

RESEARCH NOTE

EFFECT OF MINOR ENGINEERING INTERVENTION IN THE CONTROL OF BREEDING OF *PHLEBOTOMUS PAPATASI* (SCOPOLI) SANDFLIES

RC Dhiman

Malaria Research Centre (ICMR), 22 Sham Nath Marg, Delhi 110 054, India

Phlebotomine sandflies breed in loose and moist soil. In Indian subcontinent they are reported to breed mainly indoors (Dhiman *et al*, 1983) but sometimes outdoors also (Ghosh and Bhattacharya, 1991). Unlike mosquitos, their flight range is very limited and they are mainly endophilic. With their confined and restricted habitats in mud houses or cattle sheds it appears feasible to control the breeding of sandflies if the cracks/crevices, rodents' burrows are sealed and the accumulation of loose soil particularly close to the floor is prevented. So far no efforts have been made to employ environmental management for control of sandflies except recently in French Guyana where Esterre *et al* (1986) have demonstrated the control of cutaneous leishmaniasis by clearing a forest area around a village. With the objective of intervening in breeding habitats of sandflies, a small scale trial of minor engineering intervention in some houses was conducted in a village in Uttar Pradesh (UP).

Survey for sandflies was carried out in village Sirora in Ghaziabad district in UP. Seven mud houses (3 human dwellings and 4 cattle sheds) were selected for experimental purpose while 4 houses (2HD, 2CS) served as control. Monitoring of sandflies (*P. papatasi*) in all houses was done in October, November, December 1991 and March 1992. Minor engineering intervention (MEI) was done in the first week of April 1992. A brick-made, cement-plastered skirting was made at the junction of floor and walls inside the rooms throughout corners (except door portion). The skirting was extended upto 9" horizontally (on floor) and 9" on walls (vertically). The limited skirting was done so as to seal the rodent burrows, crevices present in corners and to prevent ascending of moisture from Kachha floors to walls. The cost of skirting was 12 Rupees per square foot. After intervention, monitoring of sandflies density was continued fortnightly from April, 1992 to March, 1993. Sandflies were collected from experimental as well as control houses from 0600 to 0900 hours, with the help of a suction tube and torch light;

the room-wise number of sandflies collected were held in separate test tubes. The identity of sandflies was ascertained in the laboratory and man hour density (MHD) was calculated.

Analysis of results given in Table 1 and Fig 1 revealed that after intervention there was an overall reduction in sandfly density. Of the 7 experimental houses, MHD in March, 1993 was 0 in 5 rooms, while it remained 3.0 and 21.0 in two cattle sheds. On the other hand in control houses, MHD remained high (up to 45) throughout the year except winter season when sandfly density remains almost nil. In March 1993 average MHD in experimental houses was 3.4 while in control houses it was 28.5. The maximum average MHD in experimental houses reached upto 12.2 while in control houses it was 38.

The population of sandflies is influenced by fluctuations in environmental conditions. In French Guyana in a village Cacao Esterre *et al* (1986) were able to demonstrate almost zero density of *Lutzomyia umbratilis* and nil cases of cutaneous leishmaniasis after 2 years of elimination of forest area. This was accomplished in a situation where leishmaniasis has a zoonotic reservoir and sandflies breed in forests. In India *P. papatasi* is mainly endophilic. In the present study cement plastering skirting helped in reduction of population of *P. papatasi*. But in some dwellings, particularly in cattle sheds, the density of sandflies did not decrease. This was due to holes and indentations present in the walls above the level of the skirting. In cattle sheds cow dung and fodder covered the portion of skirting on the floor, providing the conditions as similar as prior to intervention.

The confirmation of breeding sites of sandflies by demonstrating immature stages is an uphill task (Quate, 1964), therefore it was not possible to ascertain reduction by searching larvae in individual dwellings. As the intervention could not be done in all houses positive for sandflies in the village, it is also possible that the presence of sandflies in experimen-

Table 1

Effect of minor engineering interventions in mud houses/cattlesheds on the density of *Phlebotomus papatasi* in Sirora village (Ghaziabad), UP.

