

## THE NATIONAL AGRICULTURAL RESEARCH SYSTEM OF SYRIA<sup>1</sup>

### 1. HISTORICAL BACKGROUND

Since agriculture has been developing in Syria for some thousands of years, experiments conducted by farmers, herders and craftsmen are probably among the oldest in the world. However, formal agricultural research (AR) began very late within the first experimental farms at Deir Elhajar and Kharabo, close to Damascus, in the early 1940s.

After independence in 1946, limited AR activities were carried out by some units of the Ministry of Agriculture and Agrarian Reform (MAAR), along with their other main duties (administration, service, policy formulation, etc.), such as the Directorates of Field Crops, Horticulture, Forestry, Animal Resources, and Plant Protection, then by the Directorate of Cotton Bureau (DCB, Aleppo, created in 1952), the Central Directorate of Citrus Bureau (CDCB, Tartous, 1978), and the Central Directorate of Olive Bureau (CDOB, Idleb, 1980). An AR Council was established in 1959 within MAAR.

The creation of the first AR institution dates back to 1964 when the Directorate of Agricultural Scientific Research (DASR) was established by MAAR as a new additional central unit responsible for almost all AR activities. The Directorate of Soils (DS) was established in 1970 by merging the DASR Soil Department and the Land Use and Water Department of the Directorate of Agricultural Affairs of MAAR. In 1987, the DASR Department of Irrigation and Water Use became the Directorate of Irrigation and Water Use (DIWU).

In 1960, the University of Aleppo established a Faculty of Agriculture (FA), and the Ministry of Education created the High Institute of Agriculture at Damascus, which became in 1963 the Faculty of Agriculture, affiliated to the University of Damascus<sup>2</sup>.

The Faculty of Veterinary Medicine of Hama was established in 1969. Three other FAs were later created; one in Lattakia by the University of Tishreen (1971), one in Deir Ez-Zor (1977) by the FA of Aleppo which provided the academic staff during its initial years, and one in Homs (1994).

Other institutions partly involved in AR were established over the last 20 years: the Atomic Energy Commission of Syria (AECS), founded in 1979; the National Remote Sensing Center, created in 1980, renamed as the General Organization of Remote Sensing (GORS) in 1986; and the Environmental and Scientific Research Center (ESRC, 1994).

### 2. THE CURRENT NARS

#### 2.1 Overview (see Table 1)

The public NARS currently includes four sets of scientific and/or technical institutions:

- The AR specialized institutions/units for which AR is the main mandate: they include six directorates under the governance of MAAR (Directorate of Agricultural Scientific Research: DASR; Directorate of Soils: DS; Directorate of Irrigation and Water Use: DIWU; Directorate of Cotton Bureau; Central Directorate of Citrus

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<sup>2</sup> The roots of the University of Damascus date back to the founding of the Medical Institute in 1903.

Bureau; Central Directorate of Olive Bureau) and the Marine Research Institute (MRI)<sup>1</sup>, affiliated to the University of Tishreen, Lattakia. These seven units gather 66% of the potential research years (pRYs or equivalent full-time researchers) and 70% of the total financial resources of the NARS; they are presented in Section 2.2.

- The six faculties of agricultural sciences (FASs) which are affiliated to the Ministry of Higher Education (MHE): they mobilize around 19% of the pRYs and only 5% of the total financial resources of the NARS (see Section 2.3).
- Other scientific institutions of whose mandate AR activities represent a relatively small part: they are mainly the Atomic Energy Commission of Syria (AECS) and the General Organization of Remote Sensing (GORS), both autonomous institutions affiliated to the Prime Minister, and the Environmental and Scientific Research Center (ESRC) under the Ministry of Environmental Affairs. They represent around 9% of the pRYs and 16% of the total financial resources of the NARS (see Section 2.4).
- Some other agricultural institutions of whose mandate AR activities represent a relatively small part (other MAAR Directorates: Steppe, Mechanization, etc; state enterprises for tobacco and sugar): they fill the remaining marginal place in the NARS and are briefly presented in Section 2.5.

DASR has been given the responsibility for formulating the national AR policy through the identification of constraints limiting agricultural development in the country; however, this function has not been fully developed.

The Supreme Council of Sciences (SCS), based at Damascus, is officially mandated with defining and implementing the national scientific research policy; however, it has very limited influence on the NARS institutions. Accordingly, the national AR policy remains actually split among the NARS institutions (see Section 4).

Some private agro-industrial companies involved in seed, fertilizers, pesticides, and food industries have established their own experimental stations or fields, mainly used for testing new crop varieties or agricultural inputs before their release to farmers. A precise inventory of their AR activities and resources is not available.

It is worth to mention the presence of three international/regional AR organizations in Syria:

- The International Center for Agricultural Research in the Dry Areas (ICARDA), established in 1977 and supported by the Consultative Group on International AR (CGIAR). The Center has a world mandate for the improvement of lentil, barley and faba bean; all dry-area developing countries for the improvement of on-farm water-use efficiency; and a regional mandate (West and Central Asia and North Africa) for the improvement of wheat (in collaboration with CIMMYT), chickpea (in collaboration with ICRISAT), and farming systems. It has around 110 graduate researchers, mostly posted at Tel Hadya, Aleppo, and enjoys excellent physical and financial resources (around US\$ 25 million in 1998).
- The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD), created in 1971 by the Arab League. The Center, based at Douma, Damascus, on the same campus as DASR, DS and DIWU, covers a large spectrum of research fields through its five divisions (water resources, soil, crops, animal production, social studies and planning). Its permanent research staff members and part-time consultants are 17 and 20 PhD holders, and 19 and 34 MS holders, respectively. Its research budget is 75% of its total budget (US\$ 4.4 million).
- The Arab Institute for Forestry and Grazing (IFG), established in 1959 in Bouka, Lattakia. Its main responsibility is training Arab students (diploma degree: two years after high school). It currently (1999) has 4 academic staff members (with PhD) and partly relies on the Syrian universities (Tishreen, Aleppo, Damascus) for its training activities. Its 1998 budget amounted to US\$ 400,000, funded by the Arab Organization for Agricultural Development (AOAD) and fees received from Arab countries for training their students.

## **2.2 The Agricultural Research Institutes**

### **The Directorate of Agricultural Scientific Research (DASR)**

Mandate and Organization - DASR is the major institution of the Syrian NARS, accounting for 36% of the total pRYs and 33% of the total financial resources. It is responsible for research on all crops (except cotton, tobacco, olive trees, citrus) and livestock (except animal health), which is covered by 8 research departments (see research

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<sup>1</sup> MRI has been classified in this set of institutions, despite its affiliation to a university, because of its name and its strong commitment to research (as important as training) (see Section 2.2).

activities). DASR researchers allocate around 80% of their time to AR activities, and the remaining time to extension and consultancies. Its headquarters are located at Douma, Damascus.

