Agricultural R&D Indicators Factsheet | November 2015

ASTI led by IFPRI

PAKISTAN

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KEY INDICATORS, 2000–2012

Total Agricultural Research Spending	2000		2009		2012
Pakistani rupees (million constant 2011 prices)	5,737.2		7,534.6		8,120.2
PPP dollars (million constant 2011 prices)	236.2		309.5		333.6
Overall Growth	|	**31%**	|	**8%**	|
Total Number of Agricultural Researchers					
Full-time equivalents (FTEs)	3,453.7		3,555.3		3,678.3
Overall Growth	|	**3%**	|	**3%**	|
Agricultural Research Intensity					
Spending as a share of agricultural GDP	0.20%		0.19%		0.18%
FTE researchers per 100,000 farmers	18.47		14.79		14.43

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.

- Over the past decade, growth in Pakistan's agricultural R&D spending has been modest but erratic.
- The country's total number of agricultural researchers grew slightly in recent years, mostly due to increased involvement in agricultural R&D by universities; however, relative to its South Asian neighbors, Pakistan has a low share of PhD-qualified agricultural researchers.
- The complex structure of agricultural research and extension at district, provincial, and federal levels complicates the coordination of research and the dissemination of its outputs; it also gives rise to costly duplication of effort.

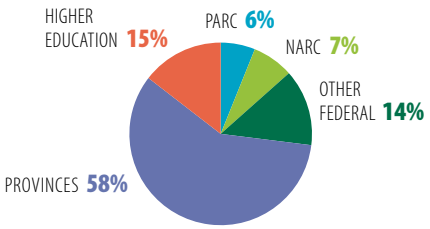
FINANCIAL RESOURCES, 2012

Spending Allocation

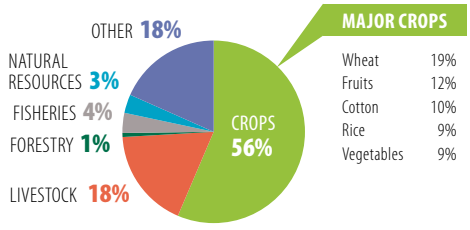
Salaries	78%
Operating costs	18%
Capital investments	3%

Note: Shares are based on federal and provincial government agencies only.

INSTITUTIONAL PROFILE, 2012



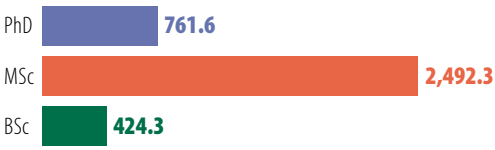
RESEARCH FOCUS, 2012



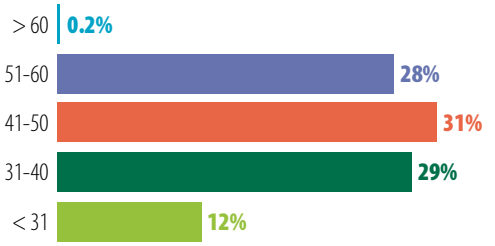
Notes: Major crops include those that are the focus of at least 5 percent of all crop researchers; 41 percent of total crop researchers focused on a wide variety of other crops.

RESEARCHER PROFILE, 2012

Number by qualification (FTEs)



Share by age group (years)



