



Agricultural
Technology
Transfer



AGRITT: WORKING IN PARTNERSHIP FOR AGRICULTURAL
TECHNOLOGY TRANSFER

合作伙伴关系加速农业技术转移 – 中英非农业合作项目



Working in Partnership for Agricultural Technology Transfer (AgriTT) is a joint initiative between the Department for International Development (UK), the Government of China, the Governments of Malawi and Uganda, and the Forum for Agricultural Research in Africa.

The AgriTT programme facilitated the sharing of successful experience in agricultural development, especially from China, with other developing countries in order to improve agricultural productivity and food security of poor people. It ran from March 2013 until March 2017.

What was the goal of AgriTT?

This programme worked to improve food security in developing countries through technology transfer and knowledge sharing. It provided a platform to extend technologies tailored to the needs and conditions of developing countries, and supported joint research to build evidence and find solutions to food security issues.



中英非农业合作项目 – 合作伙伴关系加速农业技术转移（AgriTT）是英国国际发展部、中国政府、马拉维与乌干达政府及非洲农业研究论坛联合举办的一个项目。

AgriTT项目旨在通过促进与其他发展中国家分享农业发展上的成功经验（特别是中国的），以提高农业生产率并改善贫困人口的粮食安全。项目周期为2013年3月至2017年3月。

AgriTT项目的目标是什么？

项目的目标是通过技术转移和知识分享，改善发展中国家的粮食安全。它提供了平台以依照发展中国家的需求和条件定制技术，并支持联合研究以便为粮食安全问题的积累案例并寻求解决方案。

What did AgriTT do? AgriTT做了什么?

AgriTT took an integrated approach, looking not only at production technologies, but also at various aspects of the food value chain including processing, distribution and marketing. The programme was composed of three components:

1. Two pilot development projects facilitating the exchanges of technologies and models through technical assistance from China, with the aim to
 - increase overall aquaculture production and productivity in Malawi;
 - support further development of cassava production, productivity and value addition in Uganda.
2. A Research Challenge Fund which supported 11 collaborative research projects to enable researchers from Africa, Southeast Asia, China and the UK to:
 - adapt technologies or innovations originating in China to a developing country context with attention to the whole value chain
 - identify opportunities and obstacles that affect the growth of value chains and provide recommendations to improve them
 - enhance knowledge flows relating to technology innovations so that poor rural communities are better able to make informed decisions about their livelihoods.
3. Facilitation of communication and knowledge sharing activities to share innovative solutions to agricultural production and food security challenges with policy-makers and agricultural practitioners.

AgriTT采用整合的方式，不仅着眼于生产技术，还关注食品价值链的多个方面，包含加工、经销与市场营销。项目包含三个部分：

1. 两个试点开发项目，通过中国提供的技术援助，促进技术与模式的交流，旨在
 - 提高马拉维整个水产养殖业的产量和生产率；
 - 支持乌干达进一步提高木薯的产量、生产率及增值。
2. 一个研究挑战基金，支持11个合作研究项目，让来自非洲、东南亚、中国及英国的研究人员能够：
 - 采用来自中国的适合发展中国家的整个价值链的技术或创新
 - 识别影响价值链发展的机遇和障碍并提出改善建议
 - 增加与技术创新有关的知识流动，从而使乡村社区能够做出更加明智的有关其生计的决定。
3. 促进交流和知识分享活动，与决策者和农业从业人员分享农业生产与粮食安全挑战有关的创新方案。





Malawi Pilot Development Project: improving tilapia production

马拉维试点开发项目：提高罗非鱼养殖产量

Aquaculture in Malawi plays an important role in terms of contribution to economic growth, employment, food security and nutrition. The AgriTT Pilot Development Project has demonstrated a range of techniques and practices from China to contribute to development of the sector.

The pilot has contributed to aquaculture production and productivity in Malawi by:

1. Improving fingerling production
2. Enhancing feed production
3. Demonstrating technologies for improved fish production by farmers.

Chinese expertise

AgriTT worked with Chinese tilapia commodity development system experts from the Freshwater Fisheries Research Institute, Wuxi, and Guangxi Academy of Fisheries Sciences. These experts contributed to the design of the pilot, and provided guidance during implementation. Four Chinese technical experts were posted to Malawi: three long-term, working on fingerling and fish production based at the National Aquaculture Centre, and one short-term feed expert based at LUANAR. A study tour to China was organised for Malawian partners, including DoF staff, researchers, farmers and the private sector.

Pilot Project Implementing Partners

Department of Fisheries (DoF), Malawi
Lilongwe University for Agriculture and Natural Resources (LUANAR)

马拉维的水产养殖在经济发展、就业、粮食安全及营养中发挥着重要作用。为促进此行业的发展，AgriTT试点开发项目示范了来自中国的一系列技术和规范。

试点项目通过如下方式对马拉维的水产养殖产量和生产率做出了重大贡献：

1. 改善鱼种繁殖
2. 提高饲料产量
3. 渔民示范提高鱼类产量的技术。

来自中国的专业知识

AgriTT项目与来自中国无锡淡水渔业研究所和广西渔业科学院的罗非鱼商品开发系统专家合作。这些专家负责项目试点设计，并在实施期间提供指导。四名中国技术专家被委派到马拉维：三名为长期专家，负责国家水产养殖中心的鱼种和鱼类生产工作，还有一名为短期的饲料专家，在利隆圭农业与自然资源大学工作。此外，还组织了包括马拉维渔业部工作人员、研究员、渔民及私营部门代表在内的马拉维合作伙伴到中国学习参观。

试点项目实施合作伙伴
渔业部 (DoF)，马拉维
利隆圭农业与自然资源大学(LUANAR)

Improved fingerling production

Activities:

- Demonstration of techniques and practices for improved hatchery management;
- Transfer of techniques for pond-based multiplication and production of all-male fingerlings were demonstrated;
- District Fisheries Officers (DFOs) and 30 hatchery operators were trained in improved fingerling production;
- Rehabilitation of facilities, including hatcheries and breeding ponds. Construction of a greenhouse at the National Aquaculture Centre (NAC) and other infrastructure investments;
- Production of manuals on tilapia fry and fingerling production.