**Human, Physical and Financial Resources** - DASR has currently (1998) 1400 national permanent full-time staff, 473 of whom are scientific and technical graduate staff members (gsm), 75 technicians, and 852 other support staff (administrative staff: clerks, accountants, etc.; laborers).

The 473 gsm include 47 PhD, 70 MS, 75 Diploma (between BS and MS), and 281 other graduates (275 BS and 6 veterinarians), who represent 378 pRYs<sup>1</sup>. The current academic level of the gsm is considered insufficient; however, it has been significantly increasing over the last years (24 PhD, 9 MS and 217 other graduates in 1983; 34 PhD, 7 MS and 371 other graduates in 1993), due to the efforts made to recruit young scientists and to the relative improvement in salaries (see Section 4.1). The current geographical breakdown of the graduate staff members has improved over the years<sup>2</sup> and is now rather satisfactory.

The ratios of technicians and other support staff to researcher (0.16:1 and 1.8:1, respectively) are much under the general agreed upon standards (2 and 3–4, respectively); however, many BS holders are actually working as technicians.

DASR has 8 research stations around Damascus and 32 others (main stations: Damascus, Aleppo, Hassaké, Lattakia, Homs, Hama, Deir Ez-Zor) sufficiently covering the key agroecological zones of the country. Land resources total around 1000 ha, which are sufficient for the research needs. To a large extent, other physical resources (labs, library, transport) are insufficient, but efforts have been made recently to improve scientific and computer equipment.

In 1998, DASR national financial resources amounted to Syrian pound (SP) 240 million (around US\$ 5.2 million), mainly funded by the Government, of which SP 72 million were allocated to salaries/allowances (30%) and SP 168 million to operation and capital costs (OCC) (US\$ 3.7 million). External grants provided by diverse partners (see section on linkages), mainly allocated to OCC, are estimated at around US\$ 200,000 (around SP 10 million). OCC per graduate scientific member amounts to nearly US\$ 8,200, which is relatively low and inadequate for providing satisfactory conditions for research (see Section 4.3). Given the administrative status of DASR within MAAR, administrative procedures for mobilizing the financial resources are not flexible enough.

**Research Activities and Linkages** - DASR has 8 departments specialized in: field crops (cereals, maize, food legumes, oil crops, sugar beet, forage and pasture, agronomy, genetic resources), vegetables, horticulture (pomology, stone fruit, grapes, pistachio, date palm, medicinal and ornamental plants), plant protection, pesticides (herbicide testing, residual effects, etc.) livestock production (nutrition, breeding, etc.), food industries (dairy, food preservation, etc.), and socioeconomic studies (economic and social department, design/analysis/computer, library, training, etc.).

In the future, the weight of the field crops section (around 60% of the gsm) should decline (to 40%) in favor of the other sections, especially the livestock production section (which should receive 25–30% of the gsm, compared to 15% now), horticulture section (20% instead of 10%), plant protection section (20% instead of 10%), food industries section (5% instead of 2%), and socioeconomic studies section (5% instead of 1%). Higher attention will also be given to breeding and basic sciences (biotechnology, statistics/computer).

Collaboration with other national research and development institutions is rather good. Relations with the Faculties of Agriculture (Damascus, Aleppo, Lattakia, Deir Ez-Zor), which were focussed mainly on researchers' MS training, are now covering some research activities (forage/pasture, animal production, etc.) (see Section 4.2).

Cooperation with ICARDA and, to a lesser extent, with CIMMYT is already well developed (wheat, barley, lentil, chickpea, forage/pasture, sheep, natural resources, farming systems, socioeconomics) and is expected to grow. Linkages are significant with ACSAD (agronomy, cereal breeding, horticulture). Collaboration on biodiversity and genetic resources issues has recently started with IPGRI (which has researchers based at ICARDA, Aleppo) and the Global Environment Facility (GEF) program, funded by UNDP. Relations with bilateral agencies are currently very limited and should be developed in the future.

### **The Directorate of Soils (DS)**

**Mandate and Organization** - DS is responsible, within MAAR, for research on soils. Its senior staff allocates around 80% of its time to research and 20% to services (soil mapping, analysis), consultancies for development projects, training, etc. DS has its headquarters at Douma, Damascus, and 12 stations (one in each governorate). It has six

<sup>1</sup> pRYs = Number of researchers on duty × percentage of DASR resources allocated AR (80%).

<sup>2</sup> In 1988, 43% of the gsm (152 out of the 355 available) were located in or around Damascus. This percentage has dropped in 1998.

divisions (soil classification, land use, soil conservation, soil fertility and fertilization, microbiology, environment and meteorology), a geographic information systems (GIS) unit, and 13 laboratories (for soil, water and fertilizer analysis) at Douma and in the stations.

Human, Physical and Financial Resources - DS currently (1998) has 461 national permanent full-time staff, 161 of whom are graduate staff members (gsm), around 150 technicians and 149 other support staff.

The 161 gsm (10 PhD, 2 MS, 149 BS) represent around 129 pRYs. Their academic level is rather low and has hardly improved over the years<sup>1</sup>. Their past concentration at the headquarters has been reduced (61 gsm or 50% in 1988, 38% in 1998); however, only a few stations in the governorates have a good number of researchers (20 in Aleppo, 15 in Lattakia); most of the other ones are currently too small.

The numbers of technicians and support staff have largely increased within the last 10 years (24 technicians in 1988 for 120 gsm) and are now satisfactory.

Physical resources are considered insufficient, especially in terms of scientific equipment, computers and vehicles; however, efforts have been made to improve the facilities (offices, labs) during the last years.

DS national financial resources, funded by the Government, have significantly improved over the last 10 years<sup>2</sup> and currently (1998) amount to SP 115 million (US\$ 2.5 million), SP 25 million of which are for salaries/allowances and SP 90 million (US\$ 2 million) for OCC. External grants (1998), mostly allocated to OCC, are estimated at around SP 20 million (US\$ 0.4 million)<sup>3</sup>. Total OCC amounts to about US\$ 14,900 per graduate staff member, which is considered insufficient.

Research Activities and Linkages - DS currently has 12 gsm in the division of soil classification, responsible for soil surveys and maps; 11 gsm in the land use division (research on rotation, tillage, etc.); 15 gsm in the soil conservation division (water erosion, wind erosion, land reclamation); 35 gsm in the soil fertility and fertilization division (fertilization of crops and trees in rainfed and irrigated conditions); 12 gsm in the microbiology division (organic fertilization, microbiological treatment of wastes, Rhizobium, etc.); and 15 gsm in the environment and meteorology division. The recently established GIS unit employs 12 gsm. In the future, major attention will be given to the soil fertility/fertilization and soil conservation divisions, and to the GIS unit.

Collaboration is active mainly with DASR and DIWU at the national and governorate levels. It is limited with the faculties (some collaboration with the Faculty of Agriculture of Lattakia on water erosion).

