

NARO

NATIONAL AGRICULTURAL RESEARCH ORGANISATION

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Contributing to Sustainable Agricultural Development in Uganda



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Funding Sources

NARO's funding mainly comes from

- government grants
- donor assistance
- a cess on commodities and products
- donations

NARO is in the process of establishing an agricultural research trust fund in an effort to ameliorate the problem of shortages of operational funds.

ing of high-value fish species. Finally, reducing post-harvest losses, monitoring and control of quality in industrial processing, and development of technologies for artisanal fish processing is emphasized, including the reduction of firewood use.

Forestry

Forestry research focuses on development of sustainable forest management practices, production and utilization of softwood plantations, grading of logs, wood processing and preservation, and development of sustainable agro-forestry systems. Further, a number of fast-growing species have been identified for agro-forestry, and suitable alley cropping and intercropping systems have been developed for on-farm testing.

Socio-economic Research

Socio-econonomic research has been initiated in a number of areas of critical importance for crop, livestock, forestry, and fish production. Special emphasis is on labor, inputs, infrastructure, and marketing problems; production economics; and selected policy environment studies.

Introducing NARO

NARO is the National Agricultural Research Organisation of Uganda. It represents the public-sector national agricultural research system. NARO is a semi-autonomous organisation, established in 1992 by an act of Parliament. NARO is composed of a supervisory board, a secretariat, eight research institutes, and two research stations.

Research Institutes

- Kawanda Agricultural Research Institute (KARI)
- Namulonge Agricultural and Animal Production Research Institute (NAARI)
- Serere Agricultural and Animal Production Research Institute (SAARI)
- Livestock Health Research Institute (LIRI)
- Fisheries Research Institute (FIRI)
- Forestry Research Institute (FORI)
- Food Science and Technology Research Institute (FOSRI) (proposed)
- Agricultural Engineering and Appropriate Technology Research Institute (AEATRI) (proposed)

Research Stations

- Kalengyere Research Station of NAARI
- Aquaculture Research Station of FIRI

Any institution conducting agricultural or agriculture-related research may join and become an associate institute of NARO.

NARO was formed by reorganising and restructuring the old, colonial-era research system to meet the new requirements of independent Uganda. The previous, fragmented research system has been transformed into a unified, lean organisation. NARO's institutional framework is designed to make it more effective and responsive to national development objectives such as diversifying agricultural production to supply adequate food and raw materials and improving the quality of rural life.



Legend

- NARO research institutes
- Agro-ecological zones:
  - I. High-altitude zones
  - II. Pastorial arid to semi-arid rangelands zones
  - III. Northern and eastern short-grasslands zone
  - IV. Southern and western tall-grasslands zone

Livestock

Tsetse Flies. The control of harmful diseases is one high-priority area of livestock research. *LIRI has developed a tsetse-trapping technology consisting of a cost-effective mono-screen tsetse-fly trap using local materials.* The trap has been widely tested and found very effective. Farmers themselves can make these traps and deploy them in areas where the tsetse fly is rampant. Another tsetse control method developed at LIRI is the application of Spotton (deltamethrin 1%) insecticide on as few as 10% of the cattle in a herd. This amount is sufficient to reduce the tsetse population by as much as 99 %.

Tick-borne Diseases. LIRI is working on the control of tick-borne diseases through its integrated disease control strategy, which is being tested extensively at the village level.

Animal Nutrition. In the area of animal nutrition, emphasis is on the selection of improved pasture species, development of agronomic management packages, and multiplication of pasture seed. SAARI has developed management packages for nine species and is ready to begin seed multiplication on some of these. Also, a sub-project for dairy smallholders has developed feeding recommendations and technology now ready for demonstration to farmers. The team is also working to establish a fodder bank at the farm level.

Fisheries

Emphasis in fisheries research falls into three main areas. First, conservation and management of resources is highlighted, with particular attention given to stock and catch assessment, ecosystem research, and selective gear development. The second area of focus is integrated fish farming and market-

phasis is given to combating lygus, bollworms, and bacterial blight, development of appropriate agronomic management recommendations, and purification and seed multiplication of existing varieties. Two such varieties, SATU 71 and BPA, have been purified and multiplied under the Smallholder Cotton Diversification project.

