How the Research was Developed

A Chronology

1976 – Bti is discovered by Israeli scientists when they notice a large number of dead mosquito larvae in certain ponds. On analysis of the pond water, they isolate the Bti spore.

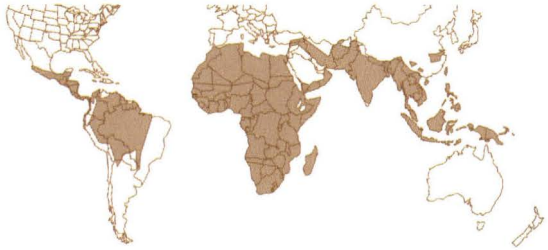
Late 1980s – It is noted at several international meetings that the malaria situation is getting worse.

1988 – The Peruvian research team tries to multiply the Bti spore by fermenting it with such locally grown produce as bananas and pineapples. The idea came from the native practice of making a fermented drink from the yucca plant. Coconuts prove to be the best option.

1992 – Recognizing the need for a renewed attack on malaria, 102 member states of the World Health Organization adopt a Global Malaria Control Strategy. The strategy acknowledges the importance of community partnerships in fighting the disease.

1993 – Using coconuts as incubators, three communities in northern Peru produce Bti to apply to local larvae breeding grounds.

Current worldwide distribution of malaria



What is IDRC?

Through funding of scientific research in Africa, Asia, Latin America, the Caribbean, and Canada, the International Development Research Centre (IDRC) helps communities in the developing world find solutions to problems related to health, technology, food, social and economic policy, information and communication, and the environment. Created by the Parliament of Canada in 1970, IDRC supports research projects that address the challenges of sustainable and equitable development.

Science in ACTION
is a brochure series profiling IDRC projects worldwide. IDRC-funded research uses science and technology to help identify practical, appropriate solutions to problems in developing countries.

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Malaria Control in a Nutshell

science in action

MALARIA CONTROL IN A NUTSHELL

Researchers in Peru have discovered a low-cost, eco-friendly weapon in the fight against malaria: that weapon is* COCONUTS. *Coconuts are used to incubate a bacteria which successfully controls the spread of malaria.

THE FACTS ABOUT MALARIA

Malaria, one of the most debilitating diseases in the developing world, is making a comeback. Epidemics are increasing, despite a decade of control programs in various parts of the world.

Malaria is spread by the bite of a mosquito. It causes fever, chills, nausea, and muscle pain and can lead to severe complications and death. Its weakening effects sap productivity; in countries where malaria is endemic, workforce and school absenteeism is high.

Every minute, two children die from the effects of malaria somewhere in the tropics. Almost half of the world's population is at risk of catching malaria. About 300 to 500 million people suffer from the disease each year and more than one million die of it.

Mosquitos are becoming more resistant to chemical insecticides, such as DDT, that have been used for decades to control malaria. Moreover, insecticides are expensive to use and can pose a threat to human health and cause environmental contamination.

A SOLUTION

Using *coconuts* to produce malaria-killing bacteria

- Bacillus thuringiensis var israelensis H-14 (Bti) is a bacteria that effectively kills mosquito larvae. It is commercially available but its cost can be prohibitive for developing countries. Researchers at the Alexander von Humboldt Tropical Medicine Institute in Lima, Peru found a cheap way to produce Bti. It can be grown in coconuts and then released into ponds where mosquito larvae flourish.

- Bti is environmentally friendly. It is a naturally occurring bacteria that is harmless to humans and livestock.

- The research team has developed a kit that communities can use to produce Bti in coconuts with minimal instruction. The coconuts are plentiful and free, growing virtually beside the ponds infested with mosquito larvae.

THE COCONUT LABORATORY

"Out in the field, the coconut can replace the petri dish and the lab."

Microbiologist and research team leader Palmira Ventosilla

How does it work?

A cotton swab that has been doused with Bti is dropped through a hole drilled in a coconut. The hole is plugged with a wisp of cotton and sealed with candle wax. The coconut's hard shell protects the Bti during incubation while the coconut milk contains the amino acids and carbohydrates the bacteria must eat to reproduce. After the coconuts have fermented for two to three days, they are broken open and thrown into an infested pond. Along with their regular diet of algae, the mosquito larvae eat the bacteria. The Bti kills the larvae by destroying the stomach lining.

In tests, the Bti killed nearly all the mosquito larvae in a pond and stopped breeding for 12 to 45 days. A typical pond needs two to three coconuts for each treatment.

IDRC AND THE FIGHT AGAINST MALARIA

IDRC supports malaria control strategies around the world...

- A computer software program, developed by researchers in **Brazil**, evaluates malaria in municipalities and produces information for prevention and control of the disease.

- Researchers in **Bangladesh**, **Benin**, **Sri Lanka**, and **Tanzania** are evaluating the effectiveness of bednets treated with insecticides in preventing mosquito bites while people are sleeping. (The insecticides are harmless to humans.) In the Tanzanian project, researchers will test "grass skirt" bednets made from material used to pack agricultural produce.

- In **Guinea**, researchers studied strains of malaria that were resistant to chloroquine, a common antimalarial drug.