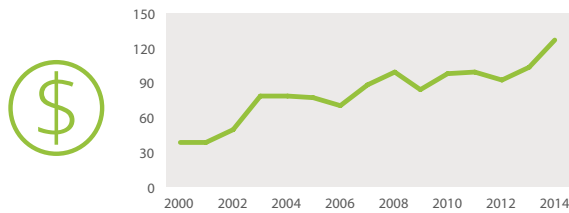


UGANDA

Nienke Beintema, Daniel Kitone, and Ambrose Agona

AGRICULTURAL RESEARCH SPENDING



Million Ugandan shillings
(2011 constant prices)

127.1

Million PPP dollars
(2011 constant prices)

152.5

KENYA

274.1

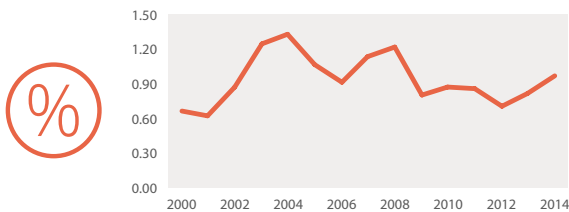
RWANDA

39.6

TANZANIA

103.9

SPENDING INTENSITY



Agricultural research
spending as a share
of AgGDP

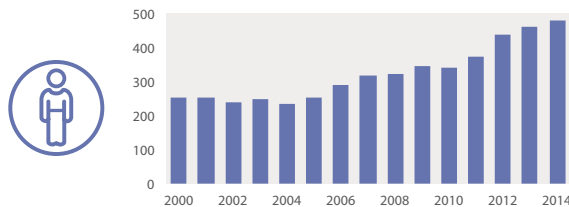
0.97%

0.79%

0.67%

0.29%

AGRICULTURAL RESEARCHERS



Full-time
equivalents

477.9

1,178.5

169.3

857.7

Share of researchers with
MSc and PhD degrees

80%

80%

77%

70%

Notes: Data above are for 2014. Research conducted by the private for-profit sector is excluded from this factsheet due to lack of available data. Information on access to further resources, data procedures and methodologies, and acronyms and definitions are provided on Page 4. See www.asti.cgiar.org/Uganda/directory for an overview of Uganda's agricultural R&D agencies.



Continuing growth

Agricultural R&D spending continued its growth path during 2011–2014. Total agricultural spending, adjusted for inflation, was three times higher in 2014 than in 2000. This growth was the result of increased government and donor support to NARO combined with the establishment of new universities. Consequently, the country's 2014 research intensity ratio nearly reached the recommended 1 percent target set by the African Union and the United Nations.



Capacity strengthening at NARO

First in 2013, and secondly in 2016, the government approved large-scale salary increases, staff promotions, and staff recruitment for Uganda's civil servants. As a result, NARO researchers received a raise twice since 2010. In addition, through the World Bank projects EAAPP and ATAAS, 42 researchers received, or are currently undertaking, MSc- and PhD-level training in Uganda or abroad (31 and 11 researchers, respectively). With these and other improvements, NARO can now provide a more competitive and incentive-driven working environment.



Increased donor funding to NARO

Under EAAPP, Uganda was selected as home to the subregion's center of excellence in cassava research, receiving a US\$30 million loan under Phase I, the majority of which was allocated to technology generation, researcher training, and the rehabilitation of NARO's cassava research facilities. Phase-I was completed in 2015, and Phase-II is expected to begin in 2017. NARO also received funding from a wide range of donors, enabling improvements in infrastructure and investment in high-quality equipment. Nonetheless, some of NARO's laboratories and research facilities remain inadequate.

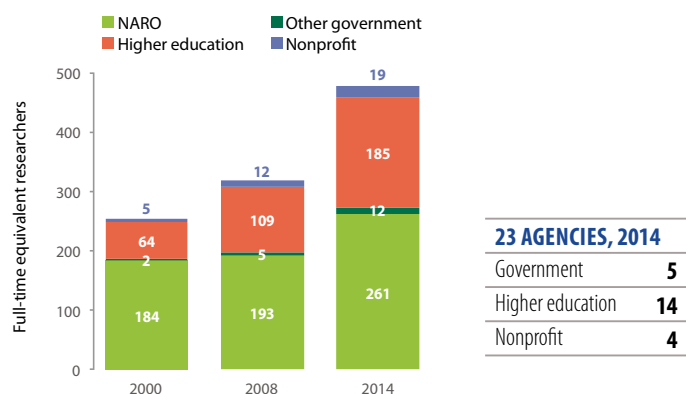


Establishment of new universities

Rising demand for higher education has prompted a significant increase in the number of (mainly private) universities in Uganda since the 1990s, although only a minority offer agricultural programs. Those that do include four public universities (Makerere University being one), four private universities, two colleges, and one training institute. The establishment of these entities from the late 1990s has resulted in increased research capacity within the higher education sector.

