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Statistical Brief on the National Agricultural Research System

of

MAURITIUS

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ISNAR INDICATOR SERIES PROJECT: PHASE II
International Service for National Agricultural Research
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ISNAR INDICATOR SERIES PROJECT PHASE II

Decision making in the agricultural research policy area in either domestic, regional, or international fora can only be aided by access to reliable and comprehensive data on these systems. It is for this reason that ISNAR initiated its Indicator Series Project in 1986. The major objective of this project is to collect, process, and analyze reliable and comprehensive time-series data on national agricultural research systems (NARSs) throughout the world in order to identify and report on major trends and emerging policy issues with regard to the development of NARSs. To this end a database has been developed that contains time-series data on agricultural research expenditures and personnel for more than 150 developing and developed countries. These data provide a quantitative basis for more in-depth research policy studies by ISNAR and others.

During the first phase of the project (1986-91), the Indicator Series project team produced two major publications published by Cambridge University Press, namely:

Pardey, P.G., and J. Roseboom. (1989) *ISNAR Agricultural Research Indicator Series: A Global Data Base on National Agricultural Research Systems*, 547 pp.; and

Pardey, P.G., J. Roseboom, and J.R. Anderson, eds. (1991) *Agricultural Research Policy: International Quantitative Perspectives*, 462 pp..

The first publication is a statistical reference volume that provides system-level data on agricultural research personnel and expenditures for 154 countries. The second publication draws on the database to report on the major policy dimensions of agricultural research, with a primary focus on less-developed countries.

Phase II of the Indicator Series Project was initiated in 1992 and seeks to update the database and the policy analyses that accompany it. New ISNAR survey data are being used in conjunction with a large variety of published and "informal" reports in order to produce reliable as well as up-to-date information and statistics about the NARSs.

The country-level data are being published in a series of NARS Statistical Briefs. These briefs include more detailed descriptive information about the institutional structure of the NARS as well as a more comprehensive set of statistics than were reported in the 1989 Indicator Series volume. It is envisaged the country-level data will be assembled and analyzed in a series of regional research reports.

These statistical briefs are not official ISNAR publications; they are not edited or reviewed by ISNAR. The information and data presented have been collected and compiled with due care and all reasonable efforts have been made to ensure their accuracy. Comments, corrections, and additions to the material reported in this brief are welcomed. These briefs may be cited with due acknowledgment.

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Contents

1.	Introduction	1
2.	Agricultural Research Institutions	2
	2.1 Historical Evolution	2
	2.2 Present Structure	4
3.	NARS Statistics	7
	3.1 Long term Development	7
	3.2 Human Resources	8
	3.3 Financial Resources	9
	3.4 Research Focus	11
	Bibliography	12
	Appendix 1: Country background information	15
	Appendix 2: Definitions and concepts	16
	Appendix 3: Organizational charts of the agricultural research institutes	18
	Appendix 4: Addresses of the agricultural research institutes	19
	Appendix 5: Researcher and research expenditure totals, 1961-91	20
	Appendix 6: Research staff development by institute, 1961-91	22

Acronyms

CGIAR	Consultative Group on International Agricultural Research	MANR	Ministry of Agriculture and Natural Resources
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement	MSA	Mauritius Sugar Authority
DARE	Directorate of Agricultural Research and Extension	MSIRI	Mauritius Sugar Industry Research Institute
DSA	Department of Scientific Agriculture	NARS	National Agricultural Research System
FAO	Food and Agricultural Organization	OECD	Organization for Economic Co-operation and Development
FARC	Food and Agriculture Research Council	PPP	Purchasing Power Parity
FTE	Full-Time Equivalent	SA/UM	School of Agriculture, University of Mauritius
GDP	Gross Domestic Product	ST/UM	Department of Sugar Technology, University of Mauritius
ISNAR	International Service for National Agricultural Research	USAID	United States Agency for International Development
MAFNR	Ministry of Agriculture, Fisheries, and Natural Resources		

1. Introduction

The primary purpose of this brief is to provide various statistical and institutional details on the development and current status of the public agricultural research system in Mauritius. This information has been collected and presented in a systematic way in order to inform and thereby improve research policy formulation with regard to the Mauritian NARS. Most importantly, these data are assembled and reported in a way that makes them directly comparable with the data presented in the other country briefs in this series. And because institutions take time to develop and there are often considerable lags in the agricultural research process, it is necessary for many analytical and policy purposes to have access to longer-run series of data.

NARSs vary markedly in their institutional structure and these institutional aspects can have a substantial and direct effect on their research performance. To provide a basis for analysis and cross-country, over-time comparisons, the various research agencies in a country have been grouped into five general categories; government, semi-public, private, academic, and supranational. A description of these categories is provided in table 1.

Table 1: *Institutional Categories*

Category	Description	Examples
Government	Agencies directly administered by government.	Research department within a ministry
Semi-public	Agencies not directly controlled by government and with no explicit profit making objective.	Research institute under a commodity board
Private	Agencies whose primary activity is the production of goods and services for profit.	Agricultural machinery or chemical company
Academic	Agencies that combine university-level education with research.	Faculty of agriculture
Supranational	Agencies whose mandate covers more than one country.	CGIAR institutes

Note: Adapted from OECD (1981).

The concept of a NARS used throughout this report includes only those institutes that can be classified as government, semi-public, and academic agencies. Where it is useful to do so, private and supranational research agencies have been discussed, but for reasons of comparability they are not included in the NARS data reported here. More detailed information on the definitions and concepts used in this brief is provided in appendix 2.

Section 2 provides a brief description of the institutional development and current structure of the NARS. Section 3 presents a statistical overview of the longer-run investment trends in agricultural research along with a more detailed look at contemporary investment orientations. The appendices provide further descriptive details and present the basic research personnel and expenditure data in disaggregated fashion. For general background information and statistics on Mauritius we refer to appendix 1.

2. Agricultural Research Institutions

2.1 Historical Evolution¹

In 1721 the French took possession of the island following more than a century of Dutch control and named it Ile de France. In 1810 England captured the island and in 1814 the island was ceded to the British by the Treaty of Paris and renamed Mauritius, the same name used by the Dutch during the 17th century. Following the Second World War the British introduced a series of economic reforms. These were followed by political and administrative reforms, which eventually led to the independence of Mauritius within the Commonwealth of Nations in 1968. Mauritius is a multilingual society with English as the official language although French and Creole are also widely used. The country's administrative structure is similar to many other anglophone countries in sub-Saharan Africa, but its francophone traditions means that it has close links with scientific research institutes in France (e.g., CIRAD).

In 1735 the French governor established one of the first botanic gardens outside Europe in Pamplemousses. The gardens played an important role in the development of agriculture on the island by aiding in the introduction, acclimatization, and multiplication of new plants. Sugarcane was introduced by the Dutch in 1639, but was initially only used for the production of alcoholic beverages. In 1696 sugarcane was manufactured for the first time. Sugar production expanded tremendously under British rule and since the early 19th century it has been the dominant crop in Mauritius. Formal agricultural research began in 1893 in response to the demands of the local sugarcane industry. Because of crop damage due to various pests and diseases research was initiated to find new, more-resistant varieties and a "Station Agronomique" was established. Agricultural training also got underway with the establishment of this station. During the early 1910s one to two men received on-the-job training each year to become agricultural chemists. The "Station Agronomique" was funded entirely by local sugar planters and staffed by national scientists. The stated objective of the station was to carry out research on issues concerning the whole agricultural sector, but in practice, research was largely directed towards the introduction of new sugarcane varieties. In 1908 the Chamber of Agriculture established a bacteriological laboratory to conduct research on a specific bovine disease. A year later the Chamber also set up a Bureau of Statistical and Agricultural Information.

