Report to the Ministry of Agriculture and Agrarian Reform of the Syrian Arab Republic

ISNAR 935

A REVIEW OF THE DIRECTORATE OF AGRICULTURAL SCIENTIFIC RESEARCH

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International Service for National Agricultural Research

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List of Acronyms

ACB	Agricultural Cooperative Bank
ACSAD	Arab Center for the Studies of Arid Zones and Dry Lands
CBS	Central Bureau of Statistics
DAEC	Directorate of Agricultural Economics
DAEX	Directorate of Agricultural Extension
DASR	Directorate of Agricultural Scientific Research
DCB	Directorate of Cotton Bureau
DIWU	Directorate of Irrigation and Water Uses
DS	Directorate of Soils
FAO	Food and Agriculture Organization of the United Nations
GOSM	General Organization for Seed Multiplication
ICARDA	International Center for Agricultural Research in the Dry Areas
IDRC	International Development Research Centre
ISNAR	International Service for National Agricultural Research
MAAR	Ministry of Agriculture and Agrarian Reform
SPC	State Planning Commission
UN	United Nations
WFC	World Food Conference

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Chapter 1

THE VISIT: ORIGIN AND TERMS OF REFERENCE

1.1 Origin

The Ministry of Agriculture and Agrarian Reform (MAAR) of the Syrian Arab Republic has the primary responsibility for carrying out agricultural research on plant crop production and protection, animal production and protection, food technology, and socioeconomics by the Directorate of Agricultural Scientific Research (DASR), on soils by the Directorate of Soils (DS), on irrigation techniques and water uses by the Directorate of Irrigation and Water Uses (DIWU), and on cotton by the Directorate of Cotton Bureau (DCB).

In recent years, MAAR has very significantly increased its support to DASR as well as to other research and service directorates, i.e., DS, DIWU, and DCB. Thus, leaders of DASR and MAAR have recognized that continuing growth both in resources and in demand for DASR research calls for improved management of research programs and resources.

A joint DASR/IDRC/ISNAR agricultural research management workshop was held in early 1987 with the participation of national agricultural research leaders and resource experts to exchange ideas on research policy formulation and improvement and to identify mechanisms to strengthen organization and management in the areas of program linkages, budgeting, monitoring and evaluation. The workshop concluded with a set of recommendations aiming at improvement of agricultural research management. Following up the workshop, a Syrian scientist visited ISNAR for three weeks in the middle of 1987 to work with ISNAR staff developing a computerized program budgeting system to meet the needs of the DASR research program. A preliminary coding manual for research objectives, personnel, projects, and operations was developed.

Furthermore, DASR requested ISNAR, in a ministerial letter (31/BZ) of 19 April 1988, to continue its collaboration for improving research program management. Responding to the request, Ghazi Hariri, Senior Research Officer at ISNAR, visited Syria from 30 May to 4 June 1988 to discuss this with officials of MAAR and other relevant ministries and institutions and to identify future areas of collaboration between DASR and ISNAR.

1.2 Terms of Reference

Based on these discussions and on information gathered before and during the visit, it was agreed with the Director of DASR that a short report consisting of findings and proposals should be written as an outcome of above-mentioned visit with the following framework:

a. to review mechanisms for determining agricultural research policy and for formulating the research program of DASR, and to make proposals for improvement;
b. to examine the existing resources available for implementing the DASR research program and to propose improvements.

Chapter 2.

INTRODUCTION

2.1 Background on Syrian Agriculture

Syria is located in West Asia at the eastern part of the Mediterranian Sea, with a total area of 185,810 km^2, of which (for 1986 statistics) 30.4% was cultivated lands, 44.8% steppe and pasture, 2.8% forests, 2.7% uncultivated lands, and 19.3% uncultivable lands (Table 1). The country may be divided geographically into four regions: (1) the coastal plain, which lies between the mountains and the sea, with 40,000 ha of fertile soils; (2) the mountainous and hilly region, covering 8% of the total area, which runs north-south and includes the mountains and hills parallel to the Mediterranean; (3) the inland plains, occupying about 37% of the total area, which comprise the plains from south to north and northeast; and (4) the Badiah semidesert region, which consists of steppe plains situated in the eastern and southeastern areas of the country along the borders with Iraq and Jordan.

Syria is generally characterized by a Mediterranean-type climate with cool, rainy winters and hot, dry summers separated by short spring and autumn seasons. Rainfall increases westwards from less than 200 mm in the steppes to 800-1000 mm in the mountainous and coastal regions. The temperature drops to about -5°C in December and January, which are the coldest months of the year, while it rises to more than 40°C during July and August, the warmest months of the year.

According to the annual rainfall and rainfed cropping patterns, the country is divided into five agricultural stabilization zones (Tables 2 and 3). Consequently, the country is generally characterized by three systems of cropping representing the responses to different regimes of moisture: (a) mixed rainfed farming systems with winter precipitation greater than 600 mm, involving a mixture of tree species in the coastal and mountainous regions with forests and mountain pastures predominant at higher elevations, while perennial cropping becomes increasingly important below 1,000 m and annual crops are confined to the lower elevations; (b) annual rainfed cropping systems with winter precipitation between 200-600 mm with annual species predominant over systems involving perennial crops and grazing livestock, while olives, figs, and grapes are grown where annual rainfall exceeds 400 mm -- regarding rainfall distribution patterns in this category, two farming systems could be identified: a wheat-based system with rainfall between approximately 350-600 mm and a barley/livestock system with rainfall between 200-350 mm; and (c) irrigated agriculture in which surface and groundwater are used by various techniques for irrigation.

Of total cultivated land in 1986, 11.6% is irrigated. The remaining rainfed and fallow land forms 57.8% and 30.6%, respectively (Table 1). About 77% of the rainfed area is planted in wheat and barley, while about two-thirds of the irrigated area is planted in wheat and industrial crops -- cotton and sugar beets (Table 4).