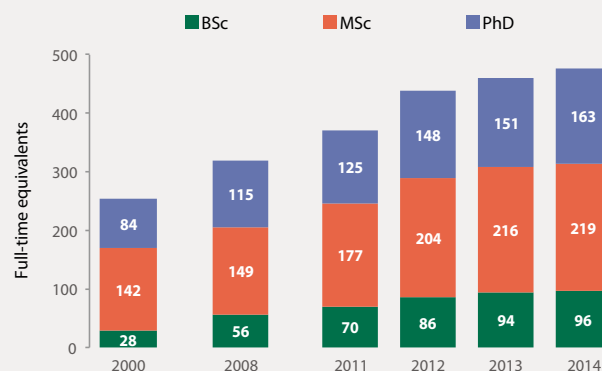
Institutional composition of Uganda's agricultural research

Both the number of agencies involved in agricultural research and the total number of FTE researchers employed in Uganda rose in recent years due to growth in the number of public and private universities. As a result NARO's share of total FTE researchers fell from 70 percent in 2000 to 55 percent in 2014.



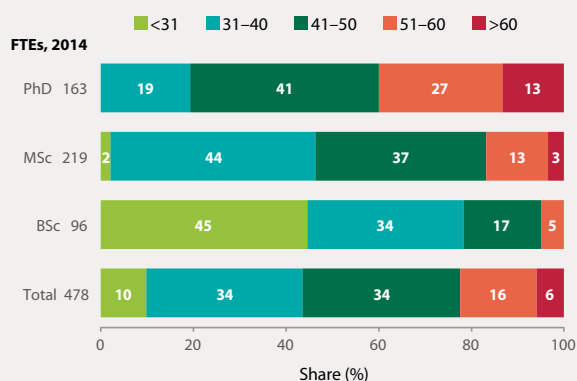
Uganda's agricultural researchers by qualification level

The country's total number of agricultural researchers almost doubled during 2000–2014, as did the number of PhD-qualified researchers. Growth in the number of BSc-qualified researchers stemmed from expansion in the number of universities combined with the promotion of technical staff to researcher at NARO.



Uganda's agricultural researchers by age bracket

As of 2014, 40 percent of PhD-qualified researchers were in their 50s or 60s. Although significant, this share is considerably lower than in most other African countries. Unsurprisingly, researchers with BSc- and MSc-degrees were comparatively younger.



Uganda's share of female researchers

Overall, the share of female researchers rose from 20 percent in 2008 to 26 percent in 2014. NARO and the other government and nonprofit agencies employed comparatively more women than did the higher education agencies. As of 2014, female researchers were generally younger and less well-qualified than their male colleagues.



By qualification level, 2014

BSc **34%** MSc **26%** PhD **21%**

By age bracket, 2014

< 41 **32%** 41–50 **26%** > 50 **13%**

Uganda's MSc- and PhD-qualified agricultural researchers by discipline

As of 2014, Uganda employed 44 plant breeders and geneticists with postgraduate degrees, representing 12 percent of the country's MSc- and PhD-qualified researchers. Close to 90 percent of these researchers were employed at NARO. Veterinary medicine and socioeconomics were also strong disciplines, accounting for 8 and 7 percent of all MSc- and PhD-qualified researchers, respectively.

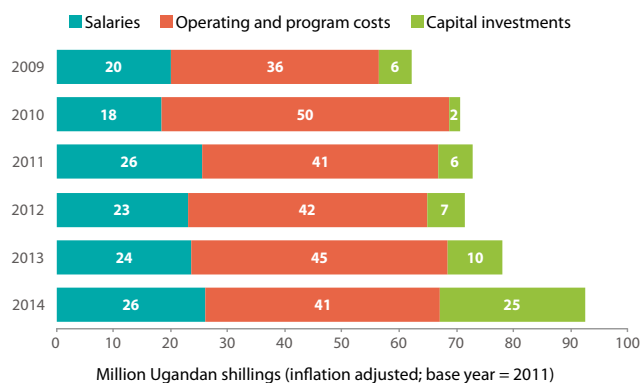
Agricultural researchers, 2014	FTEs		Share (%)	
	MSc	PhD	MSc	PhD
Plant breeding/genetics (incl. biotechnology)	24	20	11	13
Plant pathology	23	17	11	11
Plant physiology	5	3	3	2
Botany	5	7	3	4
Seed science and technology	1	0.3	1	0
Other crop sciences	19	11	9	7
Animal breeding/genetics	3	3	1	2
Animal husbandry	10	5	4	3
Animal nutrition	12	6	6	4
Dairy science	2	2	1	1
Poultry	2	0.4	1	0
Veterinary medicine	17	14	8	9
Zoology/entomology	7	11	3	7
Other animal and livestock	2	2	1	1