Prior to the First World War the British established Colonial Offices in most of their colonies and initiated a policy to increase the local production of foodcrops. The Colonial Office in Mauritius created the Department of Scientific Agriculture (DSA) in 1913 in an attempt to improve the country's agricultural research and training systems. The "Station Agronomique", the Bureau of Statistical and Agricultural Information, the Department of Forest and Gardens, and the Government Veterinary Office were merged into this new department. During its early years DSA consisted of seven divisions: chemistry, entomology, gardens and plantations, phytopathology, statistics, veterinary sciences, and administrative and clerical services. To provide agricultural training DSA established a School of Agriculture in 1914. Most of the students attending the school were trained for jobs in the sugar industry. During 1923-25 the school was transformed into a College of Agriculture, which provided training to diploma-level

1 The material presented in this section draws largely from Heeralall and Dassyne (1990) and Manrakhan (1991 and 1993).

and was financed by a special export tax on sugar. The college also conducted some agricultural research, mainly on sugar.

In an effort to further strengthen the work on improved sugarcane varieties, a Sugar Research Station was created in 1930. The Sugar Research Station was a separate division under DSA and was located in the building that housed the College of Agriculture. Fieldwork was conducted on the experiment stations of DSA at Réduit and Pamplemousses, as well as on various sugar estates throughout the country. The Sugar Research Station was mainly funded by the Government. The College of Agriculture and the Sugar Industry Reserve Funds also provided some financial support. During the 1930s and 1940s the Sugar Research Station consisted of three divisions: cane breeding, chemistry, and botany. Although the Station was physically located within the College it operated as a separate entity. Staff of the Sugar Research Station were full-time researchers and did not engage in teaching. In 1949 an extension service was added and one year later the Sugar Research Station moved to its own buildings.

In the face of increased competition on the world sugar market the Mauritius Economic Commission of 1947 recommended that the sugar industry should organize its own research, thereby leaving DSA free to conduct research on other agricultural issues. This led to the transfer of DSA's Sugar Research Station (except its extension activities) and some units concerned with sugar research (e.g., sugarcane pathology and entomology, chemistry, and sugar technology) to the new established Mauritius Sugar Industry Research Institute (MSIRI) in 1953. MSIRI eventually received most of its funding from the sugar industry, while the College of Agriculture, which was initially funded by the sugar industry, eventually received all its funding from the Government.

With the establishment of the University of Mauritius in 1965, the College of Agriculture was transferred from DSA to the university under the Ministry of Education. The university's infrastructure, however, was not in place until 1968/69. The first degree-level students in agriculture and food technology began their studies in 1970.

Following independence in 1968, the main objective of Mauritian agricultural policy was to attain food self sufficiency for a rapidly growing population. But at that time most of the island's arable land was under sugarcane. MSIRI initiated research on selected foodcrops that could be grown intercropped with sugarcane. In 1970 a Food Crops Division was added to MSIRI with financial support from the Government of Mauritius and private companies.

In 1972 DSA was renamed the Ministry of Agriculture, Fisheries, and Natural Resources (MAFNR). Prior to 1972 some research on fisheries was conducted, but formal fisheries research was initiated with the establishment of the Fisheries Division within MAFNR in this year. A number of facilities were created over the next 15 years: the pilot freshwater prawn hatchery at Trou d'Eau Douce in 1972; the Albion Fisheries Research Centre and the La Ferme fish farm in 1982, and the Marine Shrimp Culture Experimental Station in 1987. The Fisheries Division was renamed Fisheries Services in 1989 and was reorganized into four divisions: aquaculture, artisanal and banks fisheries, offshore fisheries, and marine conservation.

In 1985 the Food and Agricultural Research Council (FARC) was established to promote and coordinate research activities in agriculture, fisheries, and food production. FARC is funded by the Mauritius Sugar Authority (MSA) and MAFNR. FARC coordinates the research activities of MSIRI, the School of Agriculture, and MAFNR, and serves as a link to private sector research.

2.2 Present Structure

By way of background to a description of the present structure of the Mauritian agricultural research system this section begins with a brief overview of contemporary developments in the Mauritian agricultural sector. About two thirds of Mauritius is classed as potentially suitable for agriculture. Around 94% of this arable land is cropped, with 16% of the cropped land under irrigation. The remaining 6% of the agricultural land is pastureland. The relative contribution of agriculture to the economy has declined as the country diversifies into nonagricultural activities such as tourism, textiles, manufacturing industries, and services. In 1991, 22.3% of the Mauritian labor force worked in the agriculture sector while agricultural GDP accounted for only 9.4% of total GDP. Growth in the nonagricultural sector has led to labor shortages in the sugar industry. The agricultural sector is heavily dependent on sugarcane. Sugar occupies 90% of the arable land and accounted for 93% of the total value of agricultural exports in 1991. Mauritius has two distinct groups of sugar producers. The first group consists of large plantations that are owned by the 19 sugar processors. They account for 51% of the land under sugar cultivation and 59% of the total sugar production. The second group consists of independent planters who generally cultivate small plots and sell their cane to the large sugar mills.

The Mauritius Sugar Industry Research Institute (MSIRI) is one of the world's principal centers for sugarcane research and is financed by means of a cess levied on sugar production. MSIRI's research encompasses issues related to the growing and milling of sugarcane and the use of sugarcane by-products. Since 1970 a greater emphasis, at least at the policy level, has been placed on diversifying crop production. As a response to this policy objective, MSIRI also conducts research on crops that can be grown in combination with sugar (e.g., maize, potatoes, groundnuts, beans, and tomatoes). MSIRI is headquartered at Réduit and has three experiment stations at Union Park, Belle Rive, and Pamplemousses. However, most of the field experiments are carried out on sugar estates. MSIRI is a statutory body governed by an executive board which consists of members of the government, millers, Chamber of Agriculture, planters, and cooperative organizations. The board is responsible for policy matters with day-to-day management decisions being made by the director of MSIRI. The institute is currently organized into four divisions, namely agronomy, biology, engineering, and resources management (see appendix 3).

