

## THE NATIONAL AGRICULTURAL RESEARCH SYSTEM OF THE UNITED ARAB EMIRATES <sup>1</sup>

### 1. HISTORICAL BACKGROUND

Agricultural Research (AR) has been ongoing in the United Arab Emirates (UAE) for over five decades. As early as 1940 the British Government initiated an Agricultural Department at Digdaga in Ras Al-Khaimah to serve most of the northern and eastern Emirates.

After 1971 when the UAE union was established, AR expanded rapidly with the strong support of the highest national authorities. In 1972, the Department of Research and Plant Production (DRPD) in the Ministry of Agriculture and Fisheries (MAF) was formed, and in 1975 the Agriculture and Animal Husbandry Department of Abu Dhabi Government established an Agricultural Research Center at Al-Ain. From 1975 to 1985, FAO provided some scientists who introduced the modern irrigation systems. In 1978, the Marine Center at Um Al-Quwain (MCUAQ) was set up with technical assistance from the Japanese International Cooperation Agency (JICA). In 1980–1981, the Faculty of Agricultural Sciences at UAE University was opened.

Among the latest news from the UAE NARS is the completion, in 1999, of the Biosaline Agriculture Center situated in Dubai and funded by the Islamic Bank.

### 2. THE CURRENT NARS

#### 2.1 Overview (see Table 1)

The present (1999) public NARS is consists of

- Four institutions affiliated to MAF which have AR as their main mandate: the AR Directorate of the Department of Research and Plant Production (DRPD), the Agricultural Research Center (ARC) of the Agriculture and Animal Husbandry Department, the Artificial Insemination Center in Ajman, and the Marine Center at Um Al-Quwain, presented in Section 2.2; they account together for 77% of the total potential research years (pRYs: equivalent full-time researchers).
- The Faculty of Agricultural Sciences at the UAE University, affiliated to the Ministry of Higher Education and Scientific Research (MHESR) (18% of the pRYs), and presented in Section 2.3.

A few other national institutions may have some staff members qualified in AR-related scientific fields and may allocate some resources to AR; but precise data on this scientific potential is not available, except for the Biology Department (19 academic staff members, all PhD holders, 3 of whom are national and 16 expatriate) of the Faculty of Sciences of UAE University which has a graduate study program in environmental sciences<sup>2</sup>.

A Coordination Committee between MAF and the Ministry of Higher Education, chaired by the Dean of the Faculty of Agricultural Sciences, was set up in 1998 for coordination of AR in the UAE.

Outside the UAE NARS, at the invitation of MAF, ICARDA has opened (in January 1997) in Dubai a regional office for AR in the Arabian Peninsula. This office, which is hosted at the DRPD Dhaid Research Station, has three international scientists, and the UAE has agreed to provide experimental areas for collaborative research with the NARS.

#### 2.2 The AR Institutions

##### **The AR Directorate (ARD) of the MAF Department of Research and Plant Production (DRPP)**

This Directorate is the major component of the NARS (about 46% of the total pRYs). Its main mandate (which mobilizes around 60% of the time of its graduate staff) is applied and on-farm research on palm trees, mango and citrus, indigenous and exotic forages, protected agriculture, water-use efficiency, fertilization, and plant protection. It is responsible for the central laboratories in the country. Other activities cover technology transfer: ARD provides

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<sup>2</sup> Very few applied AR activities are also carried out in the private sector (no precise information available on them).

technical expertise and support for extension (on-farm trials and demonstrations, publications, recommendations, consultancies, and training for extension personnel) and services (materials and equipment evaluation and testing).

ARD employs 57 graduate staff members, 22 of whom are national (1 PhD, 3 MS, 18 BS) and 35 expatriate (mainly from Egypt, Syria, Sudan, Jordan, and Palestine), who represent around 34 pRYs<sup>1</sup>. With the recent move towards employing more nationals in administrative positions, the number of nationals is increasing, but industry tends to attract the better graduates as incentives to those employed with MAF are low and motivation could be improved. ARD also has 10 permanent technicians (5 of whom are national), too low a number for facing the research needs, and many other support staff (clerks, laborers, etc.).

ARD physical facilities are well equipped and maintained; they consist mainly of

- Four research stations (150 ha in total) at: Hanrannah (responsible for research on crop production and technology transfer), Dhaid (research on date palms, forages, vegetables, and crop water requirements), Dibba (research on fruits, well-equipped laboratories for tissue culture and controlled environment, poly-houses for virus-free plant production, etc.), and Fujairah (in the eastern side of the country).
- Central Laboratories located at Al-Ain, where most of the analyses (soil, plant, animals, herbicides, insecticides, fertilizers, soil conditioners, etc.) are carried out for research purposes and public services.