Agricultural researchers, 2014	FTEs		Share (%)	
	MSc	PhD	MSc	PhD
Forestry and agroforestry	8	10	4	6
Fisheries and aquatic resources	3	4	2	3
Soil sciences	8	6	4	4
Natural resources management	8	4	4	3
Water and irrigation management	9	4	4	3
Ecology	2	3	1	2
Biodiversity conservation	6	5	3	3
Food sciences and nutrition	2	5	1	3
Socioeconomics (incl. agricultural economics)	20	7	9	4
Extension and education	4	5	2	3
Other sciences	10	4	5	2
Total	214	160	100	100

These are estimates based on an agency sample, representing 95 percent of the total number of FTE researchers in the government and higher education sectors (excluding the nonprofit sector).

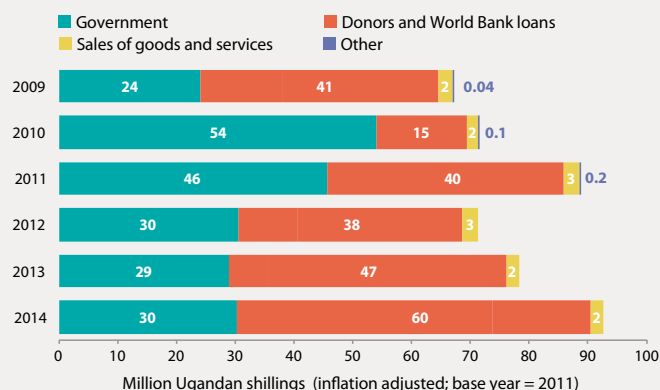
NARO's spending by cost category

Due to substantial and increasing donor support, including World Bank loans supporting ATAAS and EAAPP activities in Uganda, a comparatively high share of NARO's expenditures were allocated to operating and program costs, and capital investments. Salaries accounted for an average of 31 percent of total spending during 2009–2014.



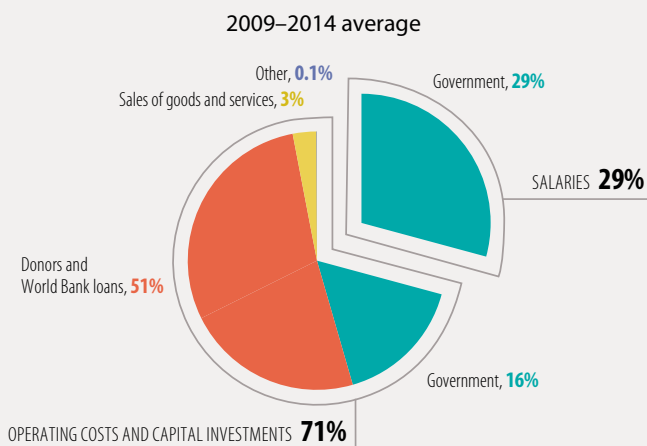
NARO's funding sources

Government funding to NARO remained stable at around 30 million Ugandan shillings during 2012–2014 (adjusted for inflation). Funding through EAAPP has enabled NARO to develop its human and institutional capacity in the area of cassava research. The high increase in funding during 2014 was the result of significant expenditures on equipment procurement and on construction of offices and laboratory facilities through ATAAS.



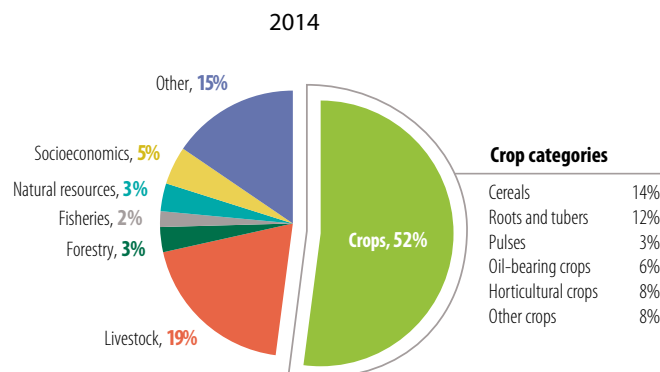
NARO's spending and funding compared

During 2009–2014, close to half of NARO's funding was derived from the national government, although the organization also received substantial contributions from donors and through World Bank loans in support of ATAAS and EAAPP activities.



Uganda's agricultural researchers by area of focus

In 2014, 52 percent of the country's FTE researchers conducted crop research, whereas 19 percent undertook livestock research. Major crops under investigation were cassava, maize, rice, bananas, and potatoes.



