

# TUNISIA

By Gert-Jan Stads, Samira Allani, and Mohamed Mounir Hedri

*This country brief reviews the major investment and institutional trends in public agricultural research in Tunisia since the mid-1990s, based on a new set of survey data collected under the Agricultural Science and Technology Indicators (ASTI) initiative (IFPRI–ISNAR–IRESA 2003–04).<sup>1</sup>*

## INSTITUTIONAL DEVELOPMENTS

Tunisia has a highly diverse economy in which mining, energy, agriculture, tourism, and manufacturing all play important roles. In 2003, the agricultural sector accounted for 12 percent of the country's Gross Domestic Product (GDP) and 8 percent of its export revenues (World Bank 2004). Agriculture also provides employment to nearly a quarter of Tunisia's labor force, supporting rural livelihoods and curbing urban migration (FAO 2004). Given its valuable economic, social, and environmental contributions, agriculture is prominent in Tunisia's socioeconomic development agenda, which stresses regional development (FAO 2004). Consequently, agriculture, along with agricultural research and development (R&D), form important priorities for the Tunisian government. We identified 17 Tunisian agencies involved in agricultural R&D in 2002.<sup>2</sup> These agencies employed 441 full-time equivalent (fte) researchers and spent a combined 30 million 2000 Tunisian dinars on agricultural research—the equivalent of 68 million international dollars in 2000 constant prices (Table 1).<sup>3</sup>

The Agricultural Research and Higher-Education Institute (IRESA)<sup>4</sup> oversees most of the agricultural R&D undertaken by government and higher-education agencies. IRESA was established in 1990 as part of the World Bank-supported Agricultural Research and Extension Project (PRVA). It is a semi-autonomous public

**Table 1—Composition of agricultural research expenditures and total researchers, 2002**

Type of agency	Spending		Researchers <sup>a</sup> (fte's)	Share		Agencies in sample <sup>a</sup> (number)
	2000 Tunisian dinars (millions)	2000 international dollars		Spending (percent)	Researchers	
<i>Public agencies</i>						
IRESA						
Research institutes <sup>b,c</sup>	13.6	30.7	188.3	44.8	42.7	4
Higher-education agencies <sup>d</sup>	8.0	18.0	118.7	26.4	26.9	9
Other research institutes <sup>e</sup>	8.8	19.7	133.9	28.8	30.4	4
<b>Total</b>	<b>30.4</b>	<b>68.4</b>	<b>440.9</b>	<b>100</b>	<b>100</b>	<b>17</b>

Sources: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04); Lasram and Mekni (1999); and INSTM (2004).

<sup>a</sup> See note 2 for a list of the 17 agencies included in this sample.

<sup>b</sup> This analysis excludes resources used by IRESA for the overall management of its agencies.

<sup>c</sup> The 210 staff at the four IRESA research institutes spent between 30 and 100 percent of their time on research, resulting in 188.3 fte researchers.

<sup>d</sup> The 339 researchers holding PhD and MSc degrees at the nine higher-education agencies spent 35 percent of their time on research, resulting in 118.7 fte researchers.

<sup>e</sup> Expenditures for IRA, CBS, and INNNTA are estimates based on average expenditures per researcher at the four IRESA research institutes. Staff at the four other research institutes spent between 15 and 100 percent of their time on research, resulting in 133.9 fte researchers.

## KEY TRENDS

- Total spending and agricultural researcher numbers rose steadily in Tunisia during 1996–2002, although the trend in total spending was more irregular.
- The National Agricultural Research Institute of Tunisia (IRESA) oversees most of the country's agricultural R&D. In 2002, the agency's four research institutes accounted for more than 40 percent of Tunisia's agricultural research staff and expenditures, while its nine higher-education agencies accounted for more than a quarter of all agricultural R&D staff and spending.
- Agricultural research is primarily funded by the government, although three consecutive World Bank projects have had a significant impact on the structure and the organization of the country's agricultural research.
- Most agricultural R&D activities still take place in and around Tunis, but a large-scale decentralization program is in progress with a view to addressing farmer needs and making R&D more demand-driven.
- Private-sector agricultural R&D is nonexistent in Tunisia.

## ABOUT ASTI

The Agricultural Science and Technology Indicators (ASTI) initiative comprises a network of national, regional, and international agricultural R&D agencies and is managed by the International Service for National Agricultural Research (ISNAR) division of the International Food Policy Research Institute (IFPRI). The ASTI initiative compiles, processes, and makes available internationally comparable data on institutional developments and investments in public and private agricultural R&D worldwide, and analyses and reports on these trends in the form of occasional policy digests for research policy formulation and priority setting purposes.

Funding for the ASTI initiative's survey round in North Africa and the Middle East region was provided by the CGIAR Finance Committee/World Bank, IFPRI unrestricted funding, and the U.S. Agency for International Development (USAID).

agency under the Ministry of Agriculture and Water Resources (MARH) that administers four of the country's eight public agricultural research institutes and all nine of its agricultural higher-education agencies (see *A Short History of Agricultural Research in Tunisia* below).<sup>5</sup> IRESA's mandate includes developing agricultural research programs; administering research budgets; facilitating linkages between its research and education agencies, and with agricultural extension agencies and producer organizations; and ensuring the viability of its agencies and the relevance of their research in terms of national agricultural production and development priorities.

IRESA is headquartered in Tunis and operates seven regional branches across the country's agroecological zones: the northeast, subhumid northwest, semi-arid northwest, central east, central west, southwest, and southeast (IRESA 2004). In 2002, IRESA's 13 research and higher-education agencies together accounted for about two-thirds of the country's fte agricultural research staff and expenditures. Each institute is financially autonomous, and each is managed by a director general nominated by MARH, and advised by a scientific council comprising researchers and representatives from socioeconomic and professional organizations.

The National Agricultural Research Institute of Tunisia (INRAT) is IRESA's largest institute in terms of financial resources and fte researcher numbers. INRAT conducts research related to crops and livestock. The institute is headquartered in Tunis and conducts research through 20 centers, laboratories, and experiment stations located across the country. In 2002, INRAT employed 87 fte researchers. The National Research Institute for Water Management, Forestry, and Agricultural Engineering (INRGREF) focuses mainly on water, forestry, agricultural machinery, soil conservation, and new and renewable energy. Also headquartered in Tunis, INRGREF conducts its research at 11 experiment stations across the country, employing 56 fte researchers in 2002. The Olive Tree Institute of Sfax (IO Sfax) undertakes olive tree research related to planting, soils, plant protection, production, and harvesting, along with issues of olive-growing technology and economics.

