11-4-80

MULTIPLE

TDMS0030 DATA EVALUATION RECORD PAGE 1 OF 5

CASE GS0014 ENDOSULFAN PM 110 ~~08/12/79~~

CHEM 079401 Endosulfan (hexachlorohexahydromethanol)

BRANCH EEB DISC 40 TOPIC 10000045 GUIDELINE CFR

FORMULATION 00 - TECHNICALS

FICHE/MASTER ID 05004151 CONTENT CAT 03

Stevenson, J.H. (1968) Laboratory studies on the acute contact and oral toxicities of insecticides to honeybees. Annals of Applied Biology 61(3):467-472.

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
SEC: EEB -40-05050045

DIRECT RVW TIME = 4 hr. (MH) START-DATE Feb 15, 1980 END DATE Feb 15, 1980

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TITLE:
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SIGNATURE: DATE:

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CONCLUSIONS: This study is scientifically sound. See tables for results.

METHODS AND MATERIALS:

A. Test Type - Toxicity to honey bees
B. Test Species - Honey Bee (Apis mellifera)
C. Test Procedures -

1. Contact toxicity tests

Test bees were anesthetized with CO_2 and placed in cylindrical wire mesh cages (10 bees per cage). Bees were maintained in the cages and fed sucrose solution.

For insecticide testing, bees were again anesthetized with CO_2 (in the cages), then laid separately on filter paper. One microliter drops of pesticide/solvent mixture were then applied to the thorax with a microapplicator. Mortality was recorded 24 hours after treatment.

2. Oral toxicity tests

As in the contact tests, groups of 10 bees were placed in wire cages. Insecticides were presented to the groups in acetone/sucrose/water solutions, each group receiving 0.2 ml of the solution.

When bees had taken all the insecticide solution, they were provided with 20% sucrose. Mortality was evaluated 24 hours after initial dosage.

3. Statistical Analysis

(Author's description)

To obtain regression lines, two lots of ten bees treated with each of five or six concentrations of poison were used after preliminary experiments established the range. LD_{50} (median lethal dose) values were calculated using the probit method (Finney, 1952) and Table I gives means for the LD_{50} values and for the slopes of the calculated regression lines. The number of regression assays used to obtain the figures quoted is also given in the table. The standard errors of the estimated average LD_{50}'s depend on the variation between the results of the individual experiments. Because of the small number of degrees of freedom between experiments for each type of insecticide, a pooled within-treatment estimate of the percentage standard deviation (S.D.) was calculated for each year. Thus the percentage standard error for an individual LD_{50} or slope value in the table is given by $(S.D./\sqrt{n})\%$; for the contact LD 50 for mevinphos in 1964, this standard error is $(27/\sqrt{6})\%$, i.e. II%. Values for LD_{90} (the dose required to kill 90% of the insects) were calculated from the mean slope and LD_{50} values.

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REPORTED RESULTS: Laboratory LD_{50}'s derived from contact and oral exposure are presented in tables 1 and 2, respectively. Data were developed from 3 years of testing with 21 pesticide compounds.

See table 1 and 2 for presentation of numerical data.

DISCUSSION:

A. Test Procedure
Procedure is sound.

B. Statistical Analysis
Analysis as performed by the author was assumed to be valid. No validation was performed by EEB.

C. Discussion/Results
This study is scientifically sound.

(c)

Table 1. Acute contact toxicity of some pesticides to worker honeybees determined in the laboratory during 1964, 1965 and 1966

Mean median lethal doses (LD_{50}) expressed as ug compound per bee and mean slopes of regression lines, n is number of regression lines used to obtain each mean. LD_{90} values derived from these means are also given.

