 2-ccm-ampoule of 10% Dial. Calcium should be given in 10% solution at the rate of 1-2 10-ccm-ampoules per day i.v., or as calcium bromide, which has a sedative and anticonvulsive action, 1-2 10-ccm-ampoules per day i.v. or i.m.

*Morphine is contraindicated.*

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\* Applicable in the main also to domestic animals.

### Phosphorous esters and carbamates, esterase-inhibitors

|                             |                                                                                                                                                                                                                                                                                                                         |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptoms                    | Narrowing of the pupils, slowing of the pulse, increased glandular secretion (sweating), nausea, severe fatigue, vomiting, diarrhoea, bronchospasms, urgency of micturition, sudden cardiac failure (collapse), exitus.                                                                                                 |
| First aid                   | Free the clothing, lay the patient on his side and keep him warm and quiet. Remove contaminated articles of clothing and thoroughly wash the body areas involved. When poisoning has been by mouth the stomach should be emptied. Gastric lavage should be carried out with saline purgatives, e.g. sodium sulphate.    |
| Suggested medical treatment | Atropine in high dosage should be injected immediately and in severe cases a dose of 1-2 mg should be given parenterally several times daily. If Atropine is not sufficient, further treatment should be given with Toxogonin "Merck".<br>Dosage: 0.1-0.25 g i.v. every 1.5-2 hours (i.v. injections/2 g per 24 hours). |

### Calcium and lead arsenates

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptoms                    | <i>Acute:</i> Severe headache, nausea, possibly diarrhoea, exitus following severe collapse in a few hours.<br><i>Subacute:</i> Gastrointestinal form: severe abdominal pains, vomiting (often uncontrollable), rice-water stools reminiscent of cholera, anuria, cramps in the calves; in slow poisoning, inflammation of the mucosa of the eyes, nose, pharynx, with painful swallowing, tenesmus, lowered temperature, cramps, loss of consciousness and lowered blood pressure. |
| First aid                   | Free the clothing, lay the patient on his side and keep him warm and quiet. Give emetics.                                                                                                                                                                                                                                                                                                                                                                                           |
| Suggested medical treatment | Without loss of time, BAL treatment using 10% solution in oil with 20% benzyl benzoate; dosage (as pure BAL): 3 mg/kg i.m. every 4 hours during the first 2 days, 4 similar injections on the third day and subsequently 2 injections per day for 10 days.<br><br>or Gastric lavage with large quantities of warm water, followed by magnesia (suspension 20 : 500) together with charcoal in tablespoon doses. Subsequently raw white of egg, milk, vegetable oils.                |

Fluorides (sodium fluoride)

|                             |                                                                                                                                                                                                                                                             |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptoms                    | Pruritus, nausea, slimy and later bloody vomit, strong salivation, severe abdominal pains, bloody diarrhoea with unquenchable thirst. Pupillary paralysis, ptosis, cramps.                                                                                  |
| First aid                   | Lay the patient on his side and keep him quiet and warm. Give emetics.                                                                                                                                                                                      |
| Suggested medical treatment | Morphine for relief of pain, calcium in high dosage i.v., shock therapy, stimulants. Calcium therapy should be continued until cure is complete.<br><br>Gastric lavage with magnesium oxide, lime-water, calcium gluconate, medicinal charcoal suspensions. |

Nicotine

|                             |                                                                                                                                                                                                                                     |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptoms                    | Nausea, vomiting, anxiety, shivering, cardiac failure, collapse, constipation or diarrhoea, salivation, tremor of the hands, sweating.                                                                                              |
| First aid                   | Lay the patient on his side and keep him quiet and warm. Give coffee. Fomentations on the abdomen.                                                                                                                                  |
| Suggested medical treatment | Caffeine subcutaneously, opiates for relief of abdominal pains, oxygen. Gastric lavage with 2% tannin solution or 1% potassium permanganate or medicinal charcoal. If necessary 0.5 mg DHE i.v. Barbiturates for control of spasms. |

