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REPORT OF THE SIXTH WHOPES WORKING GROUP MEETING

WHO/HQ, GENEVA
6–7 NOVEMBER 2002

Review of:
DELTAMETHRIN 25% WG & WP
and
AGNIQUE MMF

WORLD HEALTH ORGANIZATION
COMMUNICABLE DISEASE CONTROL, PREVENTION AND ERADICATION
WHO PESTICIDE EVALUATION SCHEME

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1. INTRODUCTION

The 6th WHOPES Working Group, the scientific committee to assist the WHO Pesticide Evaluation Scheme (WHOPES) in the review of the reports of testing/evaluation of pesticides in the Scheme, was held in WHO/HQ, Geneva, from 6 to 7 November 2002.

The meeting was opened by Dr V. Kumar, Acting Director of Communicable Disease Control, Prevention and Eradication (CDS/CPE), who welcomed the participants and highlighted the role of vector control as an integral part of vector-borne disease management. He noted the need for safe and cost-effective insecticides for vector control and stressed the important role of WHOPES in supporting the Member States in this regard.

Dr L. Savioili, Coordinator, Strategy Development and Monitoring for Parasitic Diseases and Vector Control (CPE/PVC), also welcomed the participants and noted the increasing role of WHOPES, in recent years, in promoting the safe and effective application of pesticides in public health. He also noted the close collaboration of WHOPES with industry and other agencies in promoting appropriate pesticide management in public health.

Dr M. Zaim, Scientist in charge of WHOPES, reviewed the objectives of the meeting and informed the participants of the two products under evaluation – deltamethrin 25% WG (Bayer Environmental Science, Lyon, France – formerly Aventis Environmental Science, Germany) for indoor residual spraying against malaria vectors, and Agnique® MMF mosquito larvicide and pupicide (Cognis Corporation, Cincinnati, Ohio). He also noted that earlier recommendations of WHOPES relating to use of deltamethrin WP for indoor residual spraying is for review, in light of the new information which has become available.

Dr Zaim also informed the participants that this is the final activity in the phase III of WHOPES, as it relates to evaluation of deltamethrin WG and Agnique. The final stage, WHOPES phase IV, relates to development of specifications for quality control and international trade. He briefed participants on the joint activity with the Food and Agriculture Organization of the United Nations (FAO) on development of specifications and informed them of the development of the first edition of the Manual

on development and use of FAO and WHO Specifications for Pesticides. He noted that this document supersedes all previous FAO and WHO publications on development and use of specifications. It details the standard process, unified requirements and procedures, harmonized definitions, nomenclature, technical guidelines and standards applicable to pesticides for use in agriculture and public health. FAO/WHO specifications for pesticides are now developed through the FAO/WHO Joint Meeting on Pesticide Specifications (JMPS) and are based on the procedures provided in the Manual.

The meeting was attended by 9 scientists (list of participants, Annex 2). Dr H.L. Lee was appointed as Chairman, and Dr P. Jambulingam, as Rapporteur. The meeting was convened in plenary sessions for comprehensive discussion on aspects relating to public health use of the above-mentioned products and divided in two small working groups to consider the results of the testing and evaluation of each product in detail. The reports of the safety assessments of the International Programme on Chemical Safety, WHOPES supervised trials and relevant published literature, as well as the reports submitted by the national disease and vector control programmes (bibliography, Annex 1) were fully discussed and recommendations on the use of the above-mentioned products were made.

2. REVIEW OF DELTAMETHRIN 25% WG AND WP

2.1 Safety assessment

Deltamethrin [(S)-alpha-cyano-3-phenoxybenzyl (1*R*, 3*R*)-3-(2,2-dibromovinyl)-2,2– dimethylcyclo-propanecarboxylate] is a synthetic pyrethroid insecticide. Deltamethrin is not mobile in the environment. With the current usage pattern and under normal conditions of use, environmental exposure is expected to be low.

Deltamethrin has a high to moderate acute oral toxicity and the International Programme on Chemical Safety (IPCS) has classified it as 'moderately hazardous' (WHO, 2001a). It is a type II pyrethroid; clinical signs of poisoning include tremor, salivation, and convulsion. The human and environmental safety of deltamethrin has been reviewed by WHO (1990). In addition, the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) (WHO, 2001b) assessed toxicity of deltamethrin and the following conclusions were drawn:

When deltamethrin was orally administered to rats, the compound was absorbed and was almost completely eliminated from the body within 2–4 days with very little tissue retention except in fat. Dermal absorption is low. Deltamethrin did not produce any irritant effect on the intact and abraded skin of the rabbit. Transient irritating effects however were produced in the eye of the rabbit, with or without rinsing. Deltamethrin is not a skin sensitizer in the guinea pig.

Deltamethrin is highly toxic to fish and other aquatic invertebrates. However, its toxicity to birds is very low. Deltamethrin is not mutagenic in a variety of *in vivo* and *in vitro* test systems. In a study on mouse, there were no teratogenic or reproductive effects, except for a dose-related decrease in fetal weight. No teratogenic effects were observed in rabbits. In rats deltamethrin did not induce neuropathological changes. Tests with adequate ranges of assays, both *in vitro* and *in vivo* gave no evidence of genotoxicity. Long-term experiments in rats and mice showed no carcinogenic effect and exposure to deltamethrin is unlikely to be a carcinogenic hazard to humans. Deltamethrin may cause transient itching and /or burning sensation in exposed human skin. In non-fatal cases of poisoning, numbness, itching, tingling and burning of the skin and

vertigo are symptoms that are frequently reported. Most of these symptoms are transient and disappear within 5–7 days. No long-term adverse effects were reported.

In a 2-year study in dogs, using a 100–fold safety factor, and on the basis of the NOAEL of 1.0 mg/kg body weight/day, the acceptable daily intake (ADI) for man was established at 0-0.01 mg/kg body weight.

On the basis of the NOAEL of 5 mg/kg body weight in the study of acute neurotoxicity in rats and a safety factor of 100, an acute reference dose has been established at 0.05 mg/kg body weight.

The following are the extracts from the Material Safety Data Sheet (MSDS) of the manufacturer, Bayer (formerly Aventis) for deltamethrin WG 250:

Acute oral LD_{50} (rat)	> 3465 mg/kg
Acute dermal LD_{50} (rat)	> 2090 mg/kg
Inhalation	Not relevant, large particle size prevents uptake into the lungs
Skin irritation (rabbit)	Slightly and reversible irritating
Eye irritation (rabbit)	Slightly irritating

2.2 Efficacy of deltamethrin WG - WHOPES supervised trials

M'be, Côte d'Ivoire – The efficacy of residual spraying of