PLANTING THE PREVENTION OF SCHISTOSOMIASIS

The berries of the Endod plant are helping to control schistosomiasis by killing the snails that host the parasitic disease.

For decades, Zimbabweans used the leaves, roots, and berries of the plant they called gopo (Endod) to make floor polish and medicine. Little did they know that the berries of this climber shrub, scientifically known as *Phytolacca dodecandra*, might one day help to control schistosomiasis disease in their country.

In 1964, a scientist in northern Ethiopia discovered that when tiny amounts of dried Endod berries were crushed and mixed with water, a soapy foam resulted. The solution killed the freshwater snails, which host the schistosomal parasites, within 24 hours.

Dr Aklilu Lemma's discovery and consequent international research are potential breakthroughs for countries like Zimbabwe struggling to combat this water-borne disease.

Researchers at the Ministry of Health's Blair Research Laboratory in Harare are working in partnership with IDRC to study whether they can incorporate Endod treatment into current, community-based schistosomiasis control programs in Zimbabwe's Primary Health Care system. If put into place, these programs will be the first of their kind in any affected region of the world.

Parasites living from host snails are the cause of schistosomiasis. When humans come into contact with contaminated water the parasites, scientifically known as *Schistosoma cercarie*, penetrate the skin. These parasites then develop into worms that pass into the blood vessels of the intestines or bladder.

Mature worms live for 4 or 5 years, producing up to 300 eggs per day and scientists say the more eggs in the body, the more severe the infection.

Blood in urine and stool, diarrhea, fatigue, fever, malnutrition, and decreased immunity are often symptoms of schistosomiasis. The disease has recently been found to have negative effects on physical and school performance in infested children. In its most severe form, schistosomiasis can result in paralysis and death.

Two million of Zimbabwe's population of 9 million are affected by the disease; a great many others are at risk. After malaria, schistosomiasis is the most common parasitic infection in Zimbabwe.

Schistosomiasis has its highest prevalence in 8–10 year old schoolchildren who frequently come into contact with contaminated water. Open water bodies used for bathing, cooking, laundry, and irrigation — especially in rural areas — serve as breeding grounds for both the snails and the parasites they house.

Since mid-1989, scientists at the Blair Research Laboratory have been cultivating various Endod strains to test which plants will control the disease most effectively. Jerry Ndamba, the project leader of the Endod studies at the Blair laboratory, says future Endod use could

dramatically reduce the incidence of schistosomiasis. It will also, he adds, be a more viable and cost-effective method for Zimbabwe to combat the disease.

"Endod treatment encourages self-initiatives while lessening our dependence on Western technologies," he says. "These technologies are normally out of the reach of most developing countries."

The wild plant Endod could replace more expensive synthetic ways of killing snails, scientifically known as molluscicides. The most popular of these synthetic treatments is a niclosamide ethanolamine salt, called "Bayluscide." Bayluscide is currently the only snail-killing compound recommended for use by the World Health Organization (WHO). But its cost, US$27,000 per tonne, makes it too expensive for large-scale use by Zimbabwe's Ministry of Health.

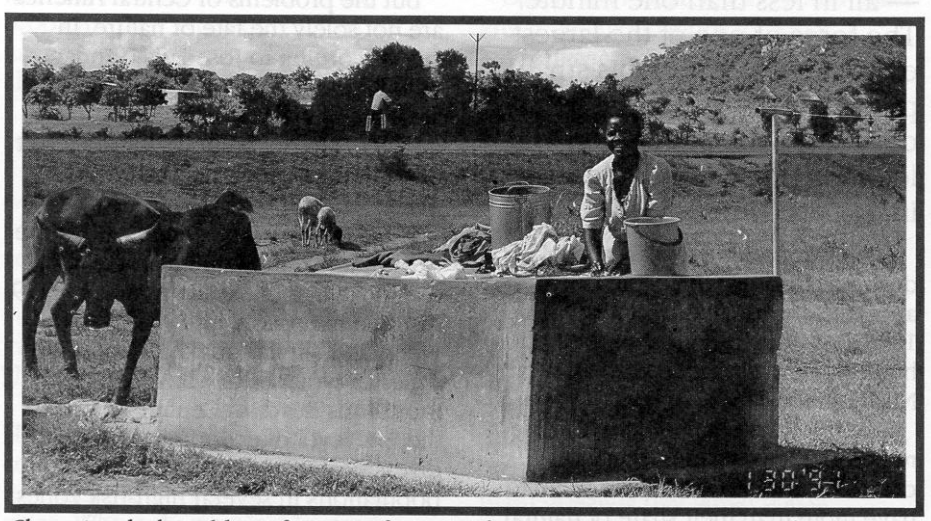
As an alternative, the Blair Research Laboratory is experimenting with different strains of Endod in 9 various regions of Zimbabwe looking at different altitudes, climates, soil types, and precipitation levels. Types of Endod include the Ethiopian strain, E-44, and Zimbabwean strains of Endod grown in the south (Masvingo), the north and the eastern highlands (Old Mutare).

The team is currently determining the conditions under which the strains grow best. To date, indications are that the E-44 strain produces more berries than the local strains, growing best when fertilized with manure and watered regularly.