“During a study tour, we visited Chinese research institutes, government institutions, and farmers. There are companies that produce fingerlings which give them to farmers who produce the fry, then they give these to other farmers for grow out. We are thinking about how we can apply this approach here”. Aquaculture Nutrition Specialist, LUANAR

Achievements

2 million fingerlings were produced at NAC over the project life, double the production level before the project;

Fry to fingerling mortality rates increased from 70 per cent at the start of the project to 95 per cent;

NAC staff were trained in production of all-male fingerlings, including through novel hybridisation of two indigenous tilapia species;

A pond-based fingerling multiplication system was successfully demonstrated;

A network of trained hatchery operators has been established.



提高鱼种生产

活动：

- 示范改善孵化管理的技术与规范；
- 示范池塘增殖及生产全雄性鱼种的转移技术；
- 地区渔业官员（DFO）和30名孵化操作员参加了提高鱼种生产的培训；
- 设施修复，包含孵化和育苗池。在国家水产养殖中心（NAC）建设温室及其他基础设施投资；
- 制作罗非鱼苗和鱼种生产手册。

“在一次学习参观中，我们参观了中国研究所、政府机构及渔场。这些单位生产鱼种并提供给生产鱼苗的渔场，这些渔场再将鱼苗提供给其他渔场养大。我们在想，我们是否可以使用这个办法”。水产养殖营养专家，利隆圭农业与自然资源大学

成果

在项目期间，国家水产养殖中心生产了两百万条鱼种，与项目实施前相比产量翻了一番；

鱼苗的死亡率从项目开始时的95%下降到现在的70%；

国家水产养殖中心员工参加了全雄性鱼种生产培训，包含两种本土罗非鱼种的新型杂交品种；

成功展示了一个鱼塘鱼种增殖系统；

建立了一个受过训练的孵化操作员网络。



Affordable, effective feed

Activities:

- Feed trials to test improved commercial feed formulas and new formulas replacing imported ingredients;
- Feeds tested using on-farm resources such as chicken manure, soybeans and pigeon peas;
- Amino acid analysis of formulas and key ingredients used in Malawi to support development of nutritionally optimal feeds;
- Chinese feed expert posted to Malawi to provide input on feed sector development;
- Construction of a feed mill at NAC, with plan developed for production of lower cost feed;
- Study on commercialisation of feed and fingerling supply chains in Malawi.

Achievements

A software tool was developed by a Chinese expert to allow adjustment of feed formulas to maintain a given nutritional profile when ingredients substituted. The formula can also link to price data.

Promising feeds and diets have been identified for further on-farm testing with farmers.



Two feed lines were procured through the project to allow the production of pelleted feed for both research and income generation.

在项目执行期间，采购了两条颗粒饲料生产线，用于研究和增加收入。

支付得起的、有效的饲料

活动：

- 进行饲料试验，测试改良的商业饲料配方和替代进口材料的新配方；
- 使用农场资源试验饲料，如鸡粪、大豆和树豆；
- 对马拉维使用的配方和关键成分进行氨基酸分析，支持营养优化饲料的开发；
- 委派中国饲料专家到马拉维为饲料行业发展出谋划策；
- 在国家水产养殖中心建设一家饲料加工厂，并制定了生产较低成本饲料的计划；
- 马拉维饲料和鱼种供应链商业化研究。

成果

一名中国专家开发了一款可以替换进口材料，调整饲料配方以保持营养成分的软件工具。此配方还可以与价格数据相连接。

确定了未来渔场试验的有前景的饲料和膳食。

Improved grow out fish production

Activities:

- 25 pilot farmers tested a package of technologies for grow out fish production. The package focused on: construction of deeper and larger ponds; higher stocking densities with faster growing, all-male fingerlings; use of improved pelleted feed and better feeding practices; pond fertilisation; predation control; careful pond management and record keeping;
- The package has been scaled out to 75 additional farmers;
- Training of farmers and DFOs;
- Production of a grow-out production manual.

“The technologies we have learned from China have helped us increase the number of fingerlings we can produce, improve the management of the facilities, as well as seeing a tremendous increase in terms of fish production”.

Principal Fisheries Extension Officer, DoF

Achievements

The pilot demonstrated that yields can increase from current levels of around one tonne per hectare to over six tonnes per hectare, using the technologies and practices introduced by Chinese experts and with technical support.

DFOs have a clear package of technologies and practices to promote to fish farmers looking to improve their productivity.

提高成鱼产量

活动：

- 25个试点渔场试验了用于提高成鱼产量的一系列技术。这些技术重点关注：建设更深更大的鱼塘；更高的放养密度和更快生长的全雄性鱼种；使用改善的颗粒饲料和更好的喂养方法；鱼塘受精；捕食控制；认真的鱼塘管理与记录保管；
- 此技术包已经扩大到75家额外渔场；
- 渔场与地区渔业官员的培训；
- 制作成鱼产量手册。

“我们从中国学习到的技术帮助我们提高了生产的鱼种数量，改善了设施管理，并看到了鱼产量的惊人增长。”

首席渔业扩展官员，DoF

成果

试点项目表明，利用中国专家提供的技术和规范及技术支持，产量可以从当前的约1吨/公顷增加到超过6吨/公顷。

地区渔业官员有明确的可以提高渔场生产率的技术和规范。





Uganda Pilot Development Project: enhancing cassava value chains 乌干达试点发展项目：木薯价值链

Cassava is a key agricultural commodity in Uganda. It has an essential role as a food crop, and also has great potential for processing as an industrial and food processing input.