Dinitro-orthocresols (DNOC)

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptoms when ingested | Loss of appetite, coated tongue, nausea, vomiting, occasionally colic and diarrhoea, tenderness over the liver and possibly jaundice. Acute poisoning can be followed rapidly by very severe symptoms: severe fatigue, burning thirst, outbreaks of sweating, painful cramps, oppression in the chest. The patient's face is greyish or cyanotic, his respiration dyspnoeic, particularly on inspiration. Most prominent are excitation and anxiety. Vertigo is sometimes experienced with buzzing in the ears, scintillation before the eyes, grey cataract formation is possible, and the pulse is arrhythmic and tachycardiac. The temperature is noticeably increased, the urine scarce and dark in colour. |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Suggested medical treatment** Mild cases need no treatment.  
 Severe cases: gastric lavage with 5% sodium bicarbonate and medicinal charcoal, saline purgatives, diuretics; if there is pulmonary oedema, dextrose injections are better than bleeding and hypertonic solutions, e.g., 20% glucose, oxygen inhalation, if necessary ice packs for fever; in the case of liver injury, protective diet (high in carbohydrates and protein and low in fats).

### Metaldehyde

**Symptoms when ingested** 30 minutes up to a few hours after ingestion, salivation, nausea, vomiting, abdominal pains, flushed face, fever, drowsiness, rigidity of the muscles, convulsive movements, tonic cramps, tetanus, opisthotonos, continuous nystagmus, loss of consciousness and exitus in 5-24 hours. If the patient survives, there is often liver and kidney damage, disorientation, loss of memory, with recovery lasting several weeks.

**Suggested medical treatment** Diuretics, with analeptics and sedatives as dictated by the patient's condition. Gastric lavage with medicinal charcoal and sodium bicarbonate, enemas and emetics, purging with sodium sulphate.

## 4. Mixing Tables

The making-up and exact dosage of sprays for various insecticides, wettable powders or emulsion concentrates are shown in the following tables.

### *I. Mixing Table for dosage of sprays from concentrates of various percentage of active ingredient*

| Percentage of active ingredient in concentrate (WP or ES) | Dosage (diluted spray) | Percentage of formulated product (concentrate) | Percentage of active ingredient |
|-----------------------------------------------------------|------------------------|------------------------------------------------|---------------------------------|
| <i>Decimal system</i>                                     |                        |                                                |                                 |
| 20%                                                       | 5 kg/1000 l water      | 0.5                                            | 0.1                             |
| 25%                                                       | 4 kg/1000 l water      | 0.4                                            | 0.1                             |
| 40%                                                       | 2.5 kg/1000 l water    | 0.25                                           | 0.1                             |
| 50%                                                       | 2 kg/1000 l water      | 0.2                                            | 0.1                             |
| 75%                                                       | 1.33 kg/1000 l water   | 0.13                                           | 0.1                             |

(Continued)

## I. Mixing Table (Continued)

| Percentage of active ingredient in concentrate (WP or ES) | Dosage (diluted spray)  | Percentage of formulated product (concentrate) | Percentage of active ingredient |
|-----------------------------------------------------------|-------------------------|------------------------------------------------|---------------------------------|
| <i>English measures</i>                                   |                         |                                                |                                 |
| <b>20%</b>                                                | 10 lbs/200 gals water   | <b>0.5</b>                                     | <b>0.1</b>                      |
| <b>25%</b>                                                | 8 lbs/200 gals water    | <b>0.4</b>                                     | <b>0.1</b>                      |
| <b>40%</b>                                                | 5 lbs/200 gals water    | <b>0.25</b>                                    | <b>0.1</b>                      |
| <b>50%</b>                                                | 4 lbs/200 gals water    | <b>0.2</b>                                     | <b>0.1</b>                      |
| <b>75%</b>                                                | 2.66 lbs/200 gals water | <b>0.13</b>                                    | <b>0.1</b>                      |

