

Results of Competition: Agri-Tech Catalyst Round 9: Agriculture and Food Systems Innovation - Mid Stage

Competition Code: 1910_CRD_DFID_AGRITECH_R9_MS

Total available funding is £6.58m across early, mid and late stage

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Royal Botanic Gardens Kew	Pyrethrum in Bloom: Bringing Back the Power of Pyrethrum to Enhance Livelihoods of Small Holders in Kenya	£228,813	£228,813
BioExtractions (Wales) Ltd		£294,424	£206,097
Egerton University		£57,120	£45,696
Grow Tech Nurseries		£50,199	£35,139
Jatflora Ltd.		£101,500	£71,050
University of Greenwich		£74,287	£74,287

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Project description - provided by applicants

Pyrethrum (*Tanacetum cinerariifolium*) is a perennial plant whose flowers are a source of bioactive pyrethrins widely recognized for their rapid knock down of insect pests in horticulture but having very low mammalian toxicity and non-persistence in the environment. They are the basis of established and globally traded natural plant insecticides. Pyrethrum is the most widely used plant pesticide in horticulture and its use is increasing with >9000 MT grown in 2016, increasing from only 4509 MT in 2007. Kenya was formerly the global leader in production contributing 90% of global supply in 1983 with nearly 30,000MT indicating the potential for this technology and scope for income generation among smallholders. Pyrethrin content is variable and dependent upon variety and growing conditions while flower proliferation is dependent on propagation. While pyrethrum is plant based, the use of toxic solvents for extraction and inclusion of synthetic additives as stabilizers, synergists and carriers in formulations means it is not suitable in organic farming so new plant-based synergists and carriers are required. The aim of this project is to optimise extraction and production and develop innovative pyrethrum formulations that are plant based and sustainable and that benefit smallholder farmers in Kenya through a cooperative movement. The economic benefits will serve as drivers for those farmers and the processing plants to grow once the sector is revived. New organic formulations and processing methods developed during the project will provide new products that incentivise more customers and help to support the continued growth of the sector and sustainable food production more widely. We believe we can achieve our primary goal of making these improvements to revive the pyrethrum sector during the 36-month timeframe of the project, leaving a sustainable industry.

This project will achieve the following outcomes:

- 1\ Develop high quality propagules using improved in vitro germination procedures to guarantee axillary shoot multiplication and rooting to optimise pyrethrin content of flowers.
- 2\ Develop an organic method for pyrethrin extraction based on ethanol and ultrasound.
- 3\ Develop new plant oil-based solvents (excipients) e.g. from *Croton megalocarpus* readily available and indigenous in Kenya, to replace the synthetic Shell Sol(r) T oil.
- 4\ Develop new formulations using plant oils/synergists to replace piperonyl butoxide; and plant-based stabilizers e.g., from *Salvia rosmarinus* to replace butylated hydroxytoluene
- 5\ Identify and work with key pyrethrum stakeholders and register a pyrethrum-based product for Kenyan organic farming via a farmer cooperative.

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CLIMATE EDGE LIMITED	Data-led soil management for low income farmers	£390,069	£273,048
Cranfield University		£188,816	£188,816
PRODUCERS DIRECT		£74,440	£74,440
Sireet Outgrowers Empowerment and Producers Co. Ltd.		£21,552	£15,086
SUSTAINABLE VENTURE DEVELOPMENT PARTNERS LTD		£79,841	£55,889
UNILEVER U.K. CENTRAL RESOURCES LIMITED		£115,138	£51,812

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Project description - provided by applicants

Soil degradation is 'one of the most pressing problems facing humanity' and disproportionately impacts smallholder farmers in developing countries (FAO, 2015). Due to cost and accessibility barriers, these farmers lack access to effective tools to combat this threat. Sireet, a smallholder tea cooperative in Kenya exemplifies this problem - 57% of their farmers lack access to the tools needed to mitigate soil degradation and less than 1% of farmers have access to basic soil testing.

During a previously funded Innovate feasibility study (109338-630625) the partners in this consortium successfully demonstrated a soil management advisory service, which leveraged mobile technology and scientific modelling to provide cost effective and accessible fertiliser scheduling to smallholder farmers.

The vision of this project is to build on this foundation by creating a Software as a Service (SaaS) platform to deliver this service at scale. The service will combine soil test data with field specific contextual data and agro-meteorological data. This data will then be fed through a tea growth and quality simulation model, called CUPPA-Tea, developed by Cranfield University. This model will automatically output fertiliser schedules tailored for individual farmers. Optimising fertiliser and harvesting schedules can improve tea quality and substantially increase (>50%) yield and revenues for smallholder tea producers.

Key objectives will be the development of this SaaS platform, development of the scientific algorithms and trialing the service at a smallholder tea cooperative in Kenya.

The innovative service developed during this project will be the first soil management service designed specifically for smallholder agriculture. It also represents a significant opportunity to increase Climate Edge's competitiveness by enabling it to access a historically underserved market helping smallholders adapt to climate change and mitigate soil degradation.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SRUC	Developing analytical and advisory networks to improve milk quality from smallholder dairy farms in Tanzania.	£160,747	£160,747
SPECTROLYTIC LTD		£204,534	£143,174
Tanga Fresh limited		£250,000	£150,000
Tanzania Livestock Research Institute(TALIRI)		£194,701	£194,701
THE GRANDE DEMAM CO LTD		£140,000	£98,000

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Project description - provided by applicants

Smallholder dairy farming systems contribute around 80% of milk production in Tanzania, with a significant role in improving the livelihood of farmers and poverty reduction through income generation and creation of employment. However due to the technical barriers they face, smallholder producers and processors do not attain the required standards for the regional and international milk markets. There is low usage of novel technologies and practices that would ensure high quality milk production, processing and marketing.

