Policy Briefing

Growing Uganda's mushroom farming

The AgriTT programme is an innovative trilateral initiative between the UK Department for International Development (DFID), the Chinese Government, the Governments of Malawi and Uganda and the Forum for Agricultural Research in Africa (FARA). The programme facilitates the sharing of successful experiences in agricultural development with developing countries to improve agricultural productivity and food security.

The AgriTT Research Challenge Fund supported two year research projects to generate new thinking and practice on technology transfer and value chain development. Each project had a Chinese, UK, and African or South-East Asian research partner.

Agri TT Agricultural Technology Transfer

The key to success – high-quality, certified mushroom spawn production

In Uganda, mushroom cultivation has the potential to empower women and other vulnerable groups who have not traditionally benefited from commercial agricultural production. The Government of Uganda and its partners have been implementing activities to support mushroom cultivation, and the industry is growing slowly but steadily: annual production in Uganda has risen over the past decade from 100–200 to 400–600 metric tonnes. However, mushroom growing remains a small-scale subsistence activity. In contrast, China operates on a commercial scale, producing over 25.7 million metric tonnes of edible mushrooms annually. This project aimed to introduce to Uganda several key innovations that have made China the world's pre-eminent mushroom producer, and to put in place the basic infrastructure for a sustainable mushroom industry. Many attempts to transfer mushroom cultivation technologies to lower-income countries have been unsuccessful because high-tech methodologies using well established mushroom strains cannot simply be transferred en masse. This project aimed to establish local capacity in western and southwestern Uganda to produce high-quality indigenous mushrooms that are acceptable to local consumers, focusing on technologies for spawn production and food safety.

Mushroom spawn production requires specialist equipment and high levels of hygiene. The project has successfully introduced a secure supply of stable, high-quality mushroom spawn through upgrading the spawn-production laboratory and building a mushroom-growing room at MTRC; and establishing a permanent mushroom germplasm culture collection at Makerere University.

Makerere University also now has a mushroom training facility to support new modern mushroom production courses that will form part of its new BSc Microbiology programme. The academics teaching these courses have been trained in China by the project. These specialised courses will support a sustained supply of home-grown mushroom biologists to manage the germplasm bank.

A standard for commercial mushroom spawn production has been developed by the Uganda National Bureau of Standards with technical support from SAAS. This licensing scheme, currently under consultation, is unique in the region and would allow legal redress for mushroom farmers sold poor-quality spawn.

A rigorous analysis of Ugandan soils for Clostridium botulinum spores demonstrated the presence in some regions of spores of *C. botulinum* Group I, which is implicated in cases of botulism from the consumption of mushrooms. A risk assessment should be made for mushroom products and standard safety processes applied. There are also implications for the packaging of fresh mushrooms.

Private sector extension services have been delivered to subsistence mushroom farmers in four districts by MTRC and Makerere University, coupled with capacity-building through the Chinese partner GAAS. The trainers introduced techniques to improve production, including methods used by commercial spawn producers for

preserving mushroom germplasm.

Mushroom growing at small scale can provide both crucial nutrition and a valuable source of income. For example, working with the Polish Window of Life foundation, the project has enabled an orphanage in Masindi to meet its rent and school fees through mushroom farming, as well as providing both food and skills training for its children.

Mushroom farmers would benefit from reducing their dependence on firewood for sterilisation prior to inoculation of mushroom spawn. A prototype gasifier stove designed for rural mushroom sterilisation, using spent mushroom compost as a fuel source, has been constructed. This efficient stove should be rolled out to the mushroom farming community in Uganda.

Policy recommendations

- **The key to developing mushroom farming is production of good quality mushroom spawn. Plans are being developed with UIRI for a business incubation programme to encourage the development of mushroom spawn-production enterprises.** The programme aims to provide participants with access to processing equipment and laboratories. There is also a need for business skills training for potential entrepreneurs, particularly in developing viable business plans to facilitate access to finance. Small businesses (especially women) find accessing loans difficult and interest rates are generally high. Government support for the business incubation programme and for access to low-interest finance would lay the foundation for expanding mushroom production in Uganda.
- **Market development is also vital.** Further support is needed for development of sustainable and reliable domestic, regional and international mushroom markets – for example, there are potential markets for dried mushrooms, allowing for longer storage and transport to urban centres and for export. This will require, among others, developing sustainable, accessible market information systems, and mobilising mushroom farmers into associations or cooperatives. Support could be provided by government in partnership with funding agencies and the private sector.
- **Regulatory frameworks are needed to encourage investment.** The standard for commercial mushroom spawn production developed with the Uganda National Bureau of Standards should be expedited and widely promoted.
- **Delivery of private sector extension services to** subsistence mushroom farmers in the project regions should be rolled out to other areas.
- **The foundation has been laid for continued training** of mushroom biologists with the skills needed to develop the industry, but training facilities need to be scaled up and made more widely available. To facilitate this, the project has generated a significant amount of data on mushroom production in China and Uganda, which will be made available via publications and the dedicated website (see http://mushroom.mra4food.co.uk).
- **Mushroom farming is a good option for addressing the economic and financial welfare of women and children in Uganda and their inclusion in poverty alleviation programmes.** The mushroom industry in Uganda is uniquely dominated by women, and engages entire families at different stages of the value chain. Resourcing the mushroom business empowers women, increases household income, improves food security and builds women's leadership skills. It can also provide a secure economic foundation for social institutions such as orphanages.

Empowering women improves the livelihoods of communities as they use the income from mushroom sales to reinvest in the business, improve family homes and pay children's school fees.

Partners

China
Edible Fungi Institute (EFI), Shanghai Academy of Agricultural Sciences (SAAS)

Guizhou Academy of Agricultural Sciences (GAAS)

Uganda
Uganda Industrial Research Institute (UIRI), Kampala

College of Natural Sciences (CNS), Makerere University, Kampala

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