

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service

TOXICITY OF VARIOUS INSECTICIDES TO THE IMPORTED FIRE ANT

By C. S. Lofgren,^{1/} W. A. Banks, and C. E. Stringer
Plant Pest Control Division

Heptachlor, aldrin, dieldrin, and chlordane were shown to be effective as soil insecticides for controlling the imported fire ant (Solenopsis saevissima richteri Forel) by Blake et al.^{2/} and Lofgren et al.^{3/} However, use in the Imported Fire Ant Eradication Program was limited because of forage residues and potential hazards to wildlife. These problems made it necessary to exclude certain areas from large-scale treatment against this insect. As a result, a search was made for other insecticides that would adequately control the imported fire ant. This report presents results of tests conducted with various insecticides.

METHODS

The procedures used for the insecticide evaluations were described by Banks et al.^{4/} Laboratory tests of candidate insecticides were made first at 10 p.p.m. in the soil. Materials giving more than 50-percent mortality of the imported fire ant at this level were then tested at 1.0 p.p.m. This procedure was repeated, reducing the concentration by tenfold increments, until a level was reached that gave less than 50-percent mortality after 96 hours.

Materials giving 90- to 100-percent mortality at 0.1 p.p.m. in the soil were considered promising for field testing against natural infestations of the imported fire ant. This criterion was used since this is the approximate toxicity of chlordane, the least effective of the commonly used insecticides.

-
- 1/ Now with Entomology Research Division, Gainesville, Florida.
 - 2/ Blake, G. H., Eden, W. G., and Hays, K. L. Residual effectiveness of chlorinated hydrocarbons for control of the imported fire ant. Jour. Econ. Ent. 52: 1-3. 1959.
 - 3/ Lofgren, C. S., Adler, V. E., and Barthel, W. F. Effect of some variations in formulation and application procedure on control of the imported fire ant with granular heptachlor. Jour. Econ. Ent. 54: 45-47. 1961.
 - 4/ Banks, W. A., Lofgren, C. S., and Stringer, C. E., Jr. Laboratory evaluation of certain chlorinated hydrocarbon insecticides against the imported fire ant. Jour. Econ. Ent. 57: 298-299. 1964.

Of 118 insecticides evaluated in the laboratory for possible use as residual treatments against the imported fire ant, only about 10 percent showed sufficient promise to warrant field testing. The results of these evaluations are presented in table 1. The insecticides were classified as follows according to their toxicity, based on insect mortality after 96 hours:

Class

- I. Insecticides giving less than 50-percent mortality at 10 p.p.m.
- II. Insecticides giving less than 50-percent mortality at 1.0 p.p.m., but more than 50-percent mortality at 10 p.p.m.
- III. Insecticides giving less than 50-percent mortality at 0.1 p.p.m., but more than 50-percent mortality at 1.0 and 10 p.p.m.
- IV. Insecticides giving more than 50-percent mortality at 10, 1.0, and 0.1 p.p.m.

Results

Of the insecticides evaluated, 53 were in Class I, 33 in Class II, 16 in Class III, and 16 in Class IV. An untreated check was run in duplicate with each test. Average mortality in the untreated checks was 6.5 percent. The results of any test in which the check mortality exceeded 20 percent were discarded, and the materials were retested.

TABLE 1.--Toxicity of various soil insecticides to the imported fire ant, based on mortality after 96 hours.

