Funded by the European Union

Optimisation of Pesticidal-plants: Technology Innovation, Outreach & Networks (OPTIONs)

Consortium

Implementing partners:

- Natural Resources Institute (NRI) - University of Greenwich, *UK (Project Co-ordinator)*
- Royal Botanic Gardens, *UK*
- University of Zimbabwe, *Zimbabwe*
- Mzuzu University, *Malawi*
- Sokoine University of Agriculture, *Tanzania*
- World Agroforestry Centre (ICRAF), *Kenya*
- Sustainable Global Gardens, *UK*
- National Museums of Kenya, *Kenya*

Associated partners:

- Centre For International Forestry Research
- (CIFOR), *Indonesia*
- Ministry of Agriculture, Irrigation and Water Development, *Malawi*
- Egerton University, *Kenya*
- Community Initiatives for Rural Development, *Kenya*
- Community Sustainable Development Empowerment Programme (COSDEP), *Kenya*
- Kenya Organic Agriculture Network, *Kenya*
- Indigenous Knowledge Centre (IKC), *Malawi*
- Environment Africa, *Zimbabwe*
- Pyrethrum Growers Association, *Kenya*

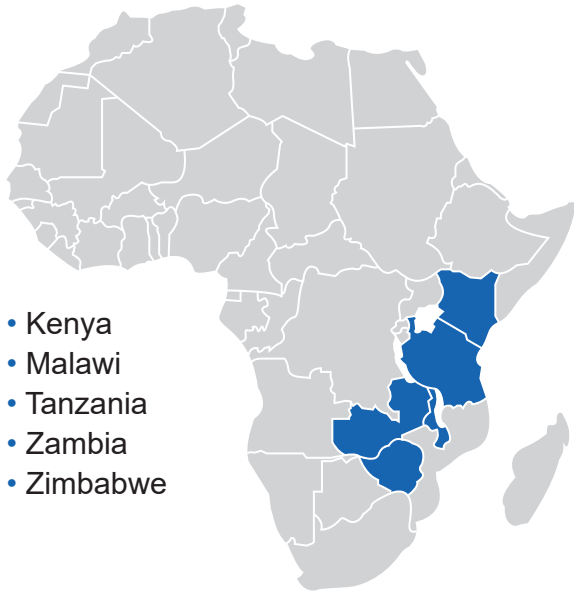
Budget

Total budget: €1,174,300.39
EU contribution: €993,525.39

Duration

January 2014 – June 2017

Countries of intervention



- Kenya
- Malawi
- Tanzania
- Zambia
- Zimbabwe

Development challenge

Food security is a major challenge in Africa, with a high demand for sustainable produced food. Crop pest damage is a significant challenge to food and nutritional security, mainly affecting poor farmers and low-input agriculture in Africa.

80% of food is produced by small holders farming (< 2ha) marginal and degraded land with little mechanisation or adequate inputs (Sibhatu et al.,2015). Smallholders frequently overlook pest control due to its prohibitive financial cost, but higher production rates depend on pest management. Current practices rely on agrochemical inputs, adversely affecting the user and consumer health and ecosystem services like pollinators and natural pest regulation.

Pesticidal plants are a viable and widely used alternative approach to pest control. However, accurate knowledge is needed to optimise the organic intervention of pesticidal plants so farmers can benefit from its natural and environmentally friendly pest control tproperties.

Project approach

The OPTIONs project used a collaborative multidisciplinary and multi-institutional approaches that targeted researchers, post graduate students, scientists, farmers, nursey growers, and related staff. The project strategy was built on a strong practical hands-on implementation and participation of all target groups and final beneficiaries, and aiming to self-sufficient and commercialisation of produced pesticides, together with inter-network collaboration.

This approach was implemented through the scientific and technical trainings on how to exploit pesticidal plants and optimise their use for poor farmers, generate a new income and scale the production to national level.

Project results

Improved knowledge on scientific, technological and application capacity of agricultural stakeholders to exploit pesticidal plants and optimise their use for smallholders was strengthened.

>20

Local training workshops have been held in Kenya, Tanzania, Malawi, and Zimbabwe.

>4,000

Farmers were trained in the optimal use of pesticidal plants (40% of whom were female, particularly in legume cropping systems).