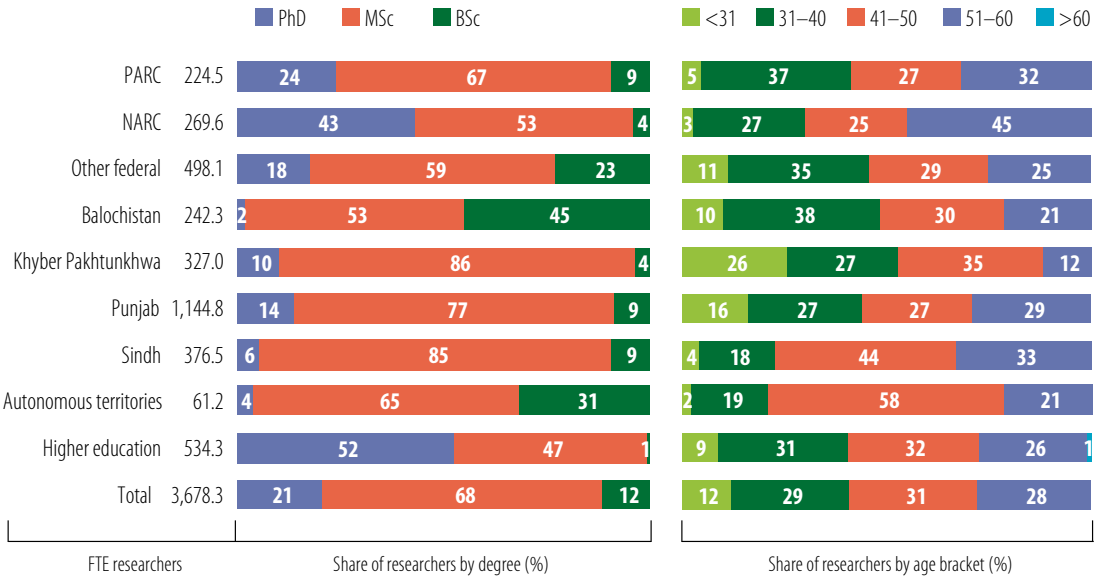
CHALLENGE

- Pakistan's capacity to deliver effective agricultural research outputs is hindered by critical human resource challenges. Long-term recruitment restrictions have left many federal and provincial research agencies with aging pools of researchers. Given the official retirement age of 60 years, large-scale capacity losses are imminent in the coming years. Moreover, limited opportunities for promotion and training, as well as a lack of performance-based merit systems, constitute key impediments to staff motivation.

POLICY OPTION

- Forthcoming ministerial approval for the recruitment of a limited number of researchers is indicated, which would allow PARC and NARC to fill their most pressing vacancies. It remains critical, however, that investments be made in staff training in order to counteract the imminent loss of senior researchers to retirement. In addition, the government should create and monitor performance standards for federal and provincial researchers and introduce a system of performance-based promotions and salary levels.

Distribution of agricultural researchers by degree and age bracket, 2012



- Close to 60 percent of agricultural researchers are employed at provincial agencies. On average, federal government agencies and universities employ much higher shares of PhD-qualified scientists than do provincial agencies. Balochistan, Sindh, and the autonomous territories, in particular, lack a critical mass of agricultural researchers with PhD degrees.
- A sizable share of Pakistan's agricultural researchers are approaching the mandatory retirement age of 60 years, especially those who are PhD-qualified. Severe staff shortages are anticipated in key disciplines. Unlike universities, government agencies are unable to employ retired researchers as consultants.

DECENTRALIZATION HAS YET TO STRENGTHEN PROVINCIAL AGRICULTURAL R&D

Following a major amendment to the constitution in 2010, agricultural sector responsibilities were devolved to the provinces, where research systems gained a clearer mandate in science, technology, and innovation. Yet, there is little evidence to suggest that provincial research systems have been significantly strengthened through this restructuring. The majority of donor funding continues to be channeled to Islamabad, with very little reaching provincial agencies.

Average researcher qualifications at provincial R&D agencies are considerably lower than those of researchers located at federal government and higher education agencies because average salary levels in the provinces are considerably lower. This, in addition to restricted recruitment and training and lack of performance-based incentives make the provincial agencies less attractive as employers. In Punjab province, for example, Ayub Agricultural Research Institute has about 200 staff vacancies, but obtaining government approval to fill these positions is difficult. Similarly, obtaining a "no objection certificate" from the provincial ministry for staff to undertake PhD training or attend short conferences is challenging, even when staff have secured their own funding for such activities. These administrative inefficiencies pose a severe burden on the long-term effectiveness of provincial R&D.

TRAINING THE NEXT GENERATION OF AGRICULTURAL RESEARCHERS

UAF is the only Pakistani institution to be ranked within the top 100 global universities in the field of agricultural science. As of 2015, the university employed 450 PhD-qualified scientists (in headcounts), representing a substantial increase over the 2010 level of just 150. Over the next ten years, UAF is expected to graduate an additional 100 PhD-qualified scientists per year, most of whom will only be in their thirties. Significant numbers of PhD-qualified scientists will also graduate from other universities in Pakistan. Over time, this steady inflow of locally trained—although comparatively inexperienced—agricultural scientists could remedy the country's acute capacity needs; however, some argue that the Higher Education Commission awards PhD scholarships without a satisfactory assessment of capacity strengthening priorities. For example, Pakistan severely lacks horticultural breeders, entomologists, plant pathologists, and virologists.

