



Eradicating tsetse from the Southern Rift Valley of Ethiopia

Farming activities in Ethiopia, as in much of sub-Saharan Africa, are restricted by the presence of tsetse flies (*Glossina spp.*). These carry the livestock and human disease, trypanosomiasis, which severely affects agricultural production and human well-being. In collaboration with the Ethiopian authorities, the International Atomic Energy Agency is sponsoring a Sterile Insect Technique (SIT) programme to eradicate tsetse from the Southern Rift Valley of Ethiopia.



JEGGOMAEA

Population pressure is risking over-exploitation of the tsetse-free, but fragile, highland areas of the Southern Rift Valley of Ethiopia.

Livestock are essential

Agriculture contributes approximately half of Ethiopia's GDP, over 90% of the foreign exchange earnings and between 85% and 90% of the labour force. In the Ethiopian highlands, which are the most densely populated regions, the predominant farming system is mixed livestock and crop production. Animal draught power is widely used for crop cultivation, and meat, milk and dung are major livestock products. Population pressure is risking over-exploitation of the tsetse-free, but fragile, highland areas while some 15% of lower-lying, fertile land lies under-used because of tsetse infestation. Although most of the lowlands have high agricultural potential, they are only sparsely populated.

Tsetse - a greater threat

It has long been recognized that tsetse is a major limiting factor to agricultural development and many efforts have been made to establish some degree of vector and disease control. Notwithstanding the continuing success of some of these measures, there are worrying trends that make an attempt at complete eradication over a wide area highly desirable. The trypanosome parasite that causes the disease is becoming resistant to the chemical treatments available. Furthermore, it seems that tsetse is moving into new and higher areas that were previously free of flies. If these two trends continue the consequences will be disastrous.

The Model Project

The International Atomic Energy Agency is providing support to the Ethiopian authorities for tsetse control/eradication in an area, initially of 5,000 km², in the Southern Rift Valley. Over the ten-year life of the project, it is planned to extend the target area to about 25,000 km².



An Ethiopian farmer trains his cow to provide draught power.

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Following an assessment of entomological, veterinary and socio-economic factors which will influence subsequent project operations, a phase of tsetse suppression by appropriate conventional means will be introduced. (*see box: SIT - not the only weapon*). This will be followed by an airborne operation during which sterile male tsetse flies will be released over the targeted area. The flies will be produced and reproductively sterilized by irradiation at a mass rearing factory to be built near Addis Ababa.

The project area has been chosen because it has high agricultural potential and is well confined from neighbouring tsetse-infested areas by high escarpments and arid land. Furthermore, tsetse infestation is high and local population pressure is putting a severe strain on available fly-free highlands.

SIT - not the only weapon

Unlike conventional insect control methods that are preferably applied to a high population of the target insect pest, SIT is most effective when fly populations are low. The ratio of released sterile male flies to wild fertile male flies should be as high as possible to minimize the odds that wild flies mate.

The project area will be divided into eradication zones, each chosen to take as much advantage as possible of natural isolating features such as high or arid land. Six to eight months prior to aerial releases of sterile flies, locally made, odour-impregnated traps will be placed at a density of four per km² by specially trained local teams to start reducing the fly population in the target area. When fly numbers have been sufficiently suppressed, the traps will be removed and aerial release of sterile males initiated. As the project develops, a pattern of suppression followed by aerial releases will advance, zone by zone, until the entire project area is covered. Throughout the life of the project, and beyond, monitoring and surveillance will be essential.



Tsetse eradication will allow more land to be cultivated for sorghum.

The fly factory

In order to begin mass rearing, a suitable strain of tsetse fly has been collected from the project area and adapted to the artificial conditions of factory production. The Agency's laboratories at Seibersdorf in Austria, and the Tsetse and Trypanosomiasis

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Research Institute at Tanga, Tanzania, are involved in this work and will maintain a back-up colony of this strain respectively once the Ethiopian facility is in production. The Tanga facility was responsible for fly production in the successful eradication of tsetse from Zanzibar.

Initially, the mass rearing facility in Ethiopia will supply 250,000 sterile males per week. Production will eventually be doubled in order to meet the project's needs. The flies will be chilled to immobility, avoiding the need to box them for aerial release.



Ethiopian technician collecting tsetse flies for a mass rearing colony build up.

Fly releases

Flies will be released over the targeted eradication zone at a rate of approximately 100 sterile males per km² per week over almost two years. These numbers will be adjusted as necessary in order to achieve the desired ratio of released sterile to wild fertile males. Aircraft will fly regular sorties over the area, ejecting chilled flies at a computer controlled, specified rate. The flies warm up and become active as they reach ground level.

The benefits

Once free of the risk of trypanosomiasis, farmers in Ethiopia should feel confident in the benefits of investing in better livestock breeds and, therefore, being able to get better productivity from a given number of animals. Foreign currency spending on treatment of trypanosomiasis will be reduced. Ecological pressure on the fragile highlands will be lessened through a slight expansion of the area under crop cultivation particularly in the previously abandoned fertile land. The use of better, not necessarily more, livestock including draught animals will allow intensified agricultural practices.

Ethiopian authorities hope that once eradication is achieved in the Southern Rift Valley, the area-wide strategy would eventually be expanded to all other tsetse-infested regions in the country, bringing enormous benefits to agricultural development in Ethiopia.

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