AGRICULTURAL SCIENCE AND TECHNOLOGY INDICATORS

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MAURITIUS

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This country brief reviews the major investment and institutional trends in agricultural research in Mauritius since the early 1990s using new survey data collected under the Agricultural Science and Technology Indicators (ASTI) initiative (IFPRI–ISNAR 2002).[1]

INSTITUTIONAL DEVELOPMENTS

The agricultural sector's relative contribution to the economy of Mauritius has declined over the past three decades as a result of diversification policies favoring nonagricultural activities like tourism, textiles, and services. In 2000, agricultural GDP accounted for only 6 percent of total GDP. Sugarcane dominates the sector, accounting for more than three-quarters of total agricultural land and 86 percent of the value of agricultural exports in 2000 (MSIRI 2000; FAO 2002; World Bank 2002).[2] The dominance of sugarcane is also reflected in the structure of the country's agricultural research. We identified 16 agencies involved in agricultural research and development (R&D) in Mauritius in 2000.[3] These agencies employed a total of 154 full-time equivalent (fte) researchers and had a combined agricultural research expenditure of 252 million 1999 rupees—equivalent to $24 million in 1993 international prices (Table 1).[4] The Mauritius Sugar Industry Research Institute (MSIRI) accounted for more than half of the total research spending and agricultural

Table 1—Composition of agricultural research expenditures and total researchers, 2000

Type of agency	Spending		Researchers[a]	Share		Agencies in sample[b]
	1999 rupees	1993 international dollars		Spending	Researchers	
	(*millions*)		(*fte's*)	(*percent*)		(*number*)
Public agencies						
AREU[c]	47.6	4.4	26.4	18.8	17.2	1
Other government[d]	41.0	3.8	33.0	16.2	21.5	7
MSIRI	144.2	13.5	82.0	57.1	53.4	1
Higher education[d, e]	7.4	0.8	5.6	3.3	3.6	3
Subtotal	*240.2*	*22.5*	*147.0*	*95.5*	*95.8*	*12*
Business enterprises	11.4	1.1	6.5	4.5	4.2	4
Total	**251.6**	**23.6**	**153.5**	**100**	**100**	**16**

Sources: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002).
[a] Include national and expatriate staff.
[b] For a list of the 16 agencies included in the sample see note 3.
[c] The 44 AREU staff spent about 60 percent of their time on research, resulting in the 26.4 fte researchers.
[d] Expenditures for four MAFNR departments and the three higher-education agencies are estimates based on the average expenditures per researcher for the four government agencies for which data were available.
[e] The 22 faculty staff employed in the three higher-education agencies spent between 10 and 30 percent of their time on research, resulting in the 5.6 fte researchers.
[f] Expenditures for business enterprises are estimates based on the average expenditures per researcher for MSIRI.

KEY TRENDS

- Sugar is a dominant commodity in Mauritius both for the agricultural sector and the economy overall, and this is reflected in a heavy concentration of agricultural research on sugarcane.
- Agricultural R&D spending and research staff levels have declined slightly in recent years.
- Agricultural research is almost completely funded from national sources.
- The share of total agricultural GDP that Mauritius invests in agricultural research (known as its investment intensity ratio) is among the highest of developing countries worldwide.
- The Agricultural Research and Extension Unit (AREU) is the country's second-largest research agency, focusing on nonsugarcane crops and livestock.
- The higher-education and private for-profit sectors have relatively limited roles in agricultural research in Mauritius.

ABOUT ASTI

The Agricultural Science and Technology Indicators (ASTI) Initiative consists of a network of national, regional, and international agricultural R&D agencies managed by IFPRI and ISNAR. The initiative compiles, processes, and makes available internationally comparable data on institutional developments and investments in public and private agricultural R&D worldwide, and analyses and reports on these trends in the form of occasional policy digests for research policy formulation and priority setting purposes.

Primary funding for the ASTI initiative was provided by the CGIAR Finance Committee/World Bank with additional support from the Australian Center for International Agricultural Research (ACIAR), the European Union, and the U.S. Agency for International Development (USAID).

researchers. MSIRI is a nonprofit institution, mainly financed through a levy on sugar production. The institute is governed by a board with seven representatives from the sugar industry and three from the government.[5] MSIRI is headquartered in Réduit, in the center of the island, and has three experiment farms that are leased from sugarcane producers. MSIRI's mandate encompasses issues involving growing and milling sugarcane and using sugar-industry by-products. It also focuses on foodcrops such as potatoes and tomatoes, which are intercropped with sugarcane for agricultural diversification (MSIRI 1998).