Item No.	Entomology No. (ENT-)	Chemical name	Other 1/ designations--	Mortality at indicated dosage		
				10 p.p.m. Percent	1.0 p.p.m. Percent	0.1 p.p.m. Percent
1	20871	Acetaldehyde, 2-(2-ethoxyethoxy) ethyl 3,4-methylenedioxyphenyl acetal.	Sesamex	3	-	-
2	13006	m-Acetotoluidide, <u>alpha, alpha</u> , <u>alpha</u> , <u>alpha</u> -trifluoro-.		3	-	-
3	16538	Benzenesulfonic acid, p-chloro-, p-chlorophenyl ester.	Ovex	8	-	-
4	9624	Benzhydrol, 4,4'-dichloro- <u>alpha</u> -methyl-.	Dimite ^(R)	8	-	-
5	18596	Benzilic acid, 4,4'-dichloro-, ethyl ester.	Chlorobenzilate	0	-	-
6	25718	BI-2,4-cyclopentadien-1-yl, decachloro-.	Pentac ^(R)	43	-	-
7	18066	Butane, 1,1-bis(p-chlorophenyl)-2-nitro-, and Propane, 1,1-bis (p-chlorophenyl)-2-nitro- (2 to 1 ratio).	Dilan ^(R)	5	-	-
8	24728	Carbamic acid, dimethyl-, 5,5-dimethyl-3-oxo-1-cyclohexen-1-yl ester.	Dimetan	40	-	-
9	24977	Carbamic acid, dimethyl-, tetrahydrofurfuryl ester.	Hercules AC-5199	3	-	-
10	25784	Carbamic acid, methyl-, 4-dimethylamino-m-tolyl ester.	Bayer 44646	3	-	-
11	25766	Carbamic acid, methyl-, 4-dimethylamino-3,5-xylyl ester.	Zectran ^(R)	15	-	-

Table 1.--Continued

Class I--Continued

12	23969	Carbamic acid, methyl-, 1-naphthyl ester	Carbaryl	40	-	-
13	25732	Carbamic acid, methyl-, m-(2-propyloxy)phenyl ester	Hercules 8717	20	-	-
14	25810	Carbamic acid, methyl-, o-(2-propyloxy)phenyl ester	Hercules 9699	8	-	-
15	25022-X	p-Chlorophenyl trichloromethyl disulfide-triethyl phosphite reaction product	Monsanto CP-7768 (mixture of CP-7769 and CP 8810--equimolar)	8	-	-
16	21195	Chrysanthemic acid, 6-bromopiperonyl ester		15	-	-
17	24654	Crotonic acid, 3-hydroxy-, benzyl ester, dimethyl phosphate.	Shell SD-4092	3	-	-
18	8379	Ethane, 1,1,1-trichloro-2,2-bis (3,5-dichloro-2-methoxyphenyl)-		38	-	-
19	8373	Ethane, 1,1,1-trichloro-2,2-bis (2,5-dimethoxyphenyl)-		33	-	-
20	8374	Ethane, 1,1,1-trichloro-2,2-bis (3,4-dimethoxyphenyl)-		38	-	-
21	1716	Ethane, 1,1,1-trichloro-2,2-bis (p-methoxyphenyl)-	Methoxychlor	46	-	-
22	23648	Ethanol, 1,1-bis(p-chlorophenyl)-2,2,2-trichloro-	Kelthane (R)	0	-	-
23	24832	Glutaconic acid, 3-hydroxy-, dimethyl ester, diethyl phosphate	General Chemical GC-3661	33	-	-
24	24833	Glutaconic acid, 3-hydroxy-, dimethyl ester, dimethyl phosphate	General Chemical GC-3707	3	-	-
25	27002	4,7-Methanoinden-1-ol, 4,5,6,7,8,8--hexachloro-3a,4,7,7a-tetrahydro	Velsicol 48-CS-34	13	-	-
26	27004	1,4-Methanonaphthalene-5,8-diol, 1,2,3,4,9-hexachloro-1,4-dihydro-	Velsicol 48-CS-36	13	-	-