CHALLENGE

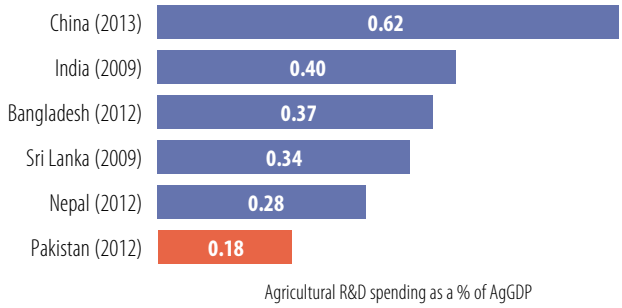
- Despite various policy reforms instituted over the past decade, Pakistan remains vulnerable to food insecurity, and agricultural R&D investment remains too low to address this challenge. In 2012, Pakistan invested just 0.18 percent of its agricultural GDP in agricultural R&D—considerably less than its South Asian neighbors and only a fraction of the internationally proclaimed target of at least 1 percent.

POLICY OPTIONS

- To address the country's agricultural productivity challenges, Pakistan needs to increase its investments in strategic agricultural research areas. The government needs to clearly define its long-term R&D priorities and secure sustained funding, not only in support of salary-related expenditures, but also to cover the day-to-day costs of operating research programs. More creative mechanisms also need to be explored to stimulate private funding for agricultural R&D.

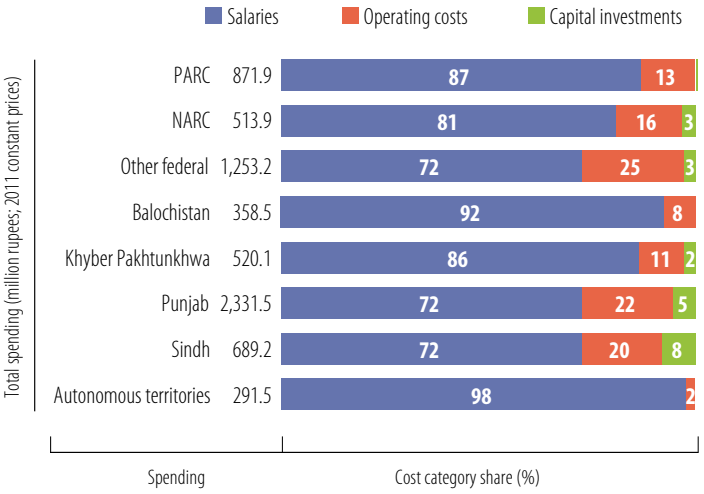
Investing just 0.18 percent of its agricultural output in agricultural R&D in 2012, Pakistan has one of the lowest agricultural R&D intensity ratios worldwide.

Agricultural R&D intensity ratios



On average, in 2012 salaries accounted for close to 80 percent of total expenditures by federal and provincial government agencies. This proportion is immense, particularly coupled with Pakistan's low agricultural R&D intensity ratio. Few resources are available to fund the day-to-day operation of research programs or to maintain/upgrade R&D infrastructure and equipment.

Allocation of government agencies' agricultural R&D expenditures by cost category, 2012



PRINCIPAL FUNDING SOURCES OF PAKISTANI AGRICULTURAL R&D

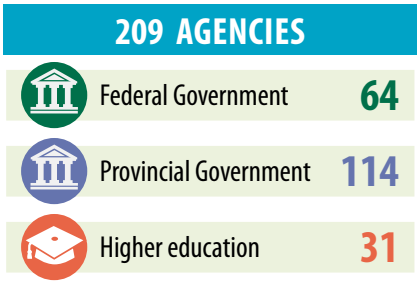
- ALP and its funding mechanism, AREF, have been operating in Pakistan since 2000. The endowment, which is managed by PARC and funded through the sale of wheat donated by the United States government, supports agricultural R&D in a number of priority areas across crop and animal sciences, natural resources, and social sciences.
- RADP receives funding from the Public Sector Development Program, a government mechanism for financing development projects. In turn, RADP funds research activities conducted by PARC under 22 priority areas. RADP also funds capacity strengthening and the maintenance and rehabilitation of R&D equipment.
- Funded by the United States and implemented in close collaboration with a number of CGIAR centers, AIP is intended to encourage the adoption of new agricultural technologies and create farm-based employment throughout Pakistan.
- Funded by Australia, ASLP is enhancing the ability of Pakistan's R&D and extension system to deliver targeted and practical research outputs to farmers and agribusiness.
- Other important donors include the governments of Canada, China, France, Germany, and Japan and various CGIAR centers.
- All internally generated resources through the sale of goods and services are channeled back to the national Treasury, which creates a disincentive for agricultural R&D agencies to pursue this revenue stream.