The main government agency involved in agricultural research is the Agricultural Research and Extension Unit (AREU), which accounted for slightly less than 20 percent of total expenditures and research staff. AREU was established in 1994 from the former Directorate of Agricultural Research and Extension (DARE) within the then Ministry of Agriculture, Fisheries, and Natural Resources (see *A Short History of Government-Based Agricultural Research in Mauritius* below). Total AREU staff spent about 60 percent of their time on research covering nonsugarcane crops and livestock, while the remaining staff time was devoted to farmer extension services. The unit is headquartered in Quatre-Bornes, in the vicinity of Réduit, and has three additional research stations throughout the country. AREU is part of the Food and Agricultural Research Council (FARC), a parastatal organization responsible for coordinating, promoting, and monitoring research in agriculture, forestry, fisheries, and food production. The council is composed of nine members representing the ministries responsible for agriculture, the local government and Rodrigues,[6] growers, and the food industry, including experienced researchers from institutions such as the University of Mauritius (UoM), MSIRI, and AREU. The council is administered by an executive director general. FARC also has a Tissue Culture Laboratory and nursery facilities to support some crop research at AREU (3 fte research staff in 2000) and in addition controls a competitive fund to finance short-term agricultural research projects (FARC 2003).[7]

Five divisions of the Agricultural Services of the Ministry of Agriculture, Food Technology and Natural Resources (MAFTNR)—also located in Réduit—conduct some research, but their combined activities (since AREU was created) are highly limited. In 2000, the 5 divisions combined employed 14 fte researchers, accounting for 9 percent of the country's total. The Albion Fisheries Research Centre (AFRC) under the Ministry of Fisheries and Marine Resources conducts the country's fisheries research and in 2000 employed 17 fte researchers (11 percent).

During 1994-2000, the Government has embarked on a modernization program for the nonsugarcane sector, placing R&D in a prominent role. The country's research, training, and development capacity will be further enhanced through the impending establishment of the Mauritius Agricultural Biotechnology Institute (MABI) and the Food Technology Laboratory, both under the responsibility of MAFTNR. Currently land for these two institutes has been identified and building plans are being finalized. The Food Technology Laboratory should be operational by 2005/6, MABI by 2008.

The Faculty of Agriculture at the University of Mauritius (FA/UoM) conducts crop and livestock research, while the Department of Biological Sciences of the Faculty of Science and the Department of Chemical and Sugar Engineering of the Faculty of Engineering conduct some research related to agriculture. The combined activities of these three units, however, were small in 2000.[8]

We also identified four private for-profit institutions with sizeable agricultural research programs, accounting for 5 percent of total agricultural R&D spending in 2000.

There is also a fair amount of collaboration among the various agricultural research agencies in Mauritius, and with regional and international organizations. MSIRI, for example, collaborates with a wide network of international partners, and many of the institute's researchers have conducted consultancies for a number of international organizations. AREU has collaborative projects with the centers of the Consultative Group on International Agricultural Research (CGIAR) such as the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). AREU is also involved in a regional program in

A Short History of Government-Based Agricultural Research in Mauritius[9]

Formal agricultural research in Mauritius began in 1893 with the establishment of an agronomic station (*Station Agronomique*), entirely funded by the sugarcane industry and staffed by national scientists. The facility's mandate encompassed the agricultural sector overall, but in practice the vast majority of its activities related to sugar. In 1913, with a view to improving and expanding the country's research and training systems, the agronomic station was merged with the bacteriological laboratory (established in 1908 to conduct livestock research) and a few other agencies to form the Department of Scientific Agriculture (DSA). In 1930, a Sugar Cane Research Station was created to strengthen research on improved sugarcane varieties. It was transferred to the newly established MSIRI in 1953, along with some other, more minor, units concerned with sugar research.

Following independence in 1968, a government ministry for agriculture was established and later renamed the Ministry of Agriculture, Fisheries and Natural Resources (MAFNR). The R&D aspects of DSA were transferred to the new ministry's Division of Agricultural Services (DAS). In addition, the government and some private companies funded the establishment of a Food Crops Division under MSIRI to conduct research on selected food crops that could be intercropped with sugarcane.

In 1985, FARC was established to coordinate, monitor, and promote agricultural, food and fisheries research. In 1994, MAFNR was reorganized as two separate ministries—the Ministry of Agriculture and Natural Resources (MANR) and the Ministry of Fisheries and Marine Resources. Under the Agricultural Management and Services Project (AMSP), funded by the World Bank, MANR's DARE adopted the research and extension activities previously undertaken by DAS. In 1995, DARE was relocated under FARC to allow it greater autonomy and flexibility, and in 1997 the directorate was renamed AREU.

MAFNR has been renamed various times over the years, most recently as MAFTNR in 1999.

Sources: Beintema et. al (1995); Naidu (n.d.); Corbett (2002.