Table 1.--Continued

		Class I--Continued			
27	15154	1,4-Methanonaphthalene-5,8-dione, 1,2,3,4,9,9-hexachloro-1,4,4a, 8a-tetrahydro-	Velsicol 48-CS-73	8	-
28	25717	1,3,4-Metheno-2H-cyclobuta [cd] pentalen-2-ol, 1,1a,3,3a,4,5,5, 5a,5b,6-decachloro-2-(2,3,- dihydropropoxy) octahydro-	Hooker HRS-1243	25	-
29	25274-X	Methyl sulfide (40 percent by volume in Deobase)		5	-
30	25767	4-Morpholineacetone trile, <u>alpha</u> - methyl-	W-24 (Velsicol)	28	-
31	27054	2,5-Norbornadiene, 1,2,3,4,7,7- hexachloro-5,6-bis(chloromethyl)-	Hooker HB-8	13	-
32	25525	1-Oxaspiro [4.4] nona-6,8-diene, 2, 3,6,7,8,9-hexachloro-	Velsicol 57-CS-41	13	-
33	38	Phenothiazine		3	-
34	24044	Phosphonic acid, (dithiodimethylene) di-,tetramethyl ester	Monsanto CP-8574	0	-
35	24695	Phosphonic acid, [(ethylthio) methylidynē] tri-, hexaethyl ester	Monsanto CP-7769	20	-
36	24952	Phosphonic acid, [(ethylthio) (phenylthio)methylene] di-, tetraethyl ester	Monsanto CP-12376	0	-
37	24951	Phosphonic acid, (mercaptomethyl idyne) tri-, hexaethyl ester, O,O-diethyl phosphorothioate	Monsanto CP-11447	28	-
38	25758	Phosphonothioic acid, (chloro- methyl)-, O-isobutyl ester, O- anhydride with diethyl phosphate.	Stauffer B-8778	5	-
39	24953	Phosphoric acid, 1-(dimethoxy- phosphinyl)vinyl diethyl ester.	Monsanto CP-12432	18	-
40	24415	Phosphoric acid, 1-(dimethoxy- phosphinyl)vinyl dimethyl ester	Monsanto CP-10502	0	-

Table 1.--Continued

Class I--Continued

41	24978	Phosphoric acid, dimethyl (4-methoxycarbonyl-1-methyl-1-butenyl) ester.	Newphos No. 1	5	-	-
42	25568	Phosphorothioic acid, <u>0,0</u> -dimethyl <u>S</u> -[2-(methylsulfinyl)methyl] ester	Bayer 24498	0	-	-
43	24980	Phosphorothioic acid, <u>0,0</u> -diethyl <u>S</u> -2-(diethylamino)methyl ester, p-toluenesulfonate	Chipman-6200	0	-	-
44	24650-X	Phosphorodithioic acid, <u>0,0</u> -dimethyl <u>S</u> -(<u>N</u> -methylcarbamoylmethyl) ester (46% soluble concentrate).	Dimethoate	5	-	-
45	25820	Phosphorodithioic acid, <u>S</u> -[2-(1,4,5,6,7,7-hexachloro-5-norbornen-2-ylmethylthio)-1-methylethyl] <u>0,0</u> -dimethyl ester.	Velsicol 58-CS-52	28	-	-
46	24653	Phosphorothioic acid, <u>S</u> -[(5-methoxy-4-oxo-4H-pyran-2-yl)methyl] <u>0,0</u> -dimethyl ester.	Endothion Kryocide Super-Seventy (72 percent cryolite)	5	-	-
47	24984-X	Sodium hexafluoroaluminate	Aramite ^(R)	5	-	-
48	16519	Sulfurous acid, 2-(p-tert-butylphenoxy)isopropyl 2-chloroethyl ester		3	-	-
49	26184	Toluene, 4-chloro- <u>alpha</u> , <u>alpha</u> , <u>alpha</u> -trifluoro-3-nitro-.		5	-	-
50	7422	<u>m</u> -Toluidine, <u>alpha</u> , <u>alpha</u> , <u>alpha</u> -trifluoro-.		28	-	-
51	25257	<u>s</u> -Triazine-2,4,6(1H,3H,5H)-trione, 3,5-dichloro		0	-	-