## II. Mixing Table for making up to 100 litres of diluted spray

| Percentage of active ingredient required in diluted spray | Percentage of active ingredient in concentrate |           |           |           |           |                                                         |
|-----------------------------------------------------------|------------------------------------------------|-----------|-----------|-----------|-----------|---------------------------------------------------------|
|                                                           | <b>75</b>                                      | <b>50</b> | <b>40</b> | <b>25</b> | <b>20</b> |                                                         |
| 0.1%                                                      | 133.3                                          | 200       | 250       | 400       | 500       | grammes of concentrate required per 100 litres of water |
| 0.075%                                                    | 100.0                                          | 150       | 187.5     | 300       | 375       |                                                         |
| 0.05%                                                     | 66.5                                           | 100       | 125       | 200       | 250       |                                                         |
| 0.01%                                                     | 13.3                                           | 20        | 25        | 40        | 50        |                                                         |

*Example:* If it is desired to make up 100 litres of 0.01% Diazinon-Spray and the Diazinon-concentrate (WP or ES) contains 40% of active ingredient, 25 grammes or 25 cc of concentrate will be required.

## III. Mixing Table for making up to 100 gallons of diluted spray\*

| Percentage of active ingredient required in diluted spray | Percentage of active ingredient in concentrate |                 |           |                 |           |                                                                           |
|-----------------------------------------------------------|------------------------------------------------|-----------------|-----------|-----------------|-----------|---------------------------------------------------------------------------|
|                                                           | <b>75</b>                                      | <b>50</b>       | <b>40</b> | <b>25</b>       | <b>20</b> |                                                                           |
| 0.1%                                                      | 21 $\frac{1}{3}$                               | 32              | 40        | 64              | 80        | ounces (fluid or weight) of concentrate required per 100 gallons of water |
| 0.075%                                                    | 16                                             | 24              | 30        | 48              | 60        |                                                                           |
| 0.05%                                                     | 10 $\frac{1}{3}$                               | 16              | 20        | 32              | 40        |                                                                           |
| 0.01%                                                     | 2 $\frac{1}{6}$                                | 3 $\frac{1}{5}$ | 4         | 6 $\frac{2}{5}$ | 8         |                                                                           |

*Example:* If it is desired to make up 100 gallons of 0.05% DDT-Spray and the DDT-Emulsion concentrate contains 50% of active ingredient, 16 fluid ounces of concentrate will be required.

\* From Orchard Spraying Guide of the N.S.W. Dept. of Agriculture.



*Some application data (approximative equivalents)*

1 kilogramme (kg) per 1000 litres water = 2 pounds (lbs) per 200 gallons (Brit) water.

10 kg per hectare (ha = 10,000 sq.metres) = 9 lbs per acre (4,047 sq.metres).

1000 litres (l) per hectare = 89 gallons per acre.

100 grammes per sq.metre (m<sup>2</sup>) = 2.8 ounces (Brit) per sq.yard.

100 cubic centimetres (cm<sup>3</sup>, cc, ml) per sq.m. = 2.8 fluid ounces (Brit) per sq.yard.

## 5. Recommendations for Control Measures

The recommendations for the use of pesticides vary from country to country. It would go beyond the scope of this book to take all the official recommendations for the control of agricultural pests into consideration.

The following recommendations for combating pests are based on information from experimental stations in various countries, on manufacturers' instructions as well as on several years of personal field practice and should serve as a guide to planters.

When recommended substances are unobtainable, they can often be substituted by other products belonging to the same chemical group or having similar effects (see table of active ingredients, page 10). It is obvious that special recommendations concerning local and economic conditions must also be considered.

Control of several pests occurring simultaneously can be undertaken either with the most suitable formulation (dust, granulate, wettable powder, emulsions, solutions) of a pesticide with a wide range of action, or with two or more products of specific effect, united in a so-called "combined spray". Combined sprays are made as tank mixtures by adding the chemical substance to the water immediately before application. Care must be taken to prevent separation or sedimentation, which reduce the sprays' effectiveness. This is particularly necessary when fungicidal and insecticidal sprays are combined. In order to avoid phytotoxic damage on delicate plant parts by combined sprays, a compatibility test must be carried out before the spray is applied generally.

