

# AGRICULTURAL R&D IN SENEGAL

## An Assessment of the Senegalese Agricultural Research Institute

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### OVERVIEW OF NATIONAL AGRICULTURAL R&D

Nine public agencies conduct agricultural R&D in Senegal. The Senegalese Agricultural Research Institute (ISRA) is by far the largest, accounting for two-thirds of Senegal’s agricultural researchers in 2011 (76 full-time equivalent [FTE] researchers).<sup>1</sup> The institute focuses on research related to crops, livestock, forestry, fisheries, and socioeconomics, and operates various centers, units, and research laboratories located across the country’s agroecological zones. ISRA falls under the Ministry of Agriculture and Rural Equipment, and its funding is administered the Ministry of Economy and Finance. ITA (employing 9 FTEs in 2011) conducts research on the storage, conservation, and processing of agricultural products and is the only other government agency involved in agricultural R&D in Senegal. The higher education sector employed an estimated 27 FTE researchers in 2011, mainly at Cheikh Anta Diop University (UCAD) and Gaston Berger University (UGB). The private sector plays a relatively important role in agricultural R&D in Senegal compared with many other African countries. Companies like the Chemical Commercialization Company (SENCHEM), Suneor, Textile Fiber Development Company (SODEFITEX), and Industrial and Agricultural Products Company (SPIA) are major innovators in the production and processing of groundnuts and cotton, Senegal’s principal export crops.

The numbers of researchers employed at ISRA and ITA have steadily declined in recent years due to significant staff

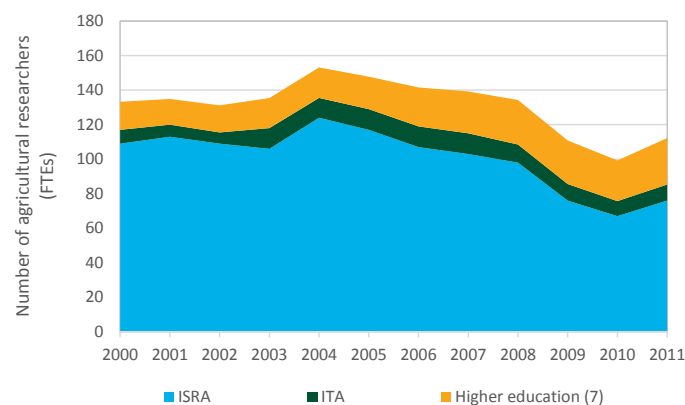
attrition combined with public-sector recruitment restrictions; the higher education sector has exhibited the opposite trend (Figure 1). National funding for agricultural research increased moderately during 2000–2011, from 5,989.2 to 6,230.8 million CFA francs (in constant 2005 prices). Senegal’s research intensity ratio (agricultural R&D investment as a share of agricultural GDP) and ratio of FTE researchers per 100,000 farmers declined from 2000 to reach 0.83 and 2.85, respectively, in 2011.

### ISRA’S CURRENT STATUS

#### Institutional Issues

- ISRA is a semiautonomous public institution, which allows it to commercialize its research results as a means of generating revenue. This status even allows the institute to create private subsidiaries (that could fund R&D activities), which is an avenue the institute has yet to explore.
- ISRA develops a strategic plan every five years in collaboration with its financial and technical partners. Numerous coordination mechanisms are in place, and each center is required to report monthly to the Science Directorate.
- ISRA collaborates with other national and international agencies in setting and fulfilling the research agenda, including training university students, working with

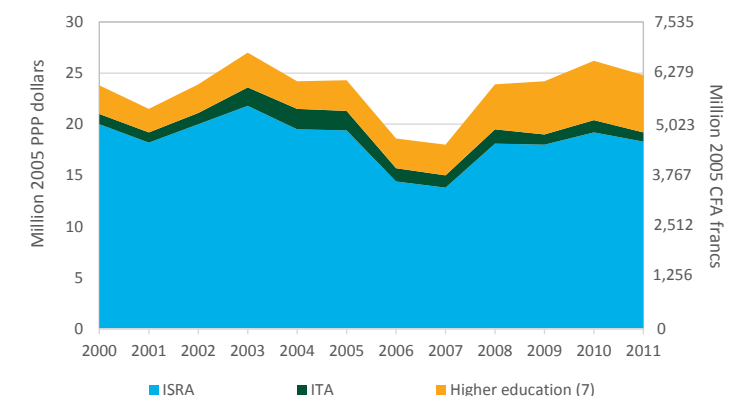
**Figure 1. Agricultural researchers by institutional category, 2000–2011**



Source: Compiled by authors from ASTI–ISRA data.

