

Agriculture and Health: Seeking sustainable solutions for reducing the burden of malaria in agricultural ecosystems in Kenya

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Introduction

Malaria is the leading cause of mortality and morbidity in Kenya, particularly among pregnant women and children under 5. Studies in Kenya suggest that between 20 - 25% of all deaths can be attributed to malaria. Up to 28 million Kenyans (70% of the population) are at risk and at any one time 1.5 million pregnant women are susceptible. In Kenya under-five mortality is currently 115 per 1,000 live births up from 112 in 1998. Measured in terms of disability-adjusted life-years, malaria is one of the major disease burdens in the country. The trend does seem unchanging as a result of the current perturbations to the environment through man-made and development related activities such as large scale crop production aimed at increasing food security.

Population growth in Kenya has led to the expansion of agricultural production, largely by irrigating arid and semi-arid areas for the cultivation of rice, sugar cane, and cotton. This has often been blamed for aggravating the problem of mosquito borne diseases by creating ideal larval habitats for vector mosquitoes. However, whereas several studies have demonstrated the relationship between malaria and irrigation, little work has been done to understand the full array of mosquito complexity within agricultural systems that drive disease transmission, for example, the potential of mosquitoes in transmission of filariasis and arboviruses. Despite the close linkage between health and agriculture, the two remain vastly disjointed. Health considerations seem to play very little part in decisions farmers make about production or policy. There is real potential for effective agricultural interventions, backed by good policy, to promote health, and the health sector taking actions leading to greater agricultural productivity.

The *icipe* led Mwea Malaria Control Project has addressed the malaria problem in rice and also collected baseline information on the prevalence of malaria in the area. Malaria is a major public health problem among the rice farming communities and hence needs attention so as to improve human health in the area. *icipe*'s projects have focussed on the following areas:

1. *An Ecosystem Approach to Human Health: Integrating malaria control interventions with development strategies in Kenya.* The guiding principle in this study is that interventions ultimately aimed at assisting communities should, among other things, be participatory, integrated and phased depending on the status of the technology to be used, and on local socio-economic circumstances. A process for development of long-term solutions has been initiated to ensure sustainability of interventions. Included in the long-term efforts is deliberate education and training of the target communities regarding the problems being addressed, and the building of the necessary research and scientific capacity among the relevant formal institutions.
2. *Microbial Control of Immature Anopheles Mosquitoes:* This research involves the development, implementation, and evaluation of an integrated vector management (IVM) program that focuses on larval management of malaria vectors at a rice irrigation-village complex in Mwea. Presently, control of *Anopheles* vectors relies almost exclusively on treating indoor sites with residual insecticides and the use of insecticide-impregnated bed nets. *icipe* has pioneered studies on managing

mosquitoes in the larval stage using environmentally safe and effective microbial insecticide formulations - when mosquitoes are the most concentrated, immobile, and accessible - is more effective in the long-term.

- *Rotational cultivation of rice and soy bean as an agro-ecosystem strategy for enhancing household incomes, nutrition and reducing malaria-vector breeding:* Seasonal rotation of rice cultivation with a dry-land crop could lead to opportunities for enhancing household incomes while directly contributing to reduction of malaria risk. Soybean is a leguminous plant (also classified under annual oil seed crops) which produces seeds with high protein and oil contents. The legume crop enhances soil fertility while mopping up water that creates mosquito larval habitats.
- *Role of intermitted irrigation on mosquito productivity and malaria burden in rice ecosystems:* Vector productivity is closely related to water management regimen in irrigated agriculture. We have made attempts to develop water management strategies that reduce the window period for vector productivity while still enhancing rice production.