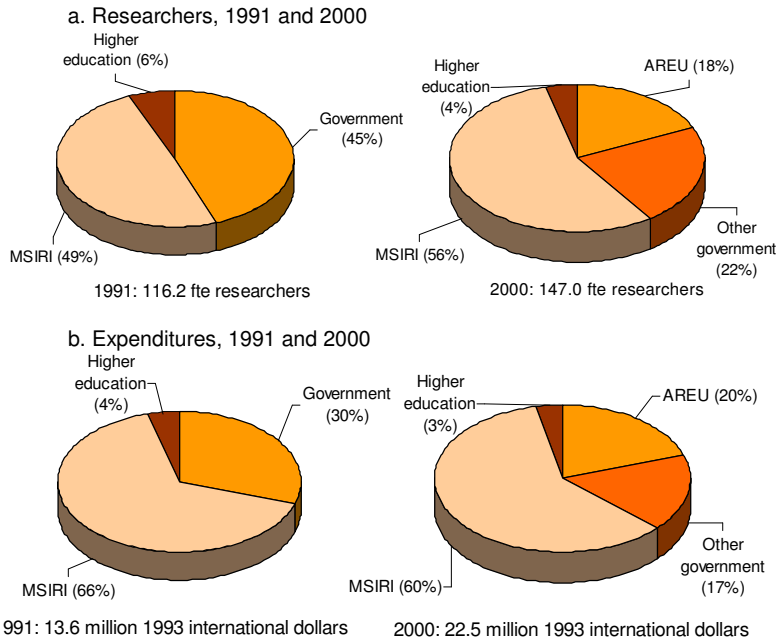
Africa with the Asian Vegetable Research and Development Center (AVRDC), which is based in Tanzania and provides AREU with training and germplasm. Although Mauritius is a member country of the Southern African Centre for Co-operation in Agricultural and Natural Resources Research and Training (SACCAR), neither MSIRI nor AREU were collaborating on any SACCAR projects in the past few years.

HUMAN AND FINANCIAL RESOURCES IN PUBLIC AGRICULTURAL R&D

Overall Trends

A series of reorganizations within MAFTNR during 1992–96 made reliable data unobtainable for some of the ministry's units over that period. In 2000, the total number of fte researchers in the public sector (excluding private business agencies) was about 25 percent higher than the corresponding total in 1991 (Figure 1a). Much of this increase occurred at MSIRI, while the three UoM units together employed fewer agricultural researchers in 2000 than they had in 1991. Contrary to trends in many African countries, total spending increased relative to total fte researcher numbers. In 2000, total public agricultural R&D spending was $23 million compared with $14 million a decade earlier (Figure 1b). In contrast to researcher trends, however, most of this growth took place in the government sector. In 2000, total research spending by AREU and the other government agencies was about twice that of the government sector in 1991.

Figure 1—Public agricultural R&D trends

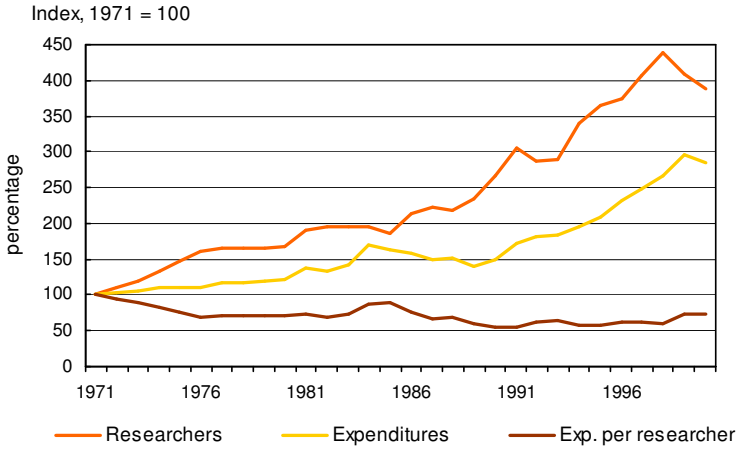


Sources: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002).
Notes: See Table 1 for sample size and additional notes. Government sector in 1991 comprises agricultural services, AFRC, and FARC. Data exclude business enterprise.

Public spending and researcher time-series data were estimated for 1971–2000 (Figure 2). The total number of fte researchers increased by an average of 4.7 percent per year, and this growth appears to have been steady over the period.[10] Total researcher numbers at both MSIRI and AREU, however, have shrunk since 1998. AREU experienced serious budgetary constraints in February 1999, resulting in a freeze on recruitment. Many AREU researchers transferred to MAFTNR's Agricultural Services or left the country for work elsewhere. The decline in MSIRI's research staff was the result of the institute's cost-reduction program, which included a rationalization process of "right-sizing" research staff numbers.

Historically, Mauritius has had one of the lowest shares of expatriate researchers in sub-Saharan Africa (Beintema et al. 1995). In 2000, only MSIRI and AFRC employed one expatriate researcher each.

Figure 2—Trends in public expenditures, researchers, and expenditures per researcher, 1971–2000



Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002) and Beintema et al. (1995).
Note: See Table 1 for sample size and additional notes. 1992–96 data for the government sector has been interpolated; data prior to 1992 includes agricultural services; data exclude business enterprises.