The objectives of this project are:

- I) to develop and test mid infra-red spectrometer and mobile phone camera technologies to analyse milk quality in smallholder dairy production systems;
- II) to identify the optimal pattern for deployment of different levels of equipment (with different capabilities and costs) at milk collection centres, dairies and reference labs;
- III) to strengthen and facilitate adoption of milk quality diagnostic techniques by processors at milk collection centres and processing dairies; and
- IV) to develop an app and cloud-based data platform to promote information on milk safety standards and marketing along the dairy value chain.

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AGSENZE LTD	Bee Smart: Improving yields for cashew growers in Ghana with smart pollination management	£250,950	£175,665
Kingston University		£149,981	£149,981
Kwame Nkrumah University of Science and Technology		£90,634	£90,634
Nature Development Ghana		£10,164	£10,164

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Project description - provided by applicants

Honeybees are vital pollinators, both to the agricultural industry and the wider environment. African honeybees are essential for cash crop, such as cashew, production to provide income to smallholder farmers in Africa. The BEE SMART project will test an innovative new commercial model to improve yields and environmental management for smallholder male and female farmers in Ghana. Specifically, the project will pilot low-cost managed pollination services for smallholder cashew farmers to improve yields, thus increasing profits as well as raising awareness of the value of ecosystem services and promoting environmental protection. The proposed strategy is novel for many African countries where pollination services have not yet become a commercial offering, as they have in many other parts of the world, and pollination management has not been integrated into the value chain for smallholders. As such, successful implementation of the project creates a new market in Ghana, benefits smallholder farmers and strengthens collaboration and capacity-building between UK and Ghana.

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LEGUME TECHNOLOGY LIMITED	AXENIC Improving food yield, quality and provide an income source for small-holders in Sub-Saharan African	£156,112	£109,278
Farm-Ag International (Pty) Ltd		£81,491	£48,895
Manufacturing Technology Centre		£253,417	£253,417
OMRON ELECTRONICS LIMITED		£50,326	£25,163
TQC LIMITED		£402,959	£282,071

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Project description - provided by applicants

AXENIC will deliver a novel small bag format, nitrogen 'fixing' inoculant to Smallholders across sub-Saharan Africa. This inoculant technology uses a natural process to make use of nitrogen from the air we breath allowing the smallholders to boost the yield of the protein rich legume crops such as soybean. Based on the proven track record of the product LEGUMEFIX from the successful SME Legume Technology who will be working as part of a consortium to design and develop the inoculant pack as well as a new machine design. The machine design will make it possible to be used in Africa to inoculate and hence deliver high quality, reliable products to the majority of farmers growing legumes as part of their staple diet. Working with TQC and the Manufacturing Technology Centre (UK Catapult), the AXENIC project will build on their collective experience in machine design as well as connectivity in under-developed areas to create a first-to market product as well as a low-cost, effective and robust machine that can be used in a number of developing countries challenged by drought that grow legumes as key part of their diet.

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WATT SOLUTIONS LTD	Solar Powered Agro-Processing: The optimisation of pioneering productive use solar milling technologies in East Africa	£54,896	£35,682
Agsol Kenya Limited		£136,292	£88,590
Agsol Limited		£215,788	£140,262

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Project description - provided by applicants

Opportunity:

40m people in Kenya depend on the agricultural sector for their livelihoods and subsistence. The most important staple food they depend on is maize, which accounts for over 65% of their calorific intake. Affordable, accessible and quality milling services are key to ensuring and increasing nutritional value and economic empowerment for smallholder farmer

communities in sub-Saharan Africa. Off-grid grain milling has the potential to increase farming efficiency, increase farmer revenue, and promote food security, yet incumbent options are expensive to use and operate, are polluting and have limited accessibility for the primary users, women.

74% of maize milled in Kenya comes from small-scale, off-grid 'posho' hammer mills. The majority of these poshos mills are diesel powered and as a result have high capital and operating costs and the potential for negative environmental impacts (e.g. pollution and GHG emissions). Furthermore, diesel mills are only viable in larger communities, meaning people in smaller villages experience hardship accessing these essential services. Transporting maize to and from the nearest mill is physically taxing and incredibly time-consuming; a task invariably handled by women.

Solution:

Agsol manufactures leading edge, solar powered, agro-processing machines for off-grid farming communities. Our life-changing machines convert the most important staple foods into edible and higher value food products. They also catalyse access to higher tier solar energy -- 500 to 1000W scale. By linking productive machines with solar power, Agsol provides off-grid communities with a new tool to improve their agricultural productivity and gain access to energy services.

The project will market test 100 of Agsol's latest innovation -- our Gen2 multi-household scale micro-mill. It will be deployed in different configurations, environments and customer segments in real world settings, to optimise the technology, and fine tune the business case for small scale solar mills in East Africa. The resulting Gen2.1 systems will be trialled prior to a regional commercial rollout.

These field trials in Kenya will help support a sustainable commercial case for its future roll-out that makes use of existing farm networks, helping to deliver a disruptive, but affordable, effective and resource-efficient milling solution for east African small holder farmers. Targeting Kenyan agricultural communities, the project will finalise development of the systems, test them in real-world, commercial applications and complete the commercialisation plan.

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