Crop categories

Cereals	14%
Roots and tubers	12%
Pulses	3%
Oil-bearing crops	6%
Horticultural crops	8%
Other crops	8%

NARO's recently released crop varieties

As Uganda's main agricultural research agency involved in crop breeding, NARO released 25 new varieties during 2012–2014.

Crop	Number of varieties, 2012–2014
NARO	
Rice	11
Beans	9
Maize	3
Bananas	1
Sesame	1
Total	25

NARO and MAK's recent peer-reviewed publications

During 2012–2014, NARO published an average of 115 articles per year in international journals, whereas MAK published 72 articles per year, in both international and regional journals. NARO also published books or book chapters. Publications per researcher averaged 0.5 and 0.9 per year for NARO and MAK, respectively.

Type	Number of publications, 2012–2014 annual average		Per FTE researcher	
	NARO	MAK-CAES&COVAB	NARO	MAK-CAES&COVAB
Journal articles				
International	115.3	57.0	0.428	0.697
Regional	0.0	12.0	0.000	0.147
National	0.0	3.0	0.000	0.037
Books	19.7	0.0	0.073	0.000
Book chapters	2.3	0.0	0.009	0.000
Total	137.3	72.0	0.509	0.881

Resources for Uganda

This factsheet presents recent data on the performance of agricultural research in Uganda, primarily focusing on key financial, human resource, institutional, and output indicators, while also highlighting relevant trends, challenges, and institutional changes. Additional resources are available at www.asti.cgiar.org and include:



ASTI's **interactive country page** for Uganda features national agricultural research investment and capacity data, a data exploration and download tool, as well as access to a variety of country publications.



ASTI's **benchmarking tool** allows key agricultural research indicators to be ranked and compared across African countries.



ASTI's **data download tool** provides access to more in-depth ASTI datasets and graphs for Uganda and many other countries.



ASTI's **agency directory** provides a view of agencies that conduct agricultural research in Uganda, along with their locations and key agency-level indicators.

ASTI Data Procedures and Methodologies

- ▶ The **data underlying this factsheet** were predominantly derived through primary surveys, although some data were drawn from secondary sources or were estimated.
- ▶ **Agricultural research** includes research conducted by the government, higher education, and nonprofit sectors; research conducted by the private for-profit sector is excluded due to lack of available data.
- ▶ ASTI bases its calculations of human resource and financial data on **full-time equivalent (FTE) researchers**, which take into account the proportion of time staff actually spend on research compared with other activities.
- ▶ ASTI presents its financial data in 2011 local currencies and **2011 purchasing power parity (PPP) dollars**. PPPs reflect the relative purchasing power of currencies more effectively than do standard exchange rates because they compare prices of a broader range of local—as opposed to internationally traded—goods and services.
- ▶ ASTI estimates the **higher education sector's research expenditures** because it is not possible to isolate them from the sector's other expenditures.
- ▶ Note that **decimal rounding** can cause totals to be one point higher or lower than the sum of their parts.



For more information on ASTI's data procedures and methodology, visit www.asti.cgiar.org/methodology.

Acronyms

AgGDP	agricultural gross domestic product
ATAAS	Agricultural Technology and Agribusiness Advisory Services Project
EAAPP	East Africa Agricultural Productivity Program
FTE(s)	full-time equivalent(s)
MAK-CAES	Makerere University, College of Agricultural and Environmental Sciences
MAK-COVAB	Makerere University, College of Veterinary, Animal Resources, and Bio-security
NARO	National Agricultural Research Organisation
PPP(s)	purchasing power parity (exchange rates)
R&D	research and development

ABOUT ASTI, IFPRI, AND NARO

Working through collaborative alliances with numerous national and regional R&D agencies and international institutions, **Agricultural Science and Technology Indicators (ASTI)** is a comprehensive and trusted source of information on agricultural R&D systems across the developing world. ASTI is led by the **International Food Policy Research Institute (IFPRI)**, which—as a CGIAR member—provides evidence-based policy solutions to sustainably end hunger and malnutrition and reduce poverty. The **National Agricultural Research Organisation (NARO)** is Uganda's principal agricultural research agency; the institute falls under the Ministry of Agriculture, Animal Industry, and Fisheries and it conducts crop, livestock, forestry, fisheries, and natural resources research.

ASTI/IFPRI and NARO gratefully acknowledge participating agricultural R&D agencies for their contributions to the data collection and preparation of this factsheet. ASTI also acknowledges the Bill & Melinda Gates Foundation and CGIAR Research Program on Policies, Institutions, and Markets for their generous support of ASTI's work in Africa south of the Sahara. This factsheet has been prepared as an ASTI output and has not been peer reviewed; any opinions are those of the authors and do not necessarily reflect the policies or opinions of IFPRI or NARO.