

INSECTICIDAL EFFECTS OF SHARIGOL AND PYRETHRUM COMBINATION ON HOUSEFLY

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In a process worked out by Siddiqui et al.^{1,2} for the desulphurisation of coal and the simultaneous recovery of depolymerised coal resin by treating pulverised coal at sub-carbonization temperatures with super-heated steam, volatile sulphur-containing liquids were obtained as by-products. Pesticidal properties of these products which have been provisionally named as Makerol, Sharigol and Jhimpirol have already been reported.³ The present paper deals with the synergistic action of Sharigol on pyrethrum.

As already mentioned, Sharigol is obtained as a by-product in the superheated steam treatment of coal from Sharig in West Pakistan.

The experiments were conducted on 3- to 5-day

old flies bred under uniform conditions in the laboratory. The test chambers used were 2-foot cubes with port holes on three sides. The fourth side was fitted with a tight fitting sliding glass. Forty, 50 or 100 flies were released in the chamber and 0.4 ml. of the formulation was sprayed through the holes by means of a de Vilbis sprayer.

Through the glass side, the knock-downs (K.D.) were observed. Time taken for 50% and 75% knock-down were noted. After 15 minute exposure, the flies were sucked by means of an aspirator. These flies were then kept under observation for 24 hours and the number of dead flies was noted.

Experiments were done using 0.1% pyrethrins

TABLE 1.—THE RESULTS OF THE EXPERIMENTS WITH FORMULATION A.

Experiment number	Number of flies used	Time (in minutes) for		K.D. in 15 minutes	Number of flies dead after 24 hours
		50% K.D.	75% K.B.		
1	2	3	4	5	6
1	40	2.2	4.3	40	38
2	40	2.4	5.4	40	36
3	40	3.1	4.6	40	38
4	40	4.0	5.2	40	35
5	40	2.0	4.0	40	36
6	40	2.5	4.2	40	38
7	40	2.2	4.4	40	37
8	40	2.1	4.2	40	38
9	40	4.2	6.1	38	35
10	40	3.5	5.6	38	36
11	40	4.0	6.2	37	34
12	40	4.1	6.0	36	35
13	40	3.2	5.2	40	32
14	40	4.6	6.0	38	24
15	40	4.7	6.5	37	22
16	40	2.7	5.2	37	38
17	40	3.3	4.2	36	22
18	40	3.0	5.0	36	28
19	40	4.0	5.6	37	26
20	40	3.5	4.5	36	21
21	100	3.2	4.4	90	62
22	100	3.9	5.2	95	63
23	100	3.6	4.8	98	58
24	100	3.0	4.0	94	62
25	100	3.2	4.9	96	67
Total	1300	82.2	125.7	1248	961
Mean		3.29	5.03		

in kerosene (formulation A) and 0.01% pyrethrins in kerosene plus 2% Sharigol (formulation B).

The experiments with formulations A and B were conducted simultaneously as far as practicable, otherwise they were conducted within as short an interval between them as possible, usually not more than twenty-four hours.

Twenty-five experiments were conducted using formulation A and 38 using formulation B. The results obtained are summarised in Tables 1 and 2, respectively.

Results

The statistical analysis was done by using

Fisher's 't'. The calculated value of 't' is in the insignificant range, and the test thus provides no evidence against the hypothesis as regards 50% knock-down of flies.

Considering similar hypothesis for 75% knock-down of flies in column 4 of Tables 1 and 2 and using the previous formula, the value of t comes to 0.403. Here also, the value of t being insignificant, formulations A and B have got the same insecticidal effect as regards 75% knock-down of flies.

We now consider the knock-down in 15 minutes and test the hypothesis that the two formulations are similar with respect to the proportion of knock-down in 15 minutes.

TABLE 2.—THE RESULTS OF THE EXPERIMENTS WITH FORMULATION B.

Experiment number	Number of flies used	Time (in minutes) for		K.D. in 15 minutes	Number of flies dead after 24 hours
		50% K. D.	75% K. D.		
1	2	3	4	5	6
1	40	2.8	4.9	40	18
2	40	3.5	5.0	40	32
3	40	3.9	4.6	40	32
4	40	4.0	5.8	40	25
5	40	3.7	6.0	40	26
6	40	3.0	4.2	40	28
7	40	4.1	6.1	40	18
8	40	3.6	5.7	40	22
9	40	3.7	6.0	39	28
10	40	3.0	5.0	38	25
11	40	2.8	5.8	38	26
12	40	2.8	4.8	38	22
13	40	3.0	5.1	39	18
14	40	2.0	5.0	40	18
15	40	3.0	6.0	38	22
16	40	3.0	5.0	38	24
17	40	2.1	6.5	39	23
18	40	2.2	3.1	40	25
19	40	2.2	4.0	40	26
20	40	3.6	6.1	38	22
21	40	3.9	4.9	36	25
22	100	3.1	5.3	96	93
23	100	3.2	5.2	98	97
24	100	4.0	5.3	96	96
25	100	4.2	5.0	98	95
26	100	2.6	4.1	100	97
27	100	3.1	5.1	100	96
28	100	2.9	4.9	100	95
29	40	2.8	5.0	38	26
30	40	2.0	3.1	36	23
31	40	3.6	4.0	38	18
32	40	3.0	4.4	38	20
33	40	3.2	4.9	36	19
34	40	3.0	4.4	37	20
35	40	2.7	4.1	36	25
36	40	2.5	4.9	38	23
37	40	3.0	4.5	37	18
38	40	3.3	4.4	36	21
Total	1940	118.1	188.2	1879	1387
Mean	—	3.11	4.95	—	—

In this case, since in all 1300 flies were treated with formulation A, the number 1300 may be regarded as the first sample size (n_1). Similarly, 1940 is the sample size (n_2) with formulation B.

The proportion of knock-down with formulation A is

$$p_1 = \frac{1239}{1300} = 0.953$$

and that with formulation B is

$$p_2 = \frac{1879}{1940} = 0.968$$

Thus $p_1 - p_2 = 0.015$.

On the basis of the above hypothesis, we have as our estimate of the common value of the proportion of knock-down (p) in the population

$$p = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} = 0.962$$

The variance of the difference of the proportions for the two samples is

$$e^2 = pq \left(\frac{1}{n_1} + \frac{1}{n_2} \right), \text{ where } q = 1 - p$$

$$= 0.00004679$$

Hence $e = 0.007$

The observed difference being less than $3e$ is insignificant, and the test thus furnishes no evidence against the hypothesis.

Applying similar hypothesis and the same test for column 6, i.e. the number of dead flies after 24

hours, we get

$$p_1 = 0.739$$

$$p_2 = 0.715$$

$$p_1 - p_2 = 0.024$$

$$p = 0.725$$

$$e = 0.016$$

In this case too, the observed difference being less than $3e$ is insignificant, and therefore, none of the formulations can claim any superiority over each other as regards the proportion of dead flies after 24 hours.

To sum up, our analysis of the data shows that Sharigol, when used in conjunction with 0.01% pyrethrum, gives the same effect as 0.1% pyrethrum thus establishing that it activates pyrethrum in killing house flies.

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References

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