More recently, IO Sfax has expanded its activities to include research on semi-arid, seed-producing trees. In 2002, the institute employed 36 fte researchers at its headquarters in Sfax and two specialized units in Tunis and Sousse. The Veterinary Research Institute of Tunisia (IRVT) focuses on animal health. It consists of a central laboratory in Tunis and four regional centers in Sousse, Sfax, Gabès, and Bousalem. IRVT employed 9 fte researchers in 2002.

The remaining four (non-IRESA) government institutes involved in agricultural research in Tunisia accounted for approximately 30 percent of both the country's fte researchers and its agricultural R&D expenditures. Three of these agencies are administered by the Ministry for Scientific Research, Technology, and Competency Development (MRSTDC). The National Institute for Aquatic Science and Technology (INSTM) conducts fishery and aquaculture research, and in 2002 employed 73 fte researchers. INSTM is headquartered in Salammbô, a suburb of Tunis, and has nine research stations located across the country (INSTM 2004). The Institute for Arid Regions (IRA), Médénine, conducts research on arid and dry areas, and in 2002 employed 53 fte researchers. The Sfax Center for Biotechnology (CBS) focuses on the production of disease-free plant and material. In 2002, it employed 2.3 fte researchers. The National Institute for Nutrition and Food Technology (INNTA) is administered by the Ministry of Public Health (MSP). While it primarily focuses on medical research, INNTA also conducts agricultural research in areas such as biological plant analysis, food technology, and nutrition policy (Lasram and Mekni 1999). In 2002, INNTA employed 9.5 fte researchers focusing on agricultural issues.

With the creation of IRESA in 1990, Tunisia's agricultural education agencies underwent reorganization. As previously mentioned, the higher-education agencies fall under the dual umbrella of MARH and the Ministry of Higher-Education (MES). IRESA sets the agenda, ensuring that the research and training are in line with national agricultural priorities. In 2002, the nine higher-education agencies accounted for over 25 percent of Tunisia's fte researchers and agricultural R&D

## A Short History of Government-Based Agricultural Research

Agricultural research in Tunisia began over a century ago with the creation of three institutes. The Livestock Laboratory was established in 1897, to become the Veterinary Research Institute of Tunisia (IRVT) in 1970; the Colonial School of Agriculture, Tunis, was established in 1898 and to become the College of Graduate Studies in Agriculture (ENSAT) in 1955; and the Botanic Service of Tunisia was created in 1913 and renamed the Botanic and Agronomic Service of Tunisia (SBAT) in 1936.

After 1956, the year of Tunisia's independence from the French, the national government gave agricultural research and education high priority, and both received important financial support from foreign donors. In 1961, SBAT became the National Agricultural Research Institute of Tunisia (INRAT), working closely with the National Agronomic Research Institute of France (INRA). From the 1960s until the 1980s, multiple research agencies were established to address a vast array of research themes. These agencies included the National Institute for Oceanographic Science and Technologies and Fisheries or INSTOP (1964); the Reforestation Institute (1966), which became the National Forestry Research Institute in 1976; the Rural Engineering Research Center (1974); the Institute for Arid Regions (1976), and the Olive Tree Institute (1981). During the same period, ENSAT developed to become the Tunisian National Institute for Agronomy (INAT). By 1983, agricultural education agencies besides INAT included the National School of Veterinary Medicine (ENMV) and seven schools of higher agricultural studies (ESA).

In 1990, the Tunisian government established the Agricultural Research and Higher-Education Institute (IRESA), which administers the majority of the country's agricultural research. In 1996, CRGR and INRF merged to become the National Research Institute for Water Management, Forestry, and Agricultural Engineering (INRGREF). More recently, IRESA developed a decentralization plan based around seven regional branches. The National Institute for Aquatic Science and Technology (INSTM) was established in 1995, following the merger of INSTOP with the National Center for Aquaculture (CNA). INSTM's origins, however, go as far back as 1924 with the colonial establishment of the Oceanographic Station of Salammbô (SOS).

Source: Lasram and Mekni (1999).

expenditures. The Tunisian National Institute for Agronomy (INAT) is the country's principal agricultural education agency. In addition to its headquarters in Tunis, INAT maintains 80 hectares of agricultural land close to the village of Mornag and an arboretum in Tunis comprising 120 species (INAT 2003). INAT employed 35 fte researchers in 2002. The remaining eight higher-education agencies each employed between 4 and 18 fte researchers focusing on a variety of themes, including veterinary medicine, horticulture, and food industry.

During the late 1990s, two-thirds of all IRESA's researchers were located in Tunis despite the fact that 9 of its 13 agencies (Salmi 1998) and two-thirds of its researchers in the higher-education sector were located regionally. Following recommendations from the World Bank, in 2002 IRESA embarked on a program of decentralizing its research in efforts to better meet farmer needs. The program has involved strengthening regional branches by increasing researcher numbers, investing in infrastructure, and securing funding for regional research programs.

No private agencies in Tunisia were identified as being involved in agricultural research, although IRESA's research agencies work closely with various professional associations and public enterprises, such as the Office for Livestock and Pastures, the Office for Cereals, and the National Office for Olive Oil. INSTM collaborates directly with the Tunisian Gas and Electricity Company (STEG) on the study the effects of increased water temperatures on fish. INSTM also conducts aquaculture research in collaboration with the Fishery Products Association (GIPP). Strong linkages exist among the various IRESA agencies. INAT, for example, works closely with INRAT on arboriculture, cereal, and vegetable research. International collaboration is considered fundamental to the successful development of the national scientific and technological research system. IRESA maintains important bilateral ties with neighboring Maghreb countries—Algeria, Libya, and Morocco—and with Belgium, France, Germany, Italy, Spain, and the United States. IRESA collaborates with the Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD) on themes related to the use of brackish water in agriculture and dromedary breeding. It also undertakes joint research with multilateral scientific partners, mainly in the European Union. Such collaborations involve the management of renewable resources (mainly water), the sustainable increase in agricultural and agro-industrial production, and issues of animal health. Multilateral research teams are drawn from a minimum of two countries to the north and two to the south of the Mediterranean. A variety of research is undertaken by IRESA in collaboration with the International Center for Agricultural Research in the Dry Areas (ICARDA) on themes including cereals, pasture production, and vegetables, along with economic analysis of production systems; with the Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) on the management of natural resources and biological and rainfed agriculture; and with the International Atomic Energy Agency (IAEA) on the use of nuclear techniques in agriculture (IRESA 2004). INSTM secured a number of important multilateral research agreements to study oceanography with the European Union, water resources and aquaculture with the Food and Agriculture Organization of the United Nations (FAO), and marine pollution and biodiversity with the United Nations Environment Programme (UNEP). INSTM also maintains

bilateral agreements with the other Maghreb countries, various European countries, Canada, and Japan (INSTM 2004).