In terms of the absolute number of scientists the Ministry of Agriculture, Fisheries, and Natural Resources (MAFNR)² is the country's largest agricultural research organization. Research is not administered by one department but is spread throughout various services and divisions. As a consequence, agricultural research within the ministry is done in conjunction with many other activities and only a few staff hold full-time research positions. MAFNR is divided into three services, namely Agricultural Services, Forestry Services, and Fisheries Services. Agricultural Services is subdivided into 11 divisions: agronomy, animal husbandry, plant pathology, agricultural engineering, entomology, land use and projects, horticulture, veterinary services, agricultural chemistry, dairy chemistry, and a remote sensing unit. The Agricultural Services is headquartered at Réduit next to MSIRI and the School of Agriculture and has nine crop stations

2 Prior to the relocation of the Fisheries Services into a newly created Ministry of Fisheries and Marine Resources in 1993, MAFNR was renamed the Ministry of Agriculture and Natural Resources (MANR). MANR is being reorganized with the Directorate of Agricultural Research and Extension being responsible for the research and extension activities hitherto undertaken by the Agricultural Services.

and eight livestock centers under its authority.³ Research conducted by the Agricultural Services seeks to improve crop and livestock production, prevent and control plant and livestock diseases, and other aspects of agricultural development. It does no research on sugarcane breeding, agronomy, and postharvest technology. The two main programs of the Forestry Services, which consists of three forestry centers, are forest ecosystems and forest plantations. The Fisheries Services consists of two fisheries centers, namely the Albion Fisheries Research Center and the La Ferme fish farm. The Albion Fisheries Research Center is subdivided into four divisions: aquaculture, artisanal and bank fisheries, marine conservations, and offshore fisheries. These divisions conduct fundamental fisheries research and collect data, as well as investigate new fisheries potentials, fish-farming, and management techniques. The La Ferme fish farm carries out research on freshwater aquaculture.

The Food and Agricultural Research Council (FARC) was established in 1985 to coordinate, monitor, and promote research projects and programs of the various institutions engaged in agricultural, fisheries, and food production research, as well as to advise the minister of agriculture on matters related to agricultural and food research. FARC consists of a chairperson and 12 members who represent MAFNR, the research institutes, the University of Mauritius, the producers, and the food industry. FARC is an autonomous body funded by the Sugar Authority and MAFNR. FARC provides only incremental funds for new research activities and has little control over the core contributions to the different agricultural research entities. However, the council recently received additional funds to coordinate projects that are executed by the various research institutes. FARC currently does not conduct any agricultural research although its mandate allows it to do so. In 1992 the Mauritius Research Council was set up to promote and coordinate all scientific research in Mauritius.

The University of Mauritius consists of four schools, of which the School of Agriculture and the Department of Sugar Technology of the School of Engineering conduct some applied agricultural research. The research activities of the School of Agriculture covers a wide range of agricultural issues (e.g., research on agroforestry and natural resource management, as well as on specific aspects of nutrition and biotechnology). The Department of Sugar Technology conducts research on sugar. The university is situated in Réduit, next to MSIRI and MAFNR.

The private sector in Mauritius conducts some agricultural research, but most of these scientists perform other tasks and functions that limits the time they spend on research. In 1991, the Food and Allied Industries Ltd. employed 11 scientists who conducted research on poultry, animal feeds, food science, and agroindustry. The Camaron Production Company Ltd. and the Camaron Hatchery Ltd. employed three scientists engaged in research on fish

culture, freshwater, and prawns. The private sector is becoming increasingly involved in research by funding projects via FARC. Private sector research activities are not included in the data presented in this report.

3. NARS Statistics

The data in this report are based on information gathered by the ISNAR Small Countries Project, as well as other secondary sources cited at the conclusion of this report.

3 Excluding nine seed and fodder production centers, nurseries, and other agricultural centers, and excluding the various experimental sites located on the sugar estates.

Table 2: Overview of Present Structure of NARS

Institutional category	Executing agency			Staffed research sites ^a	Number of researchers		
	Supervising agency	Name	Acronym		Research focus	National	Expats
Government	Ministry of Agriculture, Fisheries, and Natural Resources ^c	Agricultural Services		17 (?) ^b	72	0	72
		Forestry Services		3 (1)	1	0	1
		Fisheries Services		2 (1)	20	0	20
Semi-Public	Mauritius Sugar Industry Research Institute		MSIRI	5 (1)	55	0	55
Academic	University of Mauritius	School of Agriculture	SA/UM	1 (1)	21	0	21
		School of Engineering, Department of Sugar Technology	ST/UM	1 (1)	1	1	2
<i>Total</i>				29 (?)	170	1	171
							106.1

Note: The information refers to 1991.

^a Staffed with researchers and/or technicians. Bracketed sites are permanently staffed with researchers.

^b Excludes nine seed and fodder production centers, nurseries and other agricultural centers, as well as various experimental sites on sugar estates.

^c In 1993 the Fisheries Services were moved to the new created Ministry of Fisheries and Marine Resources and MAFNR was renamed the Ministry of Agriculture and Natural Resources (MANR). At present MANR is being reorganized and the research and extension activities of the Agricultural Services have been transferred to the newly created Directorate of Agricultural Research and Extension (DARE).

3.1 Long-Term Development

In the early 1960s the number of full-time equivalent (FTE) researchers per million economically active agricultural population was over ten-fold higher than the corresponding sub-Saharan average (table 3). This ratio grew substantially in Mauritius to the equivalent of 795 FTE researchers per million economically active agricultural population in the early 1980s compared with a regional average of 42 (Pardey, Roseboom and Anderson 1991).

Table 3: *NARS Researcher and Expenditure Series, 1961-91*

	1961-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991	Growth rate ^a
Researchers (FTEs)	14.2	25.9	47.5	63.0	73.2	87.9	106.1	7.3
Expenditures (millions 1985 Mauritian Rupees per year)	16.730	26.036	33.600	35.340	45.518	47.569	54.763	4.0
Expenditures (millions 1985 PPP dollars per year) ^b	3.857	6.002	7.746	8.147	10.494	10.967	12.625	4.0
Expenditures per researcher (1985 PPP dollars per year) ^b	271,000	235,000	166,000	129,000	144,000	125,000	119,000	-3.0
Economically active agricultural population (millions)	0.079	0.084	0.088	0.089	0.092	0.095	0.094	0.6
Researchers per million farmers	179.0	308.7	539.5	708.7	794.6	929.7	1127.5	6.6
AgGDP (million 1985 PPP dollars) ^b	525	506	586	474	457	516	574	-0.2
Expenditures as a % of AgGDP	1.5	2.5	1.7	1.7	2.5	2.0	2.4	0.6

Source: See appendices 5 and 6.

^a Least squares annual growth rates for the 1961-1991 period.

^b For information on "PPP dollars" see appendix 2.

Sugar research accounted for over half of the FTE researchers. Even when sugar research is excluded, the ratio of FTE researchers per million economically active agricultural population is still over five times higher than the corresponding sub-Saharan African average.

For the period 1961-91 the number of FTE researchers grew at an annual rate of 7.3%, which is slightly higher than the corresponding rate for sub-Saharan Africa of 6.8% during the period 1961-85. The annual rate of growth in real research expenditures was only 4.0% for the thirty year period beginning in 1961, which is lower than the corresponding rate of growth for sub-Saharan Africa of 4.7% during the period 1961-85.

Agricultural research expenditures grew more slowly than research staff, so that real spending per researcher in 1991 was only 42% of the level that prevailed during the early 1960s. During the early 1960s agricultural research expenditures as a percentage of agricultural GDP averaged 1.5% compared with a weighted average for sub-Saharan Africa of 0.3%. During the early 1980s this ratio averaged 2.5% for Mauritius. This is more than four times higher than the comparable sub-Saharan African average, but, as Pardey, Roseboom and Anderson (1991) note, it is not unusual for small countries, especially those in sub-Saharan Africa, to have higher than average research intensity ratios.