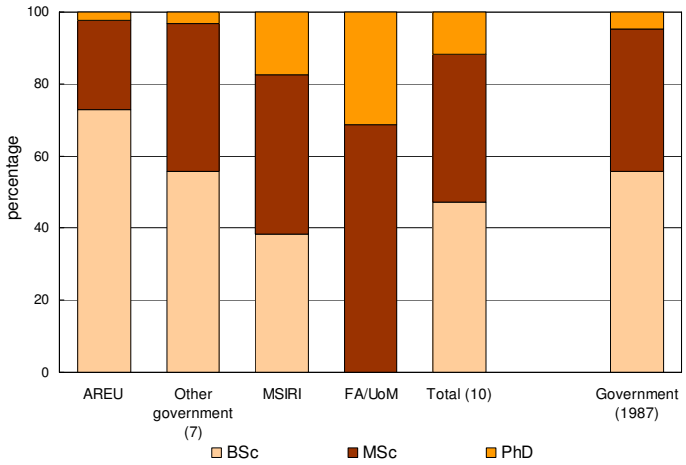
Overall growth in total agricultural spending was comparatively lower than the corresponding growth in researcher numbers (an average of 3.5 percent per year). After two decades of moderate growth, total spending increased by 7 percent per year during the 1990s. Consistent with total researcher numbers, total spending has decreased slightly in recent years. At MSIRI this was the result of the aforementioned cost-cutting strategy, which continued beyond 2000. AREU's total spending, on the other hand, more than doubled during 1998–2000 and continued to increase thereafter. This was in part because prior to 1999 part of AREU's expenditure such as salaries of some support staff and maintenance costs of the experimental stations (some of which are still not transferred to AREU) were still being paid by MAFTNR. These costs were being borne by AREU subsequently.

As a result of the higher growth of researcher numbers, spending per scientist declined from $203,000 in 1971 to $153,000 in 2000, but despite this decline Mauritius' 2000 level remains high compared with spending-per-scientist levels in many other Sub-Saharan African countries. There is also limited variation in spending-per-researcher levels among the various institutional categories.

Human Resources

In 2000, more than half the 144 fte researchers in our 10-agency sample had postgraduate level training, with 12 percent holding doctorate degrees (Figure 3). When MAFNR's research and extension services were relocated under FARC in 1995, many of the senior researchers and division heads opted to remain at the ministry. The staff that moved to AREU were predominantly the younger scientists with BSc degrees and relatively short service histories, which explains AREU's comparatively low share of research staff trained to the postgraduate level.

Figure 3—Educational attainment of researchers, 1987 and 2000

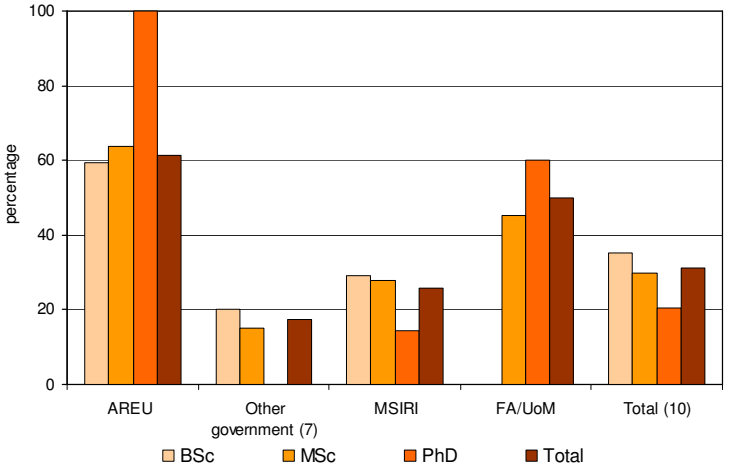


Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002) and Beintema et al. (1995).
Note: Figures in parentheses indicate the number of agencies in each category. Data exclude expatriate staff.

To improve the quality of its staff—measured as the share of researchers with PhD and MSc degrees—AREU now encourages and releases staff to follow either part-time postgraduate studies at UoM or full-time studies elsewhere. In 2002, two researchers completed MSc training at UoM, while three anticipated finishing their studies in 2003. Two researchers were studying abroad: one at the University of Malaysia following PhD training in animal production, the other following MSc training in horticulture at Reading University in the United Kingdom. In addition, a number of staff had received short-term and project-related training as part of projects funded by the International Fund for Agricultural Development (IFAD) and the International Atomic Energy Agency (IAEA) or through bilateral aid.

For a 10-agency sample, an average of 31 percent of total research staff in 2000 were female (Figure 4). Although more female researchers held BSc or MSc degrees, the low share of those with doctorate degrees, at 21 percent, is still higher than the overall share of female researchers found in many African countries. In two agencies, AREU and FA/UoM, female researchers actually formed the majority of staff (61 and 50 percent respectively), while the other government agencies, combined, employed the lowest relative share of female researchers. Historical data on the proportion of female researchers were only available for MSIRI and FA/UoM. In 1991, FA/UoM employed only 19 percent of the female fte researchers; considerably less than the 50 percent share in 2000.