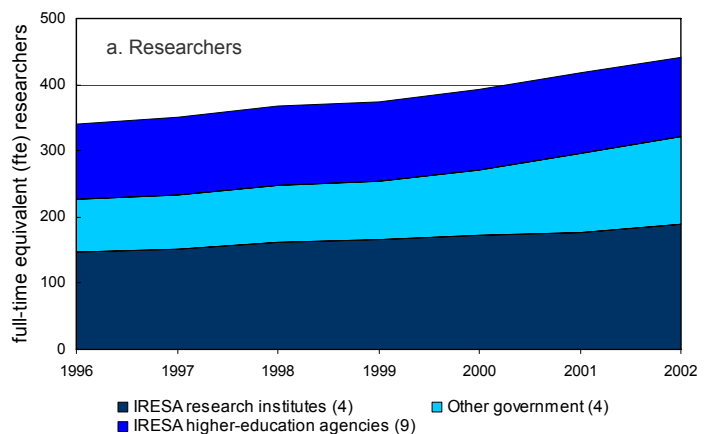
## HUMAN AND FINANCIAL RESOURCES IN PUBLIC AGRICULTURAL R&D

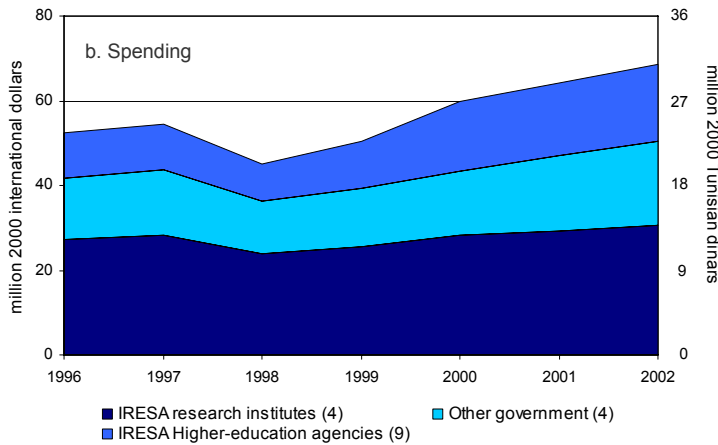
### Overall Trends

Between 1996 and 2002, total agricultural researcher numbers in Tunisia rose by an average of 4.3 percent per year (Figure 1a). Growth occurred at all institutes, though it was much slower at the higher-education agencies (0.8 percent) and generally faster at the non-IRESA government agencies (9.2 percent), led by INSTM. Recruitment of agricultural researchers stagnated prior to 1999 because public service recruitment restrictions were in place. In 1999, however, the government decided to strengthen the agricultural research system, allowing IRESA's research institutes to recruit up to 10 researchers and 10 technicians per year to 2008. The institutes were also able to recruit additional contract research staff using their operating budgets. As a result, total fte researchers at IRESA's four research institutes rose from 166 to 188 in the three years to 2002. Similarly, at INSTM total researcher numbers grew from 32 ftes in 1999 to 73 in 2002. Only six of these ftes represented permanent staff; the remaining 35 were hired on contract following an influx of foreign donor funding.

During 1996–2002, Tunisia's agricultural R&D expenditures grew by an average of 5.1 percent per year, though the overall trend was irregular (Figure 1b). The completion of PRVA in 1997 deflated spending in 1998 to the lowest level of the sample period (\$45 million). Thereafter, given the aforementioned renewed emphasis on agricultural development by the Tunisian government from 1999, total agricultural R&D expenditures began to rebound, reaching \$68 million by 2002. Growth rates of research expenditures varied widely between our three subcategories.

**Figure 1—Long-term composition of public agricultural researchers 1996–2002**

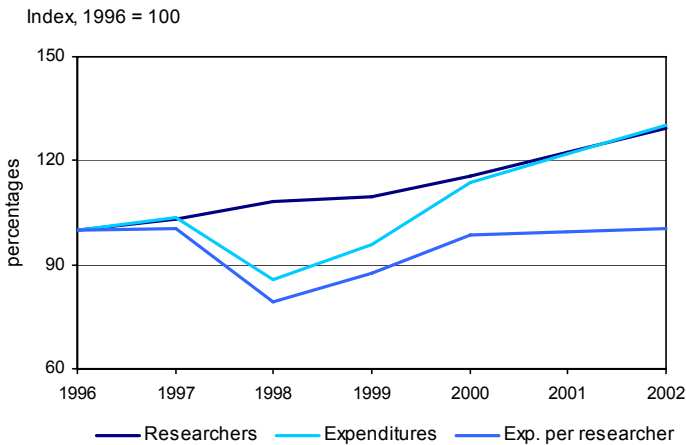




Sources: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04); Lasram and Mekni (1999); MRSTDC (2004); and INSTM (2004).  
Notes: See Table 1. Figures in parentheses indicate the number of agencies in each category. Total researcher numbers and expenditures for IRA, CBS, and INNTA during 1997–2002 have been interpolated. Underlying data are available at the ASTI web site ([www.asti.cgiar.org](http://www.asti.cgiar.org)).

The steady rise in full-time researcher numbers combined with the 1998 decline in expenditures caused spending per researcher to drop from \$154,000 in 1996 to \$123,000 in 1998 (Figure 2). By 2002, expenditures per researcher had returned to \$155,000, though this was still comparatively low. Morocco's expenditures per researcher that year, for example, were \$257,000 (Stads and Kissi 2005). No significant disparities in average expenditures per researcher were recorded across agencies.

**Figure 2—Trends in public expenditures, researchers, and expenditures per researcher, 1996–2002**

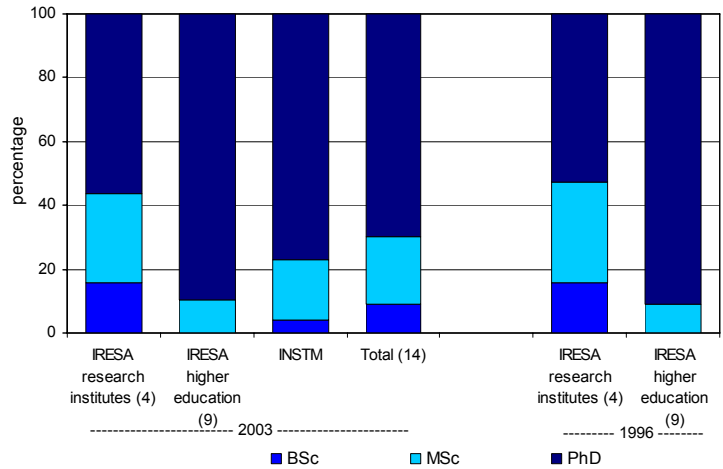


Sources: Figure 1.

