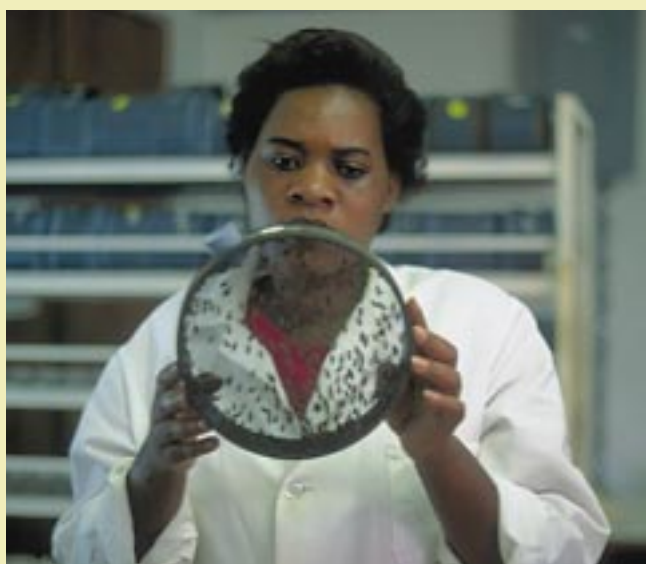


ZANZIBAR PREPARES FOR THE POST-TSETSE ERA



A technician at the TTTRI in Tanga checks the condition of tsetse flies used in Zanzibar's eradication campaign.

Credit: D. Kinley/IAEA

The tsetse fly appears to be a pest of the past on Zanzibar's Unguja island. An independent group of experts recently confirmed that since September 1996 not a single wild fly has been caught in the array of traps set out in once heavily infested areas. The Sterile Insect Technique (SIT) — the final weapon in this eradication effort — was discontinued in December 1997, though monitoring for both the insects and the live-stock disease (Nagana) they transmit will continue. With re-infestation very unlikely (the mainland is more than 30 kilometres away) the new focus is on increasing live-

stock and crop production across the island.

Tanzania's efforts to control the tsetse began more than 30 years ago, when the Tsetse Trypanosomiasis Research Institute (TTTRI) was set up in Tanga with support from the United States through the US Agency for International Development (USAID). Flies were reared on live animals, primarily for entomological research. But early efforts at control, on the mainland and in Zanzibar, had limited success. The first IAEA technical cooperation project began in 1984 to demonstrate the feasibility of mass-rearing techniques and concentrated on upgrading

the TTTRI facility and its equipment.

Mass rearing technology, developed by the IAEA and Food and Agriculture Organization (FAO) at the Seibersdorf Laboratories in Austria, were transferred to TTTRI through fellowships for scientists and technicians from Tanga and Zanzibar. During the past decade, 14 fellows spent 3-6 months each in Seibersdorf. They attended courses that were designed to enable them to employ their skills directly in the rearing facility in Tanga, as well as train others at home. By the early 1990s, TTTRI had become the largest tsetse rearing facility in the world, enabling aerial releases of 50,000 sterile males per week and 100,000 at peak production during the last two years.

Suppression of the tsetse population in the wild began at ground level on Unguja during the late 1980s, using insecticide-impregnated screens and traps. The campaign was supported by the FAO and United Nations Development Programme (UNDP). The IAEA then launched a TC Model Project, with technical support from the Joint FAO/IAEA Division, in 1994 with the aim of complete eradication. Under the

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Zanzibar prepares for the post-tsetse era *(continued from page 1)*

Model Project, aerial releases of sterilized males began over the most infested and inaccessible regions of southern Unguja and were extended later to the north.

With eradication completed, the Government of Zanzibar plans to use the land for integrated dairy farming and cropping systems, and to promote goat rearing in marginal areas, according to Dr. Kassim Juma, Commissioner of Agriculture and Livestock. Implementation will require technologies and skills that Zanzibar lacks. Isotopic and other nuclear techniques could be especially valuable in improving animal and crop productivity. In October 1997, a mission under the IAEA's TC Country Programme Framework visited Tanzania to map out medium-term assistance for the whole country, paying special attention to Zanzibar's needs. A new TC project is being developed for Zanzibar focused on



Now that Zanzibar's livestock no longer suffer from Nagana, beef and dairy production can be expanded. *Credit: D. Kinley/IAEA*

crop and livestock production in the post-tsetse era.

