BRAZIL

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KEY INDICATORS, 2006–2013

Total Agricultural Research Spending	2006		2009		2013
Reais (million constant 2011 prices)	2,718.1		3,689.0		3,977.8
PPP dollars (million constant 2011 prices)	1,847.7		2,507.7		2,704.0
Overall Growth	|	**36%**	|	**8%**	|
Total Number of Agricultural Researchers					
Full-time equivalents (FTEs)	5,359.4		5,262.2		5,869.4
Overall Growth	|	**–2%**	|	**12%**	|
Agricultural Research Intensity					
Spending as a share of agricultural GDP	1.77%		2.10%		1.82%
FTE researchers per 100,000 farmers	43.98		46.35		57.48

Notes: Research conducted by the private for-profit sector is excluded from this factsheet due to lack of available data. Acronyms, definitions, and an overview of agricultural R&D agencies are provided on page 4.

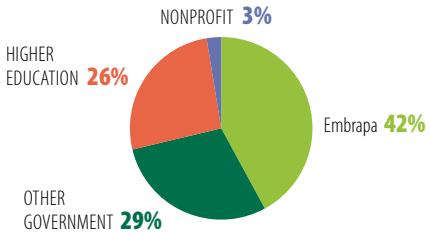
- Brazil's agricultural research system is by far the region's largest, in terms of both research capacity and spending. Almost half of all agricultural researchers are employed by the federal government agency, Embrapa, and a further quarter are employed by the state agricultural research organizations (OEPAS).
- During 2006–2013, agricultural R&D spending rose by 46 percent due to growth at Embrapa and in the higher education sector, particularly among federal universities. At 1.82 percent, spending as a share of AgGDP is the highest in Latin America.
- Brazil employs the largest number of PhD-qualified agricultural researchers in the region, and its share of researchers with PhD degrees, at 73 percent, is the highest by far.

FINANCIAL RESOURCES, 2013

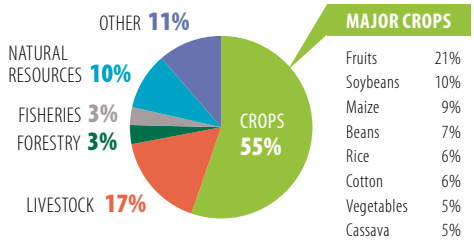
Spending Allocation	
Salaries	77%
Operating and program costs	16%
Capital investments	8%
Funding Sources	
Government	98%
Sales of goods and services	2%

Note: Shares are based on data for Embrapa centers only.

INSTITUTIONAL PROFILE, 2013

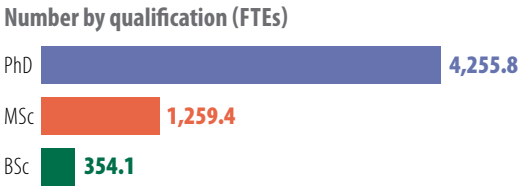


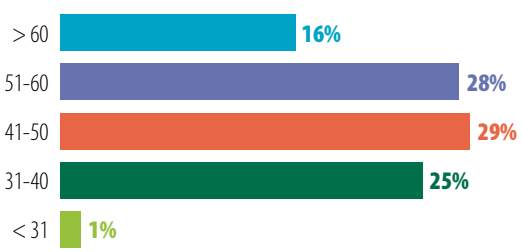
RESEARCH FOCUS, 2013



Notes: Major crops include those that are the focus of at least 5 percent of all crop researchers; 31 percent of total crop researchers focused on a wide variety of other crops.