Applications of pesticides in the *concentrations recommended* and at the *time indicated* (see manufacturers' instructions) observe the *tolerance period* (time between the last application and harvest) and the permitted amount of pesticide residue, especially on fruits and food crops. The prescribed "safety restrictions" must also be carefully observed for the consumer's protection (see p. 37).

Phytotoxic injuries are avoided if pre-planting treatment of the soil with nematocides is followed by a safety period of several days or weeks, during which the preparation disintegrates. The safety



period varies greatly from one region to another and depends on the type, structure, temperature, humidity and permeability of the soil, as well as on seasonal and other factors.

The following table gives some approximate minimum time-intervals between last spraying and harvesting of the crops

| Product<br>(cf. also table<br>of active ingredients) | Recommended period<br>from last application<br>to harvesting(in days) | Product<br>(cf. also table<br>of active ingredients) | Recommended period<br>from last application<br>to harvesting(in days) |
|------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------|
| Aldrin                                               | 40                                                                    | Isolan                                               | 21                                                                    |
| Aramite                                              | 5                                                                     | Karathane                                            | 10                                                                    |
| Azinphos ethyl                                       | 21                                                                    | Kelthane                                             | 10                                                                    |
| Azinphos methyl                                      | 21                                                                    | Lead arsenate                                        | 30                                                                    |
| * BHC                                                | 30-60                                                                 | Lime sulphur                                         | 3                                                                     |
| Binapacryl                                           | 14                                                                    | * Lindane                                            | 30                                                                    |
| Calcium arsenate                                     | 21                                                                    | Malathion                                            | 7                                                                     |
| Carbaryl                                             | 5-10                                                                  | Menazon                                              | 21                                                                    |
| Carbophenothion                                      | 21                                                                    | Methoxychlor                                         | 14                                                                    |
| Chlorbenside                                         | 7                                                                     | Mevinphos                                            | 2                                                                     |
| Chlordane                                            | 30                                                                    | Neotran                                              | 8                                                                     |
| Chlorfenson                                          | 30                                                                    | Nicotine sulfate                                     | 7                                                                     |
| Chlorobenzilate                                      | 5-10                                                                  | Oil sprays                                           | 1                                                                     |
| Chloropropylate                                      | 5-10                                                                  | Parathion                                            | 21                                                                    |
| Chlorthion                                           | 10                                                                    | Parathion methyl                                     | 21                                                                    |
| Cryolite                                             | 21                                                                    | Phenkapton                                           | 10                                                                    |
| DDD                                                  | 21                                                                    | Phosdrin                                             | 7                                                                     |
| * DDT                                                | 30                                                                    | Phosphamidon                                         | 21                                                                    |
| Demeton                                              | 30                                                                    | Phostex                                              | 8                                                                     |
| Demeton methyl                                       | 21                                                                    | Pyrethrum                                            | 1-2                                                                   |
| Derris (Rotenone)                                    | 3                                                                     | Rotenone (Derris)                                    | 3                                                                     |
| Diazinon                                             | 7-10                                                                  | Schradan                                             | 21-28                                                                 |
| Dibrom                                               | 5-7                                                                   | Sulphenone                                           | 7                                                                     |
| Dichlorvos (DDVP)                                    | 14                                                                    | Sulphur                                              | 3                                                                     |
| * Dieldrin                                           | 40                                                                    | Tetradifon                                           | 3                                                                     |
| Dimethoate                                           | 10-14                                                                 | Thiodan                                              | 30                                                                    |
| Disulfoton (Solvirex)                                | 42                                                                    | Thiometon                                            | 21                                                                    |
| * Endrin                                             | 40                                                                    | Thioquinox                                           | 21                                                                    |
| Ethion                                               | 21                                                                    | * Toxaphene                                          | 30-40                                                                 |
| Fenson                                               | 14                                                                    | Trichlorphon                                         | 14                                                                    |
| Fenthion                                             | 14                                                                    | Vamidothion                                          | 40                                                                    |
| Formothion                                           | 7-21                                                                  |                                                      |                                                                       |

