NATIONAL AGRICULTURAL RESEARCH ORGANISATION

NARO'S CONTRIBUTION TO AGRICULTURAL DEVELOPMENT

NARO is a body corporate under the ministry of Agriculture, Animal Industry and Fisheries mandated to coordinate, oversee and guide agricultural research in Uganda. Through the Public Agricultural Research Institutes, Universities and Private Sector, NARO has the mission to generate and disseminate appropriate, safe and cost effective technologies to the ender users. Over the last 10 years NARO has registered impressive results in generation of technologies for improved productivity of crops, forestry, fisheries and livestock, outreach and institutional development. Uganda's institutional performance has been ranked third (at 50% to Ethiopia (57%) and Morocco (58%) in Sub-Saharan Africa in terms of returns on investment in agricultural research and development (WB, 2004). As a result of credible ranking has also become a reference point within ASARECA region and beyond.

Outstanding outputs to improve yields for increased food security and incomes which farmers have adopted include, genotypes in cereals crops (maize, millet, rice, and sorghum); root crops (cassava, solanum potato, and sweet potato); grain legumes (groundnuts, pigeon pea, and cowpeas); oil crops(sesame and sunflower); fibre and beverage crops(cotton, and coffee); and tree provenance(eucalyptus and agro-forestry tree species).Commodity value chains have been addressed in maize streak groundnut rosette, cassava mosaic, coffee wilt disease, slow growth of eucalyptus. NARO has deployed the bulk of its resources to technology development including setting up a state-of-the Art biotechnology laboratory at Kawanda. The number of new farming methods, tools and technologies has increased by 425 percent over the 10 year period. The new varieties released have grown by 840 percent over the same period. Research briefs increased by over 15 000 percent .This reflects a high level of innovativeness and productivity. Below is a table showing achievements in selected commodities:

KEY TECHNOLOGIES AND THEIR RESEARCH IMPACT

1. Maize

- The adoption rates in terms of proportion of farmers growing improved maize varieties is 70 percent compared to 30 percent still growing local maize varieties.
- In terms of improved varieties, Longe 5 is the most popular improved variety at national level followed by Longe 4 and Kawanda composite.
- Results from the recently concluded IAS indicate that, revenue derived from each acre is ush 432,479/acre at farm gate price.

2. Solanum Potato

- At national level, 75 percent of farmers grow Solanum potato improved varieties whereas 25 percent grew local varieties.
- The mean revenue from an acre of Solanum potato is about Ush 2 million.

3. Sweet Potato

- IAS findings further indicate that 34 percent of farmers are using improved sweet potato varieties as compared to 66 percent who are still using local varieties.
- However, the adoption rate by acreage is in reverse showing that 73 percent of the land cultivated under sweet potato is planted with improved varieties.

4. Ground nut

- 66 percent of farmers grow improved groundnut varieties as compared to 34 percent who still cultivate local varieties.
- In terms of adoption rate by acreage 71 percent of the land cultivated to groundnuts is under improved varieties compared to 29 percent under local.
- Mean revenue from groundnut production is close to Ushs 600,000 per acre

5. Sorghum

- According to the Impact Assessment Studies (IAS), sorghum was reported in only 3 out of the 8 zones on which the national level data are based. 60 percent of the respondents grow improved sorghum varieties as compared to 40 percent who still cultivate local sorghum varieties.
- Only two improved sorghum varieties are cultivated namely, Sekedo and Epuripur with the former as the most dominant.
  i. Development of white seeded sorghum variety, Epuripur suitable for beer brewing. The Nile Breweries has already come out with a new brand of beer known as "Eagle Beer" from this sorghum. Under good management, it yields between 2500 and 3000 Kgs/ha compared to 1600kg/ha under poor management and matures in 110 days and grows to a height of about 150cm.
  ii. 13 districts in Uganda are now growing Epuipur for Nile Breweries for commercial production of Eagle Lager Beer.
- The national mean yield of 411kg/acre is very low compared to 1125 kg/acre attainable at research level implying a yield gap of 67 percent. Yield is lowest in Abi ZARDI at 200kg/acre probably because 80 percent of the farmers are growing local varieties.
- Sorghum has a very low cost of production compared to other enterprises.
- Mean revenue is Ushs 155,193 per acre.



6. Banana

- This is the most abundantly grown crop in Uganda covering over 1.3 million hectares and grown by 75% of the farmers. In addition to other pests and diseases, the crop was attacked by a devastating disease in the early 1990's. The "Matoke Wilt" banana bacterial wilt attacks the local varieties leaving the citizens having no alternative but to depend on maize and cassava. Research is underway to rescue this important industry from collapsing. Bananas provide food, feed ,fibre and drink. Through the Presidential Initiative on Banana, this industry will provide various products for mankind. Under research conditions 20T/ha of banana is possible compared to only 6 T/ha under traditional production and an improved varieties.