RESEARCHER PROFILE, 2013





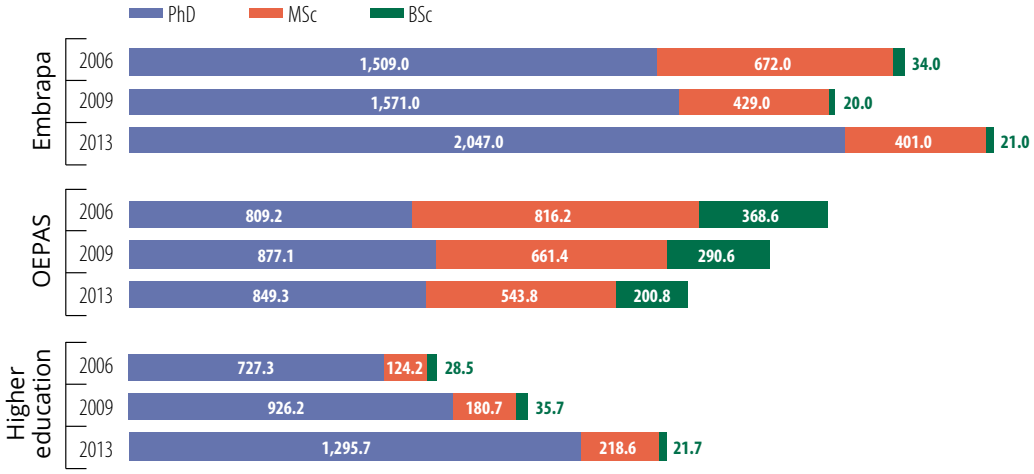
TREND

- From 2005 to 2009, a number of Embrapa researchers accepted early retirement packages, reducing the overall number of researchers. Between 2009 and 2013, however, recruitment accelerated with the opening of new units in different states, such as Mato Grosso, Tocantins, and Maranhão, and the strengthening of priority areas which has expanded researcher numbers at Embrapa by several hundred. Meanwhile, the total number of researchers at OEPAS declined because of hiring constraints by the state governments. During the same period, the number of researchers employed at the country's higher education sector grew significantly, both due to the expansion of existing federal universities and the establishment of new ones.

OBSERVATION

- Agricultural research staffing and qualification levels at Embrapa, OEPAS, and higher education agencies in Brazil far exceed the levels of agricultural research agencies in other countries in the region.

Number of researchers by qualification level, 2006, 2009, and 2013 (FTEs)



Embrapa's emphasis on training its existing staff and recruiting scientists with PhD degrees has generated substantial improvements in the overall qualification levels of its researchers (and many of its retiring researchers held only BSc or MSc degrees). As a result, the number of PhD-qualified researchers employed at Embrapa rose by 36 percent during 2006–2013, whereas the number qualified to the BSc- and MSc-degree level declined by more than half. Of note, a significant number of Embrapa's technicians and other research support staff also hold postgraduate degrees. The number of PhD-qualified researchers at OEPAS increased slightly from 2006 to 2013; like Embrapa, most of the overall decline occurred among BSc- and MSc-qualified researchers. The growth in FTE researchers in the higher education sector occurred at both the PhD- and MSc- levels.

A NEW ALLIANCE FOR RESEARCH AND INNOVATION

Embrapa's principal challenge is to improve partnerships among the country's main agricultural research institutions. Embrapa coordinates the National Agricultural Research System (SNPA), which comprises OEPAS, universities, and other government, nonprofit, and private agencies involved in agricultural research. However, this system was developed in the 1970s and 1980s and has weakened over time. In 2015, led by Embrapa, the institutions began working on an initiative to transform SNPA into an "Alliance for Innovation." The objective is to integrate, align, and articulate priorities among the different participants in the research and innovation process. Some of the main considerations are a common research and innovation agenda; a more integrated and coordinated approach, such as shared laboratories; and new ways of funding research.

CROSS-COUNTRY COMPARISONS OF KEY INDICATORS

	Total number of researchers, 2013 (FTEs)	Growth in number of researchers, 2009–2013	Share of PhD researchers, 2013 (FTEs)	Total spending, 2013 (million 2011 PPP dollars)	Overall spending growth, 2009–2013	Spending as a share of AgGDP, 2013
Brazil	**5,869.4**	**12%**	**73%**	**2,704.0**	**8%**	**1.82%**
Argentina	5,824.5	18%	21%	732.1	26%	1.29%
Colombia	1,102.9	3%	23%	253.7	33%	0.79%
Mexico	3,967.4	1%	47%	710.4	–1%	1.05%

Note: Please visit *www.asti.cgiar.org/benchmarking/lac* to benchmark Brazil with other countries in Latin America and the Caribbean or compare the country's key indicators with regional averages.