International cooperation is well developed with ACSAD, mainly through the research project on desertification (in association with the Syrian General Organization of Remote Sensing, GORS), and with ICARDA (land use, fertilization of wheat and food legumes, wind erosion).

### **The Directorate of Irrigation and Water Use (DIWU)**

Mandate and Organization - DIWU has two main complementary responsibilities: one is research on irrigation, water use, and land reclamation at the field level (water requirements and irrigation systems for various crops, irrigation methods and technologies, reclamation of saline soils and drainage, water harvesting/spreading techniques, etc.), which mobilizes around 70% of its senior staff's time; the other is development support through studying and designing irrigation projects of MAAR. It has a central administration at Douma, Damascus, consisting of four divisions (research and studies, projects, management and maintenance, administration).

Human, Physical and Financial Resources - DIWU currently (1998) has 404 national permanent full-time staff, 125 of whom are graduate staff members, 86 technicians, and 193 other support staff.

The 125 gsm (5 PhD, 5 MS, 115 BS)<sup>4</sup> represent about 88 pRYs. Their current academic level is considered too low, and, until present, the possibilities for postgraduate training have been limited: only 2 MS holders are currently preparing a PhD abroad, while the need is for 3–5 PhD and 5–8 MS every year. The current geographic breakdown of the graduate staff members has improved over the years; their proportion has been decreasing at Douma and

<sup>1</sup> In 1983, DS had 169 gsm, including 11 PhD, 1 MS and 157 BS; in 1988, there were 120 gsm, including 6 PhD, 2 MS and 112 BS; and in 1993, out of 180 gsm, there were 6 PhD, 5 MS and 159 BS.

<sup>2</sup> In 1988, the DS budget amounted to SP 8.2 million, i.e., US\$ 1.4 million (US\$ 1 = SP 5.75 in 1988).

<sup>3</sup> These grants are coming from the Desertification Project (1994–2002), implemented with ACSAD (US\$ 0.8 million), with the participation of GORS (see Section 2.4) and the support of Germany (US\$ 1.9 million). An EU-supported project on salinity is starting (1999–2003; US\$ 0.14 million).

<sup>4</sup> Compared to 75 gsm in 1988 (2 PhD, 2 MS, 71 BS) and 125 gsm in 1993 (including 4 PhD).

increasing in the governorates<sup>1</sup>, and their geographic breakdown in the country is now satisfactory. However, the number of available graduate staff members is not sufficient to cover the needs, and only a few stations in the governorates have a sufficient number.

The ratios of technicians and other support staff to graduate staff member (0.7:1 and 1.5:1, respectively) are relatively low; however, the number of technicians has registered large growth in the last 10 years (15 in 1988, 21 in 1992).

DIWU has 11 stations, one in each governorate, which carry out research and service/development activities in the key agroecological zones. The current land resources are sufficient (total area: 120 ha, without counting the 30,000 ha of the research center of Mehasseh in the steppe and the 140 ha of the station of Rakka which will be soon opened). DIWU's other physical resources (offices; labs; library; scientific, computer, transport and communication equipment), funded by the Government and external agencies, are excellent.

In 1998, national financial resources funded by the Government amounted to SP 55 million (around US\$ 1.2 million), SP 13 million of which were allocated to salaries/allowances and SP 42 million to OCC. External grants in 1998 were exceptionally low (around US\$ 0.2 million from IDRC, ICARDA and Japan), much less than those received the previous years<sup>2</sup> which were mainly allocated to equipment. In 1998, OCC amounted to around US\$ 7,300 per graduate staff member. Future prospects are encouraging with higher government budgets (SP 72 million in 1999) and starting new projects funded by international agencies.

Research Activities and Linkages - Currently, 5 researchers are involved in the water harvesting and spreading research program implemented at the Mehasseh Center, and the 120 other gsm are allocated to the water requirements and supplementary irrigation program (almost 40%), the irrigation methods and techniques program (also almost 40%), and the drainage and salinity research program (around 20%). These programs are considered well balanced and will receive equal support in the next years.

DIWU has good relations with DASR and DS (see Section 4.1). Collaboration with external institutions (UNDP, IDRC, ICARDA, Japan) has been highly profitable and will be developed and diversified in the future.

#### **The Directorate of Cotton Bureau (DCB)**

DCB is a semi-autonomous agency under MAAR. Its headquarters are located in Aleppo, which is the geographic center of the cotton growing and ginning region in Syria. Its functions are to: (i) carry out research (mainly breeding) on cotton, alone or in collaboration with other national and foreign institutions; (ii) control the quality of the produced cotton; (iii) supervise the ginning and marketing of cotton; and (iv) help plan cotton production.

DCB has 62 permanent gsm (1 PhD, 2 MS, 59 BS, supported by 50 technicians)<sup>3</sup> involved in AR, 14 (2 MS, 12 BS) of whom are full-time researchers in breeding and 48 allocate equally their time to research (agronomy, plant protection, mechanization, etc.) and development activities. They represent 38 pRYs.

Research experiments are conducted in 9 well-endowed stations across the country as well as on farms (with close participation of farmers). The DCB total budget (1998) amounted to SP 130 million. Estimated research costs are SP 45 million (US\$ 1 million), of which SP 5 million were allocated to salaries and consultancies, and SP 40 million (US\$ 0.87 million) to OCC, i.e., around US\$ 23,000 per pRY.

The graduate staff members' low academic level is a constraint that DCB has almost completely overcome through the mobilization, in its research projects, of numerous highly qualified scientists (most of them PhD holders) from other NARS institutions (Faculty of Agriculture of Aleppo, DS, DIWU, General Organization of Mechanization, AECS, etc.) and through well-developed international linkages (mainly the efficient Mediterranean Cotton Research Network and ACSAD).

#### **The Central Directorate of Citrus Bureau (CDCB)**

CDCB was established in 1978 at Tartous. It is responsible for all research and development activities related to citrus production in Syria, except marketing. Its senior staff devotes 75% of its time to research and 25% to

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<sup>1</sup> In 1988, there were 40 gsm at the headquarters and 35 in the governorates; in 1993, these numbers were 21 and 104, respectively.

<sup>2</sup> DIWU received US\$ 3.2 million in grants during the 1990s (US\$ 2.5 million from UNDP in 1990–97, US\$ 0.5 million from UNDP in 1992–1995, and 0.3 million from UNDP/IDRC in 1994–1999), in addition to the annual support coming from ICARDA (around US\$ 50,000/year), and the recent support from Japan for the activities developed at the Mehasseh Center.

<sup>3</sup> Compared to 33 researchers (2 PhD, 1 MS, 30 BS) and 25 technicians in 1988.

development activities. Its AR activities cover tissue culture, biological control, fertilization, varieties and plant protection.

It has 44 gsm (1 MS, 43 BS), with 20 gsm at the headquarters and 24 BS holders working in the 6 CDCB sections, one in each governorate, where citrus research and services are needed. This staff, whose low academic level is considered a major constraint, represents 33 pRYs.