The main crops are listed in Table 5 by area, production, and yield for 1982 and 1986. Animal resources are shown in Table 6. The principal rainfed crops are wheat, barley, food and feed legumes, watermelon, tobacco, olives, grapes, figs, apples, pistachios, and almonds. The primary irrigated crops are wheat, cotton, sugar beets, maize, tomatoes, potatoes, onions, cucumbers, apples, citrus, pomegranates, apricots, and other vegetables and fruits.

The country's cultivable landholding pattern is very complex. One encounters autonomous private holdings (about 66% of cultivable lands) that are both small and relatively large; small-scale farmers, who are the beneficiaries of agrarian reform and who are members of cooperatives (about 32% of cultivable lands); and lands held by the state that are essentially managed by the state and exploited by agricultural workers (about 2% of cultivable lands). Within this mixed set of tenure relations, there is a tendency toward fragmentation of landholdings that cuts across all private and cooperative landholdings. The majority of landholdings are small, about 8.5 ha, and divided into several noncontinguous parcels (averaging between less than 1 ha up to 45 ha per parcel). The combination of landholding patterns and fragmentation is one of the obstacles to technological change, particularly further mechanization of farming in the country.

2.2 Agriculture in the Economy

The agricultural system plays a very important role in the Syrian economy by producing food, feed, fiber, and capital for agriculture as well as the rest of the economy. About half of the population of 10.97 million inhabitants lives in rural areas (Table 7). The high rate of population growth in Syria (3.7% average annual growth for 1980-87), the tendency for rural people to migrate to urban areas, and the rapid change in food-consumption habits have resulted in an increasing demand for agricultural products.

The GDP at factor cost and current prices is estimated for 1987 at SP 98,374 million. The per capita GDP is SP 9,270 (10.612 million population of 1986), which is equivalent to US$ 2,361 at the official rate of exchange of SP 3.925=US$ 1 -- the per capita GNP for 1985 was US$ 1,570, as stated in the basic indicators of the World Bank (Table 7). Agriculture contributed 24% (1986 current prices) and 17% (1980 constant prices) to the GDP in 1986 (Table 8). The AGDP growth increased annually by 8.7% during 1965-80 and decreased to 1.5% during 1980-85 (Table 7). This reduction is mainly attributed to the vagaries of weather during the period 1980-84, which, in turn, reduced the yields of the main crops.

About two-thirds of the value of agricultural production consists of cereals (mainly wheat and barley), industrial crops (mainly cotton and sugar beets), fruits (mainly grapes, olives, stone fruits, pomes, and citrus), and vegetables (mainly tomatoes, potatoes, and cucurbits). The remaining production, about one-third, is for the animal-production subsector (mainly sheep)(Table 9).

Two decades ago, Syria was self-sufficient in major food commodities and a net exporter of wheat. However, growing demand and the years of low rainfall during the early eighties have affected the production of wheat

and barley; therefore, self-sufficiency in these two crops had declined to about 50% in 1984 (Table 10). The government has initiated programs for higher prices for wheat and barley, aimed at boosting cereal output in order to gain self-sufficiency. It has also made policies to encourage research and services to produce and diffuse new technologies to farmers. For these reasons, wheat and barley production is expected to be the highest in the past few decades, as long as there is good rainfall to support it.

There is almost no farmer subsistence sector in the country. Most farm products are produced for market. This implies that a substantial amount of family consumption needs and new inputs for the next growing cycle are purchased in the agricultural sector.

Development and diffusion of new technologies for the agricultural sector have received top priority in the Government's recent five-year plans (the fourth in 1976-80, the fifth in 1981-85, and the sixth in 1986-90). This concern with technological solutions to the problem of how to increase agricultural productivity stems, in part, from the concern of self-sufficiency in basic food and feedstuffs. It also is based on the desire to discourage the large rural population from migrating to urban areas, and on the quest for intensive methods of land use.

For the last two to three decades, the new technology diffusion process in Syrian agriculture has not generally been a consequence of autonomous individual decisions so much as a function of the planning process and the distribution of seeds, fertilizers and pesticides, new dairy cattle breeds, and herd improvement loans through the Agricultural Cooperative Bank (ACB). Thus, decisions by individual farmers have been concerned more with whether and how to reject rather than adopt these new technologies.

An important aspect of a planned economy is the government's control over the organization of production where private interests must be subordinated to social needs. Syria has achieved a certain degree of control over private interests in many sectors. Planning in the agricultural sector has resulted in certain control mechanisms being implemented, among the most import of which are (1) providing subsidized inputs to encourage the production of certain crops under modern conditions, (2) production licensing, (3) making credit available for certain crops and particular cropping practices, (4) providing extension services for all farming units, (5) supporting cooperative organizations and the peasants' union, and (6) initiating pricing policies.

All producers who license their farm production receive through ACB a fixed set of inputs of seeds, fertilizers, and pesticides, plus a limited amount of cash. The improved seeds are channeled through the ACB by the General Organization for Seed Multiplication (GOSM). Wherever possible, only improved seed is provided by the ACB. In the case of crops where the domestic production of improved seed does not meet the needs, the ACB imports seed or farmers save back their own seed from the current year's harvest, especially in the case of wheat and barley. The supplying of improved seed is an excellent form of induced adoption of innovations and is one means of controlling the production process. All improved cotton seed, sugar beets, potatoes, most wheat (irrigated and first stabilization zone), most barley (irrigated and second stabilization

zone), most maize, new varieties of lentils and chickpeas, and others are developed and/or adapted by MAAR research and provided to farmers through the ACB by GOSM.

2.3 Institutional Arrangements in the Agricultural Sector

In order to understand the basis for planning agricultural activities in Syria, it is necessary to have an idea about the institutional framework within which farmers work to transform natural resources and means of production (inputs) into commodities (outputs), and about how institutions work to attain national planning goals, with a special focus on institutions involved in technology generation and transfer systems.

Syria is administratively divided into 14 provinces called mohafazat (singular: mohafaza), including the Mohafaza of Damascus City, the capital. The mohafaza is divided into districts called manatik (singular: mantika), and there are 60 manatik. The mantika is divided, in turn, into counties called nwahi (singular: nahia), and there are a total of 183 nwahi. The nahia is composed of a number of villages, which are the smallest administrative units. There are 6,516 villages (Statistical Abstract, CBS, 1987).