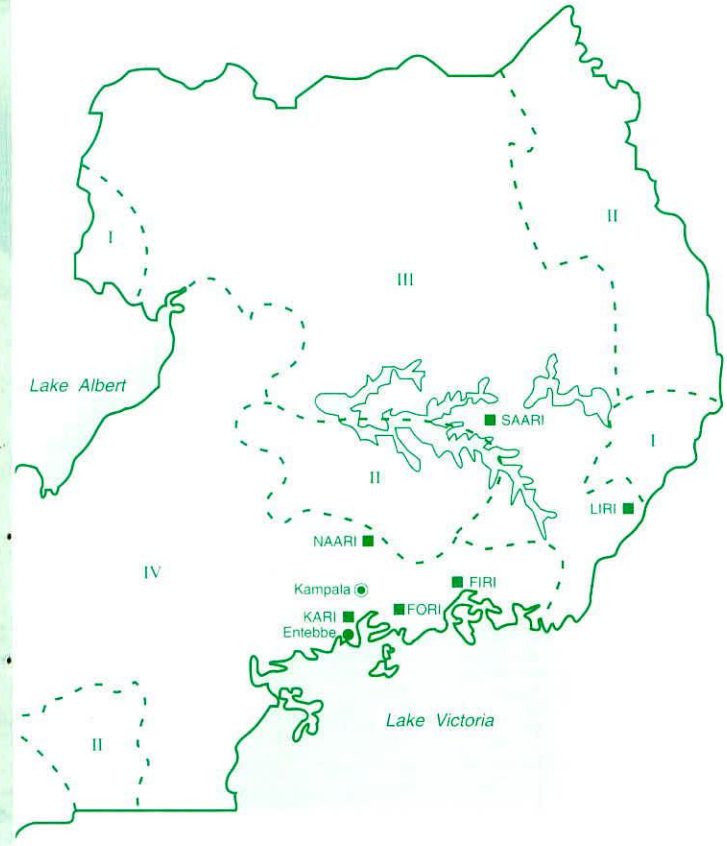
Soil Fertility. Declining soil fertility is one of the major constraints to agricultural production in Uganda. Current research addresses this problem mainly through crop and fertilizer management studies. Studies on biological nitrogen fixation have also been initiated with the collection of rhyzobial strains and their evaluation against bean and soybean lines.

Integrated Pest Management. The focus of work in integrated pest management is on pest surveys and crop loss assessments, pesticide and herbicide evaluation, disease and pest monitoring and forecasting, and weed management.

Post-harvest Research. The post-harvest research program addresses drying, handling, storage, and processing problems at the farm level. Emphasis is on measuring the physiological maturity of crops and on devising simple drying and processing equipment and farm-level storage structures. A number of technologies, such as a hand-operated maize and groundnut sheller; crib, platform and solar driers; storage structures; and a pest management package, have been developed under this program. Some of these have been transferred to farmers for validation trials.

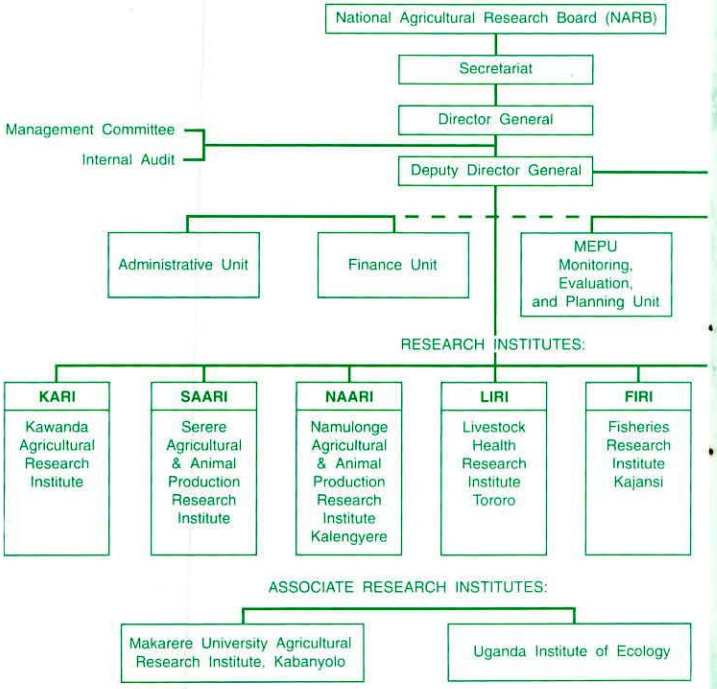
Location

The NARO Secretariat is housed at Entebbe. NARO institutes are located throughout the country to cater to the needs of different agro-ecological zones. KARI is located at Kawanda in the tall grasslands zone IV. NAARI is at Namulonge, also in zone IV. SAARI is located at Serere in the short grasslands and semi-arid rangelands covering zones II and III. LIRI is at Tororo in zone III. FIRI is at Jinja in zone IV and FORI is at Nakawa (to be shifted to Kifu), also in zone IV. FOSRI and AEATRI are yet to be established.