CDCB national financial resources are around SP 12 million (US\$ 0.26 million) (1998), of which SP 5.4 million are for salaries/allowances and about SP 6.6 million for OCC (SP 150,000 or US\$ 3,300 per gsm). External grants (US\$ 500,000) were reported as coming only from FAO during 1994–96 to cover mainly OCC for a biological control project on citrus.

CDCB has active collaboration with the facilities of agriculture in Syria, DS, Directorate of Extension, DASR and AECS. Regional cooperation with AOAD takes place through training courses.

### **The Central Directorate of Olive Bureau (CDOB)**

CDOB was established in 1980 in Idleb to assume the overall responsibility for olive production and development in Syria. It has 5 divisions (multiplication, protection, milling and processing, training and extension, planning and studies) and 10 sub-directorates (one in each governorate). Research mobilizes around 70% of its senior staff's time; the remaining 30% are allocated to development and other services.

CDOB currently (1998) has 66 national permanent full-time staff members, 40 (1 PhD, 3 Diploma, 36 BS) of whom are gsm, representing around 20 pRYs, and 6 technicians.

Physical resources are satisfactory, but scientific equipment is insufficient, especially for analysis and for the biological control laboratory, despite recent efforts for improvement.

In 1998, the national budget was SP 12 million (US\$ 0.26 million), of which SP 4 million were allocated to salaries and allowances and SP 8 million to OCC (US\$ 6,200 per graduate staff member). External grants in 1998 from FAO amounted to US\$ 320,000 (SP 15 million).

Collaboration is active with the faculties of agriculture, DASR, and DS. International cooperation is well developed with FAO, ICARDA, and the International Council for Olive Oil.

### **The Marine Research Institute (MRI), University of Tishreen**

MRI was created in 1987 and is affiliated to the University of Tishreen, Lattakia. Its scientific graduate staff equally distributes its time between research and teaching/training. MRI offers postgraduate education (Diploma, MS, PhD) in marine sciences.

MRI currently (1998) has 14 scientists on duty (14 PhD), who represent 7 pRYs, supported by 16 staff members (technicians, clerks, etc.), and 14 MS holders abroad preparing PhD degrees. MRI scientists enjoy the same incentives and conditions as university staff.

MRI has 5 departments: marine chemistry, marine biology, marine physics, marine geology, and marine fisheries and vertebrates. Its research mandate covers physical and chemical properties of seawater, sea currents and tides, marine organisms, climatic conditions, marine pollution and its effects, and desalination of seawater. Priority in research is given to marine biology and chemistry.

Physical resources are good but insufficient and need more improvement. MRI has an experimental station for research purposes (marine culture).

The national budget funded by the Government amounts to SP 10 million of which SP 2 million are for salaries and SP 8 million for OCC (SP 570,000 or US\$ 12,400 per scientist on duty). External funding (without the fellowships) is very limited.

MRI has good relations with national institutions of the Ministry of Agriculture (research in fisheries), universities (marine ecology), Ministry of Environmental Affairs (marine and coastal ecology), and Ministries of Oil and Irrigation (hydrology studies). It also has relations with the Center of Studies and Scientific Research, the Atomic Energy Commission, and GORS.

On the international level, MRI cooperates with UNEP (environment project), FAO, World Health Organization (WHO), and the International Atomic Energy Agency (IAEA).

## **2.3 The Faculties of Agricultural Sciences**

## Overview

The six Faculties of Agricultural Sciences (FASs) are (see Table 1):

- the Faculty of Agriculture (FA), University of Damascus, the oldest and largest university, with 231 academic/graduate staff members (asm), including 136 PhD and 30 MS holders, and 65 engineers (BS); and 75 technician (1998/99);
- the FA, University of Aleppo, with 213 asm, including 158 PhD and 30 MS holders, 25 of whom are preparing PhD degrees abroad, and 25 BS; and 40 technicians;
- the FA, University of Tishreen/Lattakia, with 197 asm (122 PhD, 5 MS, 70 BS);
- the FA, Baath University of Homs, with 43 asm (30 PhD, 13 BS);
- the FA of Deir Ez-Zor, University of Aleppo, with 75 asm (60 PhD, 15 BS); and
- the Faculty of Veterinary Medicine of Hama, University of Homs, with 77 asm (65 PhD, and 12 MS and BS).

Mandate and Organization - The FASs are semi-autonomous within their universities which are affiliated to the Ministry of Higher Education. The main activity of the FASs is teaching: all grant BS degrees (5 years<sup>1</sup>); the FA of Lattakia also offers Diploma (1 year after BS, in addition to a graduation project) and MS degree programs, and the FAs of Damascus and Aleppo grant MS and PhD degrees. The BS, MS and PhD programs have the same standardized national curriculum designed by the Higher University Council.

The FASs consist of departments that are more or less balanced<sup>2</sup>. The number of students enrolled at the FASs has dramatically increased during the 1970s and 80s, but has now stabilized or is even decreasing because of the labor market limitations on agricultural graduates; however, the ratio of students to academic staff is still rather high<sup>3</sup>.

Human, Physical and Financial Resources - The six FASs have 1033 asm, including 571 PhD and 71 MS holders, who are academic staff members, and 391 Diploma and BS holders considered as "technical support staff," actually working as technicians (about 250 for the six FASs). The academic staff members of the FASs represent the large majority of the highest qualified staff of the NARS. This resulted from the 1977 decree which raised the salaries of all university faculty to 200% of the standard public sector base salary rates to compensate for the increase of the course loads.

Every FAS has one or two farms for demonstration/training and for production<sup>4</sup>. Physical facilities are generally inadequate both in quantity and quality; buildings, classrooms and labs are more or less overcrowded; laboratory equipment, computer facilities, machinery, vehicles, etc. are generally insufficient or obsolete; and libraries are not able to adequately serve the training and research needs. Resources are actually providing only the basic needs.

The FASs have no financial autonomy. Their national financial resources are provided mostly by their universities (essentially government-funded) according to the available budgets and needs, and roughly amount to SP 250 million (around US\$ 5.5 million), more or less equally allocated to salaries and OCC<sup>5</sup>. External grants allocated to OCC (without taking into consideration the fellowships for postgraduate studies abroad) are very limited (no more

<sup>1</sup> Two years of education in basic sciences (most often with the support of academic staff from the Faculty of Sciences), then 3 years of specialized education; the fifth year is devoted mainly to the preparation of a "graduate project."

<sup>2</sup> For example, there are 10 departments at the FA of Damascus: basic sciences (8 asm in 1997/98), soil sciences and land reclamation (13), field crops (7), horticulture (13), forestry and ecology (10), plant protection (20), animal production (20), food sciences (17), agricultural engineering (6), agricultural economics (10); 8 departments at the FA of Aleppo (soil sciences, forestry ecology, field crops, horticulture, crop protection, animal production, food sciences, rural economics); 4 departments at the FA of Homs.