Politically, the country is led by the Socialist Arab Baáth Party, whose Secretary General is the President. The political and cooperative activities of farmers are organized and led by the Peasants' Union under the supervision of the Peasants' Office of the party.

Government institutions, parastatal organizations, groups, and others involved in the agricultural sector are summarized in Table 11. Among institutions and groups, farmers (as producers) and MAAR (as agricultural development policy executers) have the main role in developing the agricultural sector in Syria.

The core of national agricultural research in Syria is carried out by MAAR directorates, especially DASR. Others involved in national agricultural research are the Atomic Energy Commission, four faculties of agriculture, the Faculty of Veterinary Medicine, the Supreme Council of Sciences, the Tobacco Research Center of the Tobacco Establishment, the Organization for Investment and Development of the Euphrates Basin, and the Directorate of Meteorology. There are two regional and international organizations with their headquarters in the country -- the Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD) and the International Center for Agricultural Research in the Dry Areas (ICARDA) -- and both are involved in regional as well as national agricultural research in Syria.

2.3.1 Research in the Ministry of Agriculture and Agrarian Reform (MAAR)

MAAR has the primary responsibility for providing various agricultural services to farmers to improve agricultural production. In addition, it oversees an economic sector where specific agricultural products, including seeds, poultry, cattle, fodder, fish, and other items, are produced and sold to producers as production inputs, and to consumers as food. Various services are performed by central directorates while products are

produced by semiautonomous economic establishments (Annex I: Organigrams for MAAR, DASR, DS, DIWU, DCB, Directorate of Agricultural Economics [DAEC], Directorate of Agricultural Extension [DAEX], and GOSM).

Regarding agricultural research at MAAR, four directorates are involved with various commitments of resources to research. This is reflected in the objectives of the directorates as shown in Annex II. DASR is carrying out core research on commodities (except for cotton and tobacco), while DCB allocates half of its resources to research. On the other hand, DS and DIWU allocate minor resources to research on soils (for DS) and irrigation and water use (for DIWU).

Before 1965 there was no central department responsible for agricultural research within MAAR. The service directorates such as Field Crops, Horticulture, Forestry, Animal Resources, Plant Protection, and Cotton Bureau were responsible for initiating their own research programs. An agricultural research council was established in 1959 within the framework of the MAAR (then Ministry of Agriculture) to promote and coordinate the ministry's research to avoid duplication in the various directorates undertaking research. The successes of that council were very limited.

In 1962, a UN special fund project was inaugurated and a contract was signed with FAO to assist in developing a central organizational structure for conducting and administrating the country's agricultural research program. In 1965, DASR was formed with the responsibility to carry out all the ministry's fragmented research activities except for cotton, whose research program remains with DCB in Aleppo.

DCB was established in 1952 to provide various services and supervise cotton growing, to control the quality of cotton fiber during ginning and exporting cotton lint, and to conduct research to improve cotton production (Annex II).

DS was established in 1970 by the merging of the Soils Department of DASR and the Land Use and Water Department of the Directorate of Agricultural Affairs.

DIWU was created in 1987 out of the Department of Irrigation and Water Use of DS.

Regarding the organization of MAAR's research, in 1969 the minister again formed an agricultural research council to solve management problems in research. Membership of the Council was confined to the MAAR. In the same year, the minister amended membership of the council by adding representatives of other agencies concerned with agricultural development, including then the two faculties of agriculture at Damascus and Aleppo. The council did not operate.

At the National Agricultural Symposium held in early 1977, one of the recommendations was the need for a higher council for agricultural research to plan, coordinate, and finance agricultural research in the country. This proposal was not implemented.

In 1981, an FAO consultant reviewed the organization of agricultural research in Syria and made a proposal to reorganize research, which was

endorsed by MAAR. Subsequently, in 1984 a proposal to create a semiautonomous research organization to replace DASR within MAAR was sent to the office of the prime minister for government approval. This proposal is still under consideration by a ministerial committee.

In 1982, a technical committee was formed at MAAR to endorse new varieties of cereals, as well as legume and forage crops, and to coordinate research conducted at DASR with that carried out by ICARDA and ACSAD (Annex III). The committee is performing its role of endorsement of new varieties, but not of coordination of research because of the lack of formal institutional arrangements.

Chapter 3.

THE DIRECTORATE OF AGRICULTURAL SCIENTIFIC RESEARCH (DASR)

DASR has the responsibility for research on all crops (except for cotton and tobacco) and livestock. Within DASR, research is carried out by 355 graduate staff members in eight technical departments at its headquarters (Douma, Damascus), 14 research centers at the mohafaza level, and 14 research stations -- seven affiliated with headquarters and seven affiliated with research centers (see DASR Organigram in Annex I: 2, A and B).

Since 1965, when DASR was established, it has made significant contributions to agriculture in Syria, with its primary emphasis on the development of new and improved crop varieties. Examples of these contributions are listed in the DASR director's presentation to the DASR/IDRC/ISNAR Workshop, Damascus, 1987, mentioned earlier. During the past 23 years , DASR has faced a number of problems beyond its control which have disrupted research activities. Without these problematic factors, undoubtedly even greater contributions could have been achieved.

DASR has developed its research staff during the last decade at an annual growth rate of about 10-14%. In addition, it has developed its infrastructure to meet research program needs through the government's growing financial support, especially during the fifth and sixth five-year plans, 1981-1990. For instance, capital investments form about one-third of the total DASR expenditures for 1988 (see Table 24). The increase in the development budget (half for facilities) of DASR during the last five years is about 3.5-fold (SP 29.0 million for 1988 vs 8.645 million for 1983).

Research staff qualifications and research facilities at headquarters, centers, and stations vary a great deal. Staff variations are in the numbers at each location and in qualifications and experience. Availibility and adequacy of land, buildings, equipment, and other facilities vary from headquarters to main centers to small centers and remote stations. These variations in staff and facilities are reflected in the planning and programming of research at DASR.

