

Eastern Africa Agricultural Productivity Project (EAAPP) improving household income and food and feed security through forage seed production

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Introduction

The Eastern Africa Agricultural Productivity Programme (EAAPP) is a regional World Bank funded project designed to invest in regional approaches to agricultural research through supporting the strengthening and scaling up of agricultural research in Eastern Africa, focusing on Dairy, Wheat, Cassava and Rice. The overall goal of EAAPP is to contribute to enhanced sustainable productivity, value added and competitiveness of the sub-regional agricultural system. The project is implemented in Uganda, Kenya, Ethiopia and Tanzania.

The National Livestock Resources Research Institute (NaLIRRI) in Uganda is coordinating the Dairy research component research activities under EAAPP. The component has six projects namely:

1. Enhancing adoption of Napier grass to Napier stunt disease for increased feed availability in smallholder dairy systems.
2. Nutritional improvement of low value crop residues/waste and agro-industrial by-products and wastes.
3. Forage seed production
4. Enhancement of the utilization of Muguga cocktail vaccine in the smallholder dairy farming systems
5. Identification and characterization of milk-borne zoonotic organisms including haemorrhagic *E. coli*
6. Improving indigenous cattle for dairy production through targeted selection and cross breeding

Forage seed production in Uganda

A major challenge to the smallholder dairy industry in Uganda is inadequate year-round feed supply. The quality of the pastures vary considerably with season; with protein being highest during the wet season when the pastures are actively growing and declines considerably during the dry season. Availability of forage seed is critical to meet the increasing demand for meat and milk in Uganda. Consequently there is need to have concerted effort to improve forage seed availability in Uganda.

The National Livestock Resources Research Institute (NaLIRRI) under the National Agricultural Research Organization (NARO) is implementing a **Forage seed production project** in several districts of: Uganda. The objectives of the project are to: (a) increase forage seed and feed resources availability to improve livestock productivity in various ecological zones of Uganda and (b) strengthen capacity of stakeholders on forage management, conservation and utilization. The project is implemented under the Dairy research component of the EAAPP funded by the World Bank.

(a) Multiplication of tolerant varieties of Napier grass

The major threat to the use of Napier grass fodder is the Napier stunt disease caused by 16SrXI Group phytoplasma (*Candidatus Phytoplasma oryzae*). Previous studies showed that all Napier grass accessions in Uganda are susceptible to Napier stunt disease. Affected shoots become pale yellow in colour and seriously dwarfed.



Healthy (left) and stunted (right) Napier grass plants

Often the whole stool is affected, with yield reductions of 40-100% and eventual death of the plants. This has led to increased price of Napier grass in worst affected districts, insufficient feed for cows and selling off of animals by some farmers.

Efforts to identify resistant/tolerant Napier grass accessions to Napier stunt disease have intensified in the last 5 years through the Regional Dairy Centre of Excellence (RDCoE) at Kenya Agricultural Research Institute (KARI) and the International Centre for Insect Physiology and Ecology (ICIPE) in Kenya. Twenty two tolerant accessions from KARI were evaluated in Uganda in 2011 and seven accessions were found to be tolerant to Napier stunt disease in Uganda. These accessions that include Kakamega 1 and Kakamega 2 are being multiplied at different research institutes under the National Agricultural Research Organization (NARO) for further distribution to farmers through the National Agricultural Advisory Services (NAADS).

(b) Other forages being multiplied in Uganda

Forage seed/planting materials being multiplied include: *Chloris gayana* (Rhodes grass); *Brachiaria brizantha*. (Signal grass); *Panicum maximum* (Guinea grass); *Clitoria ternatea* (Butterfly-pea); *Lablab purpureus* (Lablab)

(c) Farmers' success stories from forage seed production

- There has been improved fodder availability and milk yield on farms that have received tolerant varieties of Napier grass. Farmers have observed an increase in milk yield of over 20%.
- Dairy farmers who received *Brachiaria* planting materials for multiplication and integrating it into livestock feed on average established 0.2-3 acres, sold about 230 bags of splits of planting materials to other farmers in a year and fetched net profits of about US \$ 1,330 to 1,600 per acre per annum. Non-cattle households whose fields regenerate faster given that they are not frequently cut to feed cattle registered net profits of US \$ 1,572 to 2,680 per acre per annum.