<sup>3</sup> For example, the FA of Damascus currently (1998/99) has more than 1,800 students (of whom 12, 35 and 175 are preparing PhD and MS degrees and Diploma, respectively); Aleppo has 1,650 students (of whom 9, 31 and 106 are preparing PhD and MS degrees and Diploma, respectively), compared to 1,500 students in 1993 and up to 2,500 students at the end of the 1970s.

<sup>4</sup> For example, the FA of Damascus has a farm of 75 ha 18 km from the capital; the FA of Aleppo has a farm of 134 ha 22 km from the city.

<sup>5</sup> Estimate based on data provided by the FA of Homs (1998 government budget: SP 5.5 million for salaries and around SP 5 million for OCC).

than US\$ 200,000). The total available OCC (around SP 130,000 or US\$ 2,800 per academic staff member) is insufficient and mainly allocated to training activities. Lengthy administrative procedures hamper timely availability of supplies and materials.

Linkages with Scientific Institutions - Scientific coordination among the FASs and linkages with the national AR and scientific institutes and extension services are moderate and informal. International cooperation (either with regional/international or foreign scientific institutions, or with funding agencies) is rather limited, except for the FAs of Damascus (AUPELF/UREF) and Aleppo (ICARDA, Hohenheim University and IDRC), ICARDA being the major cooperating institution.

### **Research at the Faculties**

AR at the FASs currently suffers from a number of major constraints and limitations, mainly:

- The lack of research policy of the FASs and rather weak linkages with the national AR institutes.
- The limited time available for the academic staff members to carry out research activities due to the heavy teaching loads induced by the relatively high number of students (more than 10 students per asm) and the "necessity," due to the low salaries, to seek other activities/sources of income (mostly consultancies).
- Inadequate research resources, reflecting the resource limitations presented above (insufficient physical facilities; limited and variable national and external funds available for research).

Accordingly:

- AR is currently carried out mainly by young academic staff members and graduate students, and the objectives of their research projects are largely identified and chosen on a personal-interest basis and rarely according to the priority needs of the agricultural sector.
- The percentage of human and financial resources actually allocated to AR activities is rather low. For example, the FAs of Damascus, Aleppo and Lattakia consider that their academic staff members allocate around 10 to 15% of their time to AR; the staff members of the other FASs are even less involved or hardly conduct any AR at present. It appears realistic to consider that the FAS academic staff members dedicate (as an average) around 10% of their time to AR, which means that the six FASs represent around 100 actual RYs instead of the 203 normative potential RYs.

However, the situation has been improving over the last years. Research at the FASs is now recognized as a mandate as important as education, and incentives exist for the academic staff to dedicate time to this activity. Since the mid-1990s, progress in the academic staff members' careers through evaluation of their education and research performance depends highly on their engagement in research and on their publications; since 1997 a financial "reward" of SP 5,000 is being offered for every scientific paper approved and published<sup>1</sup>.

## **2.4 The Other Scientific Institutions of the NARS**

### **The Department of Radio-agriculture of the Atomic Energy Commission of Syria (AECS)**

This Department is the largest within AECS; it mobilizes around 25% of the total resources of the Commission. It currently employs 21 researchers on duty (12 PhD, 2 MS, 7 BS) involved full-time in research, and another 7 young researchers now on study leaves abroad (preparing PhD). It has a rather low number of technicians (8 "low" Diploma holders), but enjoys good physical resources (labs at Damascus and a small animal research station near the capital) and satisfactory government financial support.

Its AR activities cover biotechnology applied to breeding, agronomy (soil and water salinity, crop resistance to saline soil), entomology (integrated pest management through sterile insects), animal production (breeding, physiology), and food preservation. Biotechnology and food preservation will be reinforced in the future.

It has developed relations with national institutions (mainly the FA of Damascus, DASR and DS), ICARDA and ACSAD. It also has a good number of collaborative programs with IAEA/Vienna, the Arab Atomic Energy Agency (AAEA), and with scientific institutions in India, the UK, Poland and Russia.

### **The General Organization of Remote Sensing (GORS)**

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<sup>1</sup> The trimestrial scientific review, "Bassel Al-Assad," published by the FA of Damascus, has a long waiting list of papers prepared by scientists from all the FASs and other national institutions ready for publication after approval by its scientific committee.

GORS is responsible for research and development activities related with remote sensing applied to geology, geophysics, hydrology, the environment and agriculture. It allocates around 10% of its resources<sup>1</sup> to AR activities, which mobilize (1998) around 13 pRYs<sup>2</sup> and SP 10 million (US\$ 0.2 million).

Physical resources are excellent (large and modern facilities and equipment near Damascus) and funds mainly provided by the Government cover the basic needs. Until present, AR activities have received few external grants.

AR-related activities consist mainly of survey/mapping of natural resources (monitoring and evaluating land resources, soil potentialities, soil erosion, desertification in the steppe, groundwater, etc.). Most of these studies have been implemented in full collaboration with other NARS institutions (FA of Damascus, DASR, DS, DIWU, DCB, etc.) and with ICARDA and ACSAD. GORS is making efforts to develop relations with foreign similar institutions (France, Germany, etc.).

### **The Environmental and Scientific Research Center (ESRC)**

ESRC is responsible for research and development activities related to environmental affairs in Syria. AR-related activities<sup>3</sup> represent about 25% of its total resources<sup>4</sup>.

AR-related activities mobilize 10 full-time researchers (2 PhD and 8 BS), who are involved in natural protected areas and soil and water management (salinity, polluted water, etc.) issues. National funds allocated to these activities amount (1998) to around SP 70 million (US\$ 1.5 million), and are complemented by grants from Germany (about US\$ 0.2 million in 1998). National and international linkages are insufficient and need to be developed.

### **The Other Faculties (Sciences, Civil Engineering, Economics, etc.)**

Some Faculties of Sciences, Civil Engineering<sup>5</sup>, and Economics may include a relatively large number of staff members highly qualified in AR-related scientific fields (natural resources, irrigation, plant and animal biology, oceanography and fisheries, agricultural engineering, food processing, agricultural social sciences). A precise inventory of this potential is not available, but it may reach around 200 academic staff members (rough/provisional estimate), representing around 50 pRYs. Under the assumption that 10% of this potential is actually mobilized for research (as for the FASs), there would be no more than 20 actual RYs instead of the 50 normative potential RYs.

## **2.5 The Agricultural Development/Service Bodies Involved in AR**

### **The Other MAAR Directorates Partly Involved in AR**

Some directorates are implementing significant AR activities, among them are: the Directorate of Steppe, the Central Directorate (CD) of Mechanization recently renamed the General Organization of Mechanization, the CD of Agricultural Economics, and the CD of Planning and Statistics<sup>6</sup>.