DSAR has been given the responsibility of formulating a national agricultural research policy through the identification of constraints limiting the development of agriculture in the country. Although DASR is carrying out this responsibility, a national agricultural research policy is not fully formulated. Furthermore, DASR's role in supporting policymakers in establishing priorities among competing agricultural development objectives has not been fully developed.

In general, the programming of DASR research is centralized at headquarters where research programs are prepared, research data analyzed, and results interpreted. Implementation of research programs and data collection, however, are decentralized. The number of research projects has grown up by an average of about 14% annually -- about 23% for field crops and plant protection -- during 1979-88 (see Table 17).

The government maintains rigid top-to-bottom administrative control over the institutions which were created to conduct agricultural research or other activities. Thus, within the present government procedures, DASR has been assigned a crucial task in the agicultural development process. However, DASR has planned, programmed, and implemented its research program to achieve its objectives with varied success.

The next two chapters briefly review and discuss the DASR research program in terms of program planning and formulation, and the resources necessary to carry out the research program efficiently, keeping in mind the fact that institutional development proceeds through stages, each stage emerging from and building upon its predecessor. In addition, management procedures must also be modified to be appropriate in respect to new stage of institutional development. It is the responsibility of MAAR to ease the bureaucratic processes inherited from earlier times that controlled, and inhibited growth and innovative change in agricultural development instead of stimulating and encouraging it.

Chapter 4.

RESEARCH PLANNING AND PROGRAMMING AT DASR

4.1 The Agricultural Development Policy Environment and Its Implications for Agricultural Research Policy

Development of the agricultural sector has always been a concern of the government's five-year plans. The agricultural sector received 9.2% of the consolidated (ordinary and development) budget of 1987, making it the second largest recipient after Community, Social, and Personnel Services, which received 69.3% (Table 12.)

The country's perspectives, developed by the State Planning Commission (SPC) for the year 2000 for agriculture, forestry, and fisheries, have clearly stated that the goal in agricultural development is to "increase the agricultural production output at an average annual growth rate of 6.7% to ensure an AGDP contribution to the GDP of 16.9%" with the following objectives:

- to satisfy increasing food demands from the growing population and to achieve self-sufficiency in crops that can be produced economically under local conditions;
- to achieve food security in staple commodities and to keep up strategic reserves, especially in cereals;
- to provide agricultural raw materials to local agroindustry;
- to maximize agricultural exports at an annual growth rate of 12% and to minimize imports by 3%;
- to reduce unemployment in rural areas;
- to improve farmers' income at an annual rate of 4.2% through increasing production and adopting inductive pricing policies.

To achieve the agricultural development goal and its objectives, the SPC has identified 10 strategic areas of concern and set forth objectives and production targets. These areas could be grouped in the following way:

- improving crop and livestock productivity;
- developing irrigated agriculture and rainfed farming systems;
- enhancing human nutrition;
- supporting and developing agricultural research, extension, and training institutions;
- intensifying investments in short- and long-term agricultural production projects, including agricultural production-inputs projects.

The agricultural development goal and its objectives and strategies have implications for the DASR agricultural research policy and the research program it is carrying out. Broad objectives for the DASR research policy could be spelled out and summarized as follows:

1. helping the country use its natural resources and meet its growing demand for food, feed, and raw materials to be used in the country and to improve the country's foreign exchange earnings through generating and developing agricultural production technologies;

2. generating and developing the means of production that would
   (a) intensify irrigated agriculture and develop rainfed farming systems;
   (b) reduce unemployment and improve income in rural areas;

3. enhancing human nutrition by devising strategies for changes in the food and agricultural systems that would rationilize consumption and increase individual calorie and protein intake.

In the implementation of these objectives, emphasis has been given to plant breeding for the development of improved varieties of wheat, barley, maize, chickpeas, lentils, sugar beets, feed legumes, oil seeds, fruit trees (apples, pears, peaches, grapes, olives, and citrus), and vegetables (onions, tomatoes, potatoes, eggplants, and cucurbits), and for improved agronomic practices and control of the main insect pests and pathogens.

In general, the research objectives of DASR appear to be in line with agricultural development policy objectives. However, there are two crucial, interrelated questions in this regard. One is concerned with government support and commitment to DASR, and the second is on DASR's capacity to diagnose and evaluate agricultural production problems, identify and test alternative solutions, and adapt technologies to local conditions. In other words, DASR is concerned with determining its research program, implementing it, and communicating appropriate findings to those that need them.

4.1.1 Government commitment to DASR

To achieve the development objectives stated in the SPC perspectives for the agricultural sector towards the year 2000, there is a need for long-term commitment of resources to agricultural research.

Government spending on agricultural research is below the World Food Conference (WFC) recommendation on expenditures on national agricultural research. The WFC recommended that expenditures should reach at least 1% of AGDP and between 10% and 20% of total funds committed to agricultural development. Also, spending on agricultural research is far below what the World Bank Sector Policy paper recommended -- a desirable investment target for research in many countries with poorly developed agricultural research systems would be an annual expenditure (recurrent plus capital) equivalent to about 2% of AGDP. These expenditures depend on several factors, including the absolute size of the research system, the availability of qualified technical staff, and the financial capability of the country to support a larger research effort. Government expenditures on agricultural research of MAAR and tobacco research are estimated by MAAR at about 82 million Syrian pounds forming 0.35% of AGDP at 1986 current prices, 2.1% of the total agricultural sector budget, and 9.3% of MAAR's budget (Table 12). These expenditures are about one-third the WFC recommendation and about one-sixth the World Bank's target for research. Average annual spending for agricultural research was 0.94% of AGDP in 52 developing countries in 1980-85, and 2.17% for developed countries (ISNAR, Annual Report 1987).