Table 1.--Continued

Class I--Continued					
52	17193	s-Triazine-2,4,6(1H,3H,5H)-trione, 1,3,5-trichloro-	3	-	-
53	24950-X	Xanthic acid, (diethoxyphosphinylmethyl) dithiomethyl-, ethyl ester	33	-	Monsanto CP-11901
Class II					
54	25661	Carbamic acid, 2-(diethoxyphosphinodithioyl)ethyl ester	95	0	Stauffer R-2968
55	19059	Carbamic acid, dimethyl-, 4-methyl-2-propyl-6-pyrimidinyl ester.	70	43	Pyramat [®] Hooker
56	25780	Carbamic acid, methyl-, 3,5-diisopropylphenyl ester.	100	8	HRS-1422
57	25726	Carbamic acid, methyl-, 4-(methylthio)-3,5-xylyl ester .	100	33	Bayer 37344
58	25763	Carbamic acid, methyl-, 6-chloro-m-cumenyl ester	100	48	Hercules 7522-H
59	25736	Carbamic acid, methyl-, 6-chloro-3,4-xylyl ester	100	28	Upjohn U-17004
60	21557	Chrysanthemumic acid, 6-chloro piperonyl ester.	100	15	Barthrin
61	21825	Chrysanthemumic acid, 3,4-dimethylbenzyl ester	55	3	
62	4225	Ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)-	70	18	TDE
63	4221	Ethane, 1,1,1-tribromo-2,2-bis(p-bromophenyl)-	98	3	
64	15153	4,9:5,8-Dimethano-1H-cyclopenta[b] naphthalene, 5,6,7,8,11,11-hexachloro-3a,4,4a,5,8,8a,9,9a-octahydro-	65	48	Velsicol 49-CS-53
65	23393	2-Norbornene, 5-(bromomethyl)-1,2,3,4,7,7-hexachloro-	100	28	Shell SD-2774

Table 1.--Continued

Class II--Continued

66	23394	2-Norbornene, 1,2,3,4,7,7-hexa- chloro-5-(chloromethyl)-.	Shell SD-2801	100	3	-
67	23979	6,9-Methano-2,4,3-benzo- dioxathiepin, 6,7,8,9,10,10- hexachloro-1,5,5a,6,9,9a- hexahydro-, 3-oxide	Endosulfan	100	8	-
68	27001	4,7-Methanoindan, 4,5,6,7,8,8- hexachloro-3a,4,7,7a-tetrahydro- 2-Norbornene, 5-[(allylthio)methyl] 1,2,3,4,7,7-hexachloro-.	Velsicol 47-CS-116 Velsicol 52-CS-53	100	10	-
70	20852	Phosphonic acid, (2,2,2-trichloro- 1-butyryloxyethyl)-, dimethyl ester.	Butonate	85	5	-
71	19763	Phosphonic acid, (2,2,2-trichloro- 1-hydroxyethyl)-, dimethyl ester	Trichlorfon	60	8	-
72	25765	Phosphonodithioic acid, <u>S-p</u> -tert- butylphenyl,ethyl-, <u>O-ethyl</u> ester	Stauffer N-3051	100	15	-
73	25757	Phosphonothioic acid, (chloro- methyl)-, <u>O-isopropyl</u> ester, <u>O-anhydride</u> with diisopropyl phosphate	Stauffer B-8760	100	5	-
74	24969	Phosphoric acid, 2-chloro-1- (2,4-dichlorophenyl)vinyl diethyl ester.	Shell compound 4072 Bayer S 209 (22684)	100	10	-
75	24941	Phosphoric acid, 2-chloroethyl 2,2-dichlorovinyl methyl ester .	Dichlorvos Hercules 3895	98	0	-
76	20738	Phosphoric acid, 2,2-dichlorovinyl dimethyl ester	American Cyanamid 18682	100	13	-
77	24729	Phosphoric acid, 2,2-bis(ethyl- thio) vinyl diethyl ester	Imidan ^(R)	100	25	-
78	24652	Phosphorodithioic acid, <u>O,O</u> - diethyl <u>S</u> -(isopropylcarbamoyl- methyl) ester		85	3	-
79	25705	Phosphorodithioic acid, <u>O,O</u> - dimethyl <u>S</u> -phthalimidomethyl ester		50	20	-