Note: Higher education comprises UCAD, UGB, and five other, smaller, agencies; for full details, see [www.asti.cgiar.org/senegal](http://www.asti.cgiar.org/senegal).

**Figure 2. Agricultural research spending by institutional category, 2000–2011**



Source: Compiled by authors from ASTI–ISRA data.

Note: Higher education comprises UCAD, UGB, and five other, smaller, agencies; for full details, see [www.asti.cgiar.org/senegal](http://www.asti.cgiar.org/senegal).

producer organizations, and collaborating with CGIAR centers.

- Despite its recent move back from the Ministry of Science and Technology to the Ministry of Agriculture, collaboration between ISRA and the agricultural extension system is too weak, with ISRA and extension competing for scarce resources and often failing to see themselves as part of a broader agricultural innovation system.

### Human Resources

- Recruitment restrictions, combined with the retirement and departure of many highly qualified researchers have caused significant capacity losses at ISRA over the past decade. ISRA’s current pool of researchers, and their skills mix (Table 1) is inadequate for the institute to effectively accomplish its mandate. There is an acute lack of soil, forestry, and veterinary scientists, as well as entomologists.
- As of 2012, 79 percent of ISRA’s employees were PhD qualified. This is a significant advantage in the conduct of research, but it has been a factor in the high attrition rate of researchers in search of opportunities elsewhere, notably the country’s universities and private sector. Recent changes to create equitable career path opportunities should curb this “braindrain” to greener pastures.
- In 2012 the government more than doubled researchers’ salary levels at ISRA and improved their promotional opportunities to halt the high attrition rate, which had a considerable impact on staff morale. In addition, to return capacity to the preferred level (about 130 researchers), it

was determined that 10 new researchers would be recruited and trained yearly for five years. The government also increased the official retirement age from 60 to 65 years, which will give senior researchers the opportunity to train and mentor their younger colleagues.

### Financial Resources

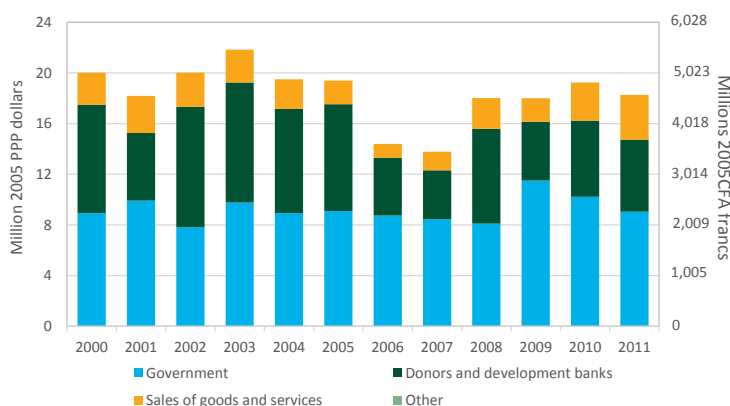
- More than half of ISRA’s funding during 2009–2011 was derived from the national government, yet contributions were insufficient to cover the cost of ISRA’s total salary bill. The institute’s operating costs and capital investments, plus any shortfall in the cost of salaries, are entirely financed by donors, development bank loans, and internally generated funding through the sale of seeds, vaccines, and fruit plants or through research conducted on behalf of the private sector.
- ISRA’s most important external funding sources include the West Africa Agricultural Productivity Program (WAAPP), CORAF/WECARD, CGIAR centers, and the Canadian International Development Agency (CIDA). Some argue that too much of the critical decisionmaking about research priorities is devolved to donors, with the result that ISRA’s research agenda is somewhat skewed toward goals that are not necessarily aligned with national priorities. Rice research, for instance, is underfunded.
- Under WAAPP, Senegal was selected as home to the subregion’s center of excellence for dryland cereals, and received a budget of CFA 7.5 billion for the 2008–2012 period. Most of this funding was allocated to short-term and degree-level training for researchers and to the rehabilitation of laboratories and equipment for research on cereals. WAAPP also funds a competitive research scheme, the National Agricultural and Food Research Fund (FNRAA), which accepts multidisciplinary research proposals from stakeholders. Roughly 35 percent of the projects submitted to FNRAA by ISRA were funded during the first phase of WAAPP. UCAD had more success in securing FNRAA funding than ISRA.
- In 2013, the World Bank approved a second phase of WAAPP in Senegal with a total budget of roughly CFA 30