The AgriTT pilot demonstrated a range of innovations, and supported knowledge sharing to contribute to the development of the cassava value chain in Uganda in the areas of production, processing and value addition.

Partnership with China

The pilot project worked closely with the Chinese cassava commodity development system, particularly the Chinese Academy of Tropical Agricultural Sciences and Guangxi University. The project has supported placement of seven Chinese technical assistance experts: five experts in mechanised cassava production and two in value addition.

Pilot project implementing partners

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Uganda
Africa Innovations Institute
Makerere University
National Agricultural Research Organisation

木薯是乌干达的一种关键农产品。它在食品作物中发挥着至关重要的作用，同时还极有可成为工业和食品加工行业的原料。

AgriTT项目试点示范了一系列创新技术并支持知识分享，推动了乌干达木薯价值链（生产、加工及增值等领域）的发展。

与中国合作

此试点项目是与中国木薯商品开发系统密切合作完成的，尤其是与中国热带农业科学院和广西大学的合作。此项目得到了七名中国技术援助专家的支持，包括五名木薯机械化生产专家及两名价值链专家。

试点项目实施合作伙伴

乌干达农业、动物工业及渔业部 (MAAIF)
马凯雷雷大学
国家农业研究组织

Mechanised production and improved crop management

Activities:

- The project demonstrated mechanised cassava production using a set of equipment imported from China, and established 8 demonstration gardens. Over 90 farmers and district officials were trained in mechanised planting and harvesting;
- 37 nursery gardens with improved, disease-tolerant cassava cuttings were established;
- Farmers were trained in ridged cassava production and other good agricultural practices.

机械化生产与改善作物管理

活动：

- 项目示范了木薯机械化生产，使用了一套从中国进口的设备，并建立了8个示范园。90多名农民和地区官员接受了机械化种植和收获的培训；
- 建立了37个改善、抗病木薯插条苗圃；
- 对农民进行了垄田木薯生产和其他良好农业实践的培训。

Achievements

Yields at the demonstration gardens ranged between 36 and 47 tonnes per hectare, representing a threefold increase on yields in the same area when using conventional production techniques.

Adoption and application of recommended agronomic practices such as timely weed control and disease management has contributed to improved cassava production by farmers in the project district.

成果

示范园的产量在36-47吨/公顷之间，与同地区之前使用传统生产技术的产量相比增长了三倍。

采用并应用了所推荐的农艺措施（如及时控制杂草和病害管理），提高了项目地区的木薯产量。



Technical support partners

Guangxi University

Chinese Academy of Tropical Agricultural Sciences

ACRO-Biotech Ltd

技术支持合作伙伴

广西大学

中国热带农业科学院

ACRO-生物技术有限公司



Cassava processing

Activities:

- Investigation and technical review of a range of technology options to allow year round cassava processing. Review of business plans and selection of a co-investor for a cassava batch drying and processing facility;
- Import and installation of one batch drier at Kigumba;
- Identification of Chinese cassava chipper technologies for demonstration and testing by SMEs and farmer groups in the project districts;
- Completion of a strategy for cassava industrialisation by Ugandan, Chinese and UK partners;
- Training of farmer groups in business practices.

“At the district, we have come to learn that cassava can be harvested, peeled, dried and processed in the very same day. We didn't know this before.”

Team Leader, Buliisa District Government

Achievements

The project demonstrated a technology to address the wet-season cassava drying and processing constraint in Uganda.

Capacity has been built in Uganda to identify and appraise technology options.

Options have been identified for large-scale cassava processing investment, including investment in high-quality cassava flour and starch production technologies.



木薯加工 活动：

- 开展可以全年进行木薯加工的一系列技术方案的调查与技术审查。进行木薯批量干燥和加工设备的商业计划审查与联合投资商的选拔；
- 进口一批干燥机，安装在 Kigumba；
- 寻找中国木薯切削机技术，以便中小型企业和农民团队在项目地区进行示范和试验；
- 完成乌干达、中国及英国合作的木薯工业化战略；
- 对农民团队进行商业规范培训。

“在当地，我们了解到木薯可以在同一天完成收获、剥皮、干燥和加工。我们之前不知道这些。”

团队领队，Buliisa 地区政府

成果

此项目示范了解决乌干达雨季木薯干燥和加工限制的技术。

乌干达有了识别和评价技术方案的能力。

确定了进行大规模木薯加工的投资方案，包含投资优质木薯粉和淀粉生产技术的方案。

Value Addition

Activities

- Posting of food technology experts from Guangxi University to Makerere University to work together on the development of a range of cassava-based food products;
- Installation of cassava snack and biscuit production lines in the Incubation Unit at Makerere University for technical support of entrepreneurs and development of new product lines.

“Through AgriTT, I have come to see that cassava is not just a food to be boiled and eaten. It can also be a source of revenue for farmers, an input product for industry, and an avenue for development of emerging entrepreneurs.” Buliisa District Production Officer

Achievements

A range of cassava-based food products with market potential have been developed, including biscuits, breakfast cereals and snacks. These serve to diversify cassava product end-use and contribute towards expanding market opportunities. Two entrepreneurs were selected through a competitive process, and provided with technical support to develop their business ideas for cassava value-addition.



附加价值 活动

- 委派广西大学的食物技术专家到马凯雷雷大学，合作开发一系列木薯食品；
- 在马凯雷雷大学产业孵化园安装木薯甜点和饼干生产线，为企业家提供技术支持，并开发新生产线。

“通过AgriTT 项目，我了解到木薯不仅仅是一种可以煮熟吃的食物。它还是农民的收入来源，一种工业原料，还是新兴企业家的一个发展领域。” Buliisa地区生产官员

成果

开发了一系列有市场潜力的木薯食品，包含饼干、早餐燕麦片和甜点。这些产品使木薯产品最终使用多样化，并有助于扩大市场机遇。通过竞选，选择了两位企业家，予以技术支持，助力实现他们的木薯增值商业想法。



The AgriTT Research Challenge Fund AgriTT研究挑战基金

The AgriTT Research Challenge Fund was launched in April 2013, inviting trilateral research teams from China, the UK and a developing country in Africa or Asia to apply for grants to work on collaborative projects focusing on innovations in agricultural productivity.