CHALLENGE

- Agricultural R&D in Brazil has benefited tremendously from strong financial support by the federal and state governments, in an environment of remarkable economic growth since the early 2000s. With the recent economic slowdown, the question will be whether budget cuts may begin to constrain agricultural R&D agencies. Some government agencies and universities that do not have a resilient funding base have faced uncertainty and concern over budget cuts in 2015 and 2016.

POLICY OPTION

- In addition to the ongoing challenges of poverty reduction and sustainable agricultural production, Brazil is facing many emerging agriculture-related challenges, such as food and energy security, demographic transformation (in terms of urbanization and an aging population), climate change, and water availability. To meet these challenges, and maintain the significant progress the country has made in recent years, consistent levels of research funding will be crucial. Diversification of funding sources may be one option to compensate for budget shortfalls.

Embrapa and OEPAS's spending by cost category, 2007, 2010, and 2013

	EMBRAPA			OEPAS (8)		
	2007	2010	2013	2007	2010	2013
	inflation-adjusted (million 2011 reais)					
Salaries	1,151.4	1,353.3	1,698.9	308.6	318.0	303.5
Operating and program costs	323.2	421.3	348.8	75.4	68.4	57.1
Capital investments	129.4	289.9	168.1	7.6	38.2	24.3
Total	1,604.0	2,064.6	2,215.9	391.6	424.5	384.9

Note: Number in parentheses indicates the number of agencies included in the sample (accounting for 69 percent of total OEPAS spending in 2013): São Paulo Agency for Agribusiness Technology; Agricultural Research Corporation of Minas Gerais; State Agricultural Research Corporation of Paraíba; Agricultural Research Corporation of Rio Grande do Norte; State Agricultural Research Foundation of Rio Grande do Sul; Agronomic Institute of Paraná; Pernambuco Agricultural Research Institute; and Agricultural Research Company of the State of Rio de Janeiro.

▲ Shares of spending fluctuated from year-to-year but on average, Embrapa and OEPAS spent 72 percent of their total funding on salaries, 18 percent on operating and program costs, and 10 percent on capital investments during 2007–2013.

▶ AGRICULTURAL RESEARCH FUNDING

During 2007–2013 the federal government contributed the majority of funding to Embrapa, supplemented by the sale of goods and services, such as contract research for the private and nonprofit sectors, and by loans from development banks. OEPAS are also primarily funded by the federal and state governments, with a small share generated by the sale of goods and services. In general, OEPAS are not as well-funded as Embrapa, but their financial circumstances vary considerably by state.

▶ ASSESSING EMBRAPA'S IMPACT

Since 1997, Embrapa has published an annual Social Report, a strategic document that presents the results and impacts of its research (http://bs.sede.embrapa.br/2013). For 2013, the report contains an assessment of the social, environmental, and economic impacts of 102 technologies and 230 cultivars developed and disseminated across Brazil. The economic impact of these technologies was estimated at 20.75 Brazilian Real (R$) billion. Considering the relationship between Social Profit and Net Revenue, for each R$ invested in 2013, Embrapa generated R$9.07 in social returns to Brazil, with a 43.4 percent internal rate of return. These social impacts included the creation of 74,544 jobs in 2013. Embrapa's impact over the course of its existence can therefore be inferred, given that the corporation has developed and disseminated thousands of technologies, products, and services across Brazil over time.

Varieties registered, by institution, 2007–2013

SECTOR/AGENCY	2007	2008	2009	2010	2011	2012	2013
Embrapa	72	40	93	53	101	72	59
Embrapa with partners	5	0	7	6	15	1	9
OEPAS	79	60	30	34	39	28	63
Higher education	12	17	11	2	5	8	11
Private (for-profit) sector	854	1,076	939	963	995	1,012	1,722
Total	1,022	1,193	1,080	1,058	1,155	1,121	1,864

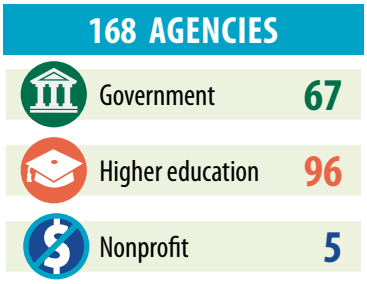
▲ The number of cultivars registered in Brazil grew by 82 percent during 2007–2013. In 2013, 92 percent of the cultivars were registered by private companies, and the main crops were corn, soybeans, and tomatoes. In addition to conducting research, Embrapa and OEPAS organized training and information sharing activities designed to promote the dissemination and adoption of technologies.