The Directorate of Steppe, Palmyra - This Directorate established together with the Directorate of Agriculture of Hama, the Al-Kram Center for Sheep Breeding located near Salamieh, Hama. This Center is implementing applied

<sup>1</sup> 325 permanent staff members, including 121 gsm (12 PhD, 2 MS, 107 Diploma and BS); total national budget: around SP 90 million (US\$ 2 million).

<sup>2</sup> This is calculated from: (i) 10 gsm (3 PhD, 1 MS, 6 BS) with a background in agricultural sciences, who are working full-time within the Agricultural Studies and Agricultural Applications Offices (respectively under the Directorate of Applications and Projects and the Directorate of Field Studies); and (ii) the equivalent of around 3 pRYs coming from BS holders from other Directorates who provide technical support in information processing, surveys and aerial photography.

<sup>3</sup> Other activities are related with climate changes, air pollution, energy/industry/transport pollution, solid waste management, trace metals in food commodities, etc.

<sup>4</sup> 60 permanent graduate staff members, 15 technicians, and 41 administrative employees (including 11 graduate employees); total national budget: SP 300 million (US\$ 6.5 million), of which around SP 30 million are for salaries/allowances and SP 270 million for OCC (more than US\$ 200,000 per gsm, which is very high), mainly allocated to procuring new equipment and to establishing a large new center which will be opened in 2001.

<sup>5</sup> For example, the four Faculties of Civil Engineering of Aleppo, Damascus, Homs and Lattakia have sections specialized in irrigation, two of them collaborate with DIWU; other sections are concerned with environmental affairs.

<sup>6</sup> Other directorates may be marginally involved in AR activities (CDs of Plant Protection, Damascus; Forestry, Damascus; Fisheries, Jableh; etc.); however, a precise inventory of their activities and the concerned resources is not currently available.

research on sheep breeding, reproduction and production. It has 6 graduate staff members (1 PhD, 5 BS) and 6 technicians. Its 1998 national budget amounted to SP 5 million. It has close relations with ACSAD<sup>1</sup>.

The General Organization of Mechanization (GOM, Aleppo) - GOM was established in 1977 to carry out research, training and services for farmers. It has 21 gsm (1 PhD, 20 BS), of whom 6 are at the headquarters in Aleppo and the remaining in the other governorates where GOM has some workshops and experimental stations. Forty percent of the graduate staff members' time is allocated to research (currently focussed on cotton, sugar beet and potato mechanization) implemented in collaboration with national institutions (Cotton Bureau, DASR, CD of Extension, etc.) and with ICARDA (lentil, chickpea mechanization). Out of a total budget of SP 85 million, around 10 are allocated to research and the balance to farmers' services (maintenance and repair of agricultural machinery).

The Central Directorates of Agricultural Economics and Planning/Statistics, Damascus - These two CDs employ 11 graduate staff members (2 PhD, 1 MS, 8 BS) who are involved in research, studies and surveys in the field of agricultural economics related with land use and production, producer and input prices, investment policies, marketing, trade policies and farm income and employment. 50% of their activities could be considered as research.

All these directorates meet around 20 pRYs and may mobilize (rough estimate) some SP 10 million for research.

### **The Public Agro-industrial Enterprises**

These enterprises are the General Organization for Tobacco (GOT) and the General Organization for Sugar (GOS). Precise data are not available; however, as a rough estimate, they employ around 40 graduate staff members in their research units<sup>2</sup>.

## **3. AR RESOURCES**

### **3.1 Human Resources** (see Table 1)

Almost 3,000 graduate staff members (all national) are working in the Syrian NARS and represent around 1058 pRYs. The AR institutions and the FASs account for around 31 and 34% of this total, respectively.

Among these two large categories of institutions, the large difference in the academic level of their graduate staff is worth noting: the FASs have the largest number and proportion of the highest trained scientists (571 PhD holders, i.e., 55% of the academic staff, and 88% of the PhD holders of the two categories of institutions), while the AR institutions have only 78 PhD holders (8% of the graduate staff) and consider the low academic level of their graduate staff members as their main constraint. This difference may be explained by the much higher salaries/allowances received by the academic staff. However, during the last few years, the Government has taken measures to minimize or reduce these differences, which include improving the academic qualifications of the staff of the AR institutions and increasing the salaries and benefits to be commensurate with qualifications (academic degree) and achievements<sup>3</sup>. However, salaries in all the NARS institutions are considered low compared to those in the private sector, and most of the staff have to seek other sources of income.

The concentration of graduate staff in/around Damascus which prevailed two decades ago has been considerably lowered, and the NARS institutions now cover the country rather well according to the importance of agriculture in the different regions. However, in the AR directorates, the graduate staff is split into too many stations; this situation is favorable for extension activities but not for research which needs smaller numbers of locations that are well equipped with human and physical resources.

Most of the NARS institutions suffer a large deficit in technicians, which may considerably reduce the efficiency of the scientists.

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<sup>1</sup> The Center received from 1992 to 1995 a US\$ 125,000 grant for research/development work on sheep production with farmers' participation.

<sup>2</sup> In 1984, GOT had 19 researchers (2 PhD, 17 BS) and GOS 10 researchers (all BS).

<sup>3</sup> During the last years, the difference in salaries between researchers within MAAR (DASR, DIWU, DS) and academic staff members of the faculties has been narrowed. In 1993, the monthly salary for PhD holders with 10 years' experience at the AR institutions amounted to around SL 4,000 (US\$ 90) with some additional "incentives" (e.g., SL 15,000 at the completion of a research task) at DASR, and SL 10,000 at the faculties. Currently, this average monthly salary (including allowances) at the AR institutions amounts to around SP 12,000 (US\$ 260) for a PhD holder and SP 9,000 (US\$ 200) for a BS holder. These figures are 20% less than at the universities.

### **3.2 Physical Resources**

Land resources (research stations, farms) of the NARS institutions cover most of the agroecological zones and are considered satisfactory by most of the NARS institutions. With a few exceptions, facilities (offices, farm buildings) are sufficient, but scientific equipment, computer, vehicles, communication equipment) as well as libraries and documentation services are considered rather inadequate.

Given the large number of NARS institutions, there are too many locations (headquarters, experimental farms, etc.) which should be reduced in order to meet the needed human and physical resources and to make better use of the financial resources.

### **3.3 Financial Resources** (see Table 1)

In 1998, the total financial resources allocated to AR in Syria were estimated at around SP 705 million (US\$ 15.3 million), of which SP 630 million (US\$ 13.7 million) came from national sources (mainly the public budget of the ministries concerned), and SP 75 million (US\$ 1.6 million) from external funds essentially secured through bilateral or multilateral grants provided by a few donors.

The NARS national and total resources amounted to around 0.28 and 0.31%, respectively, of the AGDP (estimated at US\$ 4.9 billion in 1996). Such ratios are much under the 1% ratio recommended by some international organizations (World Bank, European Union, etc.).