Through this fund, the AgriTT programme commissioned and supported eleven trilateral research projects. The projects tested and transferred five technologies from China to low-income country partners, analysed and made recommendations on how to improve 12 key value chains, designed and transferred four research facilities, and built the capacity of over 40 early career researchers.

AgriTT研究挑战基金于2013年4月启动，邀请中国、英国及非洲或亚洲的一个发展中国家组成的三方研究团队来申请资助，开展合作项目，此基金主要针对农业生产率方面的创新。

通过此基金，AgriTT项目委托并支持了十一个三方研究项目。这些项目试验了来自中国的五项技术并将之转移给低收入国家合作伙伴，分析并提出了如何改善12个关键价值链的建议，设计并转移了四个研究设备，并培养了四十多名早期研究员。



Comparing maize and cattle value chains in China and Uganda

中国与乌干达的玉米和牛肉价值链比较

This project analysed and contrasted maize and beef value chains in China and Uganda. The objective was to draw lessons from the comparison to guide future Ugandan development strategies and policies.

The team identified the factors constraining the Ugandan value chain development, such as poor market integration, and lack of investment in new production technologies. Research findings suggest that while the settings in Uganda and China are very different there are some specific approaches that have been successful in China that could be transferred to Uganda, including ammonification of straw for animal feed.

In addition, while recognising that Ugandan and Chinese value chains are socially and economically different, the researchers identified areas from China's experience that would merit further research and sharing of lessons, these included promotion of investment in processing technologies, and public sector support for improved market information systems.



项目分析并对比了中国和乌干达的玉米和牛肉价值链。目标是从比较中吸取经验教训，指导乌干达未来的发展战略和政策。

调查小组确定了限制乌干达价值链发展的因素，例如市场一体化程度低，以及缺乏对新生产技术的投资。研究报告表明，虽然乌干达和中国的情况有很大的差异，但在中国已经取得成功的一些方法，包括用于动物饲料的秸秆氨化技术，可以转移到乌干达。

此外，在认识到乌干达和中国的价值链具有不同的社会和经济意义的同时，研究人员确定了中国经验中值得开展深入研究和交流经验的领域，包括推动加工技术投资，以及公共部门支持改进市场信息系统等领域。



Lead Institution: University of International Business and Economics 牵头机构：中国对外经贸大学
Lead Researcher: Prof. Zhang Haisen 项目首席科学家：张海森教授

Using fertility control to manage rodent population outbreaks

使用生育控制措施抑制啮齿动物数量的增加

This project used Chinese technology to research the effectiveness of applying rodent fertility control to limit the threat rodents pose for agriculture in Tanzania.

Led by the Natural Resources Institute, the experts showed that **contraceptive bait was significantly better at lowering rodent populations than traditional rodenticide**. And further training suggested that Tanzanian farmers are open to using fertility control.

“This research has provided an innovative and sustainable solution to tackling rodent problems in Tanzania. The next step is to put this research into practice by gaining a licence for the product and to find a commercial partner.” Professor Steven Belmain

The licencing of rodent fertility products would be of great benefit to smallholder farmers throughout the country and, pending further research, in other countries in Africa.



项目使用中国技术来研究应用啮齿动物生育控制措施的有效性，以限制啮齿动物对坦桑尼亚农业的威胁。

在自然资源研究所的领导下，专家们研究显示，避孕诱饵在降低啮齿动物数量方面比传统的杀鼠剂效果更好。进一步的培训表明，坦桑尼亚农民愿意使用生育控制措施。

“这项研究为坦桑尼亚解决啮齿动物问题提供了一个创新和可持续的解决方案。下一步是计划通过获得产品的许可证并找到一个商业合作伙伴来实施这项研究。” Steven Belmain教授

啮齿动物生育产品的许可将为全国的小农带来巨大利益，在进一步研究后可以将生育产品推广到非洲各地。



Lead Institution: The Natural Resources Institute, UK
Lead Researcher: Professor Steven Belmain

牵头机构：英国自然资源研究所
项目首席科学家：Steven Belmain教授

Unlocking the potential of aquaculture in Africa

释放非洲水产养殖的潜力

To assist the sustainable growth of the aquaculture sector in Africa this project set out to uncover:

“What makes the aquaculture value chain the investment of choice in Ghana, Nigeria and China but not in Malawi?”

The comparative work undertaken in each country shows that success depends on having a highly visible business model; committed, professional individuals; and a responsive, supportive public sector. Based on this model, south-south technology exchange can rapidly and radically transform smallholder growth in many Africa countries, including Malawi, where at present successful business models are less evident.

“Technology was transferred from Africa to Africa - enhanced through input from China.” John Linton

This project demonstrates that aquaculture has considerable potential for enhancing African food security and nutrition, and that in countries such as Ghana and Nigeria it is proving to be an attractive sector for business investment.