3.2 Human Resources

Degree and Nationality Status of Researchers

A detailed breakdown of the educational status of the Mauritian agricultural research staff is presented in table 4. No expatriate scientists were reportedly working in either the public or semi-public institutes prior to and immediately following independence. In full-time equivalent terms MSIRI (a semi-public institute) was the largest research agency. For both the semi-public and academic sectors the proportion of total research staff with BSc degrees declined during the past three decades.

Table 4: *Educational and Nationality Status of Researchers*

Institutional category	Researcher status	1961-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991
<i>(full-time equivalents)</i>								
Government	Nationals							
	PhD	0.3	0.9	na	na	na	na	na
	MSc	0.2	2.1	na	na	na	na	na
	BSc	3.7	8.3	na	na	na	na	na
	Subtotal	4.2	11.3	25.7	35.4	42.3	44.6	56.5
	Expat	0	0	0	0	0	0	0
	<i>Total</i>	<i>4.2</i>	<i>11.3</i>	<i>25.7</i>	<i>35.4</i>	<i>42.3</i>	<i>44.6</i>	<i>46.5</i>
Semi-Public	Nationals							
	PhD	1.6	3.8	6.3	7.9	7.2	7.6	7.0
	MSc	2.8	3.4	6.9	10.1	9.4	15.6	25.0
	BSc	4.6	5.6	5.6	5.8	10.4	16.4	23.0
	Subtotal	9.0	12.8	18.7	23.9	27.0	39.6	55.0
	Expat	0	0	0	0	0	0	0
	<i>Total</i>	<i>9.0</i>	<i>12.8</i>	<i>18.7</i>	<i>23.9</i>	<i>27.0</i>	<i>39.6</i>	<i>55.0</i>
Academic	Nationals							
	PhD	na	na	0.8	0.7	1.3	1.5	1.6
	MSc	na	na	0.8	1.7	1.8	1.6	2.0
	BSc	na	na	1.1	1.0	0.7	0.5	0.8
	Subtotal	na	na	2.7	3.4	3.7	3.6	4.4
	Expat	na	na	0.4	0.3	0.2	0.2	0.2
	<i>Total</i>	<i>1.0</i>	<i>1.9</i>	<i>3.1</i>	<i>3.7</i>	<i>3.9</i>	<i>3.8</i>	<i>4.6</i>
Total	Nationals							
	PhD	na	na	na	na	na	na	na
	MSc	na	na	na	na	na	na	na
	BSc	na	na	na	na	na	na	na
	Subtotal	na	na	47.1	62.7	73.0	87.7	105.9
	Expat	na	na	0.4	0.3	0.2	0.2	0.2
	<i>Total</i>	<i>14.2</i>	<i>25.9</i>	<i>47.5</i>	<i>63.0</i>	<i>73.2</i>	<i>87.9</i>	<i>106.1</i>

Source: See appendices 5 and 6.

independence, when most countries in sub-Saharan Africa relied almost exclusively on expatriate scientists, most of Mauritius' scientific staff were nationals.

Gender

In 1991, 18% of the staff at MSIRI were female. At the School of Agriculture of the University of Mauritius 19% percent of the staff were female. For MAFNR no information on gender was available.

Staff Composition

Table 5 details the composition of MSIRI's total permanent staff. The number of support staff per researcher was 1.7 in 1991. The number of researchers grew faster than the number of technicians during the period 1985-91 and consequently the technician per researcher ratio declined from 2.1 in 1985 to 1.3 in 1991.

Table 5: *Staffing Structure for MSIRI*

Staff category	1985	1986	1987	1988	1989	1990	1991
	<i>(number of personnel)</i>						
Research	28	36	36	34	40	52	55
Support							
Technical	60	68	73	73	68	65	70
Other ^a	na	na	na	na	23	24	22
Subtotal	na	na	na	na	91	89	92
<i>Total</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>131</i>	<i>141</i>	<i>147</i>

Source: 1314.

^a "Other" support staff include administrative support staff.

3.3 Financial Resources

Expenditures

Table 6 provides a breakdown of agricultural research expenditures by institutional category. The government sector (i.e., the Agricultural Services, the Forestry Services, and the Fisheries Services) share of total expenditures was around of 19% in the early 1960s, increasing to 38% by the early 1980s. MSIRI accounted for almost three-quarters of total expenditures during the early 1960s. Academic research has declined in importance relative to the government and semi-public sectors since 1965. In the early 1960s the School of Agriculture and the Department of Sugar Technology of the University of Mauritius accounted for 7% of all agricultural research expenditures, but only 4% of such expenditures in 1991.

Table 6: *Agricultural Research Expenditures*

Institutional category	1961-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991
<i>(millions 1985 Mauritian Rupees)</i>							
Government	3.092	8.375	12.779	10.420	17.365	17.586	16.797
Semi-public	12.421	15.770	18.607	22.835	25.710	27.918	32.058
Academic	1.217	1.891	2.214	2.086	2.443	2.065	2.273
<i>Total</i>	<i>16.730</i>	<i>26.036</i>	<i>33.600</i>	<i>35.340</i>	<i>45.518</i>	<i>47.569</i>	<i>54.763</i>
<i>(millions 1985 PPP dollars per year)</i>							
<i>Total</i>	<i>3.857</i>	<i>6.002</i>	<i>7.746</i>	<i>8.147</i>	<i>10.494</i>	<i>10.967</i>	<i>12.625</i>

Source: See appendix 6

Factor Mix

Since 1985 personnel costs accounted for more than half of MSIRI's total expenditures, except for the years 1985 and 1987 when salaries accounted for 37% and 45%, respectively (table 7). Operational and capital costs shares have been quite volatile since 1985. Operational costs ranged from 35-53% of total costs while capital costs have been as low as 5% and as high as 18% of total costs.

Table 7: *Cost Categories for MSIRI*

Institute	Cost category	1985	1986	1987	1988	1989	1990	1991	1992
<i>(percentages)</i>									
MSIRI	Personnel	37.0	52.8	44.6	53.6	54.1	51.2	50.2	49.3
	Operating	53.3	42.6	37.0	35.4	40.2	40.9	36.6	39.4
	Capital	9.7	4.7	18.4	11.0	5.7	7.9	13.2	11.3
	<i>Total</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

Source: 184, 1314, and 1484.

Sources of Funds

Agricultural research in Mauritius is funded almost entirely from national sources. MSIRI is mainly financed by a cess on sugar production although the institute also receives some funds from the Government of Mauritius. MSIRI also recently received some funds from the World Bank. For the budget year 1989-90, 90.6% of MSIRI's funds came from a cess on sugar production, 1.6% from the government, 0.5% from private companies, and 7% from the World Bank.⁴ The World Bank funds were part of the Sugar Industry Restructuring Plan to finance the purchase of special capital equipment during the period 1988 to 1992.

For MAFNR no information was available on the funding sources.

4 Estimates derived from ISNAR's Small Countries Project database (source 1314).

3.4 Research Focus

An overview of the research orientation in Mauritian agricultural R&D is presented in table 8. In 1991, almost half of the full-time equivalent researchers worked on sugar, and 17.7% on other crops. Livestock production accounted for 13.3%, fisheries for 9.8%, natural resources for 3.0%, and forestry for 0.5% of full-time equivalent researchers. The remaining 9.4% of total time spent on agricultural research could not be allocated to a particular area of research.

For the Faculty of Agriculture and the Department of Sugar Technology no information was available on the allocation of researchers time although it would be safe to presume that most of the researchers within the Department of Sugar Technology work on issues associated with sugar production.