Areas of expenditure vary between the NARS institutions; however, at all the directorates involved mainly in AR, except DCB, the available OCC per graduate staff member is relatively low and inadequate for allowing satisfactory conditions of work (US\$ 8,200 at DASR; 14,900 at DS; 7,300 at DIWU; 6,200 at CDOB; etc.). The corresponding OCCs per pRY, which are slightly higher<sup>1</sup>, are much under the "optimal" amount of US\$ 25,000–30,000 per RY used in the long-term plans drawn up by many developing countries, which means that the AR scientific potential is currently far from being fully mobilized. According to this reference, the actual scientific potential of all these directorates is approximately 285 actual RYs (of which around 125 are at DASR, 80 at DS, etc.) instead of 694 pRYs (see Table 1).

As seen above, the FASs may contribute to the NARS around 100 aRYs. At the other scientific institutions (MRI, AECS, GORS, ESRC), and certainly at the public enterprises (GOT, GOS), the financial situation is much better than at the AR directorates, and their aRYs may be only slightly lower than their pRYs.

Therefore, the Syrian NARS may have around 500 aRYs (rough estimate) as opposed to the 1058 pRYs estimated above, which means that its human potential is much underemployed.

Since most of the NARS institutions (directorates, faculties) are not autonomous administrative units, they suffer lack of flexibility and responsibility in the management of their financial resources.

## **4. RESEARCH ACTIVITIES**

### **4.1 Research Orientation**

Because a precise national inventory of the AR programs and a national AR plan are not available, it is difficult to present a full balance of the research activities. Until present, priority has been given to applied disciplinary research, especially for field crops, horticulture (vegetables and fruit), and natural resources (soil and water); other domains such as animal production and agricultural economics have been more or less neglected.

Recently, attention has been given to "modern" sciences (biotechnology, remote sensing, isotopes, computers) at the NARS institutions endowed with highly qualified scientists. DASR is also implementing an interdisciplinary approach within farming systems research.

A national AR master plan to guide efforts for a better balance between research programs implemented by the NARS institutions is still lacking.

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<sup>1</sup> As the numbers of pRYs are lower than the number of graduate staff members, and part of the OCCs are allocated to other activities than research (see Table 1). The estimated OCC per RY amount to around US\$ 9,200 at DASR; 16,800 at DS; 8,900 at DIWU, etc. (the most favorable is US\$ 23,000 at DCB).

#### **4.2 National and International Linkages**

Relations between the main AR directorates (DASR, DS, DIWU) are good, thanks to their complementarity and the proximity of their headquarters. Most of the other directorates seem rather isolated, except DCB which implements research programs associating the best scientists from other institutions. To date, the FASs have had a marginal place in the NARS, but their relations with the research directorates and other scientific institutions are increasing.

The directorates involved in AR generally have good relations with development bodies and organizations; this is the main advantage of their current status as directorates.

It is well recognized that AR has contributed significantly (along with other national public services and public and private organizations) to national agricultural development which has been rather good over the last 10 years; the AGDP has registered a 50% growth during the period 1985–95. The impact of AR has been important in some areas such as field crops (cereals, food legumes, fruit, etc.) and cotton (Syria has the highest yields in the world).

International cooperation has been rather limited so far, except with ICARDA and ACSAD which have developed strong linkages with the main institutions that have mandates related to theirs. Relations have been recently developed with other international AR centers (CIMMYT, IPGRI, IWMI, etc.). In the future, scientific cooperation is planned to be extended to neighboring and developed countries.

#### **5. CONCLUSION**

The Syrian NARS has been rather dynamic during the past years. The major achievements have been the growth of the human, physical and financial resources of the MAAR Directorates involved in AR, the consolidation of the highly qualified academic staff at the FASs, the creation of new institutions (FA, Homs; GORS; ESRC); striving for better regionalization of research efforts within the country; and establishing efficient linkages with development bodies (at least for the MAAR Directorates).

However, the NARS is still suffering strong weaknesses. It remains highly fragmented, and coordination between the two main sets of institutions represented by the MAAR Directorates and the FASs is weak and does not take advantage of their complementary characteristics (support staff, physical and financial resources in the directorates; qualified staff in the FASs). Financial resources allocated to AR are relatively limited with regard to the size of the country and the challenging long-term food prospects resulting from the growing population and limited natural resources. Financial resources are not optimally used because of the absence of mechanisms for setting priorities, planning, monitoring and evaluation of research activities in most of the institutions and at the national level; and the excessively large number of infrastructures and experimental stations.

#### **Main Acronyms**

**MAAR:** Ministry of Agriculture and Agrarian Reform. **MHE:** Ministry of Higher Education.

**DASR:** Directorate of Agricultural Scientific Research. **DCB:** Directorate of Cotton Bureau. **DIWU:** Directorate of Irrigation and Water Use. **DS:** Directorate of Soils. **AECS:** Atomic Energy Commission of Syria. **GORS:** General Organization of Remote Sensing. **ESRC:** Environmental and Scientific Research Center.

**LS:** Syrian pound

#### **Main References**

FAO (Watson J.M.) - *Comparative Study of Agricultural Research Organization and Administration in the Near East Region.*- Rome, 1964, pp. 29–31.

Peterson A. - *Agricultural research (in Syria).*- In Syria agricultural sector assessment. Vol. 5: Human resources annex, chap. IX, Damas, USAID/State Planning Commission of SAR, 1980, 62 p.

Williams J.D. - *Agricultural education (in Syria).*- In Syria agricultural sector assessment. Vol. 5: Human resources annex, chap. XI, Damas, USAID/State Planning Commission of SAR, 1980, 62 p.

El-Akrass H. - *Syria and the CGIAR Centers. A study of their collaboration in agricultural research.*- Washington, CGIAR, 1986, 51 p.

- ISNAR (Hariri G.) - *A review of the Directorate of Agricultural Scientific Research.*- The Hague, Jan. 1989, 72 p.
- FAO (Abercrombie K., El Moursi A.) - *Agricultural Research Systems in the Near East and North Africa.*- Rome, 1990, pp. 112–117.
- ISESCO - *Research centres in Islamic Countries: Potential and Activities.*- Rabat, juillet 1991, pp. 461–465.
- DIWU - *Summary: Objectives, Activities, Structure of the Directorate for Water Management.*- Damas, 1992, 8 p.
- Ayari Ch. - *La recherche scientifique et technologique en Syrie.*- In "Enjeux méditerranéens. Pour une coopération euro-arabe", Tunis, IPC, mars 1992, pp. 141–146.
- DASR - *The Directorate of Agricultural Scientific Research: Goals and achievements.*- Damascus, 1994, 25 p.
- Al-Ahmad H. - *The NARS of Syria.*- Damascus, DASR, May 1997, 5 p.
- DIWU - *Scientific Plan 1998-2000.*- Damascus, 1997, 15 p.
- GORS - *General Organization of Remote Sensing.*- Damascus, presentation note, 1998, 24 p.
- Safar A., Abido M.S., Salhab S.A., Jamal M.A. - *Damascus University, Faculty of Agriculture. General Bulletin 1997-1998.*- Damascus, 1998, 104 p.
- Al-Moeh. W. - *Work plan to Citrus Bureau.*- Tartous, CDCB, 1998.
- Al-Baath University, Homs, Faculty of Veterinary Medicine - *A guide to the Faculty.*- Homs, 1997.
- Marine Research Institute - *Facts (1998-2000).*- Lattakia, Tishreen University, 1998.