- Farmers have noted that compared to most cereal crop options, forage seed production has an excellent profitability track record. For example, consistent yields and prices over the last 2 years has allowed Brachiaria to bring the average grower more revenue per acre. Mr. Peter Ddaki (0774864655), a farmer in Kitenga village, Kalungu sub-county, Masaka district has sold Brachiaria planting materials worth over US \$ 1,380 from an area of less than 1 acre. A group of youth in Wakiso district produced potted Brachiaria plantlets worth US \$ 540 in two weeks. They said that forage seed production fetches more revenue than boda boda cycling.



Brachiaria plants raised in polythene bags

- A kilogramme of forage seed ranges between US \$ 4.5 for forage legume seed such as Lablab; US \$ 8 for Rhodes grass; US \$ 8 for a sac of Brachiaria splits to US \$ 24 for Green leaf desmodium seed. A sac (about 350 cuttings) of clean Napier grass cuttings is sold at US \$ 6.
- Farmers have reported that they have been able to use income from sale of forage seed to purchase household assets like chairs, investing in other farm enterprises like vegetable production, maize and sweet potato growing by especially hiring labour, improved promptness in settling school fees and others stated that they can now buy building materials in bulk to invest in construction of rental housing units.
- Dairy farmers engaged in production and multiplication of forage seed have reported an increase in milk yield by 2 to 4 liters /cow depending on the cattle breed and grazing management system.
- Good feeds and feed management has increased manure production and crop production. Manure is used to improve soil fertility and part of manure is sold to farmers
- Forage seed production has allowed farmers to expand their rotations and diversify risk. Farmers have incorporated forage seed production as a regular part of their cropping plans.
- Crop rotations that include forages legumes such as Lablab provide more soil cover and higher levels of organic matter and a more stable structure to reduce the potential for wind and water erosion. It also reduces the cost of weeding.
- In the last 2 years, forage seed and fodder markets have opened up dramatically in smallholder dairy industry in Uganda. The demand for conserved forages such as hay has increased due to climate change and land shortage.

- When you grow perennial forages, you are also reducing carbon, one of the components of greenhouse gas. The large root systems of perennial forages can store up to 2.7 times more carbon than annual crops, and place (sequester) it deeper into the ground for better longer-term storage. As well, the lack of annual tillage slows the breakdown and release of carbon from the plants' roots.



Brachiaria hybrid cv. Mulato 11 field



Sacs of Brachiaria splits ready for sale

Lessons Learnt

- The start of pasture seed production should have different utilities not only seed production for sale, but, increased quantity and quality of livestock feed need emphasis particularly for those who have crossbred dairy cows.
- The EAAPP forage seed production project outputs indicate that Uganda can produce its own forage legume and grass seed through on-station and farmer groups and that forage seed production is a viable enterprise but the farmer should clearly define his goals in forage seed production and understand the opportunities and limitations of forage seed production.
- Sustainable marketing is of major concern to farmers if they have to undertake commercial seed production. There is a need to increase the demand for legume seed through awareness creation using participatory research and technology transfer on the roles of forage legumes in increasing milk yield when used as protein supplements and improvement in soil fertility when used in crop intercrops.
- Additional efforts are required to organize farmers in marketing groups as the sale of forage seed does not have a regular market place as food crops.
- Choice of forage species that have high demand in the market must be made.
- The Government and donors should support the production of simple affordable harvesting and threshing equipments that small-scale farmers can use so use to minimise losses and also save labour for other activities should be developed and promoted.