## Human Resources

In 2002, based on a 14-agency sample including INSTM and the IRESA agencies, 91 percent of the 362 full-time researchers in Tunisia were trained to the postgraduate level and 70 percent held PhD degrees (Figure 3). By comparison, 34 percent of agricultural researchers in Morocco held PhD degrees in 2002 (Stads and Kissi 2005). Tunisia's particularly high PhD share partly results from the fact that the minimum qualification required for researchers in Tunisia's higher-education agencies is an MSc.

**Figure 3—Educational attainment of researchers, 1996 and 2002**



Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04).

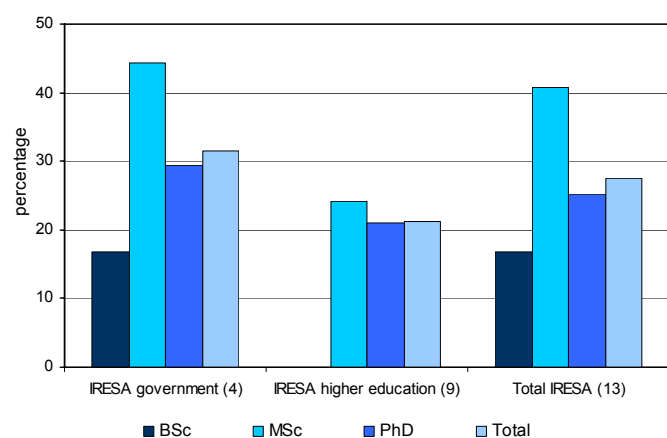
Note: Figures in parentheses indicate the number of agencies in each category.

PhD levels have generally been found to be higher in the education sectors of developing countries worldwide, but additional factors contribute to this differential in Tunisia. Until 1987, researchers at IRESA's four research institutes were classified as MARH executives and their salaries were only half those of researchers at the higher-education agencies. This created a significant incentive for PhD-qualified researchers to seek employment in the education sector (Lasram and Mekni 1999). While this issue was addressed after 1987 through changes to salary structures, an anomaly remained whereby possession of certain foreign *doctorat d'état* degrees secured the highest remuneration, unfairly penalizing those with other PhD degrees. A 1998 statute eliminated the requirement for the *doctorat d'état* at IRESA's higher-education agencies, but equity was not achieved in IRESA's research institutes until 2004.

The share of researchers holding postgraduate degrees at IRESA's four research institutes was 85 percent in 2002, and while the proportions of staff qualifications changed little during 1996–2002, the number of PhD-qualified researchers grew steadily from 78 to 106 full-time equivalents. Over half the agricultural researchers with PhDs were educated abroad, but researchers are increasingly undertaking their PhD training at Tunisian universities, likely in response to the recent statute changes described above. Researcher qualifications at the higher-education agencies also remained stable during 1996–2002, with staff spending about 35 percent of their time on research.

At the 13 IRESA agencies in 2002, an average of 28 percent of all agricultural researchers were female (Figure 4). This is considerably higher than the 2002 shares for Morocco and the average for Sub-Saharan Africa, both of which were 18 percent (Stads and Kissi 2005; Beintema and Stads 2006). In 2002, the share of female researchers was higher at IRESA's four research institutes than at the higher-education agencies. This probably correlates to some extent with the minimum MSc qualification at the education agencies. The same year, of those researchers holding PhD degrees, 30 percent at IRESA's research institutes and 21 percent at the higher-education agencies were female. Both the overall share of female researchers and the share of those holding doctorate degrees are expected to rise further in the near future given that over 50 percent of the currently enrolled students of agriculture are female and many are currently finishing PhD theses.

**Figure 4—Share of female researchers, 2002**



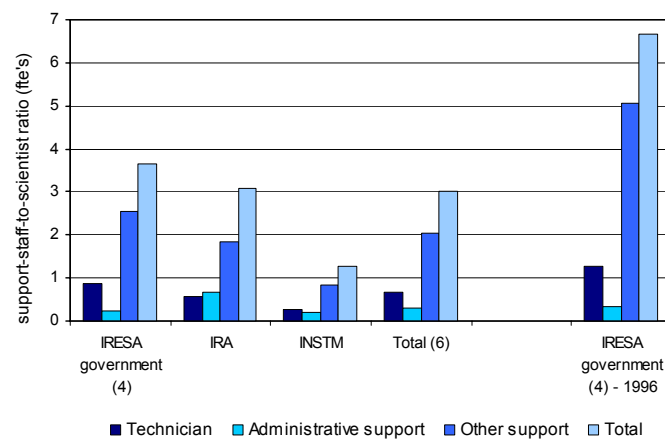
Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04).

Note: Figures in parentheses indicate the number of agencies in each category.

In a 2002 sample including IRESA's four research institutes, IRA and INSTM, the average number of support staff per researcher was 3.0, comprising 0.7 technicians, 0.3 administrative staff, and 2.0 other support staff such as laborers, drivers, and guards (Figure 5). Support-staff-per-researcher ratios for INSTM and IO Sfax—at 1.3 and 2.3, respectively—were much lower than overall Tunisian averages. In 1996, support-staff-per-researcher ratios at the four IRESA research institutes averaged 6.7 compared with only 3.6 in 2002. Declines stemmed from the nonreplacement of retiring staff across all support staff categories, especially the other support category, resulting from the aforementioned government recruitment freeze. This gap was met to some extent through the hiring of temporary workers on contract.

The higher-education agencies employed 0.8 fte technicians per researcher in 2002. Exact numbers of administrative and other staff were unknown. A number of staff with BSc degrees were also involved in agricultural research support activities.

**Figure 5—Support-staff-to-researcher ratios, 1996 and 2002**



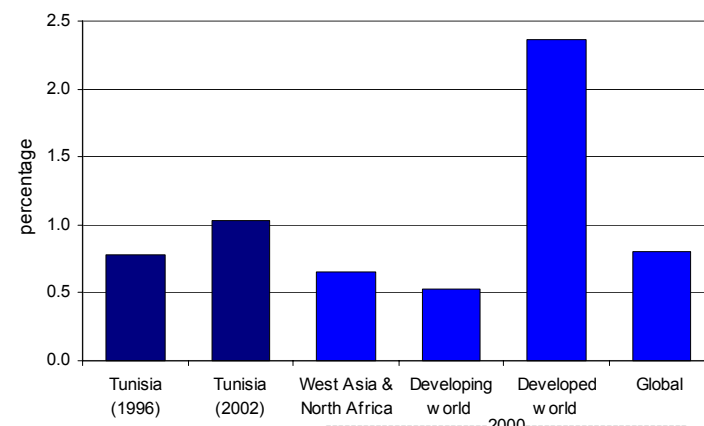
Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04).

