IDRC-182e

Resource Allocation to Agricultural Research

Proceedings of a Workshop held in Singapore 8-10 June 1981

Editors: Douglas Daniels and Barry Nestel

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IDRC-182e

Resource allocation to agricultural research : proceedings of a workshop held in Singapore, 8–10 June 1981. Ottawa, Ont., IDRC, 1981. 170 p. : ill.

/Agricultural research/, /resources allocation/, /developing countries/ — /evaluation/, /financing/, /manpower needs/, /research workers/, /manpower planning/, /organization of research/, /research policy/, /decision making/, /costs/, /classification/, /information exchange/, /conference report/, /list of participants/.

UDC: 63.001.5

ISBN: 0-88936-314-5

Microfiche edition available

V ArsHavelse

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Cosponsored by: International Federation for Agricultural Research and Development International Development Research Centre The untimely death of Dr J.D. Drilon, who was to attend the workshop as a representative of IFARD, is a great loss to all concerned with improving the welfare of the rural poor. This publication is dedicated to his memory.

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Resource Allocation to Agricultural Research in Sri Lanka

Y.D.A. Senanayake and H.M.G. Herath¹

The agricultural sector occupies a dominant position in the economy of Sri Lanka. Nearly 80% of the land area is used for agricultural production and forestry. Approximately 48% of the land is under annual, semiperennial, and perennial crops and the potential exists to increase production as more land is developed and its infrastructure established. The agricultural base has been developed through crop production; whereas the livestock and fisheries subsectors are comparatively smaller than the crop subsector. The food balance sheet of Sri Lanka shows that livestock and fisheries together contribute only 6–7% of the protein intake of the people; whereas crop products contribute the remainder.

The population of Sri Lanka was 14.8 million in mid-1980 and the average rate of growth during the 6-year period 1975–1980 was 1.73%. The latest trends indicate that nearly 51% of the population is directly employed in agriculture. If the agricultural manufacturing, processing, trade, and servicing subsectors of the economy are also considered as direct and indirect employment in agriculture this increases to about 70% of the population.

For many years, 75–80% of the export income was derived from the three main export crops tea, rubber, and coconuts. This proportion declined to 63% in 1980 due to fluctuations in production and market prices. Nevertheless, these three crops continue to be the main foreign exchange earners for the country.

Recently, the relatively rapid growth in population has increased the demand for food and has also exacerbated the unemployment problem. The goal of self-sufficiency in food has not yet been achieved. In addition, the varying fortunes of the export sector have exerted a deleterious influence on the economy. These problems require urgent attention. Their association with the agricultural sector suggests that the solution in the short run needs to be evolved in the agricultural sector itself. One of the main ways by which the severity of the problems could be mitigated is to enhance the productivity of the agricultural sector. An increase in the productivity of the agricultural sector could be achieved through a strong research organization.

The Agricultural Research Sector

Sri Lanka has attempted to speed up the pace of development, through technological change in the agricultural sector, by investment in agricultural research. Agricultural research in Sri Lanka had its origins in the Department of Agriculture at Peradeniya. Soon after the turn of the century when the plantation sector consisting predominantly of tea, rubber, and coconuts expanded, three commodity research institutes were established to undertake research on these three crops. Research on annual, semiperennial, and perennial crops of small farmers as well as livestock continued to be the responsibility of the Department of Agriculture. Research on all crops functioned under the Ministry of Agriculture.

For 25 years after independence there was no change in this functional separation. But during the seventies the responsibility for research in the agricultural sector was handed over to several ministries. Today as many as 11 Ministries and 24 units under them are responsible for the development of research on commodities or fields directly related to them (Table 1). In addition, specialized units or bodies in some of these Ministries such as the National Science Council and the Atomic Energy Authority of the Ministry of Industries and Scientific Affairs lend support to agricultural research. But there is no central Council or Authority to coordinate the research activities of different Ministries and to formulate and implement policy guidelines. Its absence could soon lead to wasteful allocations of

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Table 1. Ministries and their agencies responsible for research in the agricultural sector.