**Table 1 - The National Agricultural Research System (1998)**

*Italics:* Approximate data or rough estimate. °: Rounded numbers. ...: Data not available. \*: See footnotes.

NARS Institutions				Scientific & Tech. Graduate Staff*		Potential Research Years*	Total Budget (million SP)		AR Expend./Res. (E) (million SP)			
No.	Name - Acronym Head Office - Year Established	Mandates AR Fields	Govern. Minist.	Total - (PhD, MS)					Nat. NE	For RE	Total TE	
a	b	c	d	e	f	g	h	i	j	k	l	
1.1	Directorate of Agric. Scientific Research - Damascus	DASR - 1965	AR (80%) - (AD) All (see sect. 2.2)	MAAR	473	47, 70	378	240	10	215	10	235
2.1	Directorate of Soils - Damascus	DS - 1970	AR (80%) - (AD) Soils	MAAR	161	10, 2	129	115	20°	105	20	125
2.2	Directorate of Irrigation and Water Use - Damascus	DIWU - 1987	AR (70%) - (AD) Irrigation	MAAR	125	5, 5	88	55	10°	45	10	55
2.3	Directorate of Cotton Bureau - Aleppo	DCB - 1952	AR (60%) - (AD) Cotton	MAAR	62	1, 2	38	130		45		45
2.4	Central Directorate of Citrus Bureau - Tartous	CDCB - 1978	AR (75%) - (AD) Citrus	MAAR	44	0, 1	33	12		10		10
2.5	Central Directorate of Olive Bureau - Idleb	CDOB - 1980	AR (70%) - (AD) Olive	MAAR	40	1, 3	28	12	15	10	15	25
2.6	Marine Research Institute, Tishreen Univ. - Lattakia	MRI - 1987	AHE - AR: 50% Marine sciences	MHE	28	14, 14*	7	10	-	5	-	5
<b>1/2</b>	<b>Total AR Institutes</b>				<b>933</b>	<b>78, 97</b>	<b>701</b>	<b>582</b>	<b>55</b>	<b>435</b>	<b>55</b>	<b>490</b>
3.1	Faculty of Agriculture - Damascus	FA/D - 1960	AHE - (AR) All	MHE	231	136, 30	58	250	10	25	10	35
3.2	Faculty of Agriculture - Aleppo	FA/A - 1960	AHE - (AR) All	MHE	213	158, 30	47					
3.3	Faculty of Agriculture - Lattakia	FA/L - 1971	AHE - (AR) All	MHE	197	122, 5	49					
3.4	Faculty of Agriculture - Homs	FA/H - 1994	AHE - (AR) All	MHE	43	30, 0	11					
3.5	Faculty of Agriculture - Deir Ez-Zor	FA/D - 1977	AHE - (AR) All	MHE	75	60, 0	19					
3.6	Faculty of Veterinary Medicine - Hama	FVM/H - 1969	AHE - (AR) Animal health/prod.	MHE	77	65, 6	19					
<b>3</b>	<b>Total Agricultural Sciences Faculties</b>				<b>1033</b>	<b>571, 71</b>	<b>203</b>	<b>250</b>	<b>10</b>	<b>25</b>	<b>10</b>	<b>35</b>
4.1	Dep. of Radio-agr., Atomic Energy Com. - Damascus*	AECS - 1979	AR: 100%*	PM	21	12, 2	21	15	...	15	...	15
4.2	Ag. Offic., Gen. Org. for Remote Sensing - Damascus*	GORS - 1986	AR: 100%*	PM	13	3, 1	13	10	...	10	...	10
4.3	Ag. Sect., Environ. & Scient. Res. Center - Damascus*	ESRC - 1994	AR: 100%*	MEA	10	2, 0	10	70	10	70	10	80
4.4	Faculties of Sciences, Civil Eng., Economics, etc.*		AHE - R (AR) Diverse	MHE	200	120, 20*	50	...	...	5	...	5
<b>4</b>	<b>Total Other Scientific Institutions</b>				<b>244</b>	<b>137, 26</b>	<b>94</b>	<b>...</b>	<b>...</b>	<b>100</b>	<b>10</b>	<b>110</b>
5.1	Other MAAR Directorates (see Section 2.5)		AD - (AR) Diverse	MAAR	40	4, 1	20	...	...	10	...	10
5.2	Agro-indus. Enterprises (Tobacco, Sugar) (see Sec. 2.5)		AD - (AR) Tobacco, sugar	MAAR	40	..., ...	40	...	...	50	...	50
<b>5</b>	<b>Total AR in Admin/Development/Service Bodies</b>				<b>80</b>	<b>..., ...</b>	<b>60</b>	<b>...</b>	<b>...</b>	<b>60</b>	<b>...</b>	<b>70</b>
<b>6</b>	<b>Total NARS</b>				<b>2290</b>	<b>..., ...</b>	<b>1058</b>	<b>...</b>	<b>...</b>	<b>630</b>	<b>75</b>	<b>705</b>
<b>Exchange Rate:</b> US\$ 1 = Syrian pound (SP) 46 (1998 average rate)					<b>Actual Res. Years (aRY) (estimate) →</b>		<b>500</b>	<b>AR Expenditures (million US\$) →</b>		<b>13.7</b>	<b>1.6</b>	<b>15.3</b>

MAAR: Ministry of Agriculture and Agrarian Reform. MHE: Ministry of Higher Education. MEA: Ministry of Environmental Affairs. PM: Prime Minister.

c: Mandates: AR (. %): Approximate average % of human resources devoted to ag. research (AR); R: Research; AHE: Ag. higher education; AD: Ag. development/services (for AR and AHE institutes: seed production, soil and water analysis, extension, studies, etc.). g: Potential research year (pRY) = equivalent full-time researcher; for the FASs, the pRYs were estimated by multiplying the number of academic staff by 0.25. j: For the AR institutes, AR financial resources were roughly estimated through the following formula: Total budget × [ω + 0.5(100% - ω)], ω being the % of time devoted to AR by the graduate staff.

\* Notes: All the graduate staff members and pRYs are national. 2.6/f: The 14 MS holders are preparing PhD degrees abroad. 3.2/f: 25 MS holders are preparing PhD degrees abroad. 4.1 to 4.4: Only the human and financial resources allocated to AR are mentioned.

National AR expenditures (NE): 0.28% of the Agricultural Gross Domestic Product (AGDP: US\$ 4.9 billion in 1996). Total AR expenditures (TE): 0.31% of the AGDP.