Note: Figures in parentheses indicate the number of agencies in each category.

## Spending

Total spending as a percentage of agricultural output (AgGDP) is a commonly used indicator for comparing agricultural R&D spending across countries. In 2002, Tunisia invested \$1.04 for every \$100 of agricultural output (Figure 6). This was an increase over the 1996 ratio of \$0.78 and was also slightly higher than the corresponding 2002 ratio for Morocco of \$0.95 (Stads and Kissi 2005). By way of comparison, the 2000 average intensity ratios for the West Asia and North Africa (WANA) region and the developing world as a whole were 0.66 and 0.53 percent, respectively.

**Figure 6—Tunisia's public agricultural research intensity compared regionally and globally**



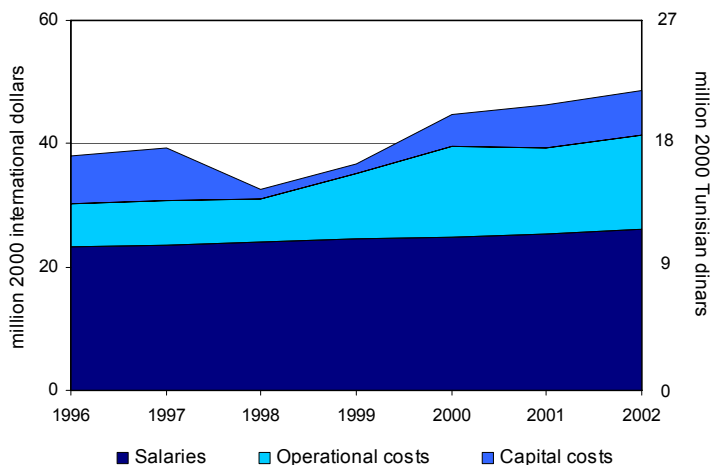
Sources: Tunisia data are compiled from Figure 1b; AgGDP are from World Bank 2004; other intensity ratios are from Pardey et al. 2006.

Between 1996 and 2002, salaries averaged 60 percent of total expenditures at IRESA's 13 agencies, while operating and capital costs accounted for 27 and 14 percent, respectively (Figure 7). Total salary expenditures increased steadily between 1996 and 2002, but operating and capital expenditures—financed primarily through foreign donors and other nongovernment sources—were somewhat more irregular. Throughout 1996–97, capital investments accounted for close to 20 percent of IRESA's total expenditures, to which PRVA was an important contributor. With the completion of PRVA in

1997, IRESA's capital spending declined to 4 percent in 1998 and 1999, but rose again from 2000 due to a financial injection from a second World Bank-supported project, the Second Loan for Investment in the Agricultural Sector (PISA Relais). This second loan enabled the construction of three new regional branches in Chott-Meriem, Tozeur, and Sidi Bouzid in further support of regional development. Funding was also allocated to research equipment and to the purchase of vehicles to facilitate mobility across the regions (World Bank 2003a). Operating costs at IRESA's agencies more than doubled during 1996–2002—from \$7.0 to \$15.3 million—which coincides with the government's commitment to strengthening Tunisia's agricultural research system, particularly in terms of the regions.

At INSTM, the breakdown of cost shares is quite different. Between 1999 and 2002, an average of 57 percent of the institute's budget was spent on salaries, 27 percent was spent on operating costs, and 16 percent was spent on capital costs.

**Figure 7— IRESA expenditure shares by cost category, 1996–2002 (13 agencies)**



Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04).

## FINANCING PUBLIC AGRICULTURAL R&D

The Tunisian government funds the majority of the country's agricultural R&D activities. Important additional funding is provided through World Bank loans, contributions from bilateral and multilateral donors (mostly the European Union), and revenues raised from public and private enterprises, producer organizations, and the sale of products and services by the individual institutes.

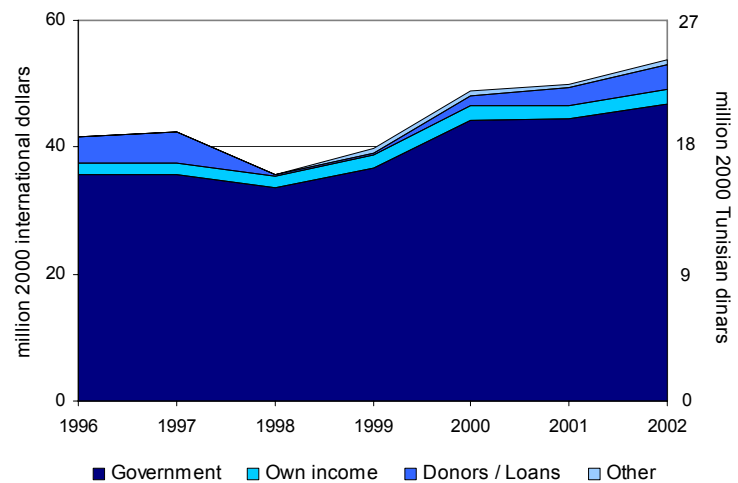
INSTM is primarily funded by the government, with about 20 percent of its budget financed by foreign donors including Belgium, the European Union, France, Spain, CIHEAM, FAO, and UNESCO. IRESA's funding is discussed in the next section.

### Agricultural Research and Higher-Education Institute (IRESA)

From 1996 to 2002, IRESA's 13 agencies largely depended on government financing, which averaged 89 percent of the total (Figure 8). Remaining funds were derived from World Bank loans and multilateral donors such as the European Union (5 percent), bilateral donors (1 percent), contributions from public

and private enterprises and producer associations (1 percent), and internally generated resources (5 percent). These averages mask certain variations among agencies. IRVT, for example, generates a comparatively large share of its funding internally (13 percent in 2002), through the production and sale of vaccines and laboratory analyses.

**Figure 8— IRESA funding sources, 1996–2002 (13 agencies)**



Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04).

Note: This analysis excludes resources for the overall management of IRESA's agencies.

The higher-education agencies do not disaggregate agricultural R&D funding sources for capital and operating budgets; however, their research programs are funded by IRESA and projects are co-financed by multilateral donors, loans, and MRSTDC grants.