Ministry of Agricultural Development and Research
Department of Agriculture — (Research Division)
Department of Minor Export Crops — (Research Di-
vision)
Agrarian Research and Training Institute
Sugar Corporation — (Sugarcane Research Institute)
Rice Processing and Development Centre
Agricultural Diversification Unit
Ministry of Plantation Industries
Tea Research Institute
Rubber Research Institute
Cashew Corporation — (Research Division)
Silk and Allied Products (Research Division)
Ministry of Coconut Industries
Coconut Research Institute
Ministry of Rural Industrial Development
Department of Animal Production and Health (Re-
search Division)
Ministry of Lands and Land Development
Forest Department — (Research Division)
Irrigation Department — (Research Division)
Ministry of Fisheries
Department of Fisheries — (Research Division)
Ministry of Higher Education
Faculty of Agriculture
Postgraduate Institute of Agriculture
Ministry of Mahaweli Development
Mahaweli Research Unit
Ministry of Industries and Scientific Affairs
Ceylon Institute of Scientific and Industrial Research
National Science Council
Atomic Energy Authority
Ministry of Finance and Planning
Central Bank — (Economic Research Division)
Ministry of Plan Implementation
Department of Census and Statistics

resources due to the competing claims of different Ministries for resources that are becoming scarce and expensive. In spite of the changes brought about in the seventies, the Ministry of Agriculture still has the largest research arm with multicrop/multidisciplinary research centres and smaller research stations located in different agro-ecological regions across the country. The commodity research institutes for tea, rubber, coconut, sugarcane, and minor export crops have one principal research station each and 1-3 substations. Sericulture and cashew, being relatively new crops with embryonic research divisions, have begun some research in one of their principal plantations. The research arm of the Department of Animal Production and Health has as its principal station the Veterinary Research Institute at Peradeniya and other subcentres distributed on animal production farms of the department.

Investment of Funds on Agricultural Research

The treatment of agricultural research and extension in an economic framework is of relatively recent origin. Thus, a systematic compilation of research expenditure data for individual countries is not widely available. Data on agricultural research expenditures have been compiled to obtain a better perspective of agricultural research investment in Sri Lanka.

Data were compiled from many sources: from the annual budget estimates of most institutes; from annual reports; and from direct communication with certain research institutes. In most cases, budget data refer to actual expenditures, but for 1980 only estimates are available.

The allocation of funds is investigated in only the most important of the institutes: the Department of Agriculture; the Department of Animal Production and Health; the Agrarian Research and Training Institute (ARTI); the Faculty of Agriculture; the Postgraduate Institute of Agriculture; the Tea, Rubber, and Coconut Research Institutes; the Sugarcane and Cashew Corporations; and the Department of Minor Export Crops.

Research in the Department of Agriculture straddles several crops such as rice, pulses, condiments, fruits, and vegetables and several disciplines such as agronomy, breeding, physiology, and chemistry. In general, a crop-wise or a discipline-wise classification of research expenditure is not maintained in the Department of Agriculture. The research expenditure incurred is subsumed under items such as salaries, travel, and communications. The data available thus comprise the total expenditure for all crops and all disciplines. An attempt is being made to obtain an approximate picture of allocation of funds by crops in the Department of Agriculture. Hopefully some results will be available in due course. The ARTI undertakes mostly socioeconomic research. The research expenditure in the Faculty of Agriculture and the Postgraduate Institute of Agriculture forms an insignificant proportion in the overall allocation and a finer breakdown of this into crops was felt to be unwarranted.

Crop-wise research expenditure was readily available for tea, rubber, coconut, sugarcane, and cashew. For tea, rubber, and coconut, the establishment of separate institutes designed specifically for their research facilitated the recording of research expenditure data on a crop-wise and discipline basis. For sugarcane and cashew research, expenditure data are available from the Sugar Corporation and the Cashew Corporation although research in these crops is still in its infancy.

Trends in Investment in Agricultural Research

Table 2 presents some figures for annual expenditures on research for the years 1975–80. The total research expenditure under all categories is also presented. Research expenditure on agriculture increased steadily from Rs.27.63 million in 1975 to Rs.91.02 million in 1980. The increase in 1980 represents nearly a 230% increase over the expenditure in 1975.