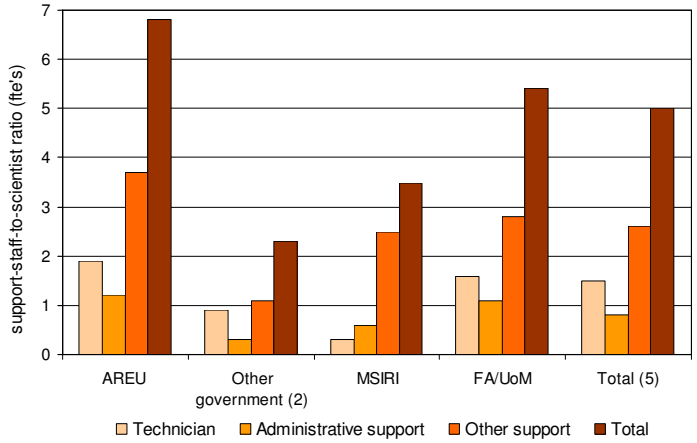
Figure 4— Share of female researchers, 2000



Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002).
Note: Figures in parentheses indicate the number of agencies in each category. Data exclude expatriate staff.

The average number of support staff per scientist in a 5-agency sample for 2000 was 5.0—comprising 1.5 technicians, 0.8 administrative personnel, and 2.6 other support staff such as laborers, guards, and drivers (see Figure 5). AREU and FA/UoM had the highest ratios of support staff per scientist (6.8 and 5.0, respectively).

Figure 5—Support-staff-to-researcher ratios, 2000

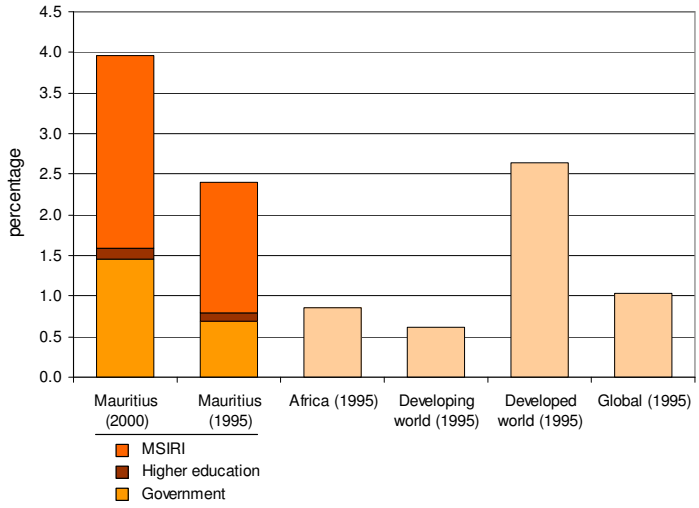


Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002).
Note: Figures in parentheses indicate the number of agencies in each category. Data exclude expatriate staff.

Spending

Total public spending as a percent of agricultural output (AgGDP) is a common research investment indicator for comparing agricultural R&D spending across countries. In 2000, Mauritius invested $3.96 for every $100 of agricultural output, which was higher than the $2.39 invested five years earlier (Figure 6). This increase was the combined result of increased spending in agricultural R&D and declining AgGDP (after adjustment for inflation). The 1995 ratio was more than twice the African average of 0.9 percent and close to the average for the developed world (2.6 percent). The high intensity ratios for Mauritius reflect the relatively high level of investment by the country in sugar research.

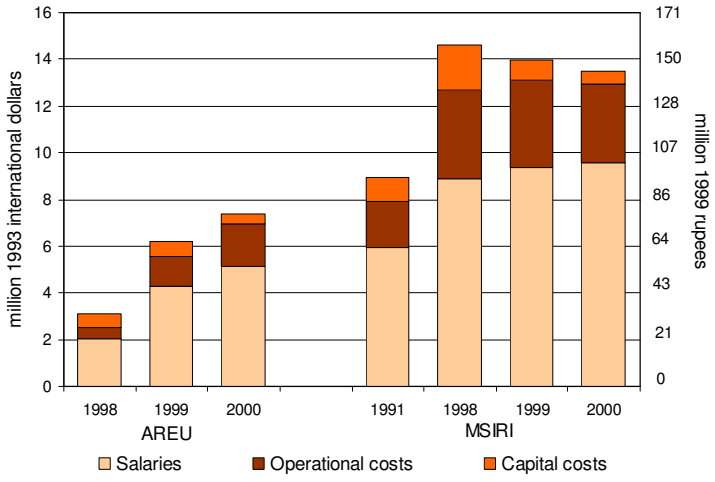
Figure 6—Mauritius' public agricultural research intensity compared regionally and globally



Sources: Data for Mauritius are compiled from Figure 1b; AgGDP are from World Bank (2002); other intensity ratios are from Pardey and Beintema (2001).

In 2000, AREU and MSIRI showed a similar spending allocation. Total salaries accounted for about two-thirds of total spending and total operational costs about a quarter (Figure 7). The shares of operational and capital costs, however, have been fluctuating for both agencies in recent years. This was an ongoing trend for MSIRI from the 1980s (Beintema et al. 1995), although the combined operational and capital cost share has decreased over the years, resulting in a relative increase in the share of total salaries.[11] The decline in AREU's spending is the result of declining budgetary allocations from the government, which negatively affected capital investments in infrastructure and equipment. Following an establishment period of substantial investments in infrastructure and equipment during 1995–98, MSIRI's capital expenditure contracted.