	1964				1965				1966			
	n	Mean LD_{50} (ug)	LD_{90} (ug)	Mean slope	n	Mean LD_{50} (ug)	LD_{90} (ug)	Mean slope	n	Mean LD_{50} (ug)	LD_{90} (ug)	Mean slope
Azinphos-methyl	—	—	—	—	—	—	—	—	2	0.063	0.13	4.0
Mevinphos	6	0.070	0.10	7.3	—	—	—	—	—	—	—	—
'Bidrin'	1	0.076	0.10	9.6	—	—	—	—	—	—	—	—
Dimethoate	3	0.12	0.17	8.4	9	0.11	0.14	11	7	0.098	0.15	7.4
Dieldrin	8	0.16	0.23	7.6	6	0.16	0.26	6.0	—	—	—	—
Diazinon	2	0.22	0.30	9.4	—	—	—	—	—	—	—	—
Malathion	2	0.27	0.38	8.5	3	0.22	0.32	8.1	—	—	—	—
Pyrethrins	4	0.29	0.45	6.6	4	0.13	0.20	4.4	—	—	—	—
Phorate	3	0.32	0.42	11	—	—	—	—	2	0.33	0.57	5.3
BHC	3	0.46	0.68	7.4	6	0.20	0.33	5.8	—	—	—	—
Demeton-methyl	3	0.74	0.90	15	1	0.41	0.52	12	3	0.54	0.95	5.2
Endrin	—	—	—	—	3	1.2	2.1	4.9	2	0.65	1.5	3.6
Carbaryl	2	1.3	7.4	1.7	1	1.1	1.5	0.96	—	—	—	—
Chlordane	3	1.4	1.9	10	—	—	—	—	—	—	—	—
Carbophenothion	—	—	—	—	—	—	—	—	2	1.4	6.6	1.9
Allethrin	4	3.4	4.6	9.7	—	—	—	—	—	—	—	—
DDT	3	3.9	6.2	6.4	—	—	—	—	—	—	—	—
Disulfoton	3	4.1	5.9	8.1	4	4.3	8.0	4.7	2	5.0	6.8	9.4
Menazon	3	4.3	8.1	3.0	—	—	—	—	—	—	—	—
Endosulfan	4	7.1	13	4.6	—	—	—	—	—	—	—	—
Ethyl mercury chloride	2	22	43	4.4	—	—	—	—	—	—	—	—
Standard deviation (%)		27		23		21		24		20		20

(10)

Table 2. Acute oral toxicity of some pesticides to worker honeybees determined in the laboratory during 1964, 1965 and 1966

Mean median lethal doses (LD_{50}) expressed as ug compound per insect and mean slopes of regression lines, n is number of regression lines used to obtain each mean. LD_{90} values derived from these means are also given.

	1964				1965				1966			
	n	Mean LD_{50} (ug)	LD_{90} (ug)	Mean slope	n	Mean LD_{50} (ug)	LD_{90} (ug)	Mean slope	n	Mean LD_{50} (ug)	LD_{90} (ug)	Mean slope
Mevinphos	3	0.027	0.057	3.9	—	—	—	—	—	—	—	—
'Bidrin'	3	0.068	0.20	2.7	—	—	—	—	—	—	—	—
Dimethoate	—	—	—	—	8	0.15	0.31	4.0	6	0.13	0.34	3.1
Azinphos-methyl	—	—	—	—	—	—	—	—	3	0.15	0.28	4.7
Cabaryl	2	0.14	0.26	4.8	2	0.11	0.39	2.3	—	—	—	—
Pyrethrins	2	0.15	0.61	2.1	2	0.15	0.41	2.9	—	—	—	—
Diazinon	2	0.20	0.68	2.4	—	—	—	—	—	—	—	—
Dieldrin	6	0.32	0.66	4.1	3	0.33	0.94	2.8	—	—	—	—
Malathion	3	0.38	0.88	3.5	—	—	—	—	—	—	—	—
Phorate	4	0.44	0.90	4.1	—	—	—	—	1	0.43	0.79	4.8
BHC	1	0.45	2.5	1.7	1	0.76	2.7	2.3	—	—	—	—
Menazon	2	0.46	0.77	5.7	—	—	—	—	—	—	—	—
Demeton-methyl	3	0.61	1.0	5.5	2	0.83	1.8	3.9	2	0.58	1.2	4.2
Endrin	—	—	—	—	2	1.4	2.8	4.2	2	0.46	1.0	3.7
DDT	5	3.7	7.5	4.2	—	—	—	—	—	—	—	—
Carbophenothion	—	—	—	—	—	—	—	—	2	5.2	10	4.2
Endosulfan	3	6.9	43	1.6	—	—	—	—	—	—	—	—
Allethrin	2	9.1	20	3.8	3	4.6	10	3.8	—	—	—	—
Phenyl mercury acetate	2	10	32	2.5	—	—	—	—	—	—	—	—
Ethyl mercury chloride	1	13	18	9.2	—	—	—	—	—	—	—	—
Disulfoton	2	16	38	3.4	1	23	41	5.0	1	39	54	9.9
Standard deviation (%)		35		55		22		33		43		41

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