The distribution of the total research expenditure among the crops or/and institutions indicates that the Department of Agriculture constitutes the largest single component in total agricultural research in Sri Lanka. The research expenditure in the Department of Agriculture was Rs.9.05 million in 1975. This rose to 9.62 million in 1976, and then increased notably in 1977 (by approximately 145%). This increasing trend continued until 1980.

Expenditure on animal production research was reported to be Rs.4.14 million in 1975. In 1976 it increased to Rs.7.18 million, but it declined both in 1977 and 1978. In 1979 the expenditure increased to 7.12 million and in 1980 a record increase of approximately 100% over that in 1979 was recorded. The total research expenditure of the Agrarian Research and Training Institute (ARTI) hovered between Rs.2.52 million and Rs.4.48 million during the 1975–80 period.

Total research expenditure on tea was 1.3 million in 1975. This has steadily increased during 1975-80 (excepting 1979) to Rs.6.8 million. The decline in 1979 was caused by a change of the management of the estates. A similar pattern of research expenditure was observed for rubber. A steady increase in the research expenditure for coconuts is indicated. Research on sugarcane and cashew is of recent origin. The expenditure on sugarcane has remained stationary at approximately Rs.3 million annually. Cashew research represents an insignificant component in overall expenditure. For minor export crops, research expenditure has steadily increased, with a substantial increase occurring in 1980 of approximately 81% over the 1979 level.

To further explore the allocation of research funds for agriculture, the shares of gross national product (GNP) and agricultural gross national product (AGNP) allocated to agricultural research were computed (Table 3). The research expenditure as a percentage of GNP was 0.107 in 1975. This percentage increased slightly to 0.149 in 1978 and more or less flattened out for the rest of the period. The ratio of research expenditure to AGNP was 0.363 in 1975 and rose to 0.647 in 1979.

Most of the institutes allocate funds for other activities such as extension and administration. The

Commodity/Institute	1975	1976	1977	1978	1979	1980
Tea ^b	1.26	1.67	2.62	5.89	3.63	6.86
Rubber ^c	2.94	3.97	5.04	7.46	5.74	8.74
Coconut ^d	2.67	2.85	3.05	4.05	5.96	7.09
Sugar ^e	2.25	2.81	2.61	2.97	2.94	2.93
Cashew ^f	Nil	Nil	0.04	0.08	0.11	0.14
Minor export crops ^g	2.79	3.22	2.28	2.90	5.34	9.68
Animal production ^h	4.14	7.18	6.97	5.93	7.12	14.64
Department of Agriculture ⁱ	9.05	9.62	23.61	28.31	36.18	35.31
Faculty of Agriculture						
and PGIA ^j		0.27	0.31	0.33	0.41	1.15
Agrarian Research and Training						
Institute ^k	2.52	2.88	1.61	2.03	3.16	4.48
Total	27.63	34.47	47.96	59.95	70.59	91.02

Fable 2.	Agricultural	research	expenditure	(in millions	of ru	pees) in	Sri Lanka.	a
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a Total of recurrent and capital expenditure.

^b Source: Project budgets of the Tea Research Institute of Sri Lanka, Talawakelle, 1975-80.

^c Source: Program expenditure reports of Rubber Research Institute of Sri Lanka, Agalawatte, 1975-80.

^d Source: Annual draft estimates of the Coconut Research Institute of Sri Lanka, Lunuwila, 1975-80.

^e Source: Sri Lanka Sugar Corporation, Colombo.

^f Source: Sri Lanka Cashew Corporation.

8 Source: Estimates of the revenue and expenditure of the Government of Sri Lanka, 1975-80 (crops include coffee, cocoa, pepper, etc.).

^h Source: Estimate of the revenue and expenditure of the Government of Sri Lanka. 1975-80.

ⁱ Source: Office of the Deputy Director of Agriculture (Research), Department of Agriculture, Peradeniya.

^j Source: Dean, Faculty of Agriculture. University of Peradeniya.

^k Source: Agrarian Research and Training Institute, Colombo.

Department of Agriculture, for example, has five major divisions in its organization: research; extension; education and training; administration; and planting materials production (farms division). The allocation of funds among these divisions is examined in Table 4. Among the five divisions, seed and planting materials production has received the highest share, approximately 38%, except in 1977 when it declined to 26%. Agricultural extension received the next largest share in 1975 and 1976. The relative proportion for research was lower than for extension in 1975 and 1976 but this pattern reversed in 1977. The percentage allocations for administration and education and training are relatively low.

The allocation of funds among the three divisions of research, extension, and administration in animal production are also given in Table 4. Here the data are complete only after 1977. The proportion spent for extension is high and has varied between 43.8 and 52.1% during the study period. Research comes next with an allocation of approximately 30% of the total expenditure in the department. Administrative expenditure is relatively low. For minor export crops the expenditure on research in relation to extension is high. The administrative expenditure is relatively low.

In tea, relatively little is spent on extension activities. Most of the expenditure is on research and administration and the relative allocation for administration is very high although it appears to have declined after 1977. For rubber, the relative importance of the various divisions has fluctuated. However, resarch in rubber has received at least 30% of the total allocation and in 1979 and 1980 the percentage for research reached approximately 50%. The expenditure for research in coconuts is approximately 30% of the total allocation and expenditures for extension activities and administration expenditures are also high.

Sources of Funds for Agricultural Research

Agricultural research is generally supported by several organizations in addition to the national government. The sources of finance for agricultural research in Sri Lanka are summarized in Table 5. An examination of the sources of finance for research conducted by the Department of Agriculture indicates that in 1975 the government allocation (consolidated fund) provided 91.2% of the support and 8.8% was from foreign sources (mainly West Germany). This pattern was similar in 1976. In 1977, the foreign aid component rose to Rs.10.2 million. Although the expenditure by the Sri Lankan government also increased in 1977, foreign aid contributed 43.1% of total research expenditure. Two main sources of foreign funding were forthcoming in 1977. These were Rs.4.76 million from IDA/IBRD and Rs.3.284 million from the UNDP/Sovabean project. In 1978 and 1979 the relative proportion of government expenditure to foreign funds was maintained. In 1980, there was a slight decline in funds from foreign sources. For animal production research, foreign aid has always been the dominant financial source. This support has fluctuated between 74.4% in 1974 and 87.8% in 1980. The major sources of foreign funding are CIDA and IDA.

For tea, the cess is the main source of finance. Between 85 and 90% of the funds used for tea research are generated from the cess and the additional expenditures are covered by commercial activities. Tea research is thus generally selffinancing. For rubber, the cess is the dominant component although it is not as high as for tea. This has

Table 3. Total agricultural research expenditure (in millions of rupees) in Sri Lanka as a percentage of gross national product (current prices), gross domestic product (current prices), and agricultural gross product (current prices).

	1975	1976	1977	1978	1979	1980
Total expenditure for					-	
research (TE)	27.63	34.47	47.96	59.95	70.59	91.02
Gross national product ^a	25746	28216	34681	40098	48885	61807
Gross domestic product ^a	25959	28494	34933	40335	49125	62246
Agriculture gross national						
product ^a	7617	7983	10193	11355	10902	14210
TE as % of GNP	0.107	0.122	0.138	0.149	0.144	0.147
TE as % of GDP	0.106	0.121	0.137	0.148	0.143	0.146
TE as % of AGNP	0.363	0.432	0.471	0.528	0.647	0.641

* Source: Review of Economy, Central Bank of Ceylon, 1975-80.

	197	5	197	90	197	7	193	8/	197	6	198	0ª
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Department of Agriculture ^b					:							
Research	9.05	14.8	9.62	11.9	23.61	23.7	28.31	20.2	30.18	23.2	15.05	1.1
Extension	16.19	26.6	24.15	30.1	20.58	20.6	22.79	16.5	27.71	17.8	38.09	1.41
Seed and planting	:							. 00	02 03		75 50	0 7 6
material production	23.30	38.2	30.36	37.8	25.96	20.0	18.50	1. 66	58. 19	51.1	6C.C/	0.10
Education and training	6.47	10.6	6.25	7.8	10.79	10.8	16.98	12.3	13.21	8.5	27.29	13.7
Administration and others ^c	5.98	9.8	9.98	12.4	18.79	18.8	15.63	11.4	19.91	12.8	23.17	11.6
Total	60.99	100	80.36	100	99.73	100	137.52	100	155.81	<u>8</u>	199.45	100
Animal Production												
Research	4.14	100	7.18	100	6.97	34.1	5.93	31.3	7.12	28.3	14.64	36.8
Extension and advisory	ļ	1	1		8.96	43.8	8.58	45.3	13.31	52.6	13.13	33.1
Administration	ļ	1	-		4.5	22.1	4.44	23.4	4.84	19.2	11.98	30.1
Total	4.14	100	7.18	100	20.43	100	18.95	100	25.27	100	39.75	100
Minor Export Crops												
Research	2.79	71.8	3.22	72.6	2.28	64.6	2.91	65.4	5.37	72.9	9.67	75.3
Extension	0.51	12.9	0.70	15.8	0.72	20.3	0.96	21.7	1.33	18.1	1.31	17.9
Administration	0.59	15.3	0.52	11.8	0.53	15.1	0.57	12.8	0.68	9.3	0.86	6.7
Total	3.89	100	4.43	100	3.52	100	4.43	100	7.34	100	12.84	100
Tea												1
Research	1.26	19.0	1.67	22.9	2.62	39.9	5.89	50.4	3.63	25.3	6.86	37.7
Extension and									000			0.00
advisory	0.26	3.9	0.36	4.8	0.36	4. 5 4. 1	0.54	4.6	2.38	10.0	07.5 02.5	21.8
Administration	5.11	1.17	5.21	72.2	3.59	54.7	5.24	8.4 8.	8.34	2.86	01.01	40.0
Total	6.63	100	1.24	001	10.0	8	10.11	001	14.00		10.19	201
Rubber				1			ţ			505	10	7 07
Research	2.94	50.0	3.97	44.7	5.0	1.22	1.47	C.67	0./4	C.2C	0./4	49.0
Extension and					101	0	1 06	, r , r	, ,	-	20 C	167
advisory			1.69 1	20.1	1.84	7.0	C6.I		10.7	1.12	C0.7	10.2
Administration	2.17	36.8	2.39	27.1	2.13	12.3	7.80	5.11	C0.U	ч. С	60.C	20.9
Others ^d	0.78	13.3	0.63	7.4	12.57	56.7	13.14	51.8	2.23	20.2	16.0	2.6
Total	5.88	100	8.87	100	22.18	00	25.39	100	10.93	100	17.59	100
Coconut												
Research	2.67	28.2	2.85	27.8	3.05	27.8	4.05	24.8	5.96	32.1	7.09	27.8
Extension and												
advisory	2.89	30.5	2.78	26.5	3.33	30.4	6.69	41.1	1.98	10.6 1	9.21	30.1 22.0
Administration	3.92	41.3	4.85	46.3	4.57	41.7	5.81	35.6	10.61	0.76	8.89	0.06
Total	9.47	8	10.47	100	10.95	<u>1</u>	16.29	100	18.62		84°C7	B

Table 4. Expenditure on research, extension, and administration by commodity (in millions of rupees).

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Estimated values.
 All crops studied by the Department of Agriculture.
 ^b All crops finance, pilot projects, and engineering division.
 ^d Includes statistical services and library and publication services, group processing centres, and plantation division.

Source	197	5	197	76	197	7	197	90	197	6	198	0
finance	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Department of Agriculture ^a												
Consolidated fund	8.251	91.2	9.161	95.3	13.452	56.9	15.861	56.1	18.791	51.9	21.412	60.6
Foreign aid	0.795	8.8	0.464	4.7	10.166	43.1	12.449	43.9	17.398	48.1	13.894	39.4
Dept. Animal Prod. and Health ^b												
Consolidated fund	1.059	25.6	1.575	21.9	1.08	15.5	1.218	20.5	1.291	18.1	1.789	12.2
Foreign aid	3.081	74.4	5.601	78.1	5.892	84.5	4.716	79.5	5.827	81.9	12.847	87.8
Tea Research Institute ^c												
Cess + Government	7.52	89.5	7.59	75.7	1.65	20.7	10.0	82.8	13.55	94.5	16.11	88.5
Commercial activities	0.87	10.1	2.19	21.7	6.19	<i>77.9</i>	1.51	12.9	0.54	3.8	1.37	7.6
Others ^d		I	0.26	2.6	0.09	1.2	0.16	1.3	0.23	1.7	0.71	3.9
Rubber Research Institute ^e												
Cess	3.30	56.1	5.60	62.6	6.00	25.6	4.80	19.9	7.20	56.5	12.00	63.4
Government	0.12	2.2	1.88	21.1	1.99	8.5	3.04	15.2	4.77	37.5	1.94	10.3
Sale of products	1.28	21.8	06.0	10.1	13.74	58.6	12.24	61.2	I	1	3.24	18.1
Others ^f	1.17	19.9	0.56	6.3	0.71	3.1	0.73	3.6	0.77	6.1	1.57	8.3
Coconut Research Institute ⁸												
Cess	0.50	5.3	7.45	71.1	7.73	73.8	1.52	9.3		ļ		
Government	7.09	75.3	0.50	4.8	0.50	4.6	10.75	62.9	13.78	74.1	20.69	81.2
Sale of products	0.91	9.5	1.58	15.1	1.77	16.2	2.97	18.3	3.61	19.3	3.29	12.9
Others ^h	0.98	10.3	0.94	8.9	0.95	8.6	1.04	6.4	1.23	6.6	1.52	6.9
^a Source: Office of the Deputy Dire	ector of Aprici	iltire (Res	earch) Denari	ment of Ac	riculture Per	deniva						

Table 5. Summary of sources of finance (in millions of rupees) for research in Department of Agriculture, Department of Animal Production and Health, Tea Research Institute, Rubber Research Institute, and Coconut Research Institute.

> source: Critte or une Deputy Director of Agriculture (Research), Department of Agriculture, Veradeniya.
 > Sources: Annual estimates of Department of Agriculture, Sri Lanka, 1975-80; Annual estimates of Department of Agriculture, Sri Lanka, 1975-80.
 > Sources: Annual estimates of TRI of Sri Lanka, Talawakelle, 1975-80.
 > Sources: Program expenditure reports of RRI of Sri Lanka, 1975-80.
 > Includes interests, royalties, and rentals.
 > Sources: Program expenditure reports of RRI of Sri Lanka, 1975-80.
 > Sources: Program expenditure reports of RRI of Sri Lanka, 1975-80.
 > Sources: Program expenditure reports of RRI of Sri Lanka, 1975-80.
 > Sources: Program expenditure reports of RRI of Sri Lanka, 1975-80.
 > Sources: Annual draft estimates of CRI of Sri Lanka, 1975-80.
 > Sources: Annual draft estimates of CRI of Sri Lanka, 1975-80.
 > Sources: Annual draft estimates of CRI of Sri Lanka, 1975-80.
 > Sources: Annual draft estimates of CRI of Sri Lanka, 1975-80.

varied somewhat as there was a sharp decline in 1977 and 1978. The sale of products has generated sufficient funds and this in fact compensated for the drop in the cess in 1977 and 1978. Government contribution is the dominant component in coconut research. The cess appears to have provided sufficient funds in 1976 and 1977.

Concluding Remarks

Several aspects relating to the allocation of financial resources in agricultural research in Sri Lanka have been discussed. These results form part of a broader study being undertaken on resource allocation to agricultural research in Sri Lanka. The allocation of research personnel is also being investigated although the results are not yet available. A logical extension to this study is to explore the productivity of agricultural research in Sri Lanka. It is hoped that the present study provides a clearer picture of resource allocation in research and will enable policymakers to identify deficiencies in the system. This would allow the research structure to increase its contribution to higher productivity in the agricultural sector and thereby improve the wellbeing of farmers.

The authors acknowledge the research grant from SEARCA, Philippines, that supported this study. We also acknowledge the cooperation extended to us by P.C. Munasinghe of IDRC, who originally suggested this study, and thank all the directors of departments, research institutions, and corporations who responded speedily to our requests for information.