Objective

NARO's objective is to undertake, promote, and coordinate research on all aspects of crops, livestock, fisheries, and forestry; integrate research, where needed, to avoid wasteful overlap and duplication of effort; and make the most efficient use of available research resources.



ety trial centers and in farmers' fields in 30 districts of Uganda. This program released two new high-yielding and disease- and insect-resistant varieties in April 1994. Three more improved varieties are at the pre-release stage. Apart from varietal improvement, the bean program does research on common bacterial blight, bean mosaic virus, ascochyta blight, and bean bruchids.

Groundnuts and Sesame. To address shortage of improved varieties, NARO's groundnut and sesame program evaluates and identifies varieties from local and exotic collections. Other areas of research include disease, pest, and agronomic management. *A high-yielding groundnut variety (2500-3500 kg/ha) resistant to rosette and a sesame variety (900 kg/ha) are now ready for transfer to farmers. A growers' guide is also ready for publication.*

Soybeans. Varietal selection for high yields and resistance has received priority consideration in the soybean research program. More than 1000 introduced and locally generated lines have been screened and evaluated across locations. *Out of 24 promising lines, two with high yields and resistance to lodging, bacterial pustule, and shattering have been released.*

Coffee. Coffee research focuses on clonal selection, disease and pest management, and identification of appropriate coffee farming systems in association with food crops. The capacity of a clonal coffee nursery has been increased from 10,000 to 60,000 clones per year. Arabica cultivars with resistance to coffee leaf rust and coffee berry disease have been introduced from various sources. A tissue-culture facility has been created for the production of disease-free material.

Cotton. In cotton research, the focus is on the selection of varieties with high yield and fibre quality and on pest and disease management. Special em-

advanced and multilocational yield trials. Studies on weevil damage have also been undertaken in collaboration with CIP.

Irish Potatoes. NARO has strong collaboration with CIP in its Irish potato research program. The program emphasizes evaluation of germplasm for yield and resistance to bacterial wilt, late blight, and viral diseases for cultivation in the high- and mid-altitude areas. *This program has released to farmers three varieties with tuber yields of about 30 t/ha and resistance or tolerance to major diseases.* Seed production forms an integral part of the varietal improvement program.

Maize. Varietal improvement, development of sustainable methods of pest and disease management, and improved crop management practices form the core of the maize research program. Special attention is given to selection of streak-resistant varieties with high yields. Management of stalk borers and termites, weed control, and plant stand establishment are receiving higher priority. *A streak-resistant variety yielding 4 to 5 t/ha has been released with a complete agronomic package.*

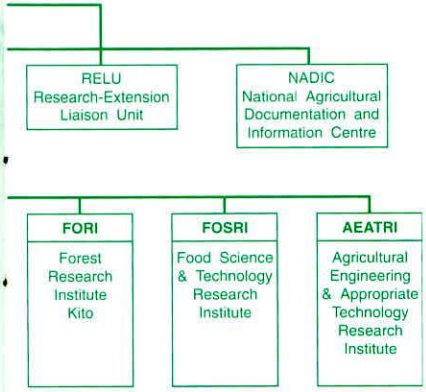
Millet and Sorghum. Evaluation of a large collection of local and exotic lines for higher yield and disease resistance is the starting point of the millet and sorghum improvement program. Crop rotation, intercropping, and weed control are other areas of research receiving greater emphasis. A number of improved lines have been identified and placed under extensive trials for selection of varieties suitable for north and north-western Uganda, including the dry areas of Karamoja.

Beans. Bean research focuses mainly on the evaluation of germplasm collected, developed locally, or introduced by CIAT through the NARO-CIAT collaborative program. Evaluation is carried out at vari-

Functions

NARO has nine major functions:

- formulate national research plans and priorities
- conduct on-station and on-farm research
- coordinate and monitor the implementation of national research programs
- develop human resources to increase research efficiency
- establish and promote internal and external linkages
- establish improved human resource management systems
- coordinate donor support to agricultural research
- review and evaluate research performance
- ensure the dissemination and application of research results



Management

NARO operates under the Ministry of Agriculture, Animal Industry and Fisheries, but its management rests with the National Agricultural Research Board (NARB). The national Treasury has awarded NARO a separate vote for budgetary allocations, and funds are released to NARO directly.