Table 1.--Continued

Class II--Continued					
80	24102	Phosphorodithioic acid, $O, O, O', O',$ O' -tetraethyl S, S' -methylene ester.	Ethion	100	48
81	24954	Phosphorodithioic acid, $O, O, O',$ O' -tetraethyl S, S' -thiodi- methylene ester.	Monsanto CP-13206	100	23
82	24689	Phosphorodithioic acid, $O, O-$ dimethyl $S-$ [2-(ethylsulfanyl) ethyl] ester.	Bayer 23453	100	35
83	17957	Phosphorothioic acid, $O-(3-chloro-$ $4-methyl-2-oxo-2H-1-benzopyran-$ $7-yl) O, O$ -diethyl ester.	Coumaphos Monsanto CP-11549	100	3
84	24949	Phosphorothioic acid, O, O -diethyl $S-2-propynyl$ ester.	Fenthion	100	25
85	25540	Phosphorothioic acid, O, O -dimethyl $O-[4-(methylthio)-m-tolyl]$ ester.	Malathion	100	48
86	17034	Phosphorothioic acid, $S-[1,2-bis-$ (ethoxycarbonyl)ethyl] $O, O-$ dimethyl ester.			
Class III					
87	25500	Carbamic acid, methyl-, $m-$ isopropylphenyl ester.	Union Carbide UC-10854	100	58
88	23970	2,4-Dioxa-3-phosphabicyclo [4.4.0] decane, 3-chloro-5-methyl-3- thio-.	Union Carbide UC-8305	100	8
89	22377	2,7-Epoxy-3,6-methanooxireno [2,3- b] naphthalene, 3,4,5,6,9,9- hexachloro-1a,2,2a,3,6,6a,7,7a- octahydro-.	Shell 52-RL-71	100	48
90	27040	1,3,4-Metheno-2H-cyclobuta [cd] pentalen-2-ol, 2-acetamido-1, 1a,3,3a,4,5,5a,5b,6-deca- chlorooctahydro-.	Hooker HRS-1362	100	70

Table 1.--Continued

Class III--Continued

91	27006	2-Norbornene, 1,2,3,4,7,7-hexachloro-5-phenyl-	Velsicol 49-CS-51	68	53	5
92	24399	1,4-Oxathiane-3-thiol, S-(O,O-diethyl phosphorodithioate).	Hercules 2032	100	93	5
93	24585	Phosphoric acid, diethyl 2-(ethylthio)-1-methylvinyl ester	Hercules 3004	100	50	33
94	24968	Phosphoric acid, 2-chloro-1-(2,5-dichlorophenyl)vinyl diethyl ester	General Chemical GC-3583	100	95	25
95	24967	Phosphoric acid, 1-(2,5-dichlorophenyl)-2,2-dichlorovinyl diethyl ester	General Chemical GC-3582	100	85	0
96	24586	Phosphoric acid diethyl 2-(methylthio)-1-methylvinyl ester	Hercules 3653	100	83	18
97	25713	Phosphonodithioic acid, ethyl-, O-ethyl S-p-tolyl ester	Bayer 38156	100	100	10
98	25712	Phosphonothioic acid, ethyl-, O-ethyl O-(2,4,5-trichlorophenyl) ester	Bayer 37289	100	100	10
99	25754	Phosphonothioic acid, ethyl-, O-(2-chloro-4-nitrophenyl) O-ethyl ester	Stauffer N-2230	100	60	23
100	25715	Phosphorothioic acid, O,O-dimethyl O-4-nitro-m-tolyl ester	Bayer 41831	100	98	38
101	25755	Phosphonothioic acid, ethyl-, O-(2-chloro-4-nitrophenyl) O-isopropyl ester	Stauffer N-2404	100	83	8
102	25635	Phosphonothioic acid, methyl-, O-(2,4-dichlorophenyl) O-methyl ester	Bayer 30911	100	100	18

