



GATSBY

BUILDING A NEMATODOLOGY NETWORK ACROSS AFRICA

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African farmers can lose up to 20% of their crops to plant-parasitic nematodes, which are widespread across the continent. Locally-adapted control strategies are desperately needed, but nematology research and development is underfunded and dissemination is also challenging.

- Between 2004 and 2011 Gatsby funded Rothamsted International to establish and support the Nematology Initiative for Eastern and Southern Africa (NIESA) – a network of scientists involved in nematology research and training across five countries in the region
- NIESA aims to combat the lack of a critical mass of nematologists in any one country and build capacity in the region to develop systems that allow farmers to reduce yield losses
- NIESA has equipped laboratories with advanced equipment; initiated collaborative research; developed materials on diagnosing and managing infestations; trained farmers, extension workers and researchers; and increased interest in nematology through the region



NEMATODES IN AFRICA

There are more than 500,000 species of nematodes - microscopic, unsegmented roundworms - and many are parasites of animals (including insects) and plants. Globally, plant-parasitic nematodes are estimated to cause average crop losses of about 12% per cent, costing between US\$100 and 700 billion annually.

In Africa, certain plant-parasitic nematodes are widespread. Root-knot nematodes (*Meloidogyne spp.*), burrowing nematodes (*Radopholus similis*), lesion nematodes (*Pratylenchus spp.*) and ectoparasites (*Scutellonema spp.*, *Helicotylenchus spp.* and *Ditylenchus spp.*) are particularly problematic. These nematodes damage the roots of multiple crops, impairing their water and nutrient uptake and leaving them susceptible to insects, diseases and other stresses. This results in losses of up

to 20% in both food crops and economically-important commodities such as cotton. Nematodes can also occasionally cause complete crop failure.

Because plant-parasitic nematodes occur in soil and affect root health, they tend to get overlooked, with symptoms often confused with nutrient deficiencies and other stresses. In many cases this leads to improper application of pesticide and inorganic fertiliser to the soil.

CONTROL STRATEGIES

Although synthetic nematicides have been available for use in Africa, they have usually only been applied to high value crops sold for export, where financial returns are sufficient to cover the increased costs. However, with limited access to the finance needed to invest in such inputs (and with many nematicides now

prohibited in certain countries due to associated environmental and health risks), smallholders instead have to rely on careful crop management and biological control agents.

Developing such control strategies across a range of different crops in varying ecological conditions is a vast task, requiring innovation and contributions from many nematologists conducting high quality research and development.

Yet nematology in sub-Saharan Africa is severely underfunded. The small number of nematologists and limited facilities mean there is little research into control systems specifically adapted to local needs, and few mechanisms for transferring the knowledge that is generated.

This all contributes to the low awareness of the nematode problem among farmers, extension services and policy-makers, lessening the likelihood the necessary investment will be made to change the situation.

NIESA

To tackle this, in 2004 Gatsby funded Rothamsted International to build a network of scientists involved in nematology research and training from five countries in Eastern and Southern Africa – Tanzania, Kenya, Uganda, Malawi and Zimbabwe. The resulting Nematology Initiative for Eastern & Southern Africa (NIESA) receives technical support from, and engages in research and training collaborations with, a UK consortium comprising Rothamsted Research, CAB International, Bioscience and the University of Reading.

“NIESA seeks to be an internationally competitive nematology research network comprised of appropriately resourced nematologists carrying out scientific research and training that provides practical benefits for local communities, especially in sustaining food security.”

NIESA aims to combat the lack of a critical mass of nematologists in any one country by acting regionally to:

- Build capacity in nematology in Eastern and Southern Africa;
- Develop sustainable nematode management systems that will enable farmers to reduce yield losses;
- Provide diagnostic and advisory services;
- Raise awareness of the damage caused by nematodes;
- Pool and share existing information and technical skills within the region.

NIESA initiates collaborative research between members, develops materials on diagnosing and managing nematode infestations, and delivers training through both formal, degree-based programmes and courses targeted at extension officers, the private sector and farmers groups.

OUTCOMES

With Gatsby support NIESA has:

- Equipped six laboratories in the region with high quality microscopes and equipment allowing for accurate diagnostics and the exchange of digital images across the region – it now offers smallholders and commercial farmers diagnostic and advisory services through the laboratories;
- Trained more than 60 people from research institutes, universities and farmers groups in seven countries (Tanzania, Kenya, Mozambique, Uganda, Zimbabwe, Malawi, and Southern Sudan) at three regional workshops – two beneficiaries of the course held in 2007 have since identified pests of quarantine importance - *Anguina tritici* and *Aphelenchoides besseyi* - not previously reported in their countries;
- Increased interest among postgraduate students – the number of students taking nematology projects in NIESA member institutions increased to 15 within five years;
- Produced a 200-page training manual for use in workshops and university teaching, and laminated field guides for use by extension services.



LESSONS

The project has shown the benefits of regional collaboration, with the network acting to overcome the lack of a critical mass of nematologists in any one country in the region.

One challenge was that most countries participating in NIESA do not have qualified technicians able to service and repair the equipment provided through the project. This led to an unsustainable and costly solution where a South African specialist was engaged across the region. When providing equipment, donors need to think through ensuring that institutes have sufficient training to enable them to maintain it.

Additionally, in early workshops NIESA noted the absence of extension staff, threatening dissemination efforts. In response it ran specialist courses for such staff across the region.

However, while workshops and courses reached farmers and extension workers, they did not target policy-makers – a group NIESA now sees as potentially vital to future efforts.

NIESA now faces the challenge of continuing its support to research and development efforts while further raising awareness, particularly among policy-makers and donors, so nematology is properly considered among wider crop protection efforts in all countries across the region.