It will be important to develop agriculture systematically and avoid haphazard cultivation and over-grazing. Preliminary plans

call for improvement of livestock through cross-breeding with more productive breeds from the mainland and abroad. The island's native cattle tolerated tsetse-spread disease. But they are small, yield little milk and meat, and are not very good for animal power. To build the herd, supplements will be developed using rice bran, coconut refuse, molasses, and poultry manure in locally manufactured feedstuffs called urea molasses multi-nutrient blocks.

Introduction of higher yielding varieties of rice and other grains is being planned. Systematic cultivation of nitrogen-producing leguminous trees such as glyricidia in the grasslands could fertilize pastures and could also be incorporated into cattle feedstock. High-quality grasses such as Napier and Guatemala, which already grow on the island and are well adapted, could be introduced into the pastureland. Working together with the IAEA, local officials are very hopeful that, with their island finally tsetse-free, Zanzibar has entered a new stage of agricultural advancement.

SIT's potential for other parts of Africa has been demonstrated on Zanzibar, where tsetse flies and trypanosomosis now appear to be problems of the past. But tsetse continue to threaten many regions of sub-Saharan Africa and to invade new agricultural areas. SIT is now being considered in a number of affected countries as a new tool in integrated area-wide tsetse eradication campaigns. One effort is already underway: the Ethiopian government and the IAEA are co-operating on the initial phase of a tsetse eradication program which is expected to evolve into a 10-year multi-million dollar activity aimed at eradicating tsetse flies from 25,000 km² of potentially productive land in the Southern

Rift Valley. Tsetse and trypanosomosis have had detrimental effects on farming in the region, and if tsetse can be eradicated, sizeable environmental and social advances will follow.

SIT could be the key missing link for integrated tsetse and trypanosomosis management in Africa. It can contribute to improving agricultural production and advance the battle against "sleeping sickness". Over the longer term, SIT may be used, together with conventional methods to establish large geographically or biologically isolated tsetse free zones. As in Zanzibar today, this could clear the way for new activities to improve the lives and health of subsistence farmers across the continent.

NEW HOPE FOR SALINE SOILS



A technician from Pakistan's Nuclear Institute for Agriculture and Biology collects data from a Neutron Moisture gauge.

Credit: M. Naqvi/IAEA

In many parts of the world, the soil has become so salty that normal crops cannot survive and land lies barren and unused. Without better management of irrigation, the area of land lost to agricultural production through salinity will continue to expand. But with a combination of better water management and salt-tolerant crops, the salt-affected land can be made productive again. Nuclear technology has an important role to play in achieving this objective.

Water has often been used to solve salinity problems as though there is no limit to its availability. The result on irrigated lands is often a harmful concentration of salts within the topsoil where most crops get nutrients. Soil salinity is most serious in arid and semi-arid regions where surface water is scarce and where groundwater tends to be saline. The net

effect can be a white-encrusted, salt-capped wasteland. Human activities are responsible for saline conditions on about 77 million hectares globally, of which about 45 million hectares are in irrigated areas.

The challenge is making productive and sustainable use of salt-affected land, preferably by tapping the saline groundwater. What is needed is "a change in thinking," explains Dr. Mujtaba Naqvi, Manager of the IAEA's Model Project, "Sustainable Utilization of Saline Lands". "Agriculture is traditionally carried out on the basis of suiting the soil to the plant, but it is perfectly possible to suit the plant to the soil," he says. There are hundreds of species of plants that are salt-tolerant including grasses, shrubs and trees. Instead of growing salt-susceptible crops such as wheat, maize, cotton and

sugarcane, tolerant plant species can be grown for use as energy sources or as timber. There are hundreds of thousands of hectares where acacia, atriplex, eucalyptus or salt-tolerant grasses are grown using saline groundwater. These are used as forage and for paper-making, and experiments are assessing the potential of using biomass from these crops for conversion. There are no ill effects to animals when they are fed on forage grown on salt-affected land.