Table 1.--Continued

		Class IV					
103	15949	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1, 4,4a,5,8,8a-hexahydro-	Aldrin	100	100	100	100
104	16225	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-6, 7-epoxy-1,4,4a,5,6,7,8,8a= octahydro-	Dieldrin	100	100	100	99
105	22376	5,8-Epoxy-1,4-methanonaphtha= lene, 1,2,3,4,10,10-hexa= chloro-1,4,4a,5,8,8a-hexa= hydro-	Shell 52-RL-45	100	100	100	100
106	8372	Ethane, 1,1,1-trichloro-2,2= bis(5-chloro-2-methoxyphenyl)-		60	90	63	
107	15156	4,7-Methanoindan, 1,2-dibromo-4, 5,6,7,8-hexachloro-3a,4,7, 7a-tetrahydro-	Velsicol 52-CS-64	100	100	98	
108	25584	4,7-Methanoindan, 1,4,5,6,7,8, 8-heptachloro-2,3-epoxy-3a, 4,7,7a-tetrahydro-	Velsicol 53-CS-17	100	100	100	
109	17713	4,7-Methanoindan, 4,5,6,7,8, 8-hexachloro-1,2-epoxy-3a, 4,7,7a-tetrahydro-	Velsicol 49-CS-56	100	100	80	
110	27005	4,7-Methanoindan, 1,2,3,4,5,6, 7,8,8-nonachloro-3a,4,7,7a= tetrahydro-	Velsicol 48-CS-104	100	100	90	
111	25960	4,7-Methanoindene, 1-bromo-4, 5,6,7,8-hexachloro-3a,4, 7,7a-tetrahydro-	1-Bromo= chlordene	100	100	100	
112	25562	4,7-Methanoindene, 4,5,6,7,8, 8-hexachloro-1-fluoro-3a,4, 7,7a-tetrahydro-	1-Fluoro= chlordene	100	100	100	
113	15150	4,7-Methanoindene, 4,5,6,7,8, 8-hexachloro-3a,4,7,7a= tetrahydro-	Velsicol 48-CS-99	100	100	58	

Table 1.--Continued

Class IV					
114	15152	4,7-Methanoindene, 1,4,5,6,7,8, 8-heptachloro-3a,4,7,7a- tetrahydro-	Heptachlor	100	100
115	27003	4,7-Methanoinden-1-ol, 4,5,6, 7,8,8-hexachloro-3a,4,7,7a- tetrahydro-, acetate.	Velsicol 48-CS-35	100	95
116	9932	4,7-Methanoindene, 1,2,4,5,6, 7,8,8-octachloro-2,3,3a,4, 7,7a-hexahydro-	Chlordane	100	93
117	24880	4,7-Methanoisobenzofuran, 1,3, 4,5,6,7,8,8-octachloro-1,3, 3a,4,7,7a-hexahydro-	Telodrin [®]	100	100
118	25719	1,3,4-Metheno-2H-cyclobuta[cd] pentalene, dodecachloroocta- hydro-	Mirex	100	50

1/ Mention of a proprietary product in this publication does not constitute a guarantee or warranty of the product by the US Department of Agriculture and does not imply its approval by the Department to the exclusion of other products that may also be suitable.