7. Cassava

- A virulent African Cassava Mosaic Virus hit the Ugandan cassava in early nineties and pushed the national food security to the brink of collapse. The situation was bad in most parts of the country and some deaths due to famine were reported in some districts. People's only means of livelihood at that time was decimated by the mosaic virus disease. NARO swung into action and developed several resistant varieties. It also developed a unique and effective network through which cassava varieties were disseminated en mass throughout the country at a time when extension service had totally collapsed. The result of this effort was estimated at a net value of US$90 Million by 1999.

8. Coffee

- Around 1993 Coffee Wilt Disease hit the major country's export crop beginning in Bundibugyo where by 2000 about 80% of the coffee plantations were destroyed. The disease spread like fire and soon 22 of the then 33 coffee growing districts were covered by the disease. This threatened the industry that was contributing 65% of total export earnings valued at $300-400 Million per year. Coffee employed 10% of the total population and provided livelihood to 1.5 Million smallholder farmers who were growing it on 277,000 ha of land.
- The coffee wilt Disease killed 10 million trees in a short time and research had to come in to address the situation. Presently, good agronomical practices have been used to slow down the spread of the disease and 6 CWD resistant varieties have been developed by NARO and are available to disseminate to the farmers.

9. Livestock

Fodder bank technologies

- Several **fodder bank technologies** have been developed and disseminated by NARO and the major ones that have been disseminated include *Pennisetum 99. P. 88 and P. 87*
- The local Napier grass variety is found along the roadsides. Although many farmers depend on this variety as a major source of fodder, its biomass yield and quality are very low. The improved varieties produce more biomass yield than the local varieties and have larger leaves.
- Fodder bank feeding technology appears to be restricted to small herds of less than 10 cows. The national mean is 4 cows with the highest zonal mean of 8 cows reported in MbaZARDI.
- Milk yield for cows fed by fodder bank technology is **12litres/cow/day** compared to a mean of 4 **litres/cow/day** for cows fed using traditional feeding methods. This translates into a milk revenue of **Ush 4,627/cow/day** or **Ush 1,388,000** per season of 300 lactation days.

Tools

- Developed a Decision Support Tool ***(DST)/ Endiisa***. This gives alternative feed resources and their combinations to economically provide sufficient nutrition for diary cattle. This innovation recently received the first prize winner in the Women in Science Competition in Africa.

Poultry/Chickens

- **Chickens** play a major role in enhancing incomes and nutrition especially for smallholder farmers, women and the youth. Chicken require limited land area, they grow and mature very fast and require low inputs thus give high profits.
- According to UBOS (2007), Uganda's national chicken flock was 23.5 million chickens of which 84.2 percent (19.8 million) are local or indigenous.
- In order to improve the production potential of local chicken, NaLIRRI has developed a stabilized improved crossbred chicken from crossbreeding exotic Bovans Brown Cocks with indigenous or local hens.
- The cross bred chicken has higher meat and egg production, higher mating ability and fertility, good brooding/mothering ability, is adapted to free range scavenging, is resistant to common diseases and is highly profitable.

Livestock Health

- Research effort in control of livestock pests and diseases like Contagious Bovine Pleuro-Pneumonia (CBPP), East Cost Fever, Swine fever, Tsetse fly show high promises. It has been reported that the number of farmers who immunize their cattle against ECF has gone up. This technology when fully adopted can save our livestock industry. The increase in cattle numbers from 6millionin 2006 to 16million in 2008 could be contributed to agricultural research and better management

10. Fisheries

- A lot of research work has been conducted in both capture fisheries and aquaculture resulting into better fishing methods and practices. This has resulted into production of farmed fish increasing by 3,900percent from 500mt in 2001 to the current 20,000 mt (as of 2007)
  i. The most common reared fish species is Nile Tilapia, followed by Mirror Carp and Cat Fish.
  ii. Average fish ***harvest/yield in kgs/m^3*** was reported to be 23 kgs.
  iii. The price of fish is high with a farm gate price of Ush 1607 per kg in MbaZARDI and Ush 2821 per kg in BugiZARDI. The high fish price translates into very high values of revenue of Ushs 803,500 for an average pond of 500m^3 of water in MbaZARDI and Ush 490,854 for an average pond of 174m^3 of water in BugiZARDI.
- The effect of the notorious Water Hyacinth on transport, fishing and power generation on Lake Victoria is still vivid in our minds. This water weed became a menace until NARO with use of biological control using beetles integrated with other methods of control brought the situation under control. The country has since made heavy savings because of this work, in terms of economic, environmental, political and social benefits.
- Research into fish farming and especially cage farming on the open waters will soon revolutionalise the fisheries sector

