STUDIES ON THE ECOLOGY OF MALARIA IN SRI LANKA

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ABSTRACT

The present work incorporates studies on, the incidence of malaria in relation to rainfall, ecology of anopheline breeding in a riverine habitat and, the use of *Aplocheilus dayi*, an indigenous fish for malaria control in Sri Lanka.

Analysis of records for 1973 and 1974 for eight malarial districts showed an association between increased incidence of malaria and deficient rainfall.

Seven species of anophelines - *Anopheles varuna*, *An.vagus*, *An.barbirostris*, *An.annularis*, *An.nigerrimus*, *An.subpictus*, and *An.culicifacies* were found breeding in the margins of the Attanagalu Oya, the riverine habitat selected for ecological studies. *An.culicifacies* was not found in micro-habitats with emergent vegetation 12 - 15 cm. in height. Anopheline breeding was directly related to the discharge rate of the river. However the colour, pH, electrical conductivity, dissolved oxygen, total hardness, total alkalinity, free ammonia, albuminoid ammonia, chloride, total iron, bacteria and the plankton content of the Attanagalu Oya waters did not show a direct correlation with larval densities.

Biological studies on *A.dayi* showed that the larger fish feed mainly on adult hemipterans, coleopterans and hymenopterans and on mosquito larvae. Female fish were observed to attain sexual maturity between 21 - 30 mm. Fluctuations of the gonadosomatic index indicated that they spawn more than once a year. Exposure of *A.dayi* to ambush, aldrex 25, endrex 20, actellic, propanex, azodrin 60, stam-F-34 and

gramoxone showed that ambush was the most toxic of the pesticides tested.

Large-scale field trials conducted in the Attanagalu Oya to determine the impact of *A.dayi* on anopheline breeding brought down the larval density by 86.9%, 71.1%, 86.6% and 81.5% within one week with fish stocked at 0.5, 0.9, 1.0 and 7.6 per square metre respectively. Reductions amounting to 94.4% and 88.9% were obtained at the end of two weeks with 0.5 and 7.6 fish per square metre respectively.

The results are discussed in relation to the use of bio-environmental methods in an integrated approach for malaria control in Sri Lanka.