INDEX

Class I

<u>Entomology No.</u> (ENT-)		<u>Item No.</u>	<u>Entomology No.</u> (ENT-)		<u>Item No.</u>
38		33	24950-X	(Monsanto CP-11901)	53
1716	(methoxychlor)	21	24951	(Monsanto CP-11447)	37
7422		50	24952	(Monsanto CP-12376)	36
8373		19	24953	(Monsanto CP-12432)	39
8374		20	24977	(Hercules AC-5199)	9
8379		18	24978	(Newphos No. 1)	41
9624	Dimite (R)	4	24980	(Chipman-6200)	43
13006		2	24984-X	(Kryocide Super-Seventy)	47
15154	(Velsicol 48-CS-73)	27	25022-X	(Monsanto CP-7768)	15
16519	(Aramite (R))	48	25257		51
16538	(ovex)	3	25274-X		29
17193		52	25525	(Velsicol 57-CS-41)	32
18066	(Dilan (R))	7	25568	(Bayer 24498)	42
18596	(chlorobenzilate)	5	25717	(Hooker HRS-1243)	28
20871	(sesamex)	1	25718	(Pentac (R))	6
21195		16	25732	(Hercules 8717)	13
23648	(Kelthane (R))	22	25758	(Stauffer B-8778)	38
23969	(carbaryl)	12	25766	(Zectran (R))	11
24044	(Monsanto CP-8574)	34	25767	(W-24 (Velsicol))	30
24415	(Monsanto CP-10502)	40	25784	(Bayer 44646)	10
24650-X	(dimethoate)	44	25810	(Hercules 9699)	14
24653	(endothion)	46	25820	(Velsicol 58-CS-52)	45
24654	(Shell SD-4092)	17	26184		49
24695	(Monsanto CP-7769)	35	27002	(Velsicol 48-CS-34)	25
24728	(dimetan)	8	27004	(Velsicol 48-CS-36)	26
24832	(General Chemical GC-3661)	23	27054	(Hooker HB-8)	31
24833	(General Chemical GC-3707)	24			

Class II

4221		63	23393	(Shell SD-2774)	65
4225	(TDE)	62	23394	(Shell SD-2801)	66
15153	(Velsicol 49-CS-53)	64	23979	(endosulfan)	67
17034	(malathion)	86	24105	(ethion)	80
17957	(Coumaphos)	83	24652	(American Cyanamide 18682)	78
19059	(Pyramat (R))	55	24689	(Bayer 23453)	82
19763	(trichlorfon)	71	24729	(Hercules 3895)	77
20738	(dichlorvos)	76	24941	(Bayer S 209 (22684))	75
20852	(butonate)	70	24949	(Monsanto CP-11549)	84
21557	(barthrin)	60	24954	(Monsanto CP-13206)	81
21825		61	24969	(Shell compound 4072)	74

Class II

<u>Entomology No.</u> (ENT-)		<u>Item No.</u>	<u>Entomology No.</u> (ENT-)	<u>Item No.</u>
25540	(fenthion)	85	25763 (Hercules 7522H)	58
25661	(Stauffer R-2968)	54	25765 (Stauffer N-3051)	72
25705	(Imidan [®])	79	25780 (Hooker HRS-1422)	56
25726	(Bayer 37344)	57	27001 (Velsicol 47-CS-116)	68
25736	(Upjohn U-17004)	59	27007 (Velsicol 52-CS-53)	69
25757	(Stauffer B-8760)	73		

Class III

22377	(Shell 52-RL-71)	89	25635 (Bayer 30911)	102
23970	(Union Carbide UC-8305)		25712 (Bayer 37289)	98
		88	25713 (Bayer 38156)	97
24399	(Hercules 2032)	92	25715 (Bayer 41831)	100
24585	(Hercules 3004)	93	25754 (Stauffer N-2230)	99
24586	(Hercules 3653)	96	25755 (Stauffer N-2404)	101
24967	(General Chemical GC-3582)		27006 (Velsicol 49-CS-51)	91
		95	27040 (Hooker HRS-1362)	90
24968	(General Chemical GC-3583)	94		
25500	(Union Carbide UC-10854)	87		

Class IV

8372		106	22376 (Shell 52-RL-45)	105
9932	(chlordan)	116	24880 (Telodrin [®])	117
15150	(Velsicol 48-CS-99)	113	25562 (1-Fluorochlordene)	112
15152	(heptachlor)	114	25584 (Velsicol 53-CS-17)	108
15156	(Velsicol 52-CS-64)	107	25719 (mirex)	118
15949	(aldrin)	103	25960 (1-Bromochlordene)	111
16225	(dieldrin)	104	27003 (Velsicol 48-CS-35)	115
17713	(Velsicol 49-CS-56)	109	27005 (Velsicol 48-CS-104)	110