PRIVATE-SECTOR AGRICULTURAL RESEARCH

The role of the private sector in agricultural research in Pakistan is growing, in terms of research conducted by companies in-house and research outsourced to the public sector. UAF and other universities operate "business incubation centers" to accelerate the successful development of startup and fledgling companies by providing entrepreneurs with an array of targeted resources and services. The private sector plays a critical role in importing new hybrid technologies (mostly from China and India), especially for Bt rice, cotton, and wheat. Nonetheless, many foreign seed companies remain reluctant to invest in Pakistan because legislation is currently insufficient to protect intellectual property and plant breeders' rights. In addition, the country offers no tax incentives in support of private-sector R&D. One major impediment is the increasing difficulty of attaining approval for new crop varieties since the 2010 devolution of agriculture to the provinces. Board members on provincial seed councils in charge of approving new varieties often represent organizations that directly compete with private companies, thereby creating a conflict of interest. These nontransparent procedures will need to be addressed in order to stimulate private-sector investment in agricultural research.

OVERVIEW OF PAKISTAN'S AGRICULTURAL RESEARCH AGENCIES

With the exclusion of the private sector, 209 agencies conduct agricultural research in Pakistan. The country's principal agricultural R&D agency, PARC, has a broad mandate to coordinate research among federal, provincial, and higher education agencies. PARC operates 12 satellite institutes and oversees a number of research agencies located across the country. NARC is one of the largest of these, and in turn oversees a number of its own research institutes. Including NARC, PARC accounts for 13 percent of the country's total agricultural research capacity. A number of other federal agencies conduct agricultural R&D administered by various ministries. Combined, they accounted for 14 percent of the country's agricultural research capacity in 2012. Punjab, the largest province, accounts for 1,145 FTE researchers and is home to PARB, a provincial body that guides research planning and resource allocation, and the Ayub Agricultural Research Institute, which manages 28 crop-related research institutes and units employing half the province's agricultural researchers. In 2012, provincial agencies in Balochistan, Khyber Pakhtunkhwa, and Sindh employed 242, 327, and 377 FTE researchers, respectively. The higher education sector accounted for 15 percent of the nation's agricultural research capacity in 2012, representing a substantial increase over levels in the early 1990s. UAF is by far the largest agricultural university in Pakistan; it operates the Division of Education and Extension and the Water Management Research Centre, along with six faculties that conduct agricultural research. Other major agricultural universities include Sindh Agriculture University Tandojam, Agricultural University Peshawar, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi, and the University of Veterinary and Animal Sciences at Lahore. A number of private companies have active breeding programs focused in areas including *Bt* cotton, hybrid maize, vegetables, and several other crops.



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

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 Pakistan, visit* **www.asti.cgiar.org/pakistan**.

ACRONYMS USED IN THIS FACTSHEET

AIP	Agricultural Innovation Program for Pakistan
ALP	Agricultural Linkages Program
AREF	Agricultural Research Endowment Fund
ASLP	Australia Pakistan Agriculture Sector Linkages Program
FTE	Full-time equivalent (researchers)
GDP	Gross domestic product
NARC	National Agricultural Research Center
OECD	Organisation for Economic Cooperation and Development
PARB	Punjab Agricultural Research Board
PARC	Pakistan Agricultural Research Council
PPP(s)	Purchasing power parity (exchange rates)
R&D	Research and development
RADP	Research for Agricultural Development Program
UAF	University of Agriculture Faisalabad

ABOUT ASTI, IFPRI, AND PARC

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 **Pakistan Agricultural Research Council (PARC)** is Pakistan's principal agricultural R&D agency. It falls under the Ministry of Food Security and Research and coordinates research among federal, provincial, and higher education agencies.

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