\* (= When applied on feed crops for dairy animals, somewhat longer intervals should be allowed)

The data given in this table are based on the recommendations of the agricultural authorities of a large number of countries. These recommendations do not apply necessarily to tropical and subtropical zones and are intended only to give guidance for the products listed. There is no doubt that decomposition and metabolism of pesticide residues generally proceed faster in warm climates than in temperate zones. The time intervals depend of course on the dosage of the pesticide and to a large extent on the weather, climatic conditions and time of year, all factors which affect the ripening process.

*Explanation of the recommendations*

In the tables below the *pests of crops* follow the same order as in chapter III. The numbers printed in *bold* in the second column (*product*) refer to those of the table of active ingredients.

Example:

7 = Aldrin,            12 = DDT,            22 = Toxaphene,  
24.4 = Coumaphos, 33.5 = Fensulfothion,    35 = Malathion,  
49.9 = Carbaryl,    78.1 = Tetradifon, etc.

Formulation and dosage of the products are given, separated by a colon, in the third column. *Formulation* and *percentage of active ingredient (AS)* are printed in *bold*. The following abbreviations are used:

D    = Dust  
G    = Granulate  
WP = Wettable powder  
ES = Emulsifiable solution  
S    = Solution  
L    = Liquid (to be used tel quel).

*Dosage* refers to weight or volume per given quantity of water or per area or tree to be treated.

The abbreviations mean:

g       = grammes  
kg      = kilogramme  
cc      = cubic centimetre  
l       = litre  
sq.m   = square metre  
ha      = hectare (10,000 sq.m).

Commercial products (concentrates) with a different percentage of active ingredient from the one recommended in the tables have to be adjusted to the corresponding percentages or concentrations respectively (cf. Mixing tables p. 34).

In most cases **ES** can replace the recommended **WP**. Choice of the adequate formulation depends largely on the mode of application (spraying machinery, high-, medium- or low-volume method).

**When not otherwise stated, dosage refers to the high-volume method. For the medium- or low-volume method (see chapter IV, p. 484) only the amount of water must be diminished. In this case the amount of active ingredient per hectare will be the same.**

In the fourth column instructions are given as to the *time of treatment*. Preventive measures which must be undertaken as soon as injurious stages of pests (e.g. fruit flies, stem borers) appear, need

careful supervision and exact field observations (see also chapter II, p. 42). Whenever possible, enquiries as to the application of pesticides should be made from local experimental stations.

*Examples:*

| Pest                          | Product                     | Formulation and Dosage                                                                                                                                                                                                     | Where and when to apply |
|-------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 10 <i>Anthores leuconotus</i> | <b>13</b><br>↓<br>Dieldrin  | <b>ES 20%:</b> 2.5 l/100 l water<br>↓<br>ES 20% = commercial product containing 20% active ingredient: 2.5 l of the commercial product dispersed in 100 l of water                                                         | . . . . .               |
| 54 <i>Adoretus hirtellus</i>  | <b>10</b><br>↓<br>Chlordane | <b>G 10%:</b> 100 kg/ha<br>↓<br>G 10% = commercial granulate containing 10% active ingredient: 100 kg of the commercial product distributed on the soil surface of one hectare                                             | . . . . .               |
| 54 <i>Adoretus hirtellus</i>  | <b>10</b><br>↓<br>Chlordane | <b>WP 50%:</b> 20 kg/1000 l water/ha<br>↓<br>WP 50% = commercial product containing 50% active ingredient: 20 kg of the commercial product dispersed in 1000 l of water and distributed on the soil surface of one hectare | . . . . .               |