为了支持非洲水产养殖部门的可持续发展，项目开始寻找这一问题的答案：

“什么原因使水产养殖价值链成为加纳、尼日利亚和中国的投资选择，而在马拉维却并非如此？”

对每个国家的水产养殖业发展进行比较发现，水产养殖业的成功取决于是否具有一个高度可见的商业模式；专注和专业的养殖个人；及一个反应迅速、支持性的公共部门。基于这一模式，南南合作技术交流可以迅速彻底改变包括马拉维在内的小农增长模式，这些成功的模式在非洲国家的效果尚不明显。

“技术从非洲转移到非洲 - 通过来自中国的投入得到加强。” John Linton

此项目表明水产养殖业有很大的提高非洲粮食安全和营养的潜力，且在加纳和尼日利亚等国家，水产养殖已经被证实是一个有吸引力的商业投资行业。



Lead Institution: The Natural Resources Institute, UK
Lead Researcher: John Linton

牵头机构：英国自然资源研究所
项目首席科学家：John Linton

Tackling soil pest problems in Rwanda

解决卢旺达的土壤病虫害问题

Farmers in Rwanda need access to low-input, environmentally friendly, and economically sustainable methods to protect their crops from soil pests. This project successfully transferred a Chinese bio-pesticide technology to Rwanda, whereby naturally-occurring, parasitic nematodes (a type of threadworm) are used to selectively kill soil-dwelling insect pests.

“The first biocontrol production facility for insect pests was established through this project. Consequently, bio-control products can now be produced in East Africa.” Dr. Li Hongmei

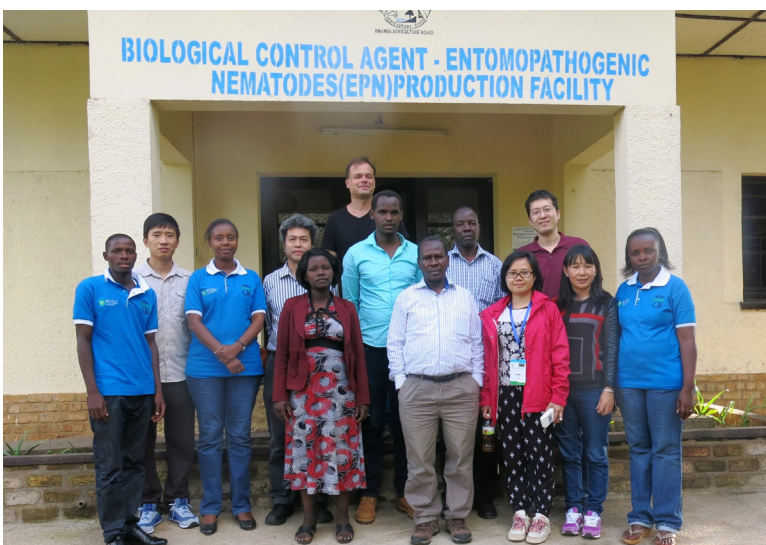
Eight indigenous nematodes were successfully identified for the first time. Rwandan project partners have already produced over 3.5 billion nematodes at a new mass-production facility funded by the project. Through in-country training, the project increased Rwandan capacity in applied bio-pesticide research, nematode production and management, and control of soil insect pests in agriculture.



卢旺达的农民需要获得低投入、环境友好且经济上可持续的方法，以保护他们的作物免受土壤病虫害的侵害。项目成功地将中国生物杀虫剂技术转移到卢旺达，利用寄生线虫（一种线虫）选择性杀死土壤栖息的害虫。

“通过这个项目建立了第一个虫害生物防治生产设施。现在，生物防治产品可以在东非进行生产。”李红梅博士

第一次成功地从卢旺达土壤中分离出八种土生线虫。卢旺达项目合作伙伴已经在此项目资助的一个新的大规模生产工厂，生产了超过35亿个线虫。通过国内培训，此项目提高了卢旺达在应用生物杀虫剂研究、线虫生产和管理，以及对农业中土壤虫害防治方面的能力。



Lead Researchers: Prof. Zhang Feng, Dr. Li Hongmei
Lead Institution: CAB International, UK

项目首席科学家：张峰教授，李红梅博士
首席研究员：英国CAB国际

Innovations in rice value chain finance

水稻价值链金融创新

This project aimed to summarise the progress and key constraints in rice value chain (RVC) financing in China, Cambodia, and Laos PDR. The research results supported evidence-based policy recommendations to improve value chain financing for smallholder farmers, and small and medium agro-enterprises (SMAE) in each country.

“Rice value chain financing models have successfully been identified for Cambodia and Laos PDR and a series of knowledge products have been produced to facilitate the recommended technology transfer.”

Dr. Hu Dinghuan

The team held a regional conference to present the research findings and develop networks for continued dissemination. The conference showcased different RVC financing models, and identified how to enhance visibility, accessibility and encourage widespread adoption among RVC practitioners both in the research countries and the wider agricultural development community.



项目旨在总结中国、柬埔寨和老挝人民民主共和国水稻价值链（RVC）融资的进展和主要制约因素。研究结果支持以证据为基础的政策建议，旨在为各国小农和中小型农业企业（SMAE）改善价值链融资。

“为柬埔寨和老挝人民民主共和国成功确定了水稻价值链的融资模式，并且开发了一系列知识产品，以推动技术转让。”胡定寰博士

研究团队举行了一次区域会议，展示了调查结果并开发了持续传播网络。会议展示了各种水稻价值链融资模式，并确定了如何提高其可见度、可访问性，并鼓励研究国家和农业发展社区的水稻价值链从业者广泛采用。



Lead Institution: Chinese Academy of Agricultural Sciences
Lead Researcher: Dr. Hu Dinghuan

牵头机构：中国农业科学院
项目首席科学家：胡定寰博士

Enhancing tilapia production in Malawi

提高马拉维的罗非鱼生产力

This project was designed to complement the AgriTT Pilot Development Project on the enhancement of tilapia value chains. The study combined biological and socio-economic research to identify:

- The best tilapia feed types and optimal feeding strategies
- Consumer preferences for different tilapia species and sources (such as farmed and capture fish), as well as willingness to pay

Clear, robust research findings have been shared with small and large scale farmers in Malawi, as well as those working further down the value chain.

"A model was developed to accelerate aquaculture technology exchange, adoption and adaptation, within the framework of the value chain."