Figure 7—Expenditure shares by cost category for AREU and MSIRI, 1991 and 1998–2000



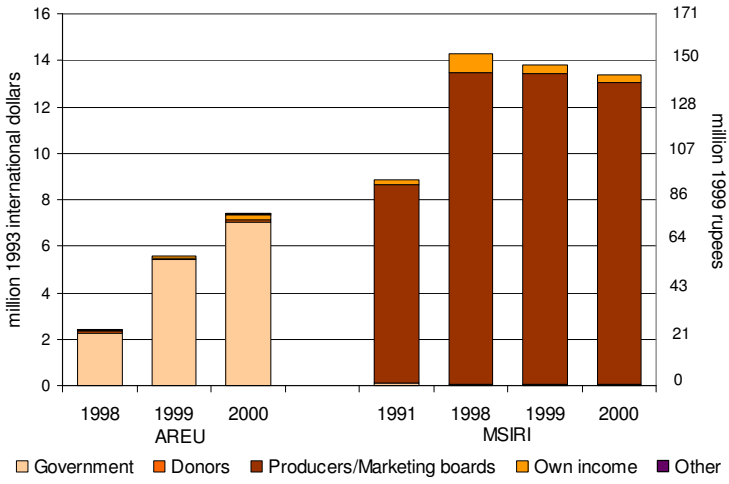
Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002).

FINANCING PUBLIC AGRICULTURAL R&D

Contrasting many African countries, agricultural R&D in Mauritius is, and historically has been, almost entirely funded through national sources. During 1998–2000, about 95 percent of AREU's funding was provided through government contributions (Figure 8). Donor contributions for specific AREU research projects only accounted for an average of 2 percent over the three-year period. These were contributions from the Mauritius Research Council (MRC),[12] FARC, and international donors like IFAD, IAEA, and the Food and Agriculture Organization of the United Nations (FAO). In addition, internally generated funds accounted for an average of 2 percent during 1998–2000. These internally generated AREU funds were raised through the sale of research by-products such as vegetables, ornamentals, milk, surplus animals, mushroom-growing bags, and selected advisory publications (AREU 2002). FARC is also heavily dependent on government funding for its operational costs. About 30–40 percent of FARC's budget for R&D-related projects is funded by the sugar levy fund administered by the Mauritius Sugar Authority. The latter is mostly used to fund research projects through a competitive grant scheme.[13] FARC obtains additional, though minimal, revenues from the sale of tissue-cultured plantlets.

MSIRI is almost completely funded by the aforementioned levy on sugar production, which is collected on total sugar sale proceeds of the year (including all earnings from export and local sale) and amounts on average 5 to 6 percent of total sugar proceeds. The rate is determined by the annual budgetary requirements of levy-financed institutions as approved by the Mauritius Sugar Authority and total sugar proceeds for the year, both of which can vary from year to year. Of the total annual revenue derived from the levy (about 440–500 million rupees during the late 1990s), MSIRI received about 30 percent. During the 1991–2000 period, other limited funding was received through the sale of products (3 percent) and from the government (1 percent).

Figure 8—AREU and MSIRI funding sources, 1991 and 1998–2000



Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002).

Producer organizations traditionally have an active role in financing and conducting agricultural research in Mauritius. In addition to the central role of the sugar industry, producer

organizations such as the Mauritius Chamber of Agriculture (MCA) and the Mauritius Meat Producers Association (MMPA) also fund research. AREU has not received any direct funding from MCA or MMPA but has been involved with both organizations through a joint public–private sector project on controlling stomoxys fly in deer farms; funding for equipment and supplies (not salaries) was directed through MRC. Acting as the agent of palm producers, MCA also has a collaborative research project with MSIRI on palm, the first phase of which will be completed in June 2003. Renewal of the project is currently being discussed.