Table 8: *Research Focus, 1991*

	MARNR			MSIRI	Total	
	Agr. Services	Forestry Services	Fisheries Services		FTE	Share
	<i>(full-time equivalents)</i>					
Sugar	0	0	0	47.0	47.0	46.3
Other crops	10.0	0	0	8.0	18.0	17.7
Livestock	13.5	0	0	0	13.5	13.3
Forestry	0	0.5	0	0	0.5	0.5
Fisheries	0	0	10.0	0	10.0	9.8
Natural resources	3	0	0	0	3.0	3.0
Other	9.5	0	0	0	9.5	9.4
<i>Total</i>	<i>36.0</i>	<i>0.5</i>	<i>10.0</i>	<i>55.0</i>	<i>101.5</i>	<i>100</i>

Source: 1303.

Note: The “natural resources” and “other” categories include research that could not otherwise be allocated to a specific commodity or commodity group. The natural resource category refers to unallocatable soils, land use, and water research.

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This bibliography comprises three different sets of references. The “references” section relates to references cited in the text, the “data sources” to references from which data have been extracted to construct the time series (see appendices 5 and 6), and “other references” to references that have been consulted in the process of data collection but not used explicitly.

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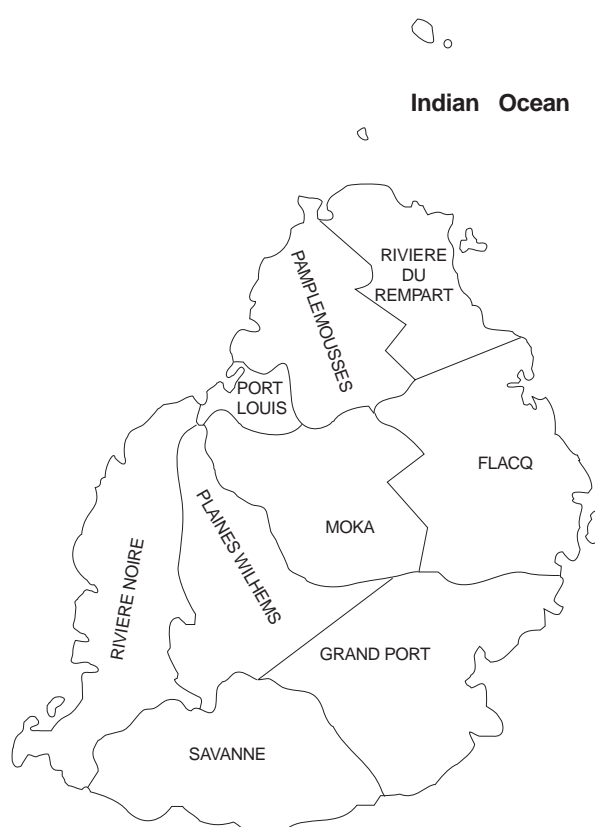
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Appendix 1: Country Background Information



Geography

Area: 0.2 million ha
 Location: island country lying about 800 km east from Madagascar in the Indian Ocean.

Agroecological features: Mauritius is a volcanic island. The northern part is plain and rises to a central plateau. The climate is maritime subtropical with a hot season between December and April and a cool season between June and September. The temperatures are fairly uniform during the year. Average rainfall varies between 900 mm on the westcoast to 5000 mm annually on the southeast coast. More than 50 percent of the island is arable and sugarcane is the major crop.

Population

Total (1991): 1.1 million
 Annual growth rate (1981-90)^a: 1.0%
 Literacy (1985): 82.8%
 Life expectancy (1991): 70 years

Economy (values reported in 1985 PPP dollars)

Gross Domestic Product (1991): 6,135 million dollars
 Per capita GDP (1991): 5,664 dollars

Agricultural GDP (1991): 574 million dollars
 Share of agriculture in GDP (1991): 9.4%

Annual growth rates (1981-90)^a
 GDP: 7.3%
 GDP per capita: 6.3%
 AgGDP: 2.0%

Trade (values reported in current values)

Net surplus total trade (1991): -391 million dollars
 Net surplus agricultural trade (1991): 174 million dollars
 Percentage of agricultural imports in total imports: 14.6%
 Percentage of agricultural exports in total exports: 34.1%
 Major agricultural import commodities (1991)^b: forestry products (19%), dry milk (13%), fishery products (6%), degreased wool (6%), mutton & goat (6%), and wheat (5%).
 Major agricultural export commodities (1991)^b: raw sugar (93%), and fishery products (4%).

Agriculture

Agricultural land (1990): 0.1 million ha
 Annual growth rate (1981-90)^a: -0.1%
 Percentage arable: 87.7%
 Percentage permanent crop: 6.1%
 Percentage permanent pastures: 6.1%
 Percentage irrigated arable and permanent cropland: 15.9%

Economically active agricultural population (1991): 0.1 million
 Annual growth rate (1981-90)^a: 0.8%
 Percentage in total economically active population: 22.3%

Fertilizer use per ha arable land (1990): 259.2 kg
 Annual growth rate (1981-90)^a: 3.0%

Major crops (in decreasing order of value of production): sugarcane, centrifugal sugar, and tea.

Sources: Europa Publications (1992), FAO (1993), and World Bank (1993).

^a Least squares growth rate.

^b Bracketed percentages represent value share of the respective total.

Appendix 2: Definitions and concepts

NARS

The construction of quantitative and internationally comparable expenditure, personnel, and related measures of a national agricultural research system (NARS) requires a precise idea of what, in fact, is being measured. Since the term NARS is subject to a variety of interpretations, it is necessary to define rather precisely the NARS concept used here. Our approach adheres, wherever possible, to the internationally accepted statistical procedures and definitions developed by the OECD and UNESCO for compiling R&D statistics (OECD 1981 and UNESCO 1984). For statistical purposes a NARS is defined in terms of the following characteristics:

(a) *National*. The concept of a “national” system used in this report refers to domestically targeted research activities funded and/or executed by the *public* sector of a particular country. A relatively broad concept of the public sector is taken to include government, semi-public, and academic research institutes. However, private, for-profit research as well as the research activities of supranational research agencies that are not executed through national institutes are excluded. Also excluded is research undertaken by short-term development projects.

(b) *Agricultural*. Agricultural research, as defined here, includes crop, livestock, forestry, and fisheries research, as well as research on agricultural inputs, the natural resource base, and socio-economic aspects of primary agricultural production. It excludes, where possible, research concerning the off-farm storage and processing of agricultural products, commonly referred to as post-harvest research and food-processing research. This delineation corresponds with the national accounts definition of the agricultural sector.

(c) *Research*. Research is often performed in conjunction with other activities such as extension, education, and production. To the extent possible, research activities (in terms of expenditures and staff) are differentiated from these other activities. However, if non-research activities were an integral part of an institute’s research activities and accounted for less than 20% of the resources of the institute, it was expedient to classify all the activities of the institute as being research-related.

Full-Time Equivalent (FTE)

A full-time equivalent researcher year is taken to be a person who holds a full-time position as a researcher during the whole year. Adjustments to full-time equivalents have only been made when: (a) a research position was part-time; (b) a research position was not filled for the whole year; or (c) if the position explicitly involved

tasks other than agricultural research. In the latter case an estimate was made of the time spent on agricultural research. No adjustments were made, however, for vacation or sick leave nor for time spent on administration, meetings, travel or other activities that form part of the normal duties required to support a research endeavor. Following this line of reasoning, professional staff in management positions were classified as researchers.