Prof. Emmanuel Kaunda

Producers and marketers are using the findings of the preferences study to segment fresh tilapia consumers. This allows them to improve their product marketing, market segmentation, and understanding of growth opportunities.



项目旨在补充关于加强罗非鱼价值链的AgriTT试点发展项目的研究。该研究将生物和社会经济研究结合起来，以确定：

- 最好的罗非鱼饲料类型及最佳饲喂策略
- 消费者对罗非鱼品种和来源的偏好（如渔场养殖和捕捞的），以及付款意愿。

与马拉维的小型 and 大型农场主及在价值链更下游的农民分享了清晰及有力的的研究结果。

“开发了一个模型，以在价值链框架内加速水产养殖技术交流、采用和适应。” Emmanuel Kaunda教授

生产者和营销者正在使用偏好研究的结果来区别购买新鲜罗非鱼的消费者。这使他们能够改进他们的产品营销、市场细分策略及了解发展机会。



Lead Institution: Lilongwe University of Agriculture and Natural Resources 牵头机构：利隆圭农业和自然资源大学
Lead Researcher: Prof. Emmanuel Kaunda 项目首席科学家：Emmanuel Kaunda教授

Commercialising insect transformation of organic waste

将昆虫转化有机废物的方法商业化

The aim of this project was to sustainably produce high quality fertiliser and livestock feed using insect larvae meal as an input, and analyse key factors affecting commercial uptake of the technology. Drawing on expertise from China, Ghana and the UK the study focused on the intensive production of high-yielding Black Soldier Flies.

Research results indicated that insect based transformation of vegetable waste from urban markets has the greatest potential for widespread uptake. Insect-meal based biofertilisers showed strong performance on soil fertility and moisture retention criteria, when compared with traditional farming practices.

“These gains mitigate against a critical Ghanaian production constraint.”

Dr Francis Murray

In two Guinea fowl trials, diets substituted with larvae meal performed significantly better than fishmeal based diets - an important step towards the ultimate goal of increasing food security and livelihood opportunities for poor people.



此项目的目的是使用昆虫幼虫可持续地生产高质量的化肥和牲畜饲料，并分析影响此技术商业化的关键因素。借鉴中国、加纳和英国的专业知识，研究重点关注高产黑战士苍蝇的集约生产。

研究结果表明，使用昆虫转化城市市场蔬菜废弃物具有最大的扩大生产潜力。与传统的耕种做法相比，昆虫转化的生物肥料可以显著提高土壤肥力且符合水分保持标准。

“这些发现有效减少了一个关键的加纳生产制约因素带来的负面影响。” Francis Murray博士

在两次珍珠鸡试验中，用幼虫饮食方法替代鱼粉饮食方法的效果明显更好- 这是实现增加粮食安全和为贫困农民创造谋生机会的最终目标的一个重要步骤。



Lead Institution: Institute of Aquaculture, University of Stirling 牵头机构：斯特林大学水产养殖研究所
Lead Researcher: Dr Francis Murray 项目首席科学家：Francis Murray博士

Optimising mushroom production in Uganda

优化乌干达的蘑菇生产

This project worked with key mushroom researchers in China and the UK to support the development of the Ugandan mushroom sector. The team researched key challenges, such as value chain innovation constraints and lack of knowledge of the status of major soil borne toxins. The research also provided facilities, materials and training needed to contribute to the transformation of Ugandan mushroom production. A focus was placed on productivity and market access to support smallholders and transform their subsistence farming activities into commercial ventures.

“The project introduced several key Chinese innovations that made China the world’s pre-eminent mushroom producer.” Dr Pradeep Malakar

Key project activities included providing:

- Training of Ugandan partners at key mushroom research institutes in China
- Development of a permanent mushroom germplasm culture collection
- Creation of a mushroom training facility for mushroom biology courses at Makerere University
- A standard for mushroom spawn production through the Ugandan National Bureau of Standards
- Demonstrating facilities for supply of stable, high quality mushroom spawn, a registration system for spawn producers and an education and training system.



项目与中国和英国的主要蘑菇研究人员合作，采取措施支持乌干达蘑菇行业的发展。研究团队分析了蘑菇生产面临的主要挑战，如价值链创新的制约因素和对主要土壤毒素状况的了解不足等挑战。研究还提供了促进乌干达蘑菇生产转变所需的设施、材料和培训。研究重点关注生产率和市场准入，以支持小农户蘑菇生产并将其自给自足的农业活动转变为商业活动。

“此项目介绍了使中国成为世界上最杰出的蘑菇生产商的几个关键的中国式创新。” Pradeep Malakar

主要项目活动包括：

- 在中国主要的蘑菇研究所培训乌干达合作伙伴
- 开发永久性蘑菇种质采集技术
- 在马凯雷雷大学建立蘑菇生物课程的蘑菇培训设施
- 通过乌干达国家标准局制定蘑菇大批量生产的标准
- 示范提供稳定、高质量蘑菇大批量生产的设施、大型生产者的注册系统和教育培训系统。



Lead Institution: Institute of Food Research, UK
Lead Researcher: Dr Pradeep Malakar

牵头机构：英国食品研究所
项目首席科学家：Pradeep Malakar 博士

Innovations in the Ugandan cassava sector

乌干达木薯部门的创新

Closely aligned to the AgriTT Pilot Development Project, this study researched key cassava production and processing technologies in China and analysed their suitability for transfer to Uganda.

Most notably the team found experience from China was particularly relevant in the areas of:

Adopting Good Agricultural Practices, such as use of improved varieties of cassava, ridged planting and timely weeding, improved fertiliser management, soil conservation and use of modern processing equipment.

Developing an integrated supply chain that supports the development of agro-industries, including the use of **new end products**.

A key conclusion was the importance of improving primary production and access to markets and market information for Ugandan growers, to create a supply chain for future large-scale processing investments.