What must be avoided is an excess of saline water and it is here that nuclear technology can be used to closely monitor moisture levels in soil and the movement of saline water. Nuclear techniques are more precise and sometimes the only means to study soil and water conditions. Neutron moisture gauges are used to measure soil water content and thus irrigation can be better managed. Nuclear techniques can also be used to analyse the composition of groundwater, and this information helps to assess the rate of recharge.

A biological approach to reclaiming salt-affected land has many advantages. The land will gradually improve in texture and fertility through the effect of the plant biomass. Soil cover by plants reduces erosion, provides shade, builds up organic matter and biological activity in the soil, transforming "dead" barren soil into a live, dynamic system.

No country can afford to waste water or abandon ever-increasing land areas to salt. Nuclear techniques can help countries to make productive and economic use of two often wasted resources, saline land and saline groundwater. Through its TC projects, the IAEA is supporting efforts toward these ends.

PAIN RELIEF FOR CANCER PATIENTS AT LOWER COST



Cancer patients may soon benefit from cheaper radiopharmaceuticals.

Credit: J. Perez-Vargas/IAEA

Cancer patients with metastases commonly experience bone pain. Radiopharmaceutical treatment is widely accepted as the most effective and least toxic, especially when the pain sites are numerous and widespread. Cost remains the major constraint in the therapeutic use of radioisotopes in developing countries. Of the radiopharmaceuticals suitable for clinical

A three-year comparative study has yielded results that will lead to widespread pain relief for cancer sufferers while cutting costs of patient treatment dramatically. The study was organized through an IAEA coordinated research project (CRP).

ical use, strontium-89 is expensive but widely marketed by a single company and phosphorus-32 is relatively cheap, available in developing countries but less used.

The CRP, started in 1993, compared the efficacy and toxicity of intravenously administered strontium-89 and orally administered phosphorus-32 in the palliative treatment of painful cancer bone metastases. This was the first therapeutic clinical study undertaken by the IAEA and is so far the only one of its kind worldwide. Five countries — Austria, India, Indonesia, Slovenia and Peru — participated and 85 patients were investigated. The results of the study were presented at the final research coordination meeting in Ljubljana, Slovenia, in April 1997. They confirmed that phosphorus-32 is as effective as strontium-89. On the basis of sound scientific evidence, the IAEA can now encourage developing countries to use phosphorus-32, which will benefit a large number of patients now denied the opportunity to improve their quality of life.

POTENTIAL INCREASE IN ORGAN DONORS

A new religious policy could pave the way for more TC involvement in nuclear medicine in some developing countries. Religious tradition can severely restrict the availability of organs for transplants. Shortages are particularly severe in Islamic countries, where religious authorities generally prohibit the surrender or replacement of any part of the body. Since government policies rarely attempt to challenge religious edicts in these countries, many patients needing transplants are forced to seek them abroad.

But break with tradition occurred this year in Egypt, where the top religious authority, Mohammed Sayed Tantawi, the Grand Sheik of Al Azhar, declared in May that transplants were indeed permissible and that he would donate his organs to needy patients when he died. Lists of dozens of prominent Egyptians who followed suit were published in Egypt's

official newspapers. Tantawi, who presides over more than 6000 religious institutions in Egypt alone, exercises enormous influence throughout the Islamic world. His declaration reinforces the Egyptian Government's request to Parliament — in response of the concern of doctors troubled by the lack of available organs — to draft a law spelling out the circumstances under which organ transplants would be permitted.

The implication for the IAEA points toward increasing technical cooperation with developing countries in using isotopic techniques and industrial radiation processes in efforts to improve human health. The introduction of organ donation and the growth of centres for transplants in Islamic countries would foster collaboration between institutions to share their experience with medical grafts using human tissues.

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