The exact ARD annual budget is not available, but inadequate funds are one of the main reasons for slow implementation of research programs.

ARD gets some assistance from local and international companies who provide materials to be tested in the field. These materials (seeds, chemicals, irrigation systems, and agriculture equipment) have to be approved for the UAE through research in MAF before selling in the market.

#### **The Agricultural Research Center (ARC) of the MAF Agriculture and Animal Husbandry Department (AAHD)**

ARC, based at Al-Ain, is part of the Abu Dhabi Municipality. It conducts applied research and extension on plant and animal production for the Abu Dhabi Emirate.

It has 18 graduate staff members (1 PhD, 2 MS, 15 BS), including 2 nationals and 16 expatriates. It enjoys excellent physical facilities (well-equipped laboratory; field facilities at three different locations in Al-Ain, including green houses and nurseries to produce seedlings; etc.). Financial resources are substantial but their exact figure is unknown.

AR activities focus on food and industrial crops, including date palm production and protected agriculture (7 scientists), forage resources (3 scientists), and animal production.

#### **The Artificial Insemination Center (AIC)**

AIC, established in 1985, is now a section of the MAF Animal Health Department (AHD). It has its main center (laboratories and a computer network) at Ajman and 5 branches in Abu Dhabi, Dubai, Al-Dhaid, Khorfakan, and Ras Al-Khaimah. Its main objectives are to conduct research activities on artificial insemination and to convey the findings to animal owners. Major areas of research are herd fertility, herd reproductive health, breed adaptability, and sheep and goat reproductive management.

Its graduate scientific and technical staff includes the national manager (BS holder) and 9 expatriates.

#### **The Biosaline Agriculture Center (BAC)**

This Center is a new agriculture applied research institution specializing in the utilization of saline, brackish, and sea waters for agriculture and revegetation and is being developed at 23 km from Dubai. It is financed by the Islamic Development Bank (IDB) in cooperation with MAF and UAE University. The new institution, which should be open by mid-1999, will become a center of excellence in its field, primarily serving the Gulf region but with an international focus.

#### **The Marine Center at Um Al-Quwain (MCUAQ)**

MCUAQ is ideally located on the western side of the entrance of Um Al-Quwain lagoon (in the Um Al-Quwain Emirate) where its research and development infrastructure (laboratory, seed production unit, fish feed production unit, aquarium library, workshop) is located.

Its objectives are to (i) conduct biological and hydrographical research and surveys; (ii) produce seeds for commercially important fishes and shrimps by artificial methods and grow them to a marketable size; and (iii) adapt these new techniques and train the local staff and fishermen on how to use them. Also, through cooperation with

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<sup>1</sup> Number of pRYs = Number of graduate staff members × 60% (percentage of the graduate staff's time devoted to AR).

similar regional and international centers, it conducts research out of its base on cage culture of fish, mangrove afforestation, field surveys in pollution-affected areas, and culturing of freshwater fish (*Tilapia*) in farmers' irrigation reservoir tanks.

MCUAQ currently has 9 graduate staff members: 5 nationals and 4 expatriates.

### **2.3 The Faculty of Agricultural Sciences (FAS) of the United Arab Emirates University, Al-Ain**

FAS academic staff members are engaged mainly in education. FAS offers BS degree courses as well as special training courses for the employees of different agriculture departments in the country. It consists of three departments: Plant Production, Animal Production, and Foods and Nutrition, which are engaged in education and academic research. FAS now has a joint MS program which is administered by the Dean of the Graduate Office, and FAS is involved in two of its programs: Environmental Science and Water resources.

FAS has 53 academic staff members of whom 16 are national (5 PhD, 6 MS, 5 BS) and 37 expatriate (mainly from Egypt), supported by 9 technicians (2 of whom are national). Physical facilities for education as well as for research are excellent (properly equipped laboratories; library among the best in the region; generalized access to Internet; excellent farm of 40 ha, including 5 ha for field trials; etc.). Data on financial resources are not available.