The average expenditure per scientist at DASR is about US$ 20,570 for a consolidated budget for salaries and operational costs, US$ 11,620 for a consolidated budget for direct operational costs, US$ 9,380 for an ordinary budget for salaries and operational costs, or US$ 430 for an ordinary budget for direct operational costs (official rate of exchange: US$=SP 3.925). The norm for these expenditures is above US$ 10,000 for direct operational costs per scientist. Therefore, without the development budget which ensures direct operational costs to current research activities, DASR would face financial difficulties in implementing its research program, keeping in mind that expenditures in the development budget are not allocated to all DASR activities but to specific development projects.

The above data show that government should increase spending on agricultural research in general as well as more per scientist to ensure that DASR will play its critical role in achieving the agricultural development objectives as stated in the development plans.

4.1.2 DASR interaction with national development policy

In general, national development policy plays a critical role in shaping the structure of agricultural production, in efficient use of natural resources, and in providing the context for technological development. The interaction between national agricultural development policy and agricultural research is often top-down with policy dictating the broad research agenda. However, national agricultural research can and should have an impact on national agricultural development policy as well.

DASR has an important role to play in helping policymakers make more realistic appraisals of the potential contributions of research to agricultural development objectives. For example, it can define the production potential of the agricultural stabilization zones, contribute to natural resource planning, define the expected returns to different kinds of research activities, and provide information to help planners establish priorities among competing agricultural development objectives. Therefore, DASR needs to strengthen its research capacity through developing agricultural policies -- in such areas as the relative emphasis on agriculture and industry, the balance of food self-sufficiency versus reliance on imports to meet demand, the determination of national priorities among export and food crops, the reconciliation of the need to keep food prices low for consumers with that of providing sufficient incentives to farmers to expand production, the determination of the degree to which price policies on subsidies should be used to stimulate production and adoption of improved technologies, and the determination of the equitable distribution of the benefits of agricultural research among various sectors and interest groups in the society -- that have a strong impact on the kinds of technology farmers will adopt. Thus, to achieve an efficient interaction with policy, DASR should operate within the general policy framework to contribute to developing articulated agricultural development policies and to ensure that its research is consistent with agricultural sector objectives.

4.2 Research Policy Formulation

To achieve the production targets listed in the SPC document on the agricultural sector toward the year 2000, mentioned earlier, particular attention needs to be given by DASR, in particular, and other research directorates of MAAR, to the development of research policies that are adequately oriented toward agricultural sector objectives and overall development and society goals.

However, the agricultural sector objectives are broad enough to accommodate practically every activity proposed by the research community. More important, the research staff of DASR organize and build their annual research agenda not on the basis of agricultural development objectives but along commodities, disciplines, production factors, natural resources, and agro-stabilization zones. There is, therefore, a need for a set of strategic statements that form a bridge between agricultural development objectives and research agenda to establish very clearly the connection between the two. This involves the need for defining priorities in agricultural research since there is no agricultural research system or institution, however large and well organized, that can hope to solve all the problems affecting agricultural production in the country. Consequently, this calls for institutional mechanisms, whether at the level of MAAR or DASR, to develop a strategy that clearly specifies agricultural research objectives and priorities and allocates existing and future resources to these priorities.

This strategy is the first step for DASR to meet the major challenges of the country's agricultural development plan (Figure 1). It will guide DASR to formulate a realistic research program that responds to these challenges and will help in developing the resources needed to implement a research program to develop production technologies for the various farming systems in the country. Furthermore, the research strategy for DASR must be based not only on a priority assessment of what is desirable in terms of improving the productivity of crops and livestock, but equally important, it must be based on the capacity of DASR to develop feasible technological solutions within available and future resources.

DASR should avoid excessive dispersal of researchers, especially qualified and experienced ones, over a wide range of commodities, disciplines, provinces, and agro-stabilization zones. In other words, in developing a research strategy, DASR should make choices that increase and sustain the production of plant crops and livestock in the various agro-stabilization zones in Syria. Principal choices can be summarized within the context of adaptive and applied research under three major areas: plant crop commodities, livestock production, and rainfed and irrigated production systems.

4.2.1 Plant crop commodities

Choices of crop and livestock commodities are based on demand for them, production capacity, and their importance in the rainfed and irrigated production systems in the country. Thus, seven plant commodity areas, within the mandate of DASR, could be identified: (1) wheat and barley, (2) food and feed legumes, (3) maize and sorghum, (4) sugar beets, (5) oil seeds, (6) fruits, and (7) vegetables.

Rainfed farming systems in the country are based on crop-livestock interactions and a cereal-legume rotation to sustain yields. The basic staples -- wheat (for food) and barley (for feed) -- are consumed in the country at very high rates, e.g., about 205 kg wheat versus the 51 kg average in 93 other developing countries. Wheat is grown in rainfed systems in rotation with legumes in areas where annual rainfall is 300-400 mm for durum wheat and above 400 mm for bread wheat. Legumes are used in rotation with wheat to sustain cereal yields and to provide food (chickpeas and lentils) and feed.

Wheat is also grown in the irrigated areas, which are more productive than low-rainfall areas. The government plans to increase both the area and yield of irrigated wheat. These plans call for an increase in area from about 180,000 ha (27.9% of the total irrigated area of 652,000 ha in 1986) to about 475,000 ha (20.8% of the total projected irrigated area in the year 2000) (Tables 1, 4, and 13), and for an increase in yield from 2.4 t/ha in 1985 up to 4.1 t/ha in the year 2000, at an annual growth rate of 3.4%.

Wheat and barley research strategies should be based on many dimensions, such as breeding the various varieties needed for rainfed, supplementary, and fully irrigated areas; breeding for heat and salinity stress tolerance; rationalizing consumption of wheat and barley by reducing post-harvest loss and per capita consumption; and a fourth dimension is concerned with research on production factors.

Strategy selection for rainfed wheat and barley as well as for rainfed food and feed legumes should consider ICARDA's research on these crops to integrate research efforts and avoid duplication.

To meet the projected increases in livestock numbers and productivity, there should be an adequate supply of feed. This implies that research strategies would consider such alternatives as improving extensive grazing in the communal grazing areas and increasing feedstuff production. Government plans call for an increase in the area planted in feed legumes and in maize and sorghum in both the rainfed and irrigated farming systems.