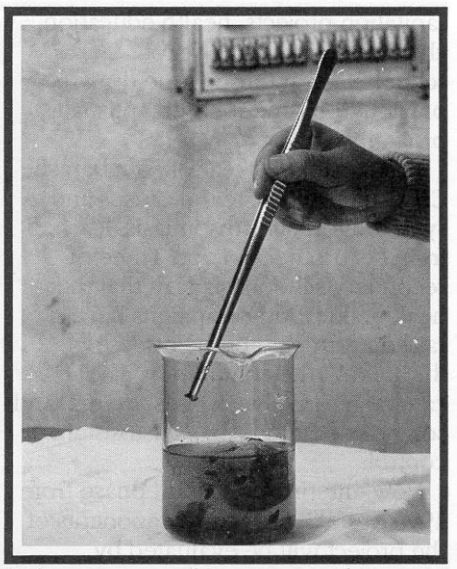
Studies on E-44 concluded that its berries were most potent to snails when picked at the green, unripe stage and then air-dried in the shade. The dried berries can then be ground to a fine particle and mixed with water to achieve the desired concentration.

The solution is stored for 24 hours at room temperature with occasional stirring. Later, the mixture is filtered through a cotton cloth. The product is finally homogenized and stored at room temperature. A 100% mortality rate occurs when snails carrying the schistosomal parasites are immersed in Endod-treated water at one part per million for 24 hours.

After application to the water, Endod does not remain or build up in the environment like some of the toxic molluscicides. Indeed, before the Endod molluscicide was used in community trials, Canadian laboratories, under the coordination of Carleton University, evaluated its toxicity. Despite its problems as a severe eye irritant, Endod was found to be no more toxic than currently recommended molluscicides. Indeed, tests have shown that use of Endod could be safer than genotoxic niclosamides like Bayluscide.



Changing habits, like refraining from washing in open water bodies, have helped in the the fight against the disease.



Laboratory tests have proven the potency of the Endod berry in killing the snails that carry schistosomiasis.

Earlier studies on Endod's environmental effects revealed that it had little impact on plants and animals, with the exception of some fish, aquatic leeches, and insect larvae.

The indigenous plant that grows in Zimbabwe's endemic areas may allow communities to take over snail control once training is given, according to Ndamba. The treatment is easy to prepare using local tools.

"Endod research has forged scientific links and fostered the belief that affected countries have the resource and technology to solve their own problems," Mr Ndamba says.

Communities Involved in Control

If put into place, Endod treatment will allow Zimbabwe's Ministry of Health to involve affected communities in all levels of schistosomiasis control. With funding from IDRC, Blair's research team has already designed and introduced an integrated, community self-help control program since 1985.

The rural communities of Madziwa (32,000 people) and Bushu (8,000) in the country's northeast region are testing-grounds for the control programs that include four components: self-help water and

sanitation projects, health education, chemotherapy treatment of schoolchildren through the drug praziquantel, and focused antisnail programs.

The fact that 10 year old Simbarashe Chagadama can cite the causes and symptoms of schistosomiasis, learned from his brother in Form Three of secondary school, is a sign that the health education campaigns have raised awareness of the disease throughout the community. The campaigns involve classes, drama, and song competitions on schistosomiasis control.

Now entering its second phase from 1990 to 1992, the four components of the project will be evaluated by scientists at the Blair laboratory. Endod treatment will allow the final segment, snail control, to be broadened to include community members.

Research is also underway in Canada and the USA to determine whether Endod treatment can be used to kill Zebra mussels currently clogging Canada's Great Lakes drainage systems, illustrating that technology transfers can flow both ways between the North and South. The plant that may save schistosomiasis-afflicted countries could also solve one of Canada's major water problems.

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THE MAN-MADE SIDE OF NATURAL DISASTER

In the "Colony of Good Hope" on the outskirts of Guatemala City, this type of housing construction is at high risk in the event of earthquakes.

Fifteen years ago, 23,000 Guatemalans died, more than 100,000 were injured and close to a million were left homeless — all in less than one minute. The force of one of the largest earthquakes ever in this small, poor Central American country devastated the population and left more than a billion dollars in damage.

A similar quake in Nicaragua in 1972 destroyed most of the capital city, another caused havoc in El Salvador in 1985, and Hurricane Joan wiped out homes and lives on the east coast of Nicaragua in 1988.

Like the wars that have put this region in the headlines, the six countries of Central America seem to have more than their share of natural disasters.

Earthquakes, volcanoes, droughts, floods, torrential rains, mudslides, and hurricanes occur here with a frequency unheard of in most other parts of the world.

But the problems of Central America are not solely the fate of nature. In fact, according to Jose Luis Gandara, who headed a research team looking at Guatemala's natural disasters, "the disasters are not natural, but the result of natural phenomena in vulnerable places."

Proof of this point is the fact that the earthquake that hit the major American city of San Francisco in 1989 resulted in fewer than 100 deaths, whereas a similar quake in Central America would likely have left thousands dead. In Central America, the low level of economic diversification, concentrated populations in several high-risk zones,