**Table 1. ISRA’s researchers by degree and discipline, 2012**

Discipline	FTE researchers by degree qualification		
	PhD	MSc	Total
Agricultural economics	3	1	4
Agronomy	22	4	26
Animal science (incl. veterinary medicine)	9	3	12
Biodiversity preservations	0	0	0
Crop science (incl. horticulture)	0	2	2
Ecology	1	0	1
Entomology	6	0	6
Extension and training	0	0	0
Fisheries and aquaculture	6	0	6
Food and nutrition science	0	0	0
Forestry and agroforestry	3	3	6
Molecular biology (for crops and livestock)	1	0	1
Natural resource management	0	0	0
Soil science	1	0	1
Irrigation science and water management	1	1	2
Other	1	0	1
<b>Total</b>	<b>54</b>	<b>14</b>	<b>68</b>

Source: Compiled by authors from ASTI/IFPRI–CORAF/WECARD survey data.

**Figure 3. ISRA’s funding sources, 2000–2011**



Source: Compiled by authors from ASTI–ISRA data.

billion for 2013–2017. The scope of this phase has been widened to also cover the livestock and horticulture sectors, and capacity strengthening will play an even more important role.

## R&D Infrastructure

- ISRA has approximately 40 laboratories covering a wide variety of specializations, including entomology, plant pathology, weed science, molecular genetics, molecular biology, and avian pathology; however, many of ISRA’s centers are in a dilapidated state.
- The crop protection and biosecurity laboratory was recently renovated, and WAAPP supported the purchase of new equipment for some of the other laboratories, although upgrades based on obsolescence are still needed for many other centers.
- It is urgent for ISRA’s laboratories to attain International Organization for Standardization (ISO) certification through upgrades and the acquisition of advanced equipment. For example, a level 3 biosafety certification would enable the National Livestock and Veterinary Research Laboratory to handle dangerous avian virus isolates and undertake efficacy testing for vaccine trials. Various other centers are now attempting to obtain ISO certification for their laboratories with the infrastructure upgrades that WAAPP funding has facilitated.
- ISRA’s fleet of vehicles needs to be upgraded, and licenses on critical software required for data analyses need to be renewed. In some cases Internet and electricity access are problematic; access to water and lack of fencing to secure production plots are also a problem at some stations.

## Research Outputs

- During 2008–2012, ISRA developed nine new varieties in-house, including four varieties of sorghum, three of millet, and two of cowpeas, resulting in a 40 to 60 percent performance improvement compared with existing varieties grown locally. ISRA also adapted a large number of varieties that were developed by CGIAR centers, including 11 varieties of irrigated rice, 5 of upland rice, 8 of corn, and 6 of sesame and groundnuts.
- None of the generated or adapted varieties released by ISRA have been patented, so little progress has been made in terms of protecting intellectual property.
- In addition to new varieties, ISRA generated around 70 new technologies and successfully disseminated these to farmers.
- The number of publications during 2008 and 2012 totaled 878, resulting in an average of about two publications per researcher per year (Table 2). These results partly reflect the fact that promotional opportunities at ISRA are now tied to performance, which enhances incentives, equity, and a generally more attractive work environment for researchers.

**Table 2. ISRA’s scientific publications, 2008–2012**

Publications	2008	2009	2010	2011	2012	Total
<i>National publications</i>						
Journal articles	4	9	19	1	3	36
Books	0	0	0	1	0	1
Book chapters	6	8	0	0	0	14
Scientific articles/publications	16	11	19	9	33	88
Papers and posters presented at conferences	11	18	31	25	9	94
Nonscientific publications (such as newspaper/magazine articles)	38	40	37	0	45	160
<b>Total</b>	<b>75</b>	<b>86</b>	<b>106</b>	<b>36</b>	<b>90</b>	<b>393</b>
<i>International publications</i>						
Journal articles	36	41	43	5	26	151
Books	0	0	0	0	0	0
Book chapters	9	11	21	9	3	53
Scientific articles/publications	22	31	16	16	20	105
Papers and posters presented at conferences	16	43	76	9	12	156
Nonscientific publications (such as newspaper/magazine articles)	2	6	3	5	4	20
<b>Total</b>	<b>85</b>	<b>132</b>	<b>159</b>	<b>30</b>	<b>65</b>	<b>485</b>
<i>Publications per researcher per year</i>						
	1.6	2.1	2.6	0.8	1.5	

Source: Compiled by authors from ASTI/IFPRI–CORAF/WECARD survey data.