It is projected that by the year 2000, feed legumes, maize, and sorghum will form 30.7% of the total irrigated area, making irrigated feedstuffs first in a ranking of irrigated crops, followed by wheat, cotton, oil seeds, and other irrigated crops (Table 13). This projected increase in irrigated feedstuffs as well as in oil seeds has its implications for DASR research. Research strategies in feedstuffs, therefore, should concentrate on increasing the crop mix by introducing new options in feed and forage legumes as feed crops and as elements in crop rotation with cereals in both irrigated and rainfed lands. Thus, intensity will increase in the second rainfed stabilization zone and in the irrigated area, i.e., projected increases are from 60% to 80% and from 127% to 175%, respectively.

Sugar beet and oil seed crop areas will form 6.6% and 11.7% of total irrigated areas, respectively, by the year 2000 (Table 13). It is projected that sugar beet yields will increase from 21.0 t/ha in 1980 to 36.0 t/ha by the year 2000. Oil seed crops are projected to be increased in area as well as in yield due to the high demand for cooking oil and for the feed value of their by-products.

Fruit trees cover a wide range, including olives, grapes, apples, and others (Table 5). Numbers of fruit trees have been increasing rapidly during the last few years, especially olives, grapes, apples, pistachios, pomegranates, and stone fruits (Table 5). It is projected that fruit trees will form 16.6% and 4.6% of the rainfed and irrigated areas, respectively (Table 13). Improving yield is another side of the projected improvement in fruit production. An annual growth in yield of 6.7% for olives, 3.3% for apples, and 2.0% for grapes is an example of such projected improvement.

Vegetables are of significance in irrigated farming. They form about one-fifth of the irrigated area (Table 4). Among 23 vegetable crops, the most important are potatoes, tomatoes, eggplants, onions, and cucurbits (Table 5). It is projected that vegetables will form 6.7% of the irrigated area by the year 2000 with an average annual increase in area of about 2%. It is also projected that yield will increase at annual rates of 3.5% for tomatoes, 3.1% for potatoes, and 2.8% for onions.

Potatoes and other vegetables will form 10.2% of total agricultural exports by the year 2000, third in ranking after cotton (25.6%) and red meat (45.7%).

4.2.2 Livestock production

Government plans call for an increase in the number of livestock at annual rates of 4.6% for cattle, 5.6% for sheep, and 6.8% for goats, and in productivity at annual rates ranging from 0.5% for mountain goats to 3.5% for Shami cattle. These increases in numbers and productivity will be achieved, as projected, through better health services, feedstuffs and breeds, to meet the growing demand for local consumption and for export. It is projected that red meat (sheep and cattle) will form about half of the agricultural product export list.

Sheep and goats form an increasingly important part of the farming systems in the third and fourth (marginal) agro-stabilization zones. There is an increasing need to ensure that improved technologies for these zones are matched with the interactions between crops and livestock (sheep and goats).

4.2.3 Rainfed and irrigated production systems

In general, agricultural production in Syria is constrained by land and water resources. Only 11.6% of total cultivated land is under irrigation (Table 1), and in rainfed agro-stabilization zones there is substantial variation in rainfall between zones as well as between years. Government plans call for intensifying irrigated agricultural farming systems and developing rainfed farming systems. Among the measures adopted to improve farming in both rainfed and irrigated areas are the following:

- to increase intensity from 137% to 175% in irrigated lands;
- to reduce fallow areas in rainfed lands, especially in the second stabilization zone, and thereby increase intensity from 50% to 80%;
- to rationalize underground water use and improve irrigation efficiency;
- to increase irrigated land area, at the expense of rainfed land, from 11.6% (1986) to 30-40% by the year 2000;

to collect small holdings in cooperatives to allow more use of mechanization to reduce the increasing production costs.

The above measures of reorganizing irrigated and rainfed production systems to meet the demands of the growing economy should be supported by a commitment for improving both the technological structure and economic conditions in these production systems. Thus, improved technologies should be evaluated within the context of complex farming systems, by giving commodity research priorities a farming system focus, which implies adaptive research at the farmer's level focusing on biological as well as socioeconomic conditions of farmers who will adopt improved technologies. This calls for setting research strategies towards the various irrigated and rainfed systems identified earlier, i.e., mixed rainfed farming systems in areas of rainfall above 600 mm, annual rainfed cropping systems in areas with rainfall between 350 mm to 600 mm, annual rainfed cropping systems in areas with rainfall between 200 mm to 350 mm; and irrigated farming systems.

The needs for research efforts vary among these production systems. Therefore, DASR must formulate strategies for these systems and to consider, while developing the strategies, research efforts by other organizations in the country as well as abroad. In its strategy, ICARDA will direct 85% of its resources towards research in rainfed areas receiving 200-500 mm annual rainfall where barley/livestock and wheat/livestock/legumes are the current principal commodities. On the other hand, it is expected that ACSAD will direct a major part of its resources towards research in the steppes, where there is less than 200 mm annual rainfall and where extensive livestock production (mainly sheep) is practiced in large communal grazing areas.

Furthermore, strategies for production systems research should be developed by DASR with the objectives of studying the characteristics of each production system, identifying key problem areas which can be taken up in relevant commodity research, and helping in integrating newly developed technologies produced by commodity research to ensure that these technologies have been successfully incorporated into the production system. This approach calls for developing farming system research where multidisciplinary teams of biologists and socioeconomists work together to achieve the objectives of production system research.

4.2.4 Applied and adaptive research

Most of the current DASR research activities are of the adaptive research type. However, the above proposed outlines for developing a DASR research strategy call for careful assessment of the correct balance between the applied and adaptive research that is required. The type of research necessary to develop technologies to meet the DSAR research strategy depends on the contribution of partner organizations within and outside the country. It must be recognized that many of the technological advances required for the various irrigated and rainfed farming systems can only be achieved by sustained, long-term applied research.