The degree status of researchers is determined on the following basis: 3-4 years full-time university education (BSc), 5-6 years (MSc), and more than 6 years plus doctorate thesis (PhD).

Expatriate Researcher Costs

Many expatriate researchers working on donor-supported projects in NARSs are paid their salaries and living expenses directly by the donor agency. All (or some substantial fraction) of these costs do not get included in the financial reports of the agricultural research organizations. To calculate these *implicit* costs we took the average cost per researcher in 1985 to be 120,000 “1985 PPP dollars” and backcast 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 makes the assumption that the personnel-cost trend for US researchers is a reasonable proxy of the trend in real costs of internationally recruited staff working in NARSs. Unless otherwise stated, FTE expatriate researchers were costed at \$80,000 “1985 PPP dollars” per researcher for the 1961-65 period, \$85,000 per researcher for 1966-70, \$90,000 per researcher for 1971-75, \$110,000 per researcher for 1976-80, and \$120,000 per researcher for 1981-91.

Deflators and Exchange Rates

All expenditure figures were first compiled in current local currency units (appendix 5). In order to facilitate comparisons over time and across countries these figures are deflated with a local GDP deflator to base year 1985, and then converted to a common currency (US dollars) using the 1985 purchasing power parity (PPP) over GDP. PPPs are synthetic exchange rates that attempt to reflect the purchasing power of a country’s currency. The PPPs used here are derived from the Penn World Table (Mark 5), which is based on the benchmark studies of the International Comparison Project (Summers and Heston 1991). For additional information on currency conversion methods in this context see Pardey, Roseboom, and Craig (1992).

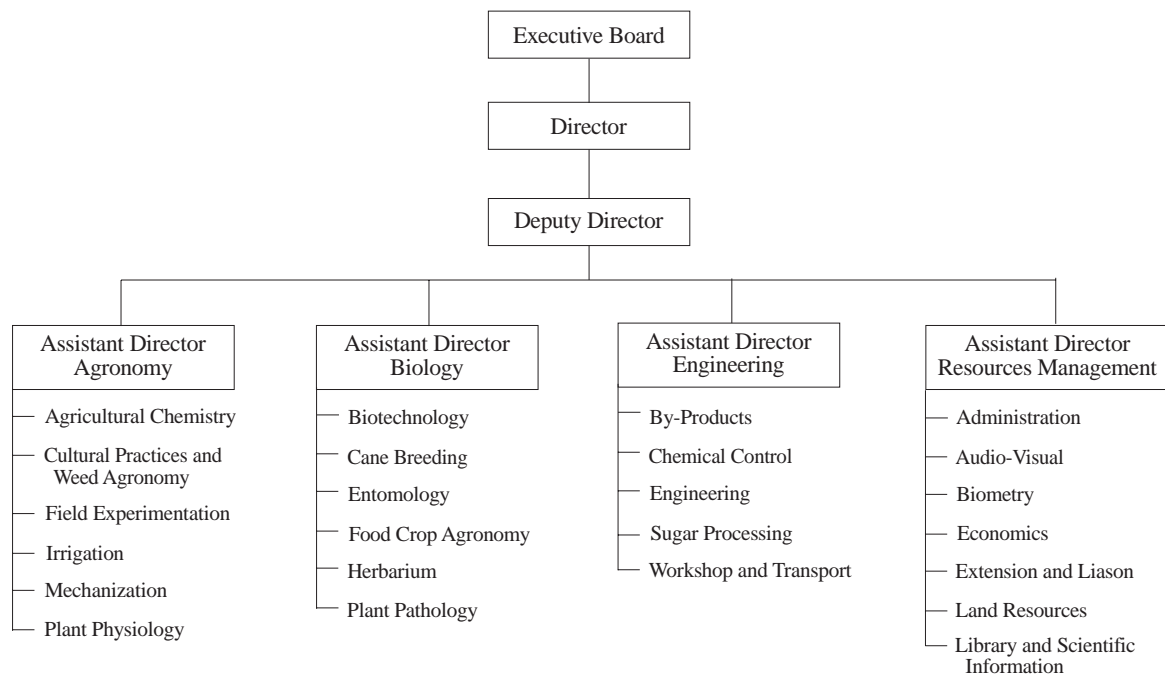
Nomenclature for tables in text

A zero indicates an actual observation of zero, a dash indicates an observation is not relevant (due to institutional mergers, closures, and so on), while “na” indicates an observation that is not available.

In the text we note any marked deviations from these data compilation norms and include points of clarification if warranted.

Appendix 3: Organizational charts of the agricultural research institutes

Mauritius Sugar Industry Research Institute (MSIRI), 1994



Appendix 4: Addresses of the agricultural research institutes

Directorate of Agricultural Research and Extension (DARE)
Ministry of Agriculture and Natural Resources
Réduit
MAURITIUS

Ministry of Fisheries and Marine Resources
Réduit
MAURITIUS

Mauritius Sugar Industry Research Institute (MSIRI)
Réduit
MAURITIUS

University of Mauritius
Réduit
MAURITIUS

Food and Agriculture Research Council (FARC)
Réduit
MAURITIUS

Appendix 5: Researcher and research expenditure totals, 1961-91

Total Number of FTE Researchers

Name country:	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Category	Name institute															
Government	AgrServ+ForServ	3.3	3.8	4.2	4.6	5.1	7.1	8.8	10.4	12.0	14.6	17.2	19.8	22.3	24.9	27.5
	FishServ	0	0	0	0	0	1.5	2.5	3.5	4.5	5.5	5.725	5.95	6.175	6.4	6.625
Government subtotal		3.3	3.8	4.2	4.6	5.1	8.6	11.2	13.9	16.5	20.1	22.9	25.7	28.5	31.3	34.1
Semi-public	MSIRI	7.4	8.1	8.9	9.6	11	12.2	12.8	13.4	14	15.6	17.1	18.7	20.3	21.9	23.4
Academic	SAJUM	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.4	2.2	2.0	1.8	2.2	2.6	3.2
	STJUM	—	—	—	—	0.2	0.5	0.7	0.9	1.0	1.2	1.0	0.8	0.8	0.8	0.6
Academic (subtotal)		1.0	1.0	1.0	1.0	1.2	1.6	1.9	2.2	2.4	3.4	3.0	2.6	3.0	3.4	3.8
TOTAL		11.7	12.9	14.0	15.2	17.2	22.4	25.9	29.4	32.9	39.1	43.0	47.0	51.8	56.6	61.4
Source:				1305		1305	286		28.4	532; 1000	279; 1000		1000		1000	95; 1000
Category	Name institute															
Government	AgrServ+ForServ	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
	FishServ	28	28.5	29	29.5	38	36	34.5	33	30	32.5	36	36.1	36.2	36.4	36.5
Government subtotal		6.6	6.8	7.1	7.3	7.5	7.8	8.0	8.2	8.4	8.6	8.9	9.1	9.3	9.5	10.0
Semi-public	MSIRI	34.6	35.4	36.1	36.8	45.5	43.8	42.5	41.2	38.4	41.2	44.9	45.2	45.6	45.9	46.5
Academic	SAJUM	25	24.3	23.7	23	23	27	28	29	28	36	36	34	40	52	55
	STJUM	3.1	2.9	2.8	2.9	3.0	3.0	3.0	3.1	3.2	3.3	3.3	3.4	3.3	3.2	4.2
Academic (subtotal)		0.7	0.7	0.8	0.9	1.0	0.9	0.8	0.8	0.8	0.7	0.5	0.4	0.4	0.4	0.4
TOTAL		3.7	3.7	3.6	3.8	4.0	3.9	3.8	3.9	4.0	3.9	3.9	3.8	3.7	3.6	4.6
Source:		63.4	63.4	63.3	63.6	72.5	74.6	74.3	74.1	70.4	81.1	84.7	83.0	89.3	101.5	106.1
				1000	185; 1314	185; 1314	185; 1314	1314;	185; 1314	185; 1314	185; 1314	1314;	1314	1000	1314;	1303; 184
						1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000;1484

Note: Italicized figures represent data that are either constructed or interpolated.

