11-4-80
MULTIPLE

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

CHEM 079401 Endosulfan (hexachlorohexahydromethano)

BRANCH EEB DISC 40 TOPIC 05050545

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 05004413 CONTENT CAT 03

Palmer-Jones, T. (1958) Laboratory methods for measuring the toxicity of pesticides to honey bees. New Zealand Journal of Agricultural Research 1:290-300.

SUBST. CLASS = S.

DIRECT RVW TIME = 3 1/2 hrs. (MH) START-DATE 2/4/80 END DATE 2/4/80

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APPROVED BY:
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Conclusions

This study is scientifically sound.

Methods and Materials

Test Procedures

Stomach poisons - Test bees were starved for one hour, then placed singly in vials with feeding tube at one end. Feeding tube held sucrose solution containing known concentration of pesticide. After dosing, bees were transfered to cage with feeder and mortality recorded after 24 hours.

Contact poisons - Pesticide was applied to tinfoil, allowed to dry, then foil was used to line the inside of a small cage. Fifty bees were caged for one hour, then removed to clean cages. Mortality was assessed after 24 hours.

Fumigants - Bees were exposed in small cages which fit over petri plates; pesticide solutions were applied to filter papers which fit into the petri plates. Bees were exposed to vapor for one hour, then removed to holding cages. Mortality was recorded after 24 hours.

Sprays - Bees were anesthetized with CO_2 and spread over filter paper in a petri plate. An atomizer was used to apply 1 ml of pesticide solution directly onto the bees, wetting the bees thoroughly. Mortality was evaluated after 24 hours of holding the bees in clean cages.

Statistical Analysis - None reported.

Results

Reported Results - Pesticides were evaluated via four methods of testing for toxicity to bees:

Feeding method, to assess toxicity as stomach poisons;

Residue method, to assess toxicity of dried residues;

Fumigation method, to assess fumigant toxicity; and

Spray method, to assess toxicity of direct application.

On the basis of these tests, the author concludes that, in the field, diazinon would present the greatest hazard to bees, followed by Primin, endosulfan, strobane, and toxaphene. Also, Compound 1080 (sodium fluoroacetate) was found to be highly toxic to bees as a stomach poison. For details see tables 2-5.

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Discussion/Results

Stomach poisons - Diazinon was the most toxic pesticide via the feeding method. For 24 hours LD_{50} values see Table 2.

Contact poisons - Diazinon and primin were both highly toxic as dried residues. For data see Table 3.

Fumigants - High mortalities were obtained in these tests only with diazinon and Primin. For details see Table 4.

Sprays - Diazinon and Primin were again most toxic of the pesticides tested. For details see Table 5.

Discussion

Test Procedure - Procedures were sound.

Statistical Analysis - None reported.

Discussion/Results - This study is scientifically sound.

TABLE 1. Formulation of Pesticides

Pesticide	Formulation of Undiluted Pesticide
Thiodan or HOE 2671	20% W.V. Emulsifier. Xylene.
Strobane	40% W/V. Emulsifier. Xylene.
Primin	6% isolan W/V. Emulsifier.
Diazinon	16% W/V. Emulsifier. Xylene.
Toxaphene	50% W/V. Sticker and emulsifier. Xylene.
Sodium fluoroacetate	Technical grade.

TABLE 2. Toxicity of Pesticides as Stomach Poisons

Pesticide	LD 50% in ug
Thiodan	4.4
Strobane	25
Primin	0.38
Diazinon	0.24
Toxaphene	20
Sodium fluoroacetate	0.8

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TABLE 3. Contact Effect of Pesticides

Pesticide	Grammes of Pesticide on 600 sq cm of Metal foil	Equivalent Field Application, oz/acre	Mortality of Bees (%)
Thiodan	.0102	24	100
	.0062	15	68
	.0060	14	94
	.0042	10	20
	.0028	7	22
	.0016	4	14
	.0016	4	10
	.0014	3	6
	.0008	2	2
Strobane	.0246	59	76
	.0218	52	45
	.0176	42	74
	.0128	30	24
	.0118	28	2
	.0066	16	2
	.0034	8	0
	.0016	4	0
Primin	.0054	13	100*
	.0016	4	100*
	.0011	3	100*
	.0010	2	100*
	.0009	2	72
	.0008	2	94
	.0007	2	32
	.0006	1	0
Diazinon	.0454	108	100*
	.0266	63	100*
	.0034	8	100*
	.0028	7	100*
	.0010	2	94
	.0006	1	10
	.0004	1	2
	.0002	1/2	2
Toxaphene	.1006	239	100
	.0984	234	100
	.0690	164	100
	.0404	93	34+
	.0390	93	42+
	.0314	75	24+
	.0205	49	22+
	.0146	35	4
	.0126	30	4
	.0124	30	0
	.0120	29	0
	.0114	27	0
	.0094	22	0
	.0090	21	0
	.0034	8	0

* Bees all died during exposure.
\+ Surviving bees severely affected.

TABLE 4. Toxicity of Pesticides as Fumigants
(% mortality for each cage in group of four treated)

	0.1% W/V	0.5% W/V	1.0% W/V	1.5% W/V	2.0% W/V	4% W/V	5% W/V
Thiodan		0, 0, 0, 0					0, 0, 0, 6.
Strobane		0, 0, 0, 0				0, 2, 2, 4	8, 14, 6, 6.
Primin	2, 2, 10, 0	4, 0, 60, 68	100, 86, 100, 100	48, 56, 80, 92	88, 96, 100, 100		
Diazinon	0, 2, 100, 100	100, 32, 100, 100	60, 70, 100, 100				
Toxaphene		0, 2, 0, 0	0, 0, 0, 2	0, 0, 0, 0	2, 2, 0, 0		2, 6, 0, 6

TABLE 5. Toxicity of Pesticides as Sprays
(% mortality for each cage in group of four treated)

	0.1% W/V	0.5% W/V	1.0% W/V	1.5% W/V	2.0% W/V
Thiodan	0, 2, 0, 0,	6, 54, 22, 20	20, 36, 80, 96	100, 100, 100, 100*	
Strobane	0, 0 0, 0	4, 0, 0, 40	90, 60, 70, 80	100, 98, 100, 94	100, 100, 100, 100
Primin	100, 100, 100, 100+				
Diazinon	100, 100 100, 100+				
Toxaphene	0, 2, 0, 0	6, 8, 12, 20	96, 100, 100, 100	100, 100, 100, 100	

* Bees dead and dying within 2 hours of treatment with 1.5%.
\+ Bees dead and dying within half hour.

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