It is clear, however, that adaptive research based on station and farmer's field testing has a critical and important role to play in the

technology transfer process, but to devote most of the available resources to this type of research activity would undermine the ability of the DASR research effort to respond to the needs of its clients. However, DASR should be able to achieve a balance between applied and adaptive research by taking the necessary steps to ensure that it can draw upon applied research in other key areas undertaken by other research organizations. This will depend on the nature and type of research priority objectives and resources allocated to meet these objectives.

It is worth mentioning that ICARDA's draft strategy has indicated its desire to strengthen strategic research in future research efforts. This calls on DASR to complement ICARDA's approach by moving towards applied research in the commodities covered by ICARDA's mandate.

4.2.5 Organizational and resource requirements

In implementing the research strategy, DASR should develop a systems approach to research through strong interaction between disciplines at various departments, centers, and stations, where a matrix-management type of implementing program should be sought. In this kind of management, research staff are located according to their disciplines (departments) in one dimension and their programs in the other. This approach will enhance forming multidisciplinary teams by allocating staff from disciplinary groups. Therefore, such arrangements will help to develop commodity-oriented projects.

Having identified the main research priority areas in the strategy, DASR should estimate the size of the target resource of each research program. Number of staff and their specializations, financial resources needed, and facilities required also have to be estimated.

4.3 Formulation of Research Program

The research departments of DASR are responsible for developing and implementing the annual work plan -- Annual Implementation Plan for Agricultural Scientific Research. The stages of developing the annual plan are summarized in Table 14. Projects are developed, in consultation with department heads year round and before the annual meeting in late September, through specialized group meetings or at the prepatory plenary meeting of researchers involved in research projects at the end of the cropping season, late August or early September. The annual plan is approved during the annual meeting in late September and before the annual meeting in October of the MAAR/ICARDA joint collaborative research program. The annual plan as well as the outcome of the MAAR/ICARDA annual meeting is published to guide researchers to implement the research program. Research projects for the season 1987/88 are summarized in Table 15.

Research project proposals are developed in response to country needs and to requests from government institutions, mainly MAAR, and in collaboration with regional and international organizations, e.g., ICARDA and ACSAD. In general, research projects are developed and approved at DASR headquarters and implemented at various centers and stations (Tables

15 and 16), while results are analyzed at DASR headquarters. Collaborative research projects with ICARDA and ACSAD are jointly developed and implemented.

In the absence of a comprehensive research strategy and a long-term program plan, a number of weaknesses in developing and implementing the annual programs of DASR can be identified in the characteristics of the research program, in the inputs necessary to formulate and implement the research program, and in the mechanisms to synthesize and implement the annual program.

Most commodity research is in breeding -- especially line testing and yield trials. Little attention is given to agronomic trials and socioeconomic studies.

Centralization of program planning and analysis at DASR headquarters limits the role of researchers at centers and stations to implementing experiments and collecting data. Thus, their role in research planning and the interpretation of results is limited.

Lack of resources predominates the implementation of research plan. The shortage of personnel -- qualified scientists, efficient leadership of research activities, technicians, and labor -- is one of the limitations. In contrast, there is a large number of new B.Sc. graduates who need more training to become effective researchers. A lack of facilities and financial resources is also a limitation.

In view of the above-mentioned weaknesses, there is a need to improve the research program planning process in DASR.

4.3.1 Formulation of long-term research program plan

Once the DASR research strategy is developed, where broad program priorities and resource allocation are defined, it is no less important to identify long-term priorities for DASR research activities (Figure 1). The long-term research program plan describes the kinds of research identified by scientists as necessary to meet the short-term and long-term needs of agriculture and presents a minimum number of research approaches needed to meet the objectives of the DASR research strategy. The research approaches are based on current scientific knowledge and will change as knowledge advances or as the research needs of agriculture change.

The first step in setting priorities in the long-term planning process is to establish goals and long-term research objectives. These are already identified in the priority-setting process for agricultural research strategy formulation.

The second step is concerned with allocation by priority to research thrusts and the development of long-term research programs. Thus, there is a need to draft a set of proposed courses of action or research approaches to achieve the objectives identified in the strategy.

In the third step, each approach should be developed further to identify elements of research approaches and project areas.

These steps could be implemented by assigning experienced task forces or program committees to deal with them (Figure 1). Each identified approach could be assigned to a selected scientist for further development and identification of research approach elements and project areas. Those scientists, in turn, would enlist the help of many other scientists to ensure full consideration of commodities, disciplines, and problem areas. During a period of about two months, the selected scientists or program committees could develop written material that defined the scope and contents of the approaches. Then, they could organize research approach elements into one or more project areas with information on the nature of the problem to be solved and its agricultural importance, current research status and critical research needs for solving the problem, the kinds of results expected -- reports, germplasm, etc. -- and the length of time needed to produce these results, potential benefits and impacts that can be expected if the research is successful, probability of success, and relative priority of the research.

This information would develop and define the final set of research approaches, approach elements, and project areas. Thus, duplication would be eliminated and only the approaches essential to achieving the objectives would be selected. A catalog of research project areas should be prepared for use in the resource projection needed for the long-term program plan, which, in turn, will guide the preparation of short-term and annual research programs. The long-term research program plan should be revised, as appropriate, to reflect the latest scientific findings and most urgent needs of agriculture in Syria.

Preparation of the long-term research program plan should be carried out with a view to planning and developing human and physical resources, and justifying resource requirements to meet the research needs for agricultural development.

4.3.2 Formulation of short-term and annual research programs

The goal of formulating a research program is to establish an effective and efficient short-term and annual research program to facilitate the country's agricultural development. This goal can be realized by responding to the needs of the country as well as those of the farmer.

Formulation of the short-term (2-5 years) and annual research programs takes place on the basis of current staff, facilities, and financial resources.

The short-term program usually includes a number of projects, each with a number of experiments that need to be carried out through several years before being reviewed. However, the annual research program is the firmest statement possible of the aggregate of experiments and studies to be carried out during the year with the available resources. Since research projects should be approved for a minimum of three years (as it seems unrealistic to expect significant and reliable results from shorter periods), the annual programming cycle should keep track of station activities, monitor the progress achieved, and evaluate new topics submitted by the researchers.