IRESA's budget is determined annually with MARH and the Ministry of Finance, and includes the following components:

- A comparatively constant (in real terms) annual operating budget for administrative and general research activities that is disbursed directly to IRESA's four research institutes;
- A special operating budget for research programs that is disbursed by IRESA based on priorities and financial need;
- A capital budget derived from multilateral donors and World Bank loans that is managed by IRESA in accordance with donor project agreements (this also includes a discretionary component allocated to the research institutes for unplanned capital expenditures);
- A relatively small capital budget is assigned to research agencies for work on infrastructure or the acquisition of unplanned equipment in projects co-financed by donors or loans;
- MRSTDC allocates an annual budget to research laboratories. This budget is transferred directly to the designated research institutes and managed by the laboratories themselves;
- An allocation for specific product-related uses funded by public enterprises and professional associations, which jointly agree on its utilization with IRESA and the research agencies;

- Operating funds from foreign donors are managed by the research agencies themselves as part of extra-budgetary competitive funds.

The World Bank-supported projects, previously discussed, facilitated positive development of Tunisia's agricultural research sector. The first project, PRVA, ran from 1990 to 1997. The World Bank loan provided US\$9.4 million under the research component (of the planned budget of US\$17.0 million for both research and extension), and the Tunisian government provided US\$17.0 million (World Bank 1997a). The main goal of PRVA was to reform agricultural research and extension in Tunisia by creating IRESA and the Extension and the Agricultural Training Agency (AVFA). This project also focused on restructuring existing experiment stations and decentralizing agricultural research programs to meet regional needs. According to the World Bank, the project's success was only limited (World Bank 2003b). Both IRESA and AVFA were created, national research priorities were set, regional structures were rationalized, budgeting and programmatic mechanisms were established, and infrastructure was developed. Original program plans however, went even further to include the establishment of three regional centers. Instead, IRESA and the World Bank project overseers agreed on the establishment of the regional branches. Some of these may eventually be developed as autonomous regional centers.

The second World Bank project, PISA Relais ran from 1998 until 2002. The project's budget was US\$67.9 million comprising US\$24.9 million from the Tunisian government. The primary objectives of this second project were to build rural revenues through the sustainable use of hydraulic resources; and to improve institutional responses to farmer needs for agricultural research, extension, and training. The project's research component was only US\$4.0 million (6 percent of the total budget). This allocation funded several priority research programs and the establishment of the regional branches in Chott-Meriem, Tozeur, and Sidi Bouzid (World Bank 1997b). The construction of a biotechnology laboratory, originally planned, was not completed because IRESA decided to integrate its biotechnological research activities into the existing research programs (World Bank 2003b). PISA Relais was deemed to have reached all its other objectives.

A third World Bank-supported project, the Agricultural Support Services Strengthening Project (PRSAA), was launched in 2002 as the first phase of a longer term (10 year) project to improve the quality and competitiveness of agricultural production and market access for small- to medium-sized producers. The total project budget is US\$42.5 million, including a World Bank loan of US\$21.3 million, US\$16.7 million from the Tunisian government and US\$4.4 million from foreign sources. The first five years of the project were to focus on strengthening the organizational capacity of producer organizations and professional associations; widening the supply of research, training, and counseling services to producers; supporting animal health; supporting crop protection; and strengthening the provision of public services and the management of projects. The project's agricultural research component has a budget of US\$8.3 million and focuses on strengthening regional agricultural research, in particular by

building linkages with producers, introducing competitive research funding and selection mechanisms, creating a single research institute with regional research centers, and establishing a database of research results and a scientific information system (World Bank 1997b, 2001). As of 2005, sound progress had been made on the regional priorities under PRSAA, with branches strengthened in terms of staffing, equipment, and individual operating budgets. Research projects responding to producer groups had also been initiated via competitive mechanisms, and a "research results card," planned for electronic circulation to users from 2006, had been developed to provide concise summations of the research outcomes. MRSTDC also plans to develop a virtual scientific library accessible to research staff. In terms creating a single national agricultural research institute, the government has decided to postpone the consolidation of IRESA's research institutes in favor of reinforcing regional research by developing some of existing regional branches as autonomous centers.

## RESEARCH ORIENTATION

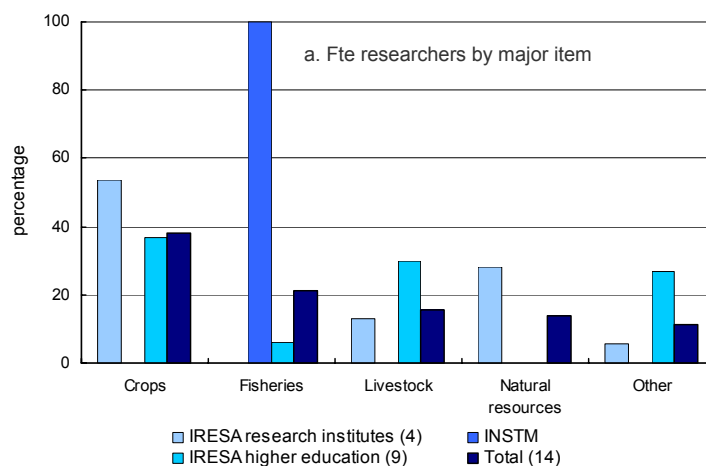
### Commodity Focus

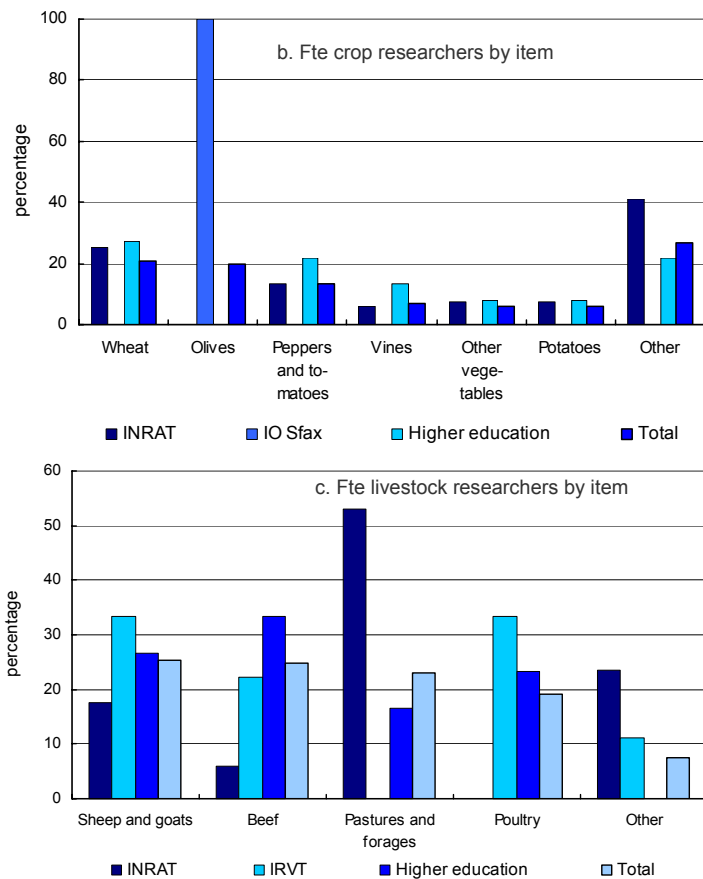
The allocation of resources across lines of research is an important policy decision; hence, detailed survey information was collected on the number of full-time researchers working in specific commodity and thematic areas.