此研究与AgriTT试点开发项目紧密相关，研究了中国主要的木薯生产和加工技术，并分析了这些技术是否适合转移到乌干达。

最值得注意的是，研究团队发现中国的经验主要在以下领域：

采用良好的农业实践，例如使用改良的木薯品种、垄田种植与及时除草、改善化肥管理、土壤保持及使用现代加工设备

开发整合供应链，支持农业工业的发展，包括使用新的最终产品。

一个关键的结论是，必须改善乌干达种植者的初级生产及市场准入和市场信息，为未来大规模加工投资建设一个供应链。

Lead Institution: The Natural Resources Institute, UK
Lead Researcher: Prof. Andrew Westby

牵头机构：英国自然资源研究所
项目首席科学家：Andrew Westby教授

AgriApp - using smartphone technology to reach farmers

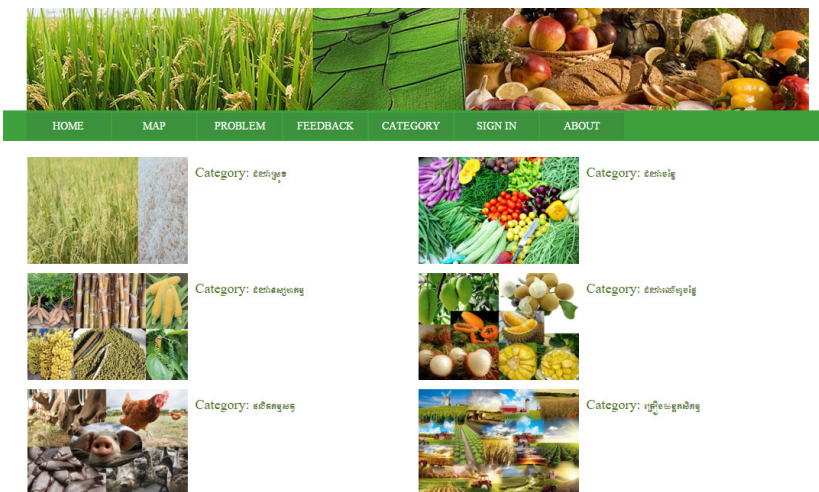
AgriApp - 使用智能手机让农民得到技术

The key objective of this project was to develop a smartphone based agricultural information dissemination system for Cambodia, drawing on China's extensive experience in this field.

The project applied cutting edge mobile internet and GIS technology, to develop an interactive mobile phone app that addresses the needs of the country's farmers for accurate, timely and easily accessed information, together with guidance on agricultural production and marketing issues. The app can be used by extensionists to share information with technical specialists, including questions on pests and diseases, and receive technical responses.

"Cambodian agricultural ministry staff, researchers, extensionists and young farmers all welcomed the new channel for disseminating information and for discussing agricultural practices." Mr Tang Zhishao

After developing a suitable technology the project worked with the Cambodian Ministry of Agriculture, Forestry and Fisheries to pilot the app in two districts of Cambodia. The results are promising and merit further scale-out.



项目的主要目标是利用中国在这一领域的广泛经验，为柬埔寨开发一个基于智能手机的农业信息传播系统。

此项目采用了尖端的移动互联网和GIS技术，开发了一个互动手机应用程序，以满足国内农民对准确、及时和易访问的信息及农业生产和营销问题指导方面的需求。推广者可以应用该程序与技术专家共享信息，包括病虫害的有关问题，并获得技术响应。

“柬埔寨农业部工作人员、研究人员、推广人员和青年农民都欢迎这个传播信息和讨论农业实践的新渠道。” 唐治韶先生

在开发合适的技术后，此项目与柬埔寨农林渔业部合作，在柬埔寨两个地区试点应用该程序。结果令人满意，值得进一步推广。

Lead Institution: Foreign Economic Cooperation Centre, Ministry of Agriculture, China 牵头机构：中国农业部对外经济合作中心 Lead Researcher: Mr Tang Zhishao 项目首席科学家：唐治韶

Matching dairy cattle breeds to smallholder farming systems

将奶牛品种与小农户养殖系统相匹配

This study examined the genetic profile of dairy breeds, identifying different combinations of indigenous and exotic genes, in order to determine the most appropriate dairy breed types for the various production environments in Tanzania.

With a strong capacity development component, the team characterised and quantified the differential performance between breed types in contrasting smallholder production systems. Based on the results, farmers are now making informed choices on what breed suits them best, given their individual resource base.

Getting the breed type right is not the only factor that will support smallholder dairy sector development; disease and nutrition management, for example, are also important. However starting out with optimal breeds is vital, and as such this research can make a valuable contribution to the implementation of the Tanzanian government's 10 year dairy sector development strategy.



本研究调查了奶牛品种的遗传基因，确定了不同的土着和外来基因的组合，目的是为坦桑尼亚的多种生产环境确定最合适的奶牛养殖品种。

凭借强大的开发能力，研究团队区分和量化了各种小农业生产系统中养殖品种之间的差异性。根据得到的结果，农民根据自己的资源基础，选择最适合他们的养殖品种。

得到合适的养殖品种并不是唯一一个支持小农户乳制品行业发展的因素；除了这一因素，疾病和营养管理等也很重要。从研究最佳养殖品种着手非常重要，可以为坦桑尼亚政府10年乳制品行业发展战略的实施做出宝贵贡献。



Lead Institution: International Livestock Institute, Kenya
Lead Researcher: Dr. Fidalis Mujibi

牵头机构：肯尼亚国际畜牧研究所
项目首席科学家：Fidalis Mujibi博士

Knowledge sharing and communication

知识共享与交流

Sharing knowledge about effective technology transfer through networking and exchange is the third component of the AgriTT programme. The programme has reached regional and international audiences through workshops, conferences, press coverage and wider dissemination through literature, videos and social media.