Knowledge transfer activities by Embrapa and OEPAS, 2013

ACTIVITY/OUTPUT/ PARTICIPATION	EMBRAPA	OEPAS	TOTAL
	Number of events/outputs/participants		
Training events conducted	936	1,172	2,108
Field days organized	917	770	1,687
Producer events conducted	2,257	1,067	3,324
Participants trained	24,835	17,035	41,870

OVERVIEW OF BRAZIL'S AGRICULTURAL RESEARCH AGENCIES

As of 2013, 168 agencies were identified as conducting agricultural R&D in Brazil. Embrapa, the country's primary agricultural research agency (employing 2,469 FTE researchers in 2013), is a federal-level semiautonomous corporation that operates 17 central units in Brasília and 46 decentralized units throughout the country. In 2013, Embrapa employed 42 percent of the country's agricultural researchers, predominantly focusing on crop research (mostly fruit, soybeans, and maize). Other government research agencies include 16 state (OEPAS) agencies, the largest of which are the São Paulo Agency for Agribusiness Technology (498 FTEs in 2013), the Agricultural Research and Rural Extension Corporation of Santa Catarina (263 FTEs), and the Agricultural Research Corporation of Minas Gerais (167 FTEs). The higher education sector in Brazil comprises 96 federal and state universities, colleges, university research centers, agricultural faculties, and smaller agencies. One of the largest is the University of São Paulo (138 FTEs). Nonprofit agencies play a small role in agricultural research in Brazil, accounting for less than 3 percent of the country's agricultural researchers. Private (for-profit) research is significant (mainly by multinational corporations), but data on these activities are not accessible.



Note: Excludes private for-profit agencies.

For a complete list of the agencies included in ASTI's dataset for Brazil, visit **www.asti.cgiar.org/brazil**.

ASTI DATA PROCEDURES AND METHODOLOGIES

- The **data underlying this factsheet** were predominantly derived through primary surveys, although some data were drawn from secondary sources or were estimated.
- **Agricultural research** includes research conducted by the government, higher education, and nonprofit sectors; Research conducted by the private for-profit sector is excluded due to lack of available data.
- ASTI bases its calculations of human resource and financial data on **full-time equivalent (FTE) researchers**, which take into account the proportion of time staff actually spend on research compared with other activities.
- ASTI presents its financial data in 2011 local currencies and **2011 purchasing power parity (PPP) dollars**. PPPs reflect the relative purchasing power of currencies more effectively than do standard exchange rates because they compare prices of a broader range of local—as opposed to internationally traded—goods and services.
- ASTI estimates the **higher education sector's research expenditures** because it is not possible to isolate them from the sector's other expenditures.
- Note that, due to **decimal rounding**, the percentages presented can sum to more than 100.

For more information on ASTI's data procedures and methodology, visit **www.asti.cgiar.org/methodology**; *for more information on agricultural R&D in Brazil, visit* **www.asti.cgiar.org/brazil**.

ACRONYMS USED IN THIS FACTSHEET

AgGDP	Agricultural gross domestic product
Embrapa	Brazilian Agricultural Research Corporation
FTE(s)	Full-time equivalent (researchers)
OEPAS	State Agricultural Research Organizations
PPP(s)	Purchasing power parity (exchange rates)
SNPA	National Agricultural Research System
R&D	Research and development

ABOUT ASTI, IFPRI, AND EMBRAPA

Working through collaborative alliances with numerous national and regional R&D agencies and international institutions, **Agricultural Science and Technology Indicators (ASTI)** is a comprehensive and trusted source of information on agricultural R&D systems across the developing world. ASTI is led by the **International Food Policy Research Institute (IFPRI)**, which—as a CGIAR member—provides evidence-based policy solutions to sustainably end hunger and malnutrition and reduce poverty. The **Brazilian Agricultural Research Corporation (Embrapa)** is Brazil's principal agricultural research agency; the institute falls under the Ministry of Agriculture, Livestock, and Food Supply and focuses on the development of a tropical agriculture and livestock model for the production of food, fiber, and energy.

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