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## EVALUATION OF SMOKE FROM INSECTICIDAL COILS CONTAINING SYNTHETIC PYRETHROIDS AS MOSQUITO REPELLENTS<sup>1</sup>

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Fales *et al.* (1968) used a method of evaluating the repellency to mosquitoes of smoke from coils treated with insecticides to compare the repellency of pyrethrins or allethrin against *Culex pipiens pipiens* L. The same method was used to compare the repellency of the following pyrethroids with 0.5 percent pyrethrins: *trans*-(+)-allethrin (concentration of 0.5 percent)

tetramethrin (concentration of 0.5 percent)

S. B. Penick SBP-1382 (NRDC-104) (5-benzyl-3-furyl)methyl *cis**trans*-(±)-2,2-dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylate (concentrations of 0.5, 0.25, and 0.125 percent)

S. B. Penick SBP-1390 (NRDC-107) (5-benzyl-3-furyl)methyl *trans*-(+)-2,2-dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylate (concentrations of 0.5, 0.25, and 0.125 percent)

The coils were prepared by dipping them in benzene solutions containing the insecticide.

As in the earlier test, two wire cages of the same size (50.8 x 50.8 x 25.4 centi-

meters) were used. One cage containing about 50 mosquitoes (*C. p. pipiens* reared from egg rafts collected in nature) was placed inside a 28.3-m<sup>3</sup> chamber; the other just outside the chamber was connected to the first cage by a large (20.3-centimeter diameter) glass tube. When the coils were burned on the floor of the chamber, the test insects could move from the cage exposed to the smoke to the outside cage. Repellency was measured by the percentage of mosquitoes that left the exposed cage during a 20-minute exposure to the smoke. The doses of coil were measured in weight (grams=g) of coil burned. Thus, *trans*-(+)-allethrin and tetramethrin were both tested with 0.25, 0.5, and 1 g of coil; SBP-1382 and SBP-1390 were tested with 0.25 g of coil; and the pyrethrins standard was tested at 0.25 g of coil. Blank coils were tested with each lot of mosquitoes.

The results are given in Table 1. The repellency of the pyrethrins standard was only slightly less than in the earlier test (42 percent). Also, the untreated blanks again had little repellency.

*Trans*-(+)-allethrin was one-half as effective as pyrethrins at a dose of 0.25 g and only approximated the repellency of the standard when the dose of coil was

<sup>1</sup> Mention of a pesticide in this paper does not constitute a recommendation of this product by the U.S.D.A.

TABLE I.—Repellency of *Culex pipiens pipiens* of smoke from coils treated with insecticides.

Insecticide in coils	Concentration (%)	Weight of coil burned (g)	No. of tests	Estimated % knockdown	Percent mosquitoes repelled		
					Avg. of all insects	Male	Female
<i>trans</i> -(+)-Allethrin	0.5	0.25	4	0	18	17	18
		.50	2	11	24	18	30
		1.0	2	36	42	36	47
Tetramethrin	.5	.25	3	0	10	5	16
		.50	2	0	29	26	31
		1.0	2	19	28	24	40
SBP-1382 (NRDC-104)	.125	.25	2	22	26	15	38
		.25	2	56	28	22	35
		.5	3	6	27	29	25
SBP-1390 (NRDC-107)	.125	.25	2	32	18	16	20
		.25	2	48	28	33	22
		.5	3	89	36	24	50
Blank		.25	4	0	6	6	5
		.50	1	0	5	0	20 <sup>a</sup>
		1.0	1	0	5	10	0
Standard pyrethrins	.5	.25	4	0	36	38	32

<sup>a</sup> Abnormally low number of females in this test. Actual number of females repelled was 2.

increased to four times (1 g) that of the pyrethrins. However, at this dose, 36 percent of the mosquitoes were down in both the cages. Recently Baker (1970) reported that coils containing *trans*-(+)-allethrin caused more rapid knockdown of *Aedes aegypti* L. than coils containing allethrin. Also Chadwick (1970), in studying knockdown of *Aedes aegypti* L. with smoke from various coils, found that pyrethrins, allethrin, NRDC-104 and NRDC-107 showed similar activity, whilst *trans*-(+)-allethrin was significantly more active.

Tetramethrin was generally less effective than *trans*-(+)-allethrin, though the two compounds were about equally repellent at a dose of coil of 0.5 g. Winney (1969) compared mosquito coils containing tetramethrin and pyrethrins and concluded that "neopynamin was significantly poorer than pyrethrins in knockdown and kill," though he did not mention the species of mosquito.

SBP-1382 at 0.5 percent was only three-fourths as effective as pyrethrins. At the two lower concentrations of compound, the repellency was still only three-quarters that of the standard, but knockdown increased in both cages. SBP-1390 at a

concentration of 0.5 percent and a dose of coil of 0.25 g was equal in repellency to the pyrethrins standard, but total estimated knockdown in the two cages climbed to 89 percent. Also, the two lower concentrations were less repellent than the pyrethrins standard.

Thus, SBP-1390 was the only pyrethroid of those tested that equalled the pyrethrins standard in repellency. However, it also caused high knockdown of the mosquitoes in both cages. We did not determine whether these mosquitoes recovered, but the pyrethrins standard caused no knockdown in either cage.

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