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APPLICATION OF ANTI-LARVAL OPERATIONS IN THE PROBLEM AREAS OF AFGHANISTAN

by

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During the course of the last five years, several problem areas have appeared in Afghanistan, notably in the Kunduz-Imam Sahib areas of the northern region, in all the eastern parts of the central-eastern region and in the Kandahar-Helmand valley areas of the south. In all these places agricultural development, the expansion of irrigation methods and rice cultivation are to be found.

In the northern region, A.pulcherrimus and A.hyrcanus are the major vectors and both species appears to have developed an "avoidance" reaction to DDT while A.hyrcanus also exhibits physiological resistance to this insecticide. In the central-eastern region the vectors are A.stephensi, A.culicifacies and A.pulcherrimus, the first two of which species show physiological resistance to DDT. In the southern region, A.stephensi, A.pulcherrimus and A.hyrcanus are to be found. A.superpictus has a widespread distribution in all these regions, and though susceptible to DDT is also probably instrumental in the continued malaria transmission.

Transmission appears to have continued at a low level in the northern region for the past several years despite DDT spraying, ACD and radical treatment of positive cases. In 1970, small epidemics appeared in central-eastern region and assumed major proportions in 1971. The need for supplementary attack measures became apparent and toward this end a trial was carried out during 1971 on the use of Abate as a larvicide. The trial was carried out in the Kunduz area of the northern region from 14 June to 17 September[1]. The objective of this trial were:

(a) to study the effectiveness of Abate Insecticide against larvae of A.hyrcanus and A.pulcherrimus under the prevailing natural conditions of the breeding places;

[1]Assignment Report - Malaria Eradication Programme, Abate Trial, Kunduz Area, 14 June - 17 September 1971, A.A. Mamser, WHO Document, EM/MAL/109.

(b) to determine the duration of residual action of different dosages of Abate in rice fields;

(c) to study the efficiency of Abate to be used as a larvicide in malaria eradication programmes.

The study was carried out in rice fields near to the town of Kunduz using Abate sand granules 1% a.i. Five ponds were selected initially but this was later increased to 12, two of which were controls. The area of the ponds averaged 153 m^2 (100-208 m^2) each and the degree of vegetation varied from a thickly growing rice nursery with almost total shade, to ponds with sparsely and newly planted seedlings which were almost completely exposed to sunlight.

An enamel photographic dish 22 x 16 x 4.5 cm was used for larval dipping, each pond being checked daily throughout the trial. Fifteen dipperfuls were taken from each pond and checked for larvae of different stages. The limit of Abate efficacity was considered to be from the time of application until the day prior to the appearance of third or fourth instar larvae.

Initially dosages of 50 gm a.i./ha, 100 gm a.i./ha and 250 gm a.i./ha were used but these were very shortly changed to 50 gm a.i./ha, 110 gm a.i./ha and 220 gm a.i./ha. The Abate was applied by hand using a rubber glove for protection, the quantities for each pond having been pre-weighed so that exact dosing was obtained.

The results obtained were good and the mean period of efficacity of Abate at the different dosages is shown in the following table.

Abate Larvicide 1% Sand Granules in Rice Fields

Dosage	No. of days before reappearance of three or four-stage larvae
50 gm	7.13
110 gm	9.72
220 gm	10.42

It was concluded from the experiment that Abate (Sand granules):

(a) was a safe and reliable larvicide against anopheline mosquitoes in rice fields with heavy vegetation and organic pollution;

(b) was easily handed and requires no complicated equipment for dispersal;

(c) well-trained larviciders can achieve an adequate distribution and good coverage, and could be expected to treat between 1 and 1.5 hectares of rice field breeding places per day;

(d) had a rapid lethal action on larvae, nearly 100% mortality being observed 24 hours after each application;

(e) had no adverse effects on fish.

It was concluded that weekly applications at a dosage of 110 gm/ha (a.i.) would give very effective control of the anopheline species present at the time of the trial: A.hyrcanus and A.pulcherrimus. The higher dosage of application and the lower dosage at weekly intervals was therefore chosen.

The wider application of Abate larvicide as a supplementary attack measure in Afghanistan must depend very largely on the question of cost. The factors involved are as follows:

1. Cost of insecticide: Sand granules are at a very low concentration and very high shipping charges have to be paid for the importation of inert material. If a granular preparation could be prepared locally from a 50% concentrate, much of this cost disadvantage would disappear.

2. Cost of application: It is thought probable that larviciding would have to be implemented for a period of at least four months each year (June to September) and perhaps longer. Although no estimate of the area of breeding places needing treatment is at present possible, it must be a very large area indeed. Rice, and other irrigated cultivation is increasing every year, particularly in the problem areas. A staff of larviciders, supervisors and entomological collectors would have to be maintained throughout the period of larviciding operations.

Before any such operations could be put in hand a complete geographical reconnaissance of breeding places would be necessary and would involve considerable labour costs.

The rural population of Afghanistan live mostly in villages, though some scattered housing can be seen. However, villages are often close to one another and in consequence large areas of breeding places would have to be treated in order to protect these rural peoples. Nomadism and seasonal agricultural movement of populations occur extensively, and the building of temporary shelters in cultivation areas is widespread; further factors adding to the area to be treated. Some urban areas could be aided extensively by the use of Abate as a supplementary attack measure.