## CONCLUSIONS AND POLICY RECOMMENDATIONS

- ISRA has made a lot of progress in recent years: researcher salaries have doubled, and promotional opportunities have improved significantly. These measures have also halted the exodus of researchers to the universities, private sector, and abroad.
- The retirement of scientists remains a challenge, especially because the total number of researchers at ISRA is very low compared with other African countries of similar size, and insufficient to fulfill the institute’s mandate.
- ISRA needs to double its number of scientists (to 130). Recent salary increases and promotional opportunities are a step in the right direction, but recruitment processes are still too cumbersome, and need to be simplified. Many researchers who left before the salary increases have shown an interest in returning. New appointments need to be negotiated on a case-by-case basis, which is impractical for large-scale recruitment in the short term. ISRA needs greater autonomy in recruiting staff.
- On the heels of the success of its recent human resource initiatives, ISRA needs to develop a systematic human resource strategy incorporating existing and anticipated skills gaps and training needs (working closely with universities to make sure that researchers receive the

right training), but also to plan for staff attrition through retirement (and unforeseen departure) of researchers. The successful implementation of such a plan would also require both political and financial support. Such a plan would also support ISRA in further improving working conditions, based on the significant advances made in recent years through salary increases, equitable career path opportunities, and training opportunities.

- Donor dependency is too high. The government leaves the funding of ISRA's R&D programs entirely in the hands of donors and development banks. The government needs to clearly identify its long-term R&D priorities and secure stable and sustainable funding for R&D programs. Donor funding also needs to be aligned with national priorities to ensure the consistency and complementarity of resulting research programs.
- Government funding for the operating and capital expenses associated with conducting research programs is still very low. Rehabilitation of research equipment and infrastructure is urgently needed, both in terms of basic needs, such as reliable electricity, Internet, and computer software access, but also in terms of achieving ISO certification where appropriate.
- The government needs to take action and make sure that improved varieties and technologies released are adopted by farmers. This will involve improving the linkages between research and extension.

## ABOUT THE ASSESSMENT

Given the importance of agriculture in West Africa, the Economic Community of West African States (ECOWAS) asked the West and Central African Council for Agricultural Research and Development (CORAF/WECARD) to undertake an in-depth assessment of agricultural research capacity in the region focusing on key institutional, human resource, and financial resource issues. The assessment is a critical input into the development of national and regional agricultural policy recommendations, which will in turn feed into a regional agricultural research strategy for West Africa.

To accomplish the assessment, CORAF/WECARD requested the support of the Agricultural Science and Technology Indicators (ASTI) initiative of the International Food Policy Research Institute (IFPRI). ASTI facilitated the assessment in six countries—Benin, Burkina Faso, Ghana, Senegal, Sierra Leone, and Togo—which included a quantitative survey on human and financial resources, R&D infrastructure, and R&D outputs; a series of interviews with selected research and managerial staff; and a staff motivation survey distributed to a selected group of researchers and managerial staff.

## FOR FURTHER READING

[www.asti.cgiar.org/pdf/factsheets/senegal-factsheet.pdf](http://www.asti.cgiar.org/pdf/factsheets/senegal-factsheet.pdf)

## NOTES

1. FTEs only take into account the time researchers actually spend on research, as opposed to other activities like teaching or unrelated administrative duties.



## ABOUT THE AUTHORS

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## ABOUT ASTI, IFPRI, AND CORAF/WECARD

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 **West and Central African Council for Agricultural Research and Development (CORAF/WECARD)** is a nonpolitical organization of the national agricultural research systems of 23 countries of West and Central Africa. It aims to increase the efficiency of agricultural research in the region in order to facilitate economic growth, food security, and export competitiveness through productive and sustainable agriculture.

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