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REPORT OF THE SECOND WHOPES WORKING GROUP MEETING

WHO/HQ, GENEVA
22-23 JUNE 1998

REVIEW OF:

ALPHACYPERMETHRIN 10% SC and 5% WP
CYFLUTHRIN 5% EW and 10% WP

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1. Introduction

The meeting was opened on behalf of the Director of the Division of Control of Tropical Diseases (CTD) of WHO by Dr M. Zaim, Scientist in charge of the WHO Pesticide Evaluation Scheme (WHOPES). He recalled that the first meeting of the WHOPES Working Group, the scientific committee to assist WHOPES in the review of the reports of testing/evaluation of pesticides in the Scheme, was held in June 1997[1] and the present meeting was convened to review the reports of the testing/evaluation of alphacypermethrin (OMS 3004) 10% SC and 5% WP (American Cyanamid, USA), and cyfluthrin (OMS 2012) 5% EW and 10% WP (Bayer AG, Germany), for indoor residual spraying and/or impregnation of bednets and fabrics, for malaria vector control.

Dr Zaim emphasized that one of the mandates of WHOPES is to collect, consolidate and disseminate information on the use of pesticides for public health use. The collection of data includes the information which is already available in the literature, or through the studies directly supervised by WHOPES.

Once a product is found to meet the requirements of the Scheme, specifications are prepared and published. The specifications include a description of the pesticide concerned and the formulations suitable for use in public health, together with sections concerning their physical and chemical characteristics. If necessary, the maximum contents of impurities are also included in the specifications. Methods for measuring the characteristics of the products are also described. The specifications are part of the International Code of Conduct on the Distribution and Use of Pesticides and are used in international trade and for quality control.

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[1] Report of the first WHOPES Working Group Meeting, WHO/HQ, Geneva, 26-27 June 1997 (CTD/WHOPES/97.5)

Dr Zaim also emphasized that the main objective of the WHOPES testing/evaluation of insecticides is to study the properties of the products and their impact on the vector and/or pest population. Therefore, safety, determination of the application dose, residual activity on different surfaces, efficacy in different ecological settings, ease of application, acceptability, resistance assessment and cost-effectiveness are the main objectives of the programme. Epidemiological studies are only carried out where appropriate.

Dr Zaim informed the Group that the two compounds under the review by the Scheme have been reviewed for safety by the WHO/ILO/UNEP Joint Meeting on Pesticide Residues (JMPR)[2]. The International Programme for Chemical Safety (IPCS) has classified, by hazard, the technical products of the two compounds in Class II "moderately hazardous", with acute oral LD_{50} (mg/kg of body weight) of 250 and 79 for cyfluthrin and alphacypermethrin, respectively[3] . It should however be noted that the final classification of any product is based on the formulation and thus the above-mentioned formulations of the two compounds are classified as "products unlikely to present acute hazard in normal use".

Dr Zaim mentioned that based on the WHOPES laboratory studies, cyfluthrin and alphacypermethrin (=alphamethrin) have been found to be among the most potent pyrethroids, when tested against the susceptible laboratory strains of *Anopheles stephensi, Culex quinquefasciatus* and *Aedes aegypti* (Table 1).

[2] Inventory of IPCS and other WHO pesticide evaluations and summary of toxicological evaluations performed by the Joint Meeting on Pesticide Residues (JMPR), WHO/PCS/98.1

[3] The WHO recommended classification of pesticides by hazard and guidelines to classification 1996-1997, WHO/PCS/96.3

Dr Zaim informed the Group that the tentative diagnostic concentration has been established by WHOPES for cyfluthrin and alphacypermethrin as 0.15 and 0.05%, respectively, using WHO standard test tubes and one hour exposure. More detailed studies, however, are needed to determine the diagnostic concentration for wider range of mosquito vector/pest species, to establish an accurate discriminative concentration.

Table 1. Activity of pyrethroids against the reference susceptible mosquito strains (LC_{50} in tarsal contact tests, using technical products)

Compound	*An. stephensi* (Beech strain)		*Cx.quinquefasciatus* (PEL SS strain)		*Ae. aegypti* (Sri Lanka strain)	
	LC_{50}	x per[1]	LC_{50}	x per[1]	LC_{50}	x per[1]
Permethrin	0.049	1	0.029	1	0.019	1
Alpha-cypermethrin	0.002	24.5	0.003	9.7	0.001	19
Cyfluthrin	0.0013	37.7	0.0024	12.1	0.002	9.5
Deltamethrin	0.005	9.8	0.008	3.6	0,.007	2.7
Etofenprox	0.0029	16.9	0.0038	7.6	0.008	2.4
Lambda-cyhalothrin	0.004	12.2	0.004	7.2	0.006	3.2

[1] Permethrin as reference

Dr Zaim emphasized that pyrethroid resistance has already been reported in several major mosquito vectors and pests of public health importance (e.g., *An. albimanus, An. gambiae*, *An. sacharovi, An stephensi* and *Cx. quinquefasciatus*) in which insensitive sodium channels (kdr) and monooxygenases have been the resistance mechanisms involved and which confer cross resistance to a wide range of pyrethroids, including cyfluthrin and alphacypermethrin. Hence, careful monitoring of pyrethroid resistance and their judicious use should be promoted.

The Meeting was attended by 8 scientists (see List of participants, Annex 2). Professor H. Townson was appointed as Chairman and Dr C. Lengeler as Rapporteur. The meeting was convened in plenary sessions at WHO/HQ in Geneva 22-23 June 1998, and the reports of the WHOPES supervised trials, published literature on the two compounds, as well as the reports submitted by the national disease and vector control programmes (see bibliography, Annex 1) were fully discussed and recommendations on the use of the above-mentioned products were made.

2. Review of alphacypermethrin SC and WP

2.1 Background/supportive documents

India - Alphacypermethrin WP, sprayed in huts in two villages of Pondicherry, India, at the dosage of 100 mg/m^2, significantly reduced the density of *Cx. quinquefasciatus* and *An. subpictus* for 18-27 weeks (Amalraj *et al.,* 1987). Alphacypermethrin was found to be more potent as compared to other pyrethroids, i.e. fenfluthrin, permethrin and cyfluthrin, but less potent in comparison to decamethrin (deltamethrin). The bioassays conducted on mud, cement and thatched surfaces showed that the