In 2002, close to 40 percent of the 380 full-time researchers in a sample comprising the 13 IRESA agencies and INSTM conducted crop research (Figure 9a). Fisheries research represented 21 percent; livestock, 16 percent; and natural resources, 14 percent. Researchers at IRESA's four research institutes spent relatively more time on crops than their colleagues in the higher-education sector, who spent more time on livestock. Unsurprisingly, INSTM accounted for 90 percent of fisheries research conducted in Tunisia.

In 2002, the most researched crops were wheat (21 percent), olives (20 percent), peppers and tomatoes (13 percent), and vines (7 percent) (Figure 9b). Researchers focusing on livestock spent 26 percent of their time on sheep and goats, 25 percent on beef, 23 percent on pastures and forages, and 19 percent on poultry (Figure 9c).

Figure 9—Commodity focus, 2002





Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04).

Note: Figure 9b only includes agencies involved in crop research; Figure 9c only includes agencies involved in livestock research.

### Thematic Focus

In 2002, 17 percent of the researchers at IRESA's four research institutes focused on crop genetic improvement, 15 percent on livestock pest and disease control, 13 percent on crop pest and disease control, and 10 percent on water (Table 2). The remaining researchers focused mainly on other crops and natural resources. Half of the agricultural researchers at the higher-education agencies focused on fundamental sciences such as biology, chemistry, and economics. Other important themes include livestock pest and disease control (9 percent), water (7 percent), and crop pest and disease control (6 percent).

Table 2—Thematic focus, 2002

	Numbers of researchers		Shares	
	IRESA research institutes	IRESA higher education	IRESA research institutes	IRESA higher education
	<i>(in fte's)</i>		<i>(percent)</i>	
Crop genetic improvement	36.1	3.6	17.2	3.0
Crop pest and disease control	26.8	7.1	12.7	6.0
Other crop	34.9	9.5	16.6	8.0
Livestock genetic improvement	0.9	1.2	0.4	1.0
Livestock pest and disease control	31.0	10.7	14.8	9.0
Other livestock	7.0	6.0	3.3	5.0
Soil	0.0	3.6	0.0	3.0
Water	21.8	8.3	10.4	7.0
Other natural resources	17.4	3.6	8.3	3.0
Postharvest	0.0	6.0	0.0	5.0
Other	34.2	59.5	16.3	50.0
<b>Total</b>	<b>210.0</b>	<b>119.0</b>	<b>100.0</b>	<b>100.0</b>

Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–IRESA 2003–04).

Notes: Figures in parentheses indicate the number of agencies in each category.



## CONCLUSION

Tunisia's agricultural research system underwent important reforms over the past decade, facilitated by the national government's commitment to the agricultural sector and important World Bank-support agricultural research and extension projects. After a period of stagnation due to a recruitment freeze, total agricultural researcher numbers steadily increased from 1996 until 2002. Expenditures in agricultural research evolved more irregularly—hitting a slump in 1998—due to fluctuations in government and donor funding and particularly the completion of the first World Bank-supported project in 1997. Expenditures rebounded to \$68 million by 2002 (in 2000 constant prices) with additional government funding focusing on regional development in particular.

Agricultural research in Tunisia is largely funded by the national government. In addition, the World Bank has provided loans for three consecutive projects, the first beginning in 1990

and the most recent scheduled to run until at least 2006. IRESA, the agency that oversees the majority of the country's agricultural research, was established under the first project. Regional branches were also established to coordinate and evaluate regional agricultural research and extension in support of farmer needs. Subsequent projects have continued to focus on developing regional capacity by building linkages with producers and meeting farmer needs for information, extension, and training. Competitive funding mechanisms for specific project have recently been introduced, though it is too soon as yet to report on their effects.

Overall Tunisia has outperformed its Maghreb counterpart, Morocco, and many Sub-Saharan African countries in several key indicators in recent years. These include total agricultural spending as a share of agricultural output, shares of female researchers, and shares of postgraduate-qualified researchers.

## NOTES

1. The authors are grateful to numerous colleagues in Tunisia for their time and assistance with data collection, and thank Nienke Beintema, Mohamed Ben Hammouda, Abdelaziz Mougou, and Ridha Mrabet for useful comments on drafts of this brief.
2. The 17-agency sample consists of the following agencies:
  - Eight government agencies including (a) four agencies under the *Institution de la Recherche et de l'Enseignement Supérieur Agricoles* (IRESA): the *Institut National de la Recherche Agronomique de Tunisie* (INRAT), the *Institut National pour la Recherche en Génie Rural, Eaux et Forêt* (INRGREF), the *Institut de l'Olivier de Sfax* (IO Sfax), and the *Institut de Recherche Vétérinaire de Tunisie* (IRVT); (b) three agencies under the *Ministère de la Recherche Scientifique, de la Technologie et du Développement des Compétences* (MRSTDC)—the *Institut National des Sciences et Technologies de la Mer* (INSTM), the *Institut des Régions Arides* (IRA), and the *Centre de Biotechnologie de Sfax* (CBS), and finally (c) the *Institut National de Nutrition et de la Technologie Alimentaire* (INNTA) under the *Ministère de la Santé Publique* (MSP);

- Nine higher-education agencies—the *Institut National Agronomique de Tunisie* (INAT), the *École Nationale de Médecine Vétérinaire* (ENMV), the *École Supérieure d'Horticulture et d'Élevage de Chott-Mariem* (ESHE), the *École Supérieure d'Agriculture de Mograne* (ESAMo), the *École Supérieure d'Agriculture de Mateur* (ESAMa), the *École Supérieure des Ingénieurs et de l'Équipement Rural de Medjez El-Bab* (ESIERM), the *École Supérieure d'Agriculture du Kef* (ESAK), the *École Supérieure des Industries Alimentaires de Tunis* (ESIAT), and the *Institut Sylvio-Pastoral de Tarbaka* (ISPT).
3. Unless otherwise stated, all data on research expenditures are reported in 2000 international dollars or in 2000 Tunisian dinars.
  4. English translations have been used throughout this brief, except in note 2 where the original French is provided.
  5. Note that the higher-education agencies fall under the joint umbrella of MARH (through IRESA) and MRSTDC.