>90

Scientists and nursery growers (30% female) were trained in the propagation of 4 indigenous species, with additional training and knowledge transfer on other effective species such as Tephrosia.

>90

Graduate students and scientists were trained in scientific techniques for validating biological activity as well as pesticidal plant propagation and use.

3

Policy papers published in Food Security Journal, 6, 369-384, and Outlooks on Pest Management.

Farmers' knowledge and scientific evidence on pesticidal plants (http://projects.nri.org/options) and detailed information on

18

pesticidal plant species common in the region (http://projects.nri.org/options/background/plants-database).

Handbook on Pesticidal Plants. World Agroforestry Centre (ICRAF), Nairobi, Kenya (http://projects.nri.org/options/images/handbook.pdf).

Project results (2)

Improved Protocols and methodologies used for testing plants against target pest organisms in laboratory and field trials, together with the propagation of eight key pesticidal plant species to guarantee supply.

10
Different species, elite pesticidal plant materials have been identified.

4
Plant species have application technologies for controlling cattle ticks on livestock.

Guidelines for the "Sustainable harvesting of traditional medicinal plants".

Mzuzu University established an analytical chemical facility to provide technical support for future pesticidal plant research.

Improved environment and capacity building of communities in Kenya and Tanzania.

12
Pesticidal plant information sheets (in English, French and Kiswahili):

- **Aloe ferox**
- **Chenopodium (syn. Dysphania) ambrosioides**
- **Euphorbia tirucalli**
- **Lippia javanica**
- **Securidaca longepedunculata**
- **Solanum incanum**
- **Strychnos spinosa**
- **Tagetes minuta**
- **Tephrosia vogelii**
- **Tithonia diversifolia**
- **Vernonia amygdalina**
- **Zanthoxylum holtzianum**

40,000
Trees and pesticidal shrubs have been planted in:

- **Kenya**
- **Tanzania**
- **Malawi**
- **Zimbabwe**

>4,000
Farmers were trained in the process of planting trees for propagation.

Training material for the management and use of pesticidal plants.

- Handbook on 'Pesticidal Plants' (English and French).
- Leaflet on the propagation of Securidaca longepedunculata.
- Proceedings of a training workshop on Optimisation of Pesticidal plants:
  - Technology Innovation
  - Outreach & Networks

A Kenyan manufacturer is reviving the pesticidal plant sector by establishing commercial production of pesticidal plants in an existing company: Botanical Extracts EPZ LTD, specifically of Pyrethrum during the project implementation.

14 research papers published from 2013-2018.

Impact

The OPTIONs project has impacted the target groups and final beneficiaries by creating a cross-training and skill-transfer environment through practical demonstration trainings on propagation and optimised application of plant-based pesticides and by building individual and institutional capacity with further training. The effective knowledge technology transfer and practical use of plant-based pesticides at research and scientific level as well as small farmer and community level have been great with a solid ado.

Through the McKnight Foundation network that supports a variety of research activities on legume production systems in Southern and Eastern Africa, OPTIONs' botanicals research has supplemented R&D projects because they suffered from pest issues and have since used pesticidal plants to resolve the problem effectively and thus promoted a wider uptake in their use.

£361,168.00
from UK Research and Innovation for "Pyrethrum in Bloom: Bringing Back the Power of Pyrenthrum to Enhance Livelihoods of Small Holders in Kenya", (July 2020 - July 2023), led by Royal Botanic Gardens Kew.

£989,639.00
from UK Research and Innovation to implement the project "**Natural Pest Regulation on Orphan Crop Legumes in Africa (NaPROCLA)**" in Kenya, Malawi, Tanzania.

Sustained Impact

The OPTIONs project sustain impact is based on the grassroot adoption of the propagation and optimised application of plant-based pesticides.

Evaluate sustainable agro-ecological crop protection using pesticidal plants.

£124,654.00
from UK Research and Innovation for "Realising the potential of bioresources to mitigate development challenges in Ethiopia, a center of wild & domesticated plant diversity" (May 2020 to September 2021) led by Royal Botanic Gardens Kew.

£288,762.00
from the Darwin Initiative for wider benefits of pesticidal plants in supporting beneficial insects in natural landscapes adjacent to farm land, (April 2015 - March 2018).

Key lessons learned and best practices