Academic staff members allocate about 25% of their time to research activities (they represent 13 pRYs) in the domains of irrigated crops (palms, horticulture, forage, soil, water, etc.), livestock, fisheries, and food technology. Most of the work is connected with thesis preparation for BS-level programs. FAS publishes a journal titled *Emirates Journal of Agricultural Sciences* every six months.

## **3. AR RESOURCES**

### **3.1 Human Resources**

The UAE NARS currently (1997) involves 166 scientific and technical senior graduate staff members (including 49 nationals and 117 expatriates), who represent roughly 73 pRYs.

Among the national graduate staff members, 10 have a PhD (20%) and 13 an MS (26%) degree. The level of academic training is higher at UAE University (42% with PhD holders at FAS and the Biology Department); this discrepancy could be explained by the difference in salary scales between the MAF institutions (where salaries are similar to those paid for all national civil service employees) and the University (salaries are much higher). However, MAF is giving great attention to developing national scientists in quality and number. Recently, a Civil Servants Law was set up which proposes giving better financial incentives to agricultural scientists with higher degrees.

In general, the number and quality of technicians and other support staff (laborers, clerks) are insufficient due to the very low salaries offered by the public institutions. Most of the technicians are expatriates and many of the laborers are illiterate with little interest in the research programs. This situation is a strong limiting factor to the scientists' research efficiency and the amount of quality research that can be achieved.

### **3.2 Physical and Financial Resources**

The network of NARS locations (labs, farms, etc.) is rather well distributed all over the country in the seven Emirates, and covers all agroclimatological zones and different fields of research. In general, the working resources at the NARS institutions are in good condition.

The total AR expenditure is not known. As seen above, DRPD financial resources are limited while most of the other institutions are enjoying much better conditions.

## **4. RESEARCH ACTIVITIES**

### **4.1 Research Lines**

Research programs are mainly applied<sup>1</sup> and concentrated on irrigated farming systems, including the palm system (palms and agriculture under palms: vegetables, cereals, forages, small ruminants, etc., which cover 60% of the cultivated lands), the greenhouse system, and all themes related with these systems and with soil and water

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<sup>1</sup> With advanced techniques in some fields, such as tissue culture used in palm research by FAS.

management (irrigation methods and on farm water management, water requirements, salinity, drought resistance, fertility, disease and insect control, etc.). Significant impact on agricultural development is reported, especially in palm production and protection, irrigation scheduling, fertigation, animal production systems, etc. Other programs concern livestock, fisheries, marine ecology, conservation of indigenous forages, and food technology. Little research in rural economics has been conducted but some research on indigenous technical knowledge was initiated in 1998.

Recently, in collaboration with UAE University, the municipalities, and ICARDA, the UAE has been engaged in a very active program on the conservation and utilization of indigenous desert forages, and their evaluation and role in alternative forage systems for goats, sheep and camels. Collection missions have been carried out in the northern Emirates and the germplasm has been stored "in trust" in the Genetic Resources Unit at ICARDA. A small herbarium flora and gene bank for these important forages was also developed in 1999 at MAF.

To date, there is no precise inventory of the research programs developed by all the NARS institutions. However, this should be done within the scheduled preparation of a national strategy for AR and technology transfer.

#### **4.2 Linkages and Collaboration**

Linkages between the NARS institutions have been rather weak until recently, which resulted in duplication of research programs (palms, forages, etc.) and lack of synergy in their implementation. Few collaborative research programs existed until recently; these are now being developed and are encouraged by all institutions. Recently, collaboration between the NARS institutions has been strongly encouraged by MAF, and joint research projects involving MAF, UAE University and the Municipality in Sharjah Emirate have been set up with ICARDA.

Relationships with development agencies, extension services, and farmers take various forms: annual meetings of the technical committees of regional AR centers, seminars, training, and extension programs. They are much better established for ARC than for FAS. ARD and ARC maintain a good relation with most of the agricultural companies: they test seeds, fertilizers, chemicals, irrigation equipment, and other new technologies before introduction into the country.

International cooperation is active with ICARDA, the Arab Organization for Agricultural Development (AOAD), the Islamic Bank for Development, FAO, and many other organizations. Cooperation is in the form of donations and/or strengthening of human resources to make research programs sustainable. FAS has a joint research program with all colleges of agricultural sciences in the Gulf countries.

### **5. CONCLUSION**

The UAE NARS is very young. Within less than three decades it has made considerable progress with regard to its structure, and human, physical and financial resources, and has been serving the agricultural sector well. There is still much to be done, particularly for improving national qualified human resources (researchers and technicians) in the MAF institutions, the relations among these institutions and FAS, and international scientific linkages. The AR Coordination Committees and the Amended Joint Agricultural Policy for the Arab States of the Gulf Cooperation Council will be helpful in achieving this.