11. Forestry

a) The research for development (R4D) in NaFORRI aims at increasing the benefits derived from trees and forests through conservation and sustainable management. NaFORRI has generated and disseminated a number of technologies over the years. Highlights of NaFORRI achievements since 2000 include:

- Introduction of 12 eucalyptus clones for plantation forestry in Uganda. The clones grow faster (1 ½ yrs.- firewood, 4 yrs.- fencing posts,6 years- electric poles and 8-10 yrs.- timber.
- The clones also have attributes of uniform growth and are comparative tolerance to pests and diseases e.g Blue gum chalcid wasp.
- Established distribution of Blue gum chalcid attacking Eucalypts in the country. The Pest is present in all agroecological zones but absent in Kabale highlands. NaFORRI has also identified resistance in Eucalypts. Clones are more resistant than land races. However within clones, there is varying resistance to the pest. GC 796,540 and 784 are susceptible while GC 578,514, and 550 are resitant.GU21, 8 and 7



Fig. 2 Cypress and pine woolly aphids aphids

Fraud Alert!
All work Published here is payable only to GLOBAL WIDE PUBLISHERS LTD (0752 356459). Do not Pay Cash

NATIONAL AGRICULTURE RESEARCH ORGANISATION

Maximising Profits in Agriculture Through Value Addition

The National Agricultural Research Organization (NARO) is the apex body for guidance and coordination of all agricultural research activities in the national agricultural research system in Uganda. NARO is a Public Institution established by an act of Parliament, which was enacted on 21st November 2005

The National Agricultural Research Organisation (NARO) continues to be committed to generating relevant Technologies, Information, Management Practices, and Strategies (TIMPS) for agricultural development and socio-economic transformation.

NARO delivered on all her Key Performance Indicators (KPIs) including 20 varieties submitted for release and 70 production technologies developed. Remarkably, NARO initiated a Competitive Grant Scheme (CGS) funding mode for GOU budget through which strategic research leading to products and commercialization are supported. Accordingly, twenty-one projects were funded under the GoU CGS mode and these projects will be operated for a period of three years.

Crops research

In the crop sector, 16 varieties out of the 20 candidate varieties submitted to the National Variety Release Committee of MAAIF were released. The candidate varieties have superior attributes over the current existing varieties with respect to yield advantage, pest and disease resistance, adaptation to drought prone environments and culinary attributes.

Fisheries research

In the fisheries sub-sector, efforts were geared towards generating relevant information to guide interventions in the sector. This included Impacts of fish cages on water quality and biota at SON cage fish farm; and Occurrence, abundance and diversity of micro plastics in sediment, water and fish, Light attraction technologies for enhanced harvest of Mukene on Lake Victoria were determined.

Forestry research

Research in the forestry sub-sector focused on improving the hydrocarbon-sawdust blending that led to an increase in the combustibility of saw dust fuel lighters by 5%. High value fuel lighters of improved blend of wax and saw dust were produced. In addition, a new design of a wood waste fuel cook stove prototype was produced and is to be commercialised.

Tea research

Tea genetic diversity using Genomic DNA extraction method was conducted for 63 accessions to determine the best breeding pipelines. Further, laboratory analysis of 22 tea accessions for biochemical attributes was conducted. Preliminary results show that all the 22 accessions picked are fast fermenters implying they are good for black tea and not green tea. The analysis also showed that all the tea accessions had good and high cup quality.



Agricultural engineering

First prototype of the NARO Polycyclic Aromatic Hydrocarbons (PAHs)-safe Liquid Smoke Distiller developed. Additionally, a second generation of the NARO PAH-Safe smoking kiln technology designs (NAROFIK-3) was developed. The new designs are expected to lead to better quality management systems for processing smoked fish products.

Value addition

Protocols for development of a nutrient dense Market-Smart AroNutro Instant Maize Snack were developed. The snack is intended to contribute to reducing impacts of malnutrition and reducing food losses. An innovative technology transfer model that facilitates market access for the product was developed and is yet to be tested.

Socioeconomic and cross-cutting research

Gender mainstreaming in agricultural research for development NARO has registered considerable achievements in the implementation of its gender and Diversity programs. At the grass level, in an effort ensure that all gender categories of persons benefit including; children, women, youth, the elderly and persons with disabilities from its technology development and dissemination initiatives, the organization has endeavoured to developed technologies in various disciplines including agricultural engineering, crops, livestock and fishers to cater for production challenges such as lack of improved technologies, limited production skills, burden of food and nutrition security, labour concerns, workload burden especially for women, and income concerns among others.

Studies conducted to establish demand for selected products

To provide information to guide development and commercialization of product lines that respond to niche markets, studies have been conducted along selected value chains to establish demand; ascertained the potential for production and consumer demand of specialty tea (Green, white, silver, purple, yellow) in Uganda