Months	Man Hour density in experimental houses							Average MHD in exptl houses	MHD in control houses				Average MHD in control houses
	1 (HD)	2 (CS)	3 (CS)	4 (HD)	5 (CS)	6 (CS)	7 (HD)		1 (CS)	2 (HD)	3 (CS)	4 (HD)	
October'91	6.0	4.0	24.0	9.3	8.0	9.3	HD	10.1	6.8	10.0	9.3	HD	6.5
November	0.0	0.0	18.0	28.0	12.0	18.0	18.0	13.4	0.0	12.0	12.0	42.0	16.5
December	0.0	0.0	6.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	
March'92	21.0	54.0	42.0	12.0	48.0	18.0	6.0	28.7	36.0	24.0	36.0	12.0	27.0
Intervention													
April	7.2	0.0	3.6	3.6	43.6	0.0	3.6	8.8	30.0	25.5	45.0	15.0	28.3
May	15.0	0.0	12.0	0.0	33.0	1.5	4.5	9.4	30.0	24.0	48.0	12.0	28.5
June	10.8	4.2	0.0	0.0	34.2	9.6	18.0	10.9	36.8	42.0	45.8	27.7	38.0
July	14.5	0.0	0.0	0.0	31.0	19.8	3.8	9.8	24.6	31.0	18.5	18.0	23.0
August	17.1	0.0	9.0	3.0	31.0	18.8	7.2	12.2	24.0	28.0	15.6	15.6	20.8
September	12.8	0.0	17.2	2.2	0.0	15.8	15.0	9.0	41.2	HD	24.0	18.0	27.7
October	10.0	0.0	24.0	10.0	0.0	28.0	12.0	12.0	20.0	21.3	58.2	28.0	31.8
November	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.4	3.0	0.0	6.0	6.0	3.8
December	1.0	0.0	2.0	0.0	0.0	0.0	0.0	0.4	1.0	0.0	1.0	0.0	6.5
January'93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
February	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
March	0.0	0.0	0.0	0.0	21.0	3.0	0.0	3.4	30.0	24.0	45.0	15.0	28.5

HD = Human dwelling; CS - Cattle shed; MD - Mixed dwelling

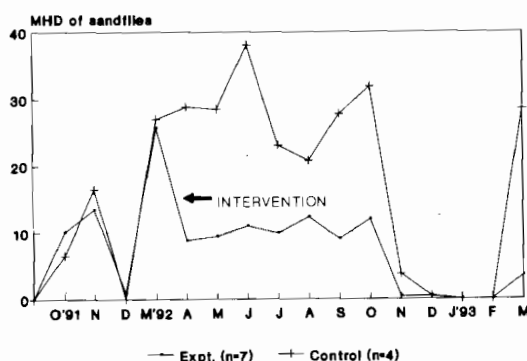


Fig 1—Man hour density of *P. papatasi* before and after cement skirting in mud houses and cattlesheds.

tal rooms/sheds may be due to the presence of sandflies breeding elsewhere but caught resting in the experimental rooms owing to availability of blood meal.

It is evident that minor engineering intervention helped in reduction of sandfly population considerably but not totally. Cement skirtings could be a permanent solution to control sandflies breeding, but

care should be taken that the skirting is cleaned and that dilapidated conditions of mud walls above the skirting are also sealed to avoid the possibility of sandflies finding resting places.

ACKNOWLEDGEMENTS

I wish to acknowledge with thanks the advice and valuable comments given by Dr VP Sharma, Director, Malaria Research Centre since inception of this study. Thanks are also due to Dr T Adak, Assistant Director for helpful cooperation, to S/Shri YP Chawla, Technical Officer and to Javed Akhtar, Junior Engineer for helping in technical and engineering aspects of work respectively.

REFERENCES

- Dhiman RC, Shetty PS, Dhanda V. Breeding habitats of Phlebotomine sandflies in Bihar, India. *Indian J Med Res* 1983; 77 : 29-32.

Esterre P, Chippaux JP, Lefait JF, *et al.* Evaluation d' un programme de lutte contre la leishmaniose cutanee dans un village forestier de Guyane française. *Bull WHO* 1986; 64 : 559-65.

Ghosh KN, Bhattacharya A. Breeding places of *Phlebotomus argentipes* Annandale and Brunetti (Diptera: Psycho-

didae) in West Bengal, India. *Parasitologia* 1991; 33 (Suppl 1) : 267-72.

Quate LW. *Phlebotomus* sandflies of Paloich area in the Sudan (Diptera: Psychodidae). *J Med Entomol* 1964; 1 : 213.