Appendix 5: Researcher and research expenditure totals, 1961-91 (contd.)

Total Research Expenditures		Currency: million Mauritian Rupees															
Category	Name institute	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Government	AgriServ+ForServ	0.373	0.354	0.504	0.421	0.520	0.542	0.776	0.913	1.251	1.401	1.700	1.987	2.218	3.293	3.049	2.555
	FishServ	—	—	—	—	—	0.049	0.163	0.261	0.422	0.525	0.641	0.663	0.668	0.911	0.783	0.616
Government subtotal		0.373	0.354	0.504	0.421	0.520	0.591	0.939	1.173	1.673	1.926	2.341	2.650	2.886	4.204	3.832	3.171
Semi-public	MSIRI	1.562	1.438	1.991	1.629	2.113	2.136	2.348	2.226	2.531	2.395	2.660	3.297	4.049	6.900	7.744	8.550
Academic	SA/UJM	0.180	0.151	0.191	0.144	0.164	0.155	0.174	0.170	0.200	0.198	0.309	0.297	0.281	0.501	0.566	0.652
	ST/UJM	—	—	—	—	—	0.028	0.053	0.081	0.132	0.146	0.168	0.149	0.125	0.182	0.174	0.122
Academic (subtotal)		0.180	0.151	0.191	0.144	0.164	0.208	0.255	0.267	0.332	0.344	0.477	0.446	0.406	0.683	0.740	0.774
Total (current LCU)		2.115	1.942	2.686	2.195	2.825	2.935	3.542	3.666	4.536	4.665	5.478	6.392	7.341	11.786	12.316	12.494
GDP deflator		15.24	12.79	16.29	12.33	13.92	13.34	14.70	14.04	16.17	15.59	16.64	19.01	21.71	34.64	36.64	38.33
Total (constant 1985 LCU)		13.880	15.185	16.490	17.796	20.299	21.989	24.095	26.111	28.052	29.922	32.918	33.624	33.817	34.023	33.616	32.597
Total (constant 1985 PPP dollars)		3.200	3.501	3.802	4.103	4.680	5.072	5.555	6.020	6.467	6.898	7.589	7.752	7.796	7.844	7.750	7.515
Source:							589					589					17.95
Category	Name institute	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Government	AgriServ+ForServ	3.086	3.744	4.787	6.678	10.295	11.320	12.536	13.000	13.500	15.000	17.000	18.424	18.340	21.350	22.500	
	FishServ	0.730	0.900	1.168	1.653	2.039	2.437	2.898	3.230	3.791	3.992	4.191	4.641	4.718	5.605	6.164	
Government subtotal		3.816	4.644	5.955	8.331	12.333	13.757	15.434	16.230	17.291	18.992	21.191	23.065	23.058	26.956	28.664	
Semi-public	MSIRI	9.873	10.415	11.736	14.512	16.568	16.667	19.940	29.382	30.168	30.955	31.741	36.297	36.479	44.713	60.740	65.473
Academic	SA/UJM	0.701	0.740	0.829	1.108	1.265	1.290	1.506	2.014	2.286	2.115	2.182	2.548	2.296	2.342	3.699	
	ST/UJM	0.152	0.185	0.237	0.344	0.422	0.387	0.402	0.520	0.572	0.432	0.349	0.300	0.278	0.293	0.352	
Academic (subtotal)		0.853	0.925	1.066	1.452	1.687	1.677	1.907	2.534	2.858	2.546	2.531	2.847	2.574	2.635	4.052	
Total (current LCU)		14.482	15.984	18.757	24.294	30.588	32.101	37.281	48.146	50.318	52.493	55.463	62.210	62.111	74.303	93.456	
GDP deflator		41.14	44.77	51.76	65.73	73.24	79.52	86.32	92.68	100.00	107.68	117.25	129.98	132.45	157.95	170.66	178.27
Total (constant 1985 LCU)		35.202	35.702	36.237	36.962	41.767	40.369	43.188	51.946	50.318	48.747	47.303	47.859	46.894	47.042	54.763	
Total (constant 1985 PPP dollars)		8.115	8.231	8.354	8.521	9.629	9.307	9.957	11.976	11.600	11.238	10.905	11.033	10.811	10.845	12.625	
Source:					1314	1314	1314	17.1314	1314	801.1314	801.1314	801.1314	1314	1314	1314	1301.1484	1484

Note: Italicized figures represent data that are either constructed or interpolated. Research expenditures for Fisheries Services are estimated by assuming the ratio of expenditures per researcher to be equal to the Agricultural Services figure. Research expenditures for the academic sector are estimated by assuming the ratio of expenditures per researcher to be equal to the corresponding figure for the institutes within MAFNR and MSIRI.

Appendix 6: Research staff development by institute, 1961-91

Agricultural Services and Forestry Services, Ministry of Agriculture, Fisheries and Natural Resources

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD	0.4	0.5	0.6	0.8	0.9	1	1.4	1.9	2.3	2.7	3.3	3.9	4.5	5.1	5.7	6.3
MSc	0.6	0.5	0.4	0.2	0.1	0	1.5	2.9	4.4	5.8	7.1	8.3	9.6	10.8	12.1	13.4
BSc	5.6	6.5	7.4	8.2	9.1	10	11.4	12.7	14.1	15.4	18.8	22.1	25.4	28.7	32.0	35.4
Subtotal	6.6	7.5	8.4	9.2	10.1	11	14.2	17.5	20.8	24.0	29.2	34.3	39.5	44.7	49.8	55.0
Expatriates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6.6	7.5	8.4	9.2	10.1	11	14.2	17.5	20.8	24	29.2	34.3	39.5	44.7	49.8	55
FTE Research	3.3	3.8	4.2	4.6	5.1	5.5	7.1	8.8	10.4	12.0	14.6	17.2	19.8	22.3	24.9	27.5
Source						286				532						95
Nationals	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
PhD	6.5	6.6	6.8	7	5	7	5.5	4	5	5	4	5.8	7.5	9.2	11	
MSc	14.3	15.2	16.1	17	25	23	21.5	20	20	20	25	28.0	31.0	34.0	37	
BSc	35.3	35.2	35.1	35	46	42	42.0	42	40	43	43	38.5	34.0	29.5	25	
Subtotal	56.0	57.0	58.0	59	76	72	69.0	66	60	65	72	72.2	72.5	72.8	73	
Expatriates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	56.0	57.0	58.0	59	76	72	69.0	66	60	65	72	72.2	72.5	72.8	73	
FTE Research	28.0	28.5	29.0	29.5	38.0	36.0	34.5	33.0	30.0	32.5	36.0	36.1	36.2	36.4	36.5	
Source						185			185	185	185				1303	

Notes: Italicized data are either constructed or interpolated. In 1958 the Agricultural Services of MAFNR employed 4 national scientists (source 0287). The percentage of time spent on research has been estimated at 30%.

