Research to Impacts Map: **Ecological Pest Management**

Botanical Pesticides Project, 2009-2017

Farmers growing beans are receivinga short training from NMAIST Masters student Angela Mkindi (yellow scarf) on the use of botanical pesticides.
Photo Credit: Dr Kelvin Mtei, Kilimanjaro Region, Tanzania

Summary: The project aims at increasing data on pre- and post- harvest efficacy of pesticidal plants under African farm conditions, as well as, develop novel ways of helping farmers assess potential efficacy of collected pesticidal plants. The project also works in commercialization issues.

For more information see:
www.ccrp.org/grants/botanical-pesticides-ii/

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COLLABORATIVE CROP RESEARCH PROGRAM

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The diagnosis:

Legumes are susceptible to pest pressure and often have high levels of losses without heavy pesticide use.
Extracts of many plant species are widely used across Africa as pesticides.

Model or monitor impact of pest management practices on non-target organisms, ecological services and human health:

A field trial **in the Kilimanjaro** region of Tanzania **showed that the botanical pesticide derived from the plant *Tephrosia vogelii*** performed **similarly to** a **commercial synthetic pesticide**. **Bean yields** rose from **about 1200 kilogrammes per hectare** when untreated **to 1,900 per hectare using a 10% weight/volume extract.** Whereas **farmers using synthetic pesticides** reported yields of **1,500 k/ha**, signifying that organic pesticides can perform well with similar levels of productivity when using synthetics. Furthermore, **the botanical pesticide treatments had lower adverse effects on pollinators and predators** in comparison to the synthetic treatment. So although the **pesticidal plant treatments were not 100% effective in eliminating all pest insect species, further protection** of the bean crop was **facilitated through the presence of several beneficial species such as ladybirds, spiders, robber flies and hoverflies that are killed when using synthetics**

Assess cost-effectiveness:

An economic analysis assessing the input costs of using the different treatments and the bean yield obtained clearly showed that the **pesticidal plants had a higher economic rate of return**. The **marginal rate of return** for the **synthetic** was **no different** from the **untreated control**, around **$4/ha**, **compared** to a rate of **return of around $5.5/ha for plant pesticide treatments.**

Project published 3 peer reviewed journal articles that have cumulatively been cited over 20 times.

First inspection of bean plants by Prisila Mkenda, a NMAIST PhD student supported by the McKnight Foundation and the Darwin Initiative.
Photo Credit: Professor Patrick Ndakidemi, Kilimanjaro Region, Tanzania

Test and refine management options, including working with farmers:

In all the **trials**, the **botanical pesticides from different plants** were **assessed by farmers** with **respect to efficacy** and were **ranked accordingly.** In the Kilimanjaro region of Tanzania the top two ranked plants were *Tephrosia vogelii* and *Lantana camara*. The **main reasons** for the **higher ranking** according **to the farmers** is because the botanical pesticides also acted as a foliar **fertiliser, as well as controlling pests,** and their crop is doing better compared to where is it not applied. Testimonies were given with respect to productivity **increase using different local units of measurements which averaged to an increase of between 100% - 300%.**

Extension:

Farmers' field days were then organised whereby **160 farmers from the project area and in the neighbourhood were invited to come and learn from the trials.**

Scaling via commercialization/ Policy impacts:

Government policies cater for **imported synthetic insecticides, not locally produced botanical extracts** and registration fees are very high. Moving from farm-based production and use to local commercialisation of extracts with a proven shelf-life **will need** producers to **work with local retailers and stockists to ensure there is a place to enter the market.**

Strengthen capacity in pest research:

FRN approach was used in the 2017/18 cropping season. A network of **12 lead farmers formed** a **group** of **between 10 and 15 farmers each.** The **lead farmer trains** the group on **use of pesticidal plant extracts** on common beans as well as **propagation of pesticidal plants.**