SUPPRESSION OF REPRODUCTIVE POTENTIAL OF *ANOPHELES STEPHENSI* USING CHITIN SYNTHESIS INHIBITORS

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IT has been shown that chitin synthesis inhibitors can be successfully utilized for suppressing the reproductive potential of the insects of medical and public health importance[1-3]. In the present investigation, Penfluron (N-(2,6-difluorobenzoyl)-N'–(4-trifluoromethyl) phenyl urea) and Furyltriazine were tested against *Anopheles stephensi*, a known malaria vector to assess their sterilizing potential.

A colony of *A. stephensi* was maintained in the laboratory at 28 ± 2°C, humidity 70–80% and a photoperiod of LD 10:14 hr.

Penfluron and Furyltriazine were each dissolved in acetone to obtain 1% (W/V) standard stock solution and final concentrations of 0.001 to 10 ppm (W/V) were prepared by adding the stock solution in required volume of distilled water. Tween-80 was used as an emulsifier at the concentration of 0.02% (V/V) in the final test solution.

Early fourth instar larvae were treated by immersion method with different concentrations of the compounds. The controls with acetone and Tween-80 treated larvae were also run. Sexing of adults was done soon after their emergence. The following crosses were set:

Treated male × treated female,

Table 1 *Effects of Penfluron and Furyltriazine on the reproductive potential of A. stephensi.*

Treated Sex	Dose in ppm*	Total No. of eggs laid	Eggs laid per female	Percent reduction in eggs per female	Total No. of larvae hatched	Percent hatch	Percent sterility.
Penfluron							
Both sexes treated	0.001	1583	63.32[a]	41.95	13	20.57[a]	78.26
	0.0001	1814	72.56[a]	31.84	22	30.23[a]	68.05
	0.0005	2228	89.14[a]	16.14	44	48.60[a]	48.65
	Control	2668	107.72	—	101	94.64	5.36
Males	0.001	1234	49.37[a]	56.04	26	52.31[a]	44.34
	0.0001	1428	57.12[a]	50.75	35	60.7[a]	35.41
	0.0005	1720	68.82[b]	37.42	49	71.17[b]	24.34
	Control	2819	112.77	—	106	93.99	6.01
Females	0.001	923	36.93[a]	64.38	16	43.34[a]	54.05
	0.0001	1268	50.74[a]	53.94	25	49.84[a]	47.15
	0.0005	1416	56.64[a]	47.21	33	56.44[a]	40.16
	Control	2677	107.07	—	101	94.32	5.68
Furyltriazine							
Both sexes treated	10	2542.66	101.70[b]	8.26	74.66	73.56[a]	23.50
	5	2619.33	104.77[b]	5.49	85.66	82.00[b]	14.72
	Control	2771.50	110.86	—	106.50	96.50	3.50
Males	10	2282.33	91.29[b]	16.29	75.00	82.33[b]	14.38
	5	2402.00	96.08[b]	11.90	84.00	87.66[b]	8.83
	Control	2726.50	109.06	—	106.00	98.00	2.00
Females	10	2137.00	85.48[b]	19.31	64.33	75.66[a]	21.31
	5	2321.33	92.85[b]	12.35	77.00	83.33[b]	13.34
	Control	2648.50	105.94	—	99.00	94.00	6.00

* 25 pairs were crossed at each level.
[a] = values are significantly different from control ($P < 0.01$).
[b] = no significant difference between treated and control value.

Treated male × untreated female,
Untreated male × treated female.

Twenty five pairs were taken for treatment with each concentration. After 5 days of cohabiting the females were given blood-meal from a back and belly shaven rabbit. The eggs were collected in water-filled plastic bowls kept in cages, thrice during 10 days oviposition period and the number of eggs laid and larvae hatched was recorded.

In adults treated with both the compounds a significant fall in fecundity and fertility was recorded (table 1). The maximum sterility induced by Penfluron was 78.3 % when both the sexes treated with 0.001 ppm are mated against the maximum sterility of 23.6% only, induced by Furyltriazine at 10 ppm dose level when homologous cross is performed (table 1). The control adults showed normal egg production and hatching.

The compounds cause a dose-dependent reduction in the reproductive potential of the adults emerging out of treated fourth instar larvae. The main adverse effect is recorded on egg-hatchability. Both the sexes get affected but differ in degree. The reduction in the average number of eggs per female is maximum when the treated females mate with untreated males, whereas the maximum per cent sterility is induced on mating both the treated sexes.

Treated males may be affected in two ways: firstly, a failure to transfer sperms during mating according to Borkovec[4]; secondly, the transfer of chemical to untreated females during copulation as suggested earlier[5,6]. Such a transfer of compound during mating may be the cause of infertility in male *A. stephensi*. It was suggested earlier[7–9] that the chitin synthesis inhibitor compounds inhibit the glucose incorporation in chitin biosynthesis in developmental stages of insects resulting in abortive hatching of the eggs due to insufficient chitin.

The present findings and the earlier report[10] show that Penfluron is more effective than Furyltriazine and Diflubenzuron in suppressing the population of *A. stephensi*.

The authors express their gratitude to Dr A. B. Borkovec, Agricultural Research Centre, Beltsville, for the gift of the compounds and to I.C.M.R., New Delhi for funding the investigation.

26 August 1985; Revised 31 December 1985

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EFFECT OF CEDARWOOD OIL ON REPRODUCTION OF *DYSDERCUS KOENIGII* (F.)

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UNDER the screening programme of plant extracts and natural products for insectistatic properties we found cedarwood oil as a source of insecticidal material against Indian mosquitoes adult under laboratory conditions[1]. With a view to finding out other sub-lethal effects of this material, an attempt was made to work out the bioefficacy of cedarwood oil on reproduction. The oil vapour of cedarwood distilled from *Cedrus deodara* Roxb was found to prolong incubation period while reducing the hatching percentage and offspring survival by affecting the fecundity and ovipositional intervals in the treated male of red cotton bug.

The newly emerged adult bugs of *Dysdercus koenigii* (F.) reared under laboratory conditions on water soaked cotton seed were taken as test insects. Cedarwood oil at the rate of 5 μl (0.20% concentration diluted in acetone) was applied topically on the abdominal tergites of either sex using microapplicator. The treated bugs were then sexed separately and allowed to mate with their acetone-treated counter-