

SUBSTRATE PREFERENCE OF SIMULIID LARVAE IN THE FIELD IN INDIA

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In vector control programs, it is essential to ascertain relative or absolute densities of the population, before and after the insecticide treatment (Pegel and Ruhm 1982). Black fly control is mainly based on attacking the larvae by applying insecticide to stream or river water. Unlike mosquitoes, the simuliid larvae remain submerged and attached to the substratum during most of their development. They are substrate specific and concentrate only in selected microhabitats (Laird 1981).

The need for a suitable substrate, to study the bionomics, is a long standing demand of the biologists. Substrates, e.g., cloth tapes, metal cones, ceramic tiles, natural rocks, polyethylene strips, polytyrene foam balls and tiles were used earlier for sampling of simuliid larvae (Williams and Obeng 1962, Lewis and Bennett 1974, Pegel and Ruhm 1976, Boobar and Garnett 1978, Walsh et al. 1981).

In the present study, polyethylene (= polythene) strips, banana leaves, cloth tapes, asbestos sheets and stones were evaluated in different habitats of Nagaland, Manipur and Arunachal Pradesh of India.

Ten microhabitats, biased for maximum density of simuliid larvae, were selected in each stream. Each of the five substrates were placed in one spot. Asbestos sheets (15 × 15 cm) and stones (almost round and approximately of same surface area) were placed at 10–12 cm depth. Asbestos sheets were kept slanting towards the water current with the help of stones. Wooden pegs were fixed in the stream bed to tie the strips of polyethylene, banana leaves and cloth

(each 1 × 25 cm) with nylon thread and to keep them floating just below the water surface. Observations were taken every 24 hr and the number of larvae attached to the substrates were counted. Mature larvae were brought to the laboratory for species identification. Substrates were cleaned and placed again for five successive observations. Trials were conducted in 10 different streams with 250 replicates in each (10 replicates × 5 substrates × 5 days).

Altogether 10 species were encountered. *Simulium himalayense* Puri was dominant in Arunachal Pradesh while *S. indicum* Brecher prevailed in Nagaland and Manipur. Other species encountered were: *S. barraudi* Puri, *S. metatarsale* Bran, *S. praelargum* Dutta, *S. striatum* Brunetti, *S. rufibasis* Bruneti, *S. varicornis* Edwards, *S. aureohirtum* Bran and *S. nitidithorax* Puri. Results obtained are shown in Table 1.

Larval attachment was highest on polyethylene strips followed by banana, cloth, asbestos and stone. Using a two way analysis of variance (F values are given in Table 1), polyethylene strips and banana leaves were found significantly better than other substrates. Earlier, Pegel and Ruhm (1976, 1985) also noticed narrow and rough polyethylene strips were superior to broader and smooth ones. Lewis and Bennett (1974) advocated ceramic tiles for quantitative estimation of larvae though they became fouled quickly with sediments and algae. Laird (1981) submitted that no single, standardized method for trapping larval black flies will prove universally applicable. In the present trial, however,

Table 1. Number of Simuliidae larvae attached to different substrates.

| Substrates | Number of larvae/100 cm ² | | |
|------------------------------------|--------------------------------------|----------------|--------------------------|
| | Nagaland stream | Manipur stream | Arunachal Pradesh stream |
| Polyethylene | 134* (60-204)** | 150* (80-256) | 428* (136-720) |
| Banana | 86* (40-152) | 46* (24-92) | 210* (32-400) |
| Cloth | 6 (0-16) | 0 (0-16) | 60 (16-208) |
| Asbestos | 6 (2-16) | 2 (0-3) | 4 (0-12) |
| Stone | 4 (0-14) | 1 (0-6) | 2 (0-6) |
| Least significant difference (LSD) | 18.88 | 19.24 | 75.73 |
| F value | 56.741 | 62.848 | 32.785 |

* Significant at 0.01 probability level.

** Range of larval attachment is shown in parenthesis.

we did not obtain encouraging results with asbestos tiles. Furthermore, asbestos tiles are more prone to pilferage from stream beds.

It may be concluded that the polyethylene strip is undoubtedly a superior substrate for a quantitative estimation of larval density in our simuliid control program. Moreover, it is cheap, durable, free floating and is less subject to fouling even when evaluated in the subtropical environment of this region.

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