PRIVATE AGRICULTURAL R&D

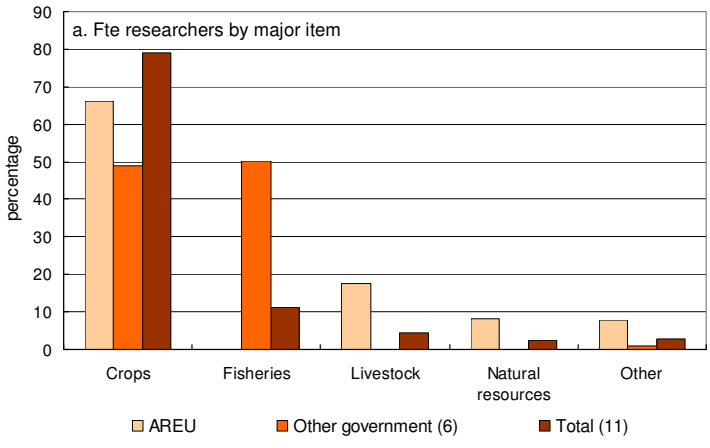
Agricultural R&D performed by the private sector in Mauritius is limited. We identified four private companies with active research programs in 2000 that together employed 7 fte researchers and accounted for 5 percent of total agricultural R&D investments in 2000 (see Table 1). Two of these, *Compagnie Agricole de Labourdonnais* (CAL) and the Food and Allied Groups of Companies (FAGC), have had ongoing research activities in Mauritius since the early 1980s. CAL conducts varietal and postharvest research on fruit, sugarcane, potatoes, and vanilla. FAGC focuses its research activities on livestock and dairy. The Mauritius Oil Refineries employed 3 fte researchers focusing on the process of engineering vegetable oils. The Mauritius Deer Farming Cooperative Society conducts some research on pasture management.

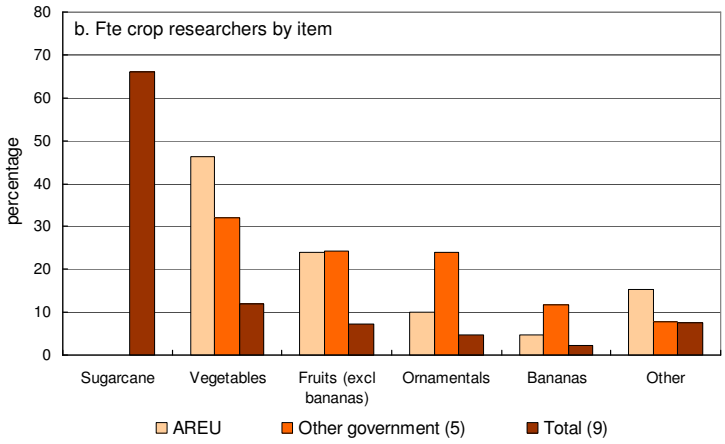
RESEARCH ORIENTATION

Commodity Focus

The allocation of resources across various research lines is a significant policy decision; hence detailed survey information was collected on the number of fte-researchers working in specific commodity and thematic areas. In 2000, more than three-quarters of the 148 fte researchers in our 11-agency sample conducted crop research (Figure 9a). Fisheries totaled 11 percent, while livestock and natural resources research accounted for 4 and 3 percent, respectively. Two-thirds of AREU researchers were involved in crop research, while researchers at the other government agencies split their research time about equally between crop and fisheries research. Unsurprisingly, the major crop was sugarcane, accounting for two-thirds of the research activities of the 117 fte crops researchers (Figure 9b).

Figure 9—Commodity focus, 2000





Sources: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002).
Note: Figures in parentheses indicate the number of agencies in each category. Total includes MSIRI and two private companies but excludes higher-education agencies. Figure 9b excludes a government agency and a private company, neither of which conducted crop research.

Thematic Focus

In 2000, 37 percent of total researchers worked on crop pest and disease control and 20 percent on other crop genetic improvement, while 40 percent worked on other crop-related themes (Table 2). AREU was the only agency in the 9-agency sample that conducted research on livestock themes, representing 20 percent of AREU research time but only 4.5 percent of total research time. Only a small portion of total researchers conducted research on soils and water (4 and 5 percent, respectively). Close to one-third of the fte researchers employed at the three private companies included in our sample were involved in postharvest research.

Table 2—Thematic focus, 2000

	Numbers of researchers		Shares	
	AREU	Total (9)[a]	AREU	Total (9)[a]
	(*in fte's*)		(*percent*)	
Crop genetic improvement	1.3	37.2	5.0	29.5
Crop pest and disease control	4.9	20.3	18.5	16.1
Other crop	9.2	39.5	35.0	31.3
Livestock genetic improvement	0.5	0.5	2.0	0.4
Livestock pest and disease control	0.8	0.8	3.0	0.6
Other livestock	4.0	4.5	15.0	3.5
Soil	—	4.1	—	3.2
Water	0.8	4.9	3.0	3.9
Other natural resources	0.4	0.4	1.5	0.3
Postharvest	2.1	3.6	8.0	2.8
Other	2.4	10.4	9.0	8.3
Total	**26.4**	**103.1**	**100**	**100**

Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR 2002).
Notes: Figures in parentheses indicate the number of agencies in each category.
[a] Includes AREU, MSIRI, four other government agencies, and three private companies; excludes the higher-education sector.

