

Characterization of insecticide resistance in malaria vectors in Lao People's Democratic Republic and Thailand and capacity building in medical entomology (MALVEC Project)

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Funding of the project:

5% Global Fund, France Expertise Internationale, French ministry of Foreign Affairs

Partners:

- National Center of Malariology, Parasitology and Entomology (CMPE), Vientiane, Lao PDR
- Institut de Recherche pour le Développement (IRD) IRD-MIVEGEC, IRD UMR-MD3, Bangkok Thailand
- Kasetsart University, Department of Entomology, Bangkok, Thailand
- Institut de Médecine Tropicale d'Anvers (IMTA), Belgium
- University of Life Sciences (ULS), Oslo, Norway
- Bureau of Vector Borne Diseases (BVBD), Ministry of Health, Thailand
- World Health Organization (WHO)

Description of the project and objectives:

In Lao PDR, a recent national survey on the distribution of malaria showed that 65% of the population was still living in transmission areas. This study also showed the predominance of

Plasmodium falciparum particularly in the southern part of the country associated with a high risk of transmission.

In 2004, an entomological survey showed that *Anopheles dirus* was an important malaria vector despite its low density and that the role of *An. minimus* in the transmission varied over time and space. However, the successive appearance in tropical forest areas of

An. minimus during the dry season and *An. dirus* s.s. during the second part of the rainy season allows a sustainable malaria transmission. More worrying, the recent environmental modifications linked to agriculture and forestry culture (e.g. rubber plantations Cf. ECOMORE Project) may change the status of several vectors, secondary and major, by giving them appropriate ecological conditions to thrive. Insecticide bioassays showed that *An. minimus* was resistant to pyrethroids in northern Vietnam and Thailand and

An. epiroticus was resistant to DDT and pyrethroids in Cambodia and southern Vietnam. It is possible that the use of agricultural insecticides may be at

the origin of the selection of these resistances and so constituting a danger for the implementation of effective vector control strategies. Unfortunately, there is a paucity of data available on the insecticide resistance of the main malaria vectors in Lao PDR. The "hot-spots" of transmission being located in border zones (Thailand, Cambodia, Vietnam...), there is an important risk of dispersal of the population of vectors and the resistances in the surrounding areas.

In Lao PDR, no data are available regarding the impact of agriculture pesticides on the resistance selection. The only available means of control of the transmission is the use of pyrethroid treated bed-nets, but in Laos, 30 to 50% of the people at risk sleep under treated bed-nets. We do not know if the malaria vectors from Thailand and Lao PDR are endophagic or exophagic. For example,

An. dirus is known to be exophagic, biting people at twilight at a time of day when that is not protected by treated bed-

nets. Hence, it is necessary to understand the vectors biology in Lao PDR and Thailand to adapt the vector control strategies.

The risk of distribution of the insecticide resistances of vectors in South-East Asia represents a serious threat to the good results recorded these last years in the control of malaria. It is urgent to identify the distribution, the levels and the mechanisms of resistance of the vectors in the lower Mekong countries with the aim of helping the health authorities to develop more effective strategies of prevention and control of the disease.

This project has 4 fundamental objectives:

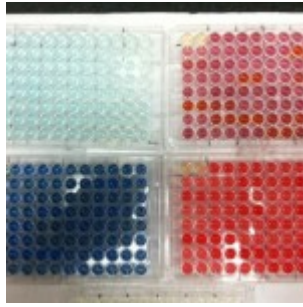
- Evaluation of vectors bionomics and distribution and their role in malaria transmission
- Evaluation of the levels, types and mechanisms of insecticide resistance
- Evaluation of the impact of environmental factors on vector dynamic and resistance selection
- Capacity building in medical entomology in Lao PDR

Expected outcomes:

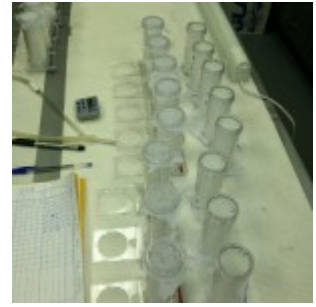
- Set up a comprehensive map representing the "hot spots" for malaria transmission in Lao PDR and Thailand (border area)
- Generate an Insecticide Resistance database in the main malaria vectors
- Address the dynamics and gene flows between malaria vectors populations
- Guide public health authorities in the design and implementation of Insecticide Resistant Management strategies
- Capacity strengthening of Lao and Thai students in medical entomology and vector control



Mosquito



Biochemical



susceptibility-
test

Results:

Publications: