AGRICULTURAL SCIENCE
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Key trends in agricultural R&D investments in Indonesia

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Introduction*

In 2005, agriculture accounted for 15 percent of Indonesia's gross domestic product (GDP), down from 45 percent in 1970. Despite this decline, agriculture still represents an important input to the national economy and an important livelihood for the rural population. In fact, the vast majority of Indonesia's rural poor depend on agriculture for employment and income as well as their own food supply. Consequently, agricultural research and development (R&D) is given priority by the Indonesian government.

This brief provides an overview of the major investment trends in agricultural research in Indonesia since the mid-1990s, drawing on a new set of data developed through a comprehensive survey by the International Food Policy Research Institute (IFPRI) and the Indonesian Agency for Agricultural Research and Development (IAARD).

Human Resource and Investment Trends in Public Agricultural Research

Sixty public-sector agencies were identified to be involved in agricultural R&D in Indonesia. In 2003, the 58 agencies for which time-series data were available employed close to 5,000 full-time equivalent (fte) researchers and spent more than 500 billion Indonesian rupiahs (in 2000 prices)—the equivalent of 254 million international 2000 dollars (Table 1).

The government agencies in our survey sample combined employed 3,349 fte researchers in 2003, accounting for more than two-thirds of Indonesia's public agricultural R&D staff. IAARD is Indonesia's principal government body involved in agricultural R&D and it oversees nine major research centers that focus on socio-economics, soils and agro-climates, engineering, food crops, estate crops, horticulture, livestock, biotechnology, and postharvest activities. In 2003, these nine centers combined spent 25 percent of the country's total agricultural R&D expenditures and employed 45 percent of total agricultural research staff. The Indonesian Research Institute for Estate Crops (IRIEC) is a semi-public R&D agency that is linked to IAARD, but not formally part of it. The institute conducts research on Indonesia's principal plantation crops (rubber, oil palm, tea, cocoa, coffee, and sugarcane) and is single-handedly by far the largest agricultural R&D agency in the country in terms of research expenditures (20 percent). The other five government agencies involved in agricultural research are small in size in terms of their expenditures and staffing. The Forestry Research and Development Agency (FORDA), on the other hand, is the archipelago's principal government agency involved in forestry research. The higher education sector (dominated by Bogor Agricultural University) plays a fairly important role in Indonesia as well, accounting for 24 percent of the country's public agricultural R&D staff. The nonprofit sector plays only a negligible role in Indonesia's agricultural research.

Table 1—Composition of public agricultural research expenditures and total researchers, 2003

Type of agency	Spending: 2000 Indonesian rupiahs (*millions*)	Spending: 2000 international dollars (*millions*)	Researchers (*fte's*)
Government agencies	358,229.1	178.8	3,349.1
Nonprofit agencies	68.6	0.03	2.4
Higher education[a]	149,900.9	74.8	1,541.1
Public-sector total	**508,198.8**	**253.6**	**4,892.6**

Sources: Stads et al. (2007) based on ASTI survey data .

[a] Expenditures for the higher education sector in our sample are estimates based on average expenditures per researcher at the government agencies.

During the period 1994–2003, total agricultural research staff in our sample of 58 public-sector agricultural R&D agencies decreased at an average rate of 0.5 percent per year (Figure 1a). This overall rate masks differences among institutional categories. Total research staff at the nine IAARD agencies combined and IRIEC show a consistent decline throughout this period, while the total number of researchers at FORDA and the higher education sector rose steadily. As a result, the relative shares of the various public agricultural research staff categories shifted considerably during 1994–2003. The share that the nine IAARD agencies (excluding IRIEC) occupy in total fte research staff has consistently declined from nearly 58 percent in 1994 to 49 percent in 2003. Similarly, the share of IRIEC dropped from 6 to 5 percent throughout the same period. FORDA's corresponding share, on the other hand, rose steadily from 7 percent in 1994 to 11 percent in 2003, following important recruitment efforts. The share of the higher education agencies also grew from 26 to 32 percent during 19994-2003.

In 2003, 28 percent of the total public agricultural research staff were women, similar to the share recorded in other Southeast Asian countries.

During 1994–2003, agricultural R&D investments for the sample of 58 public R&D agencies declined by an average of 6.9 percent annually from $289 million to $254 million (Figure 1b). Spending fell drastically during 1997–98, as a result of the Asian financial crisis. Total spending rebounded somewhat in recent years, but the 2003 total spending level (in real terms) was still well below the levels recorded a decade earlier.

The breakdown of agricultural R&D expenditures by institutional category in our sample differed noticeably from the

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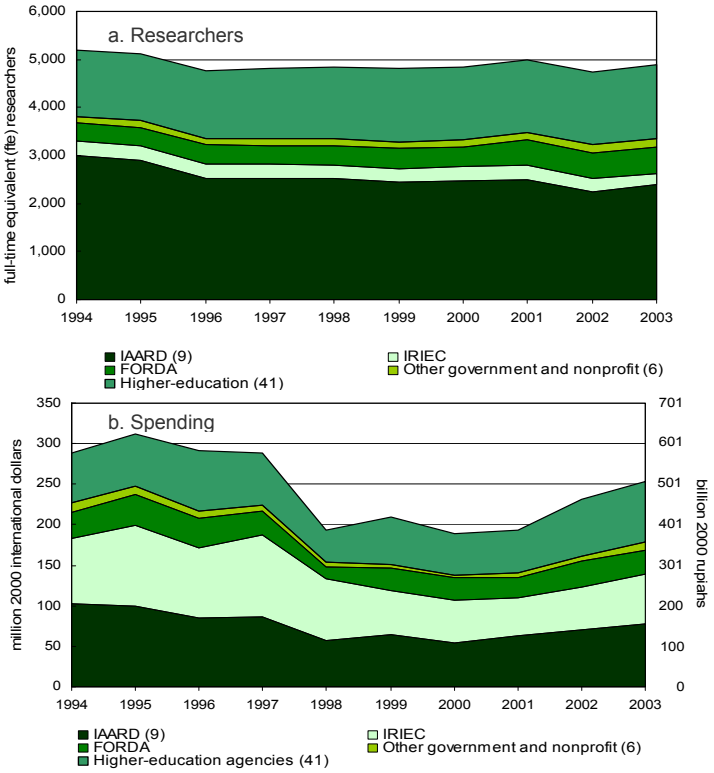
agencies accounted for a quarter of total agricultural R&D expenditures compared with 45 percent of total fte research staff, while IRIEC had 20 percent of the expenditures and just 4 percent of the fte researchers, reflecting IRIEC's stronger financial situation compared with the IAARD agencies. The institutional breakdown of fte researchers and spending for the other government, nonprofit, and higher education agencies were more or less the same.

Figure 1—Public agricultural R&D trends, 1994–2002



Sources: Stads et al. (2007) based on ASTI survey data.
Notes: See Table 1. Figures in parentheses indicate the number of agencies surveyed in each category.

A Regional Perspective

Indonesia accounted for less than 2.5 percent of the Asia–Pacific region's total agricultural R&D spending in 2000 (excluding OECD countries), lower than the share recorded in 1981 and 1991 (Table 2). Indonesia was hit particularly hard by the Asian financial crisis, and its share in regional agricultural R&D spending has fallen as a result.

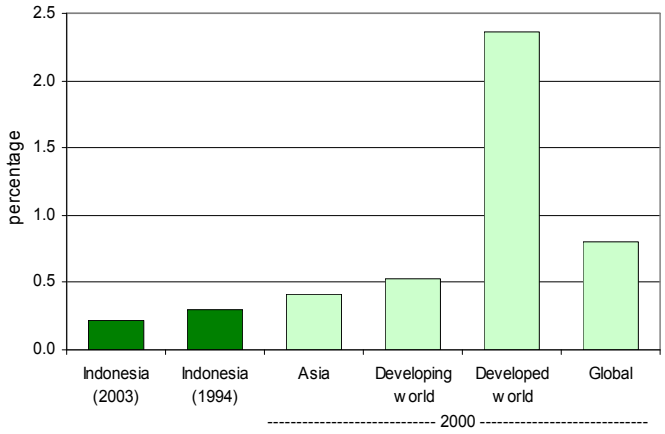
Table 2—Public agricultural R&D spending in Asia-Pacific, 1981–2000

	1981	1991	2000
Total spending	(*million 2000 international dollars*)		
Indonesia	206.7	251.1	188.8
China	1,049	1,733	3,150
India	533	1,004	1,858
Asia-Pacific (28 countries)	*3,047*	*4,847*	*7,523*
Shares	(*percentages*)		
Indonesia	6.8	5.2	2.5
China	34.4	35.8	41.9
India	17.5	20.7	24.7
Other Asia-Pacific (25 countries)	41.3	38.4	30.9

Sources: Stads et al. (2007) and Pardey et al. (2006).
Note: Asia-Pacific excludes Australia, Japan, and New Zealand.

Total public spending as a percentage of agricultural output (Agricultural GDP) is a commonly used indicator of a county's research investment levels and a useful means of comparing agricultural R&D spending across countries. In 2003, Indonesia invested $0.22 for every $100 of agricultural output, which represented a drop of nearly 30 percent compared with its corresponding 1994 ratio of 0.30 (Figure 2). The comparable 2000 averages reported for Asia and the developing world as a whole were 0.41 and 0.53, respectively.

Figure 2—Indonesia's public agricultural research intensity compared regionally and globally



Sources: Indonesia data are compiled from Figure 1; Agricultural GDP data are from World Bank (2005); all other intensity ratios are from Pardey et al. (2006).

Private-Sector Investments

Compared to most countries in the Asia-Pacific region, the private sector plays a relatively important role in conducting agricultural R&D in Indonesia. Based on the sample agencies for which data were available and estimates made for omitted agencies, 19 percent of the country's total agricultural R&D spending was attributed to the private sector in 2003 (Table 3).

Table 3—Estimated public and private expenditures, 2002

	2000 Indonesian rupiahs	2000 international dollars	Share
	(*millions*)		(*percentage*)
Public agencies	508,198.8	253.6	81.1
Private agencies	118,676.8	59.2	18.9
Total	**626,875.5**	**312.8**	**100.0**

Sources: Stads et al. (2007) based on ASTI survey data.

References

Pardey, P. G., N. M. Beintema, S. Dehmer, and S. Wood. 2006. *Science for agriculture: A growing global divide?* St. Paul and Washington, D.C.: University of Minnesota and International Food Policy Research Institute (forthcoming).

Stads, G. J., Haryono, and S. Nurjayanti. 2007. *Agricultural R&D in the Indonesia: Policy, investments, and institutional profile.* ASTI Country Report. Washington, D.C.: IFPRI and IAARD.

World Bank. 2005. *World development indicators 2005*. Washington, D.C. CD–ROM.