#### **Main Acronyms**

**MAF:** Ministry of Agriculture and Fisheries. **MHESR:** Ministry of Higher Education and Scientific Research.

**ARC:** Agricultural Research Center (MAF Agriculture and Animal Husbandry Department, Al-Ain). **DRPD:** MAF Department of Research and Plant Production. **FAS:** Faculty of Agricultural Sciences, United Arab Emirates University. **MCUAQ:** Marine Center at UmAl-Quwain.

#### **Main References**

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Al-Aifi M. - *Annual Report of the Faculty of Agric. Sciences at the University of the United Arab Emirates.* - 1997.

GCC Supreme Council - *The Amended Joint Agricultural Policy for the Arab States of the Gulf Cooperation Council.* - Doha, State of Qatar, December 1996.

**Table 1 - The National Agricultural Research System (1997/98)**

*Italics:* Approximate data. ...: Data not available. \*: See footnotes.

NARS Institutions				Graduate Scientific & Tech. Staff (Units)				Potential Research-Years *			Total Budget (Dh 1000)*	AR Budget (Dh 1000)*	
No.	Name -Acronym Head Office – Year Established	Mandates AR Fields	Govern. Minist.	Nationals Total - (PhD, MS)	Exp.	Total	Nat.	Exp.	Total				
a	b	c	d	e	f	g	h	i	j	k	l	m	
1.1	AR Directorate, Dept of Research & Plant Production Dubai	ARD/DRPD 1972	AR (60%) - (AD) Crop, forage	MAF	22	1, 3	35	57	13	21	34	...	...
1.2	AR Center, Agric. & Animal Husbandry Dept Al-Ain, Abu Dhabi	ARC/AAHD 1975	AR (60%) - (AD) Crop, forage, animal	MAF	2	0, 1	16	18	1	10	11	...	...
2.1	Artificial Insemination Center, Animal Health Dept Ajman	AIC/AHD 1985	AR (60%) - (AD) Animal breeding	MAF	1	0, 0	9	10	1	5	6	...	...
2.2	Biosaline Agricultural Center* Dubai	BAC 1999	AR Biosaline Agriculture	<i>MAF/MHESR</i>									
2.3	Marine Center Um Al-Quwain	MCUAQ 1978	AR (50%) - AD - R	MAF	5	1, 3	4	9	3	2	5	...	...
<b>1/2</b>	<b>Total AR Institutions</b>				<b>30</b>	<b>2, 7</b>	<b>64</b>	<b>94</b>	<b>18</b>	<b>38</b>	<b>56</b>	...	...
3.1	Fac. of Agriculture Sciences, UAE University Al-Ain, Abu Dhabi	FAS 1980	AHE - (AR: 25%) All	MHESR	16	5, 6	37	53	4	9	13		
<b>3</b>	<b>Total Agricultural Sciences Faculties</b>				<b>16</b>	<b>5, 6</b>	<b>37</b>	<b>53</b>	<b>4</b>	<b>9</b>	<b>13</b>		
4.1	Biology Departm., Fac. of Sciences, UAE University Al-Ain, Abu Dhabi	FS 1980	HE - (AR: 20%) Biol./Environment	MHESR	3	3, 0	16	19	1	3	4	...	...
<b>4</b>	<b>Total Other Institutions</b>				<b>3</b>	<b>3, 0</b>	<b>16</b>	<b>19</b>	<b>1</b>	<b>3</b>	<b>4</b>	...	...
<b>5</b>	<b>Total NARS</b>				<b>49</b>	<b>10, 13</b>	<b>117</b>	<b>166</b>	<b>23</b>	<b>50</b>	<b>73</b>		

**MAF:** Ministry of Agriculture and Fisheries. **MHESR:** Ministry of Higher Education and Scientific Research.

**c:** Mandates: **AR** (.. %): Approximate average % of resources devoted to ag. research (AR); **R:** Research; **AHE:** Ag. higher education; **AD:** Ag. development/services (seed production, soil analysis, extension studies, etc.). **i, j, k** Potential research year (PRY) = equivalent full-time researcher. **l, m:** Data on financial resources (all funded by the UAE) are not available. **2.2:** the Biosaline Agricultural Center should be opened by mid-1999.