NARB

NARO's board, NARB, is composed of representatives of the Ministry of Agriculture, Animal Industry and Fisheries; Ministry of Finance and Economic Planning; Ministry of Natural Resources; Ministry of Trade and Industry; Makerere University; Uganda National Council for Science and Technology; Uganda Farmers' Association; and agro-industries. Three eminent agricultural scientists are also on the board. One of them serves as chairperson.

NARB works through the NARO Secretariat and advisory committees. One of these, the Technical Committee, advises on the appropriateness of the annual research program and the allocation of resources.

Secretariat

The director general of NARO is the executive head of the Secretariat. He is assisted by a deputy director general and a staff of professionals organised into the following functional units:

- Monitoring, Evaluation and Planning Unit (MEPU)
- Research-Extension Liaison Unit (RELU)

Research Highlights

NARO's research programs are formulated by the research institutes within the framework of Uganda's national research plan and priorities approved by NARB. The institutes are charged to conduct research on priority commodities and production factors in their mandated areas. NARO's current research focus is on adaptive and applied research. Below are highlights of some of the priority research programs in crops, livestock, fisheries, forestry, and socio-economics.

Crops

Bananas. In bananas, the major research thrusts are on the development of an integrated management package, control of weevils and nematodes, management of black sigatoka and Panama wilt diseases, and collection and characterization of germplasm.

Cassava. Cassava research is directed mainly at screening and evaluating new varieties of seeds and plantlets for resistance to African cassava mosaic virus, a major threat to cassava cultivation in Uganda. *This program has released three new virus-resistant varieties to farmers.* Other research includes the development of mealybug control methods and farm-level cassava storage and processing techniques.

Sweet Potatoes. Because local varieties of sweet potato are poor yielders, attention has been given to large-scale testing and evaluation of introduced genotypes. More than 100,000 seedlings have been cloned, and another 70 clones are being evaluated through yield trials. Twelve superior genotypes with root yields of more than 15 t/ha have been identified from on-farm trials. Another 21 new entries with root yields ranging from 20 to 40 t/ha are being tested in

Research Mandate

NARO currently conducts research through eight research institutes. The mandates of these institutes are as follows.

KARI: perennial cash and food crops, soils, crop protection, farming systems, and plant introduction and quarantine.

NAARI: annual cash and food crops, crop-livestock management systems, and pastures for the humid and sub-humid areas.

SAARI: cereals, roots, and tubers; legumes and oil seeds for semi-arid areas; semi-arid production systems; seed research and production; pastures and range management; and crop-livestock management systems for the semi-arid areas.

LIRI: animal health, animal breeding and reproduction, and animal diseases, including human trypanosomiasis.

FIRI: freshwater fisheries, fishing and fish technology, aquaculture, and fish production systems.

FORI: natural forest and plantation forest management, forest products and utilization, and agro-forestry.

FOSRI: food preservation, processing, storage, marketing, and dietetics.

AEATRI: farm mechanization, crop processing and storage, and soil and water engineering and technology.

- Agricultural Research Information Centre (ARIC)
- Administrative Unit
- Finance Unit

The director general is also supported by a number of committees, such as the Management Committee, the Human Resource Development Committee, and the Procurement and Finance Committee.

Research Institutes

The research institutes are the technical arms of NARO. They are autonomous in operation. Each institute is headed by a director, who is supported by professionals and support staff in administration, finance, and farm and laboratory operation and management. The director is assisted by an executive committee in the area of general administration and a research program planning and review committee in the area of research. Research programs are implemented and managed by multidisciplinary teams of scientists.

Research Strategy

NARO's research strategy supports a major increase in the flow of improved technologies to producers. Research is organized into programs by commodity and subject matter. Adequately supported, multidisciplinary teams of researchers work on a finite range of high-priority commodities and production factors from a farming systems perspective.

Client Orientation

NARO seeks strong client orientation and guidance in research planning, research priority setting, and identifying research problems. Critical importance is given to clients' participation in defining research themes and assessing research results.

Linkages

NARO promotes linkages with clients at the institution and program levels. The focus at the program level is on researcher-extension-client participation in the process of priority setting, program planning, technology transfer, and on-farm research.

NARO also maintains linkages with regional and international organisations, programs, and networks. Such linkages have been established with a number of international research centers. NARO also participates actively in regional research programs. Two of these are headquartered at NARO: the East and Southern Africa Research Centre (ESARC) for cassava and the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA).

Donor Coordination

NARO has established a system for monitoring and coordinating donor efforts to provide support to agricultural research in crops, livestock, fisheries, and forestry.

Research Management

NARO focuses on research and resource management components that foster creativity, productivity, and better service to clients.