## METHODOLOGY

- Most of the data in this brief are taken from unpublished surveys (IFPRI, ISNAR, and IRESA 2003-04).
- The data were compiled using internationally accepted statistical procedures and definitions developed by the OECD and UNESCO for compiling R&D statistics (OECD 1994; UNESCO 1984). We grouped estimates using three major institutional categories—government agencies, higher-education agencies, and business enterprises, the latter comprising the subcategories private enterprises and nonprofit institutions. We defined public agricultural research to include government agencies, higher-education agencies, and nonprofit institutions, thereby excluding private enterprises. Private research includes research performed by private-for-profit enterprises developing pre, on, and postfarm technologies related to agriculture.
- Agricultural research includes crops, livestock, forestry, and fisheries research plus agriculturally related natural resources research, all measured on a performer basis.
- Financial data were converted to 2000 international dollars by deflating current local currency units with a Tunisian GDP deflator of base year 2000 and then converting to U.S. dollars with a 2000 purchasing power parity (PPP) index, both taken from World Bank (2004). PPP's are synthetic exchange rates used to reflect the purchasing power of currencies, typically comparing prices among a broader range of goods and services than conventional exchange rates.
- Annual growth rates are calculated using the least-squares regression method, which takes into account all observations in a period. This results in growth rates that reflect general trends that are not disproportionately influenced by exceptional values, especially at the end of the period.

See the ASTI website (<http://www.ASTI.cgiar.org>) for more details on methodology.

## REFERENCES

- Beintema, N. M. and G. J. Stads. 2006. *Agricultural R&D in Sub-Saharan Africa: An era of stagnating growth*. Washington, D.C.: International Food Policy Research Institute (forthcoming).
- FAO (Food and Agriculture Organization of the United Nations). 2004. FAOSTAT. <<http://faostat.fao.org/default>> (accessed October 2004).
- IFPRI–ISNAR–IRESA (International Food Policy Research Institute, International Service for National Agricultural Research, and Agricultural Research and Higher-Education Institute). 2003–04. Agricultural Science and Technology Indicators for Tunisia. Unpublished surveys. Washington, D.C.: International Food Policy Research Institute.
- IRESA (Agricultural Research and Higher-Education Institute). 2003. *Institution de la Recherche et de l'Enseignement Supérieur Agricoles*. Tunis. CD-ROM.
- INAT (Tunisian National Institute for Agronomy). 2003. *Institut National Agronomique de Tunisie*. Tunis. CD-ROM.
- INSTM (National Institute for Aquatic Science and Technology). 2004. *Présentation de l'Institut National des Sciences et Technologies de la Mer*. Salammbô, Tunisia.
- Lasram, M. and M. S. Mekni. 1999. *The national agricultural research system of Tunisia*. WANA NARS Study. Aleppo, Syria: International Center for Agricultural Research in the Dry Areas.
- MRSTDC (Ministry for Scientific Research, Technology, and Competency Development). 2004. *Recherche Scientifique, Technologie et Développement des Compétences en Tunisie*. <<http://www.mrstdc.gov.tn>> (accessed August 2004).
- OECD (Organisation for Economic Co-operation and Development). 1994. *The measurement of scientific and technical activities 1993: Standard practice for surveys of research and experimental development—Frascati Manual*. Paris: OECD.
- Pardey, P. G., N. M. Beintema, S. Dehmer, and S. Wood. 2006. *Science for agriculture: A growing global divide?* University of Minnesota and International Food Policy Research Institute, St. Paul and Washington, D.C. (in preparation).
- Salmi, A. 1998. *Système national de la recherche agronomique en Tunisie: Régionalisation de la recherche agronomique en Tunisie*. Cahiers Options Méditerranéennes. Vol. 32. Paris: Centre for Advanced Mediterranean Agronomic Studies.
- Stads, G. J. and A. Kissi. 2005. *Morocco*. ASTI Country Brief No. 27. Washington, D.C.: International Food Policy Research Institute and National Agricultural Research Institute.
- UNESCO (United Nations Educational, Scientific, and Cultural Organization), Division of Statistics on Science and Technology. 1984. Unpublished manual for statistics on scientific and technological activities. Paris.
- World Bank. 1997a. *Implementation completion report Republic of Tunisia agricultural research and extension project*. Report No. 17224. Washington, D.C.
- \_\_\_\_\_. 1997b. *Project appraisal document on a proposed loan in an amount equal to FRF 246.6 million to the Republic of Tunisia for a second agricultural sector investment loan*. Report No. 17208-TUN. Washington, D.C.
- \_\_\_\_\_. 2001. *Project appraisal document on a proposed loan in the amount of Euros 23.8 million (US\$ 21.3 million equivalent) to the Republic of Tunisia for an agricultural support services project*. Report No. 22135-TUN. Washington, D.C.
- \_\_\_\_\_. 2003a. *Project performance assessment report Republic of Tunisia agricultural research and extension project (loan 3217); agricultural sector investment project (loan 3661); Northwest mountainous areas development project (loan 3691), natural rural finance project (loan 3892)*. Report No. 26260. Washington, D.C.
- \_\_\_\_\_. 2003b. *Implementation completion report (SCL-42780) on a loan in the amount of US\$42 million to the Republic of Tunisia for a second agricultural sector investment loan*. Report No. 26165-TUN. Washington, D.C.
- \_\_\_\_\_. 2004. *World development indicators 2004*. Washington, D.C. CD-ROM.

Copyright © 2006, International Food Policy Research Institute and the Agricultural Research and Higher-Education Institute. All rights reserved. Sections of this report may be reproduced without the express permission of, but with acknowledgment to, IFPRI and IRESA. Interpretations and conclusions expressed in this report are those of the authors, not necessarily their respective organizations.

## ABOUT THE AUTHORS

Gert-Jan Stads <[g.stads@cgiar.org](mailto:g.stads@cgiar.org)> is a consultant for the Agricultural Science and Technology Indicators (ASTI) initiative under the ISNAR division of IFPRI. Samira Allani <[allani.samira@iresa.agrinet.tn](mailto:allani.samira@iresa.agrinet.tn)> is the assistant director of IRESA's international cooperation office. Mohamed Mounir Hedri <[hedrimounir@yahoo.fr](mailto:hedrimounir@yahoo.fr)> is IRESA's Director of Research.

## CONTACT ASTI INITIATIVE <http://www.asti.cgiar.org>

Nienke Beintema, Project Coordinator <[ASTI@cgiar.org](mailto:ASTI@cgiar.org)>

### International Food Policy Research Institute (IFPRI)

2033 K Street, N.W.  
Washington, D.C. 20006 U.S.A.  
Phone +1 (202) 862-5600  
Fax +1 (202) 467-4439

<http://www.ifpri.cgiar.org>