CONCLUSION

In contrast to many other countries in Africa the great majority of agricultural R&D in Mauritius has been funded, historically, from national sources. Sugar research, consistent with its dominant role in both agriculture and the economy, accounts for more than half the domestic agricultural research spending. MSIRI, which is predominantly funded by a levy on sugar production, has established itself among the world-renowned centers for sugarcane research. Research focused on nonsugar crops and livestock is undertaken by AREU and five departments under MAFNR, while the role of the higher-education and private sectors in agricultural research is limited. Given the high level of investment in sugar research, the intensity of research and research spending is high in Mauritius relative to other developing countries. Nevertheless, in line with world trends, agricultural research spending and staffing levels have decreased in the past few years with the contraction of domestic and international funding

NOTES

1. The authors are grateful to numerous colleagues in Mauritius for their time and assistance with the data collection, and thank Jagadish Manrakhan and Kailash Ruhee for useful comments on drafts of this brief.
2. As a result of diversification policies, sugar production as a share of the total value of merchandise exports in Mauritius declined from over 80 percent in the 1970s to less than 20 percent in the late-1990s (FAO 2002).
3. The 16-agency sample consisted of:
   - Eight government agencies/units: The Agricultural Research and Extension Unit (AREU), the Food and Agricultural Research Council (FARC), the Albion Fisheries Research Centre (AFRC); and the Divisions of Agronomy; Horticulture; Plant Pathology; Entomology; and Agricultural Information under the Ministry of Agriculture, Food Technology and Natural Resources (MAFTNR);
   - One nonprofit institution: The Mauritius Sugar Industry Research Institute (MSIRI);
   - Three higher-education agencies under the University of Mauritius (UoM): the Faculty of Agriculture, the Department of Biological Sciences under the Faculty of Science, and the Department of Chemical and Sugar Engineering under the Faculty of Engineering;
   - Four private enterprises: *Compagnie Agricole de Labourdonnais*, Food and Allied Groups of Companies, Mauritius Deer Farming Cooperative Society, and Mauritius Oil Refineries.
4. Unless otherwise stated, all data on research expenditures are reported in 1993 international dollars or in 1999 rupees.
5. The MSIRI board is comprised of two representatives from two smallholder representatives, one larger-scale/commercial farm representative, a member of the Chamber of Agriculture, and three owner representatives of sugarcane estates with factories. The three government representatives are from MAFTNR, the Ministry of Finance, and the Ministry of Economic Development, Financial Services and Corporate Affairs.
7. The grants are normally for a period of up to three years but in some cases can be extended to five years (FARC 2003).
6. Rodrigues is the biggest among a few of the Outer Islands that form part of the Republic of Mauritius and recently got some measure of autonomy by the establishment of a Rodriguan Assembly with 16 elected members and an Island Commissioner as leader
8. One new publicly funded university, the University of Technology, was established in 1999/2000, but no information was available as to whether it had initiated any agricultural research activities.
9. The history of agricultural research in Mauritius during the period 1893-1971 is extensively covered in the publication *History of Agricultural Research in Mauritius* by Manrakhan (1997).
10 Based on least squares growth rates.
11. As a consequence of institutional restructuring, expenditure allocation data for the government sector was unavailable prior to 1998. In addition, a few privately funded, higher-education agencies were established in recent years, but these are mainly in areas such as management, policy, accountancy, and informatics.
12. MRC was established in 1992 to promote and coordinate R&D in all scientific, technological, social, and economic areas. It developed two grant schemes for unsolicited and solicited proposals: the private-sector collaborative research grant scheme, and the small-scale research grant scheme (MRC 2003).
13. The sugar levy fund also financially supports the organization of the annual meeting of agricultural scientists in Mauritius and the proceedings from this meeting.

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METHODOLOGY

- Most of the data in this brief are taken from unpublished surveys (IFPRI and ISNAR 2002).
- The data were compiled using internationally accepted statistical procedures and definitions developed by the OECD and UNESCO for compiling R&D statistics (OECD 1994; UNESCO 1984). We grouped estimates using three major institutional categories—government agencies, higher-education agencies, and business enterprises, the latter comprising the subcategories private enterprises and nonprofit institutions. We defined public agricultural research to include government agencies, higher-education agencies, and nonprofit institutions, thereby excluding private enterprises. Private research includes research performed by private-for-profit enterprises developing pre, on, and postfarm technologies related to agriculture.
- Agricultural research includes crops, livestock, forestry, and fisheries research plus agriculturally related natural resources research, all measured on a performer basis.
- Financial data were converted to 1993 international dollars by deflating current local currency units with a Mauritius GDP deflator of base year 1993 and then converting to U.S. dollars with a 1993 purchasing power parity (ppp) index, both taken from World Bank (2001). Ppp's are synthetic exchange rates used to reflect the purchasing power of currencies, typically comparing prices among a broader range of goods and services than conventional exchange rates.
- The salaries and living expenses of many expatriate researchers working on donor-supported projects are paid directly by the donor agency and are often excluded in the financial reports of the agricultural R&D agencies. These *implicit* costs have been estimated using the average cost per researcher in 1985 to be $160,000 1993 international dollars and backcasting this figure using the rate of change in real personnel costs per fte researcher in the US state agricultural experiment station system. This extrapolation procedure has the assumption that the personnel-cost trend for US researchers is a reasonable proxy of the trend in real costs of internationally recruited staff in the agricultural R&D agencies.

See the ASTI website (http://www.ASTI.cgiar.org) for more details on methodology.

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