AgriTT has been showcased at key global and regional events. A successful session was held at the 7th FARA Africa Agriculture Science Week on “Making Chinese Technology work for African Agriculture: Key insights & lesson learning from AgriTT”. The programme also convened well-received meetings at the Aquaculture Strategy for Africa meeting (2016) and the World Congress on Root Crops and Tubers (2016).

Two conferences on technology transfer were held in Beijing. The first brought together Chinese experts in the field to discuss lessons from Chinese agricultural technology initiatives in Africa. The second conference was organised by China Agricultural University and FARA. Participants from seven African countries, China, the UK and India shared perspectives on best practice in agricultural technology transfer.

Other key knowledge sharing highlights follow:



通过网络和交流分享知识是AgriTT 项目的第三个组成部分。项目通过研讨会、会议、新闻发布及文献、视频和社交媒体进行更广泛地传播，让各个地区和国际受众了解相关信息。

AgriTT项目展示了主要的全球和地区活动。在第七届非洲农业研究论坛科学周上成功举办了“让中国技术为非洲农业服务：从AgriTT项目获得的关键经验和教训”活动。另外，还在非洲水产养殖战略会议（2016年）及全球根和块茎作物会议（2016年）上举行了相关会议，反响良好。

在北京举办了两次技术转移会议。第一次会议将中国相关领域的专家集聚一堂，讨论中国在非洲进行农业技术转移的成效。第二次会议由中国农业大学和非洲农业研究论坛组织，参与者来自七个非洲国家、中国、英国及印度，分享了农业技术转移的最佳实践。

其他重点知识分享包括如下方面：



Research and analysis of the perspectives of 100 Chinese technical experts posted to Africa under the FAO South-South programme, on how to ensure technology transfer is effective.

在联合国粮农组织南南合作项目支持下，100名中国技术专家被委派到非洲以确保有效的技术转移



Presentations at ten events in Africa and Asia, including technology transfer events attended by African, Chinese and other international delegates.

在非洲和亚洲举办的十个活动，包括非洲、中国和其他国际代表参加的技术转让活动上进行展示



The production of an aquaculture video documentary showcasing successful aquaculture value chains in Africa.

制作了一个非洲水产养殖视频纪录片，展示非洲成功的水产养殖价值链





Development of policy briefings on each of the RCF projects and PDP components, reflecting the final results and recommendations.

为每个研究挑战基金项目及试点项目的制作政策简报，呈现最终成果和建议。



Holding an AgriTT event at the 7th FARA Africa Agriculture Science Week. *"Making Chinese Technology work for African Agriculture: Key insights & lesson learning from AgriTT"*

在第7届非洲农业研究论坛科学周上举办了一次AgriTT活动 – “让中国技术为非洲农业服务：从AgriTT项目获得的关键经验和教训”



RESEARCH CHALLENGE FUND
END OF PROGRAMME SUCCESS AND
LESSON LEARNING

Partners of the AgriTT programme:
Department for International Development (DFID), UK
Ministry of Agriculture, China
Ministry of Agriculture, Irrigation and Water Development, Malawi
Ministry of Agriculture, Animal Husbandry and Fisheries, Uganda
Research in Agriculture Research in Africa (RIARA)



2015年12月9日-10日 北京高马河饭店
9th-10th December 2015 Landmark Hotel, Beijing, China

Production of a lesson-learning study on trilateral cooperation and technology transfer.

开展关于三方合作和技术转移的经验教训的研究。

What lessons have we learnt? 我们学到了什么经验?

AgriTT has shown that trilateral cooperation can be an effective way to support technology transfer, and is a valuable addition to the toolbox of aid instruments.

With this partnership approach, it can take time to understand each other's systems and culture, but once trust and mutual understanding is established, complementary strengths of different partners are brought into full play, for example, in management, technology innovation, or knowledge of local development needs.

AgriTT focussed on technology transfer from China, and found that transfer of carefully chosen technologies and practices contributed to improvements in agricultural productivity and value chain development.

A value chain approach is essential. The projects confirm that it is not feasible to transfer technologies without a clear understanding of market demand and whether or not a new technology will create economic benefits for those producing or processing a commodity.

Technologies and practices need to be adapted to the local context. This requires team members with different strengths working together to solve problems, adapting and innovating what has worked elsewhere. Under AgriTT, all partners set objectives and selected target technologies together, working side-by-side to test, demonstrate and adapt new approaches. This ensured a close match between supply and demand for technologies.

AgriTT项目表明，三方合作可能是一种有效的支持技术转移的方式，且是援助手段的一个宝贵补充。

采用这种合作方法，需要一段时间了解彼此的系统和文化，但是一旦建立信任和相互理解，各方优势互补，管理、技术创新或地方开发需求方面的知识将会得到充分利。

AgriTT项目的重点是中国技术的转移，研究发现，转移精挑细选的技术和实践提高了非洲的农业生产率并促进了价值链发展。

价值链方法是必不可少的。这些项目证实，在不清楚了解市场需求以及新技术是否会为生产或加工商品带来经济效益的情况下就进行技术转移是不可行的。技术和实践需要适应当地环境。

这需要各有所长的团队成员精诚合作，解决问题、调整和创新转移的技术。在AgriTT项目下，所有合作伙伴一起制定目标并选择目标技术及合作试验、示范及采用新方法。这将确保技术供给和需求之间的完美匹配。





AgriTT was managed by Landell Mills, UK, with the Foreign Economic Cooperation Centre, Ministry of Agriculture, China, and Triple Line, UK.

More information about AgriTT can be found at: **www.agriTT.org**

AgriTT项目由英国Landell Mills、中国农业部对外经济合作中心及英国Triple Line共同管理。
如需更多有关AgriTT项目的信息，可以在www.agriTT.org查询。