Fisheries Services, Ministry of Agriculture, Fisheries and Natural Resources

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD						0	0	0	0	0	0					
MSc						0	0.6	1.2	1.8	2.4	3					
BSc						1	2.4	3.8	5.2	6.6	8					
Subtotal						1	3.0	5.0	7.0	9.0	11	11.5	11.9	12.4	12.8	13.2
Expatriates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	3.0	5.0	7.0	9.0	11	11.5	11.9	12.4	12.8	13.2
FTE Research	0	0	0	0	0	0.5	1.5	2.5	3.5	4.5	5.5	5.725	5.95	6.175	6.4	6.625
Source						286				279						
Nationals	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
PhD																
MSc																
BSc																
Subtotal	13.2	13.7	14.2	14.6	15.0	15.5	16.0	16.4	16.8	17.3	17.8	18.2	18.7	19.1	20	
Expatriates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	13.2	13.7	14.2	14.6	15.0	15.5	16.0	16.4	16.8	17.3	17.8	18.2	18.7	19.1	20	
FTE Research	6.6	6.8	7.1	7.3	7.5	7.8	8.0	8.2	8.4	8.6	8.9	9.1	9.3	9.6	10.0	
Source															1303	

Notes: Italicized data are either constructed or interpolated. The percentage of time spent on research has been estimated at 30%.

Appendix 6: Research staff development by institute, 1961-91

Mauritius Sugar Industry Research Institute (MSIRI)																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD	1.3	1.4	1.6	1.7	2	2.6	3.2	3.8	4.4	5	5.4	5.9	6.3	6.7	7.1	7.6
MSC	1.9	2.3	2.7	3.1	4	3.8	3.6	3.4	3.2	3	4.3	5.6	6.9	8.1	9.4	10.7
BSc	4.3	4.4	4.6	4.7	5	5.2	5.4	5.6	5.8	6	5.9	5.7	5.6	5.4	5.3	5.1
Subtotal	7.4	8.1	8.9	9.6	11	11.6	12.2	12.8	13.4	14	15.6	17.1	18.7	20.3	21.9	23.4
Expatriates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	7.4	8.1	8.9	9.6	11	11.6	12.2	12.8	13.4	14	15.6	17.1	18.7	20.3	21.9	23.4
Source					286					279						
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	8	8.0	8.0	8	8	8	7	7	6	9	8	7	7	7	7	7
MSC	12	10.7	9.3	8	7	9	9	12	10	13	14	13	18	20	25	25
BSc	5	5.7	6.3	7	8	10	12	10	12	14	14	14	15	25	23	23
Subtotal	25	24.3	23.7	23	23	27	28	29	28	36	36	34	40	52	55	55
Expatriates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	25	24.3	23.7	23	23	27	28	29	28	36	36	34	40	52	55	55.8
Source	243			1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	184	

Notes: Italicized data are either constructed or interpolated. In 1958 MSIRI employed 5 national scientists (source: 0287).

School of Agriculture, University of Mauritius (SA/UJM)																
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Nationals																
PhD						0	0.2	0.5	0.8	1	5	4.0	3	4.0	5	4
MSC						1	1.0	1.0	1.0	1	2	2.0	2	3.5	5	7
BSc						4	4.0	4.0	4.0	4	2	2.5	3	2.5	2	4
Subtotal						5	5.2	5.5	5.8	6	9	8.5	8	10.0	12	15
Expatriates						0	0.2	0.5	0.8	1	2	1.5	1	1.0	1	1
Total	5.0	5.0	5	5.0	5	5	5.5	6.0	6.5	7	11	10.0	9	11.0	13	16
FTE Research	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.4	2.2	2.0	1.8	2.2	2.6	3.2
Source			1305		1305	286				1000	1000		1000		1000	1000
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Nationals																
PhD	3.7	3.3	3	4.0	5	5.0	5	5.5	6	6.7	7.3	8	6.0	4	7	7
MSC	7.7	8.3	9	9.0	9	9.0	9	9.0	9	8.7	8.3	8	7.5	7	10	10
BSc	3.3	2.7	2	1.5	1	1.0	1	1.0	1	1.0	1.0	1	3.0	5	4	4
Subtotal	14.7	14.3	14	14.5	15	15.0	15	15.5	16	16.3	16.7	17	16.5	16	21	21
Expatriates	0.7	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	15.3	14.7	14	14.5	15	15.0	15	15.5	16	16.3	16.7	17	16.5	16	21	21
FTE Research	3.1	2.9	2.8	2.9	3.0	3.0	3.0	3.1	3.2	3.3	3.3	3.4	3.3	3.2	4.2	4.2
Source			1000		1000	1000	1000		1000			1000		1000	1000	1000

Notes: Italicized data are either constructed or interpolated. The percentage of time spent on research has been estimated at 20%.

Appendix 6: Research staff development by institute, 1961-91

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Department of Sugar Technology, School of Engineering, University of Mauritius (ST/UJM)																
Nationals																
PhD											0	0.0	0	0.0	0	0
MSc											2	1.0	0	0.5	1	1
BSc											3	3.0	3	3.0	3	1
Subtotal											5	4.0	3	3.5	4	2
Expatriates											1	1.0	1	0.5	0	1
Total					0.9	1.7	2.6	3.4	4.3	5.1	6	5.0	4	4.0	4	3
FTE Research					0.2	0.3	0.5	0.7	0.9	1.0	1.2	1.0	0.8	0.8	0.8	0.6
Source											1000		1000		1000	1000
Department of Industrial Technology, Formerly the School of Industrial Technology, Department of Agricultural Engineering																
Nationals	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
PhD	0.0	0.0	0	0.5	1	1.0	1	1.0	1	1.0	1.0	1	1.0	1.0	1.0	
MSc	0.7	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0.0	0	0	0	0	0
BSc	1.7	2.3	3	3.0	3	2.5	2	2.0	2	1.3	0.7	0	0	0	0	0
Subtotal	2.3	2.7	3	3.5	4	3.5	3	3.0	3	2.3	1.7	1	1.0	1.0	1.0	
Expatriates	1.0	1.0	1	1.0	1	1.0	1	1.0	1	1.0	1.0	1	1.0	1.0	1.0	1.0
Total	3.3	3.7	4	4.5	5	4.5	4	4.0	4	3.3	2.7	2	2.0	2.0	2.0	2.0
FTE Research	0.7	0.7	0.8	0.9	1.0	0.9	0.8	0.8	0.8	0.7	0.5	0.4	0.4	0.4	0.4	0.4
Source			1000		1000		1000		1000			1000				

Notes: Italicized data are either constructed or interpolated. The percentage of time spent on research has been estimated at 20%. Formerly the School of Industrial Technology, Department of Agricultural Engineering (1970-1975) is not included.

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