To institutionalize the planning of the annual research program in order to confirm the quality and relevance of research, a number of inputs are necessary to delineate the formulation process of annual and short-term programs. These inputs include:

(a) a long-term program plan to provide parameters within which to orient program formulation at the researcher's level;
(b) well-trained research personnel and technicians;
(c) a current list of facilities on which workplans must be based;
(d) preliminary funding estimates for project proposals (ranked by priority) to allow unworthy projects to be terminated and to allow marginal resources to shift to more important projects;
(e) information on the users of research results to be made available to researchers for proposing and conducting experiments and studies that will serve the primary clients, including farmers, development agencies, and policymakers, and that will also enable the appropriate body within the organization to reach decisions on alternative choices of experiments and studies.

4.4 Institutional Arrangements

As stated earlier, formulating agricultural research programs is an ongoing goal-oriented process, involving rational decision making optimizing the means and use of resources to achieve agricultural development objectives. Thus, there are needs for institutional arrangements to help in formulating (a) a research strategy, (b) a long-term research program plan, and (c) short-term and annual research programs. A proposal for an institutional arrangement is illustrated in Figure 1. In the proposal, while decisions are made independently at MAAR, DASR, and researcher levels, the levels are connected by the flow of information downwards and upwards through DASR and MAAR.

The outputs (decision products) at one level become part of the inputs (information base) for another. For example at the MAAR level, the goal is priority setting for its research enterprise. The inputs necessary at this level are national development goals and agricultural development objectives. The outputs at MAAR level are broad research priorities, resource allocations for these priorities, and a strategic plan for national/MAAR research. These outputs from the national/MAAR level become the inputs for a task force of senior researchers. These inputs, with the group's experience in world knowledge and technical possibilities, will be utilized by the group to develop a long-term research program plan consisting of long-term research project areas along with available and projected resources needed to implement the research program. This long-term research program plan, with the national/MAAR research policy and strategy, world knowledge of current technical results, and microeconomic data on client circumstances, becomes the input for DASR management, program committee(s), and research workers to develop the short-term and annual research program, study, and experiment proposals.

4.4.1 MAAR Research Committee (MRC)

The membership of the proposed MAAR Research Committee (MRC) would include representatives from the decision-making levels of the various

MAAR directorates involved in agricultural research -- DASR, DS, DIWU, DCB, DAEC, DAEX, Directorate of Statistics and Planning, Directorate of Agricultural Affairs, Directorate of Steppe, GOSM, and Directorate of Animal Production -- the Ministries of Planning, Irrigation, and Finance, the universities, Peasants Union, and Agricultural Engineers Syndicate.

A technical secretariat could be established at DASR to coordinate the implementation of MRC policies and decisions.
The major functions of the proposed MRC would be:

- to define the National/MAAR agricultural research policy and strategy by developing clear statements of agricultural research objectives, setting broad priorities, and rationalizing resource allocations;
- to approve MAAR research programs;
- to secure coordination within MAAR research as well as with other agricultural research in the country;
- to institutionalize MAAR research linkages with its clients;
- to promote bilateral and international cooperative research programs.

MRC should meet at least every six months in order to fullfill the above objectives.

4.4.2 National task force

To allocate resources by priority to research thrusts and to develop long-term research program plans, there is need to draft a set of proposed courses or research approaches, elements of the approaches, and research project areas to achieve the research strategy objectives. This could be done by an experienced national task force (NTF). With the help of other scientists to ensure full consideration of commodities, disciplines, and problem areas, the NTF, within a period of about two months, could develop written material that defines the scope and content of the approaches, their elements, and research project areas.

4.4.3 DASR Technical Committee (DTC) and program committees

A DASR technical committee (DTC) should be established and should meet at least every six months in order to review research programs and to ensure that the overall objectives of DASR are being fulfilled as effectively as possible. Membership of DTC could include the Director of DASR and his deputies, heads of departments, four program coordinators (two in plant crop commodities, one in the livestock program, and one in farming systems), and four directors of centers and stations. An example of the functions of DTC would be to define periodically the research programs, assess and interpret research requirements, monitor the progress of research, and formulate and monitor linkages within the departments of DASR, with clients and other research organizations.

In addition to DTC, each research program, i.e., plant crops, livestock, and irrigated and rainfed farming systems, would have a program committee to plan and review the program. The program committees would comprise senior scientists in the DASR as well as members of other directorates, organizations, or client groups, such as GOSM, universities, other research directorates of MAAR, etc., who have a technical interest and input into the specific programs. One member from DASR would be the

program coordinator for each program committee, who is appointed by the Director of DASR, for a fixed period of years from among senior scientists, e.g., heads of departments, heads of centers, etc.

The main responsibilities of the program coordinators and program committees would be to define the technical objectives and contents of the program and projects by identifying centers, stations, and staff who would be responsible for carrying out program activities (if possible in multidisciplinary teams) tackling specific research projects, preparing resource requirements for the program, monitoring progress, and preparing program and annual reports on the programs based on analyzed data provided by researchers who are implementing the research program.

4.4.4 Projects Documentation Unit (PDU)

For the program committees and program coordinators to carry out their careful review and report to the management of DASR, the research projects must be well documented through a projects documentation unit (PDU) which documents the outcome of the evaluation by the program committees. Each project proposal should include information on client conditions, objectives of research, relevance of potential results, plan of work, cost estimates, reporting schedules, etc.

The PDU is not only valuable in reviewing present proposals, it is also the basis for any subsequent planning of staff time and monitoring and evaluation of progress. Thus, a program budgeting system (PBS) within PDU will be developed as a management tool to facilitate programming, budgeting, and accounting. PDU will help DASR management in assessing allocation of funds and research staff time to different disciplines, commodities, research centers and stations, stabilization zones, and irrigated and rainfed farming systems.

Chapter 5.

RESOURCES FOR IMPLEMENTING THE RESEARCH PROGRAM OF DASR

5.1 Implementing the Research Program

Once the research program for the next season has been determined in the annual meeting at DASR headquarters, DASR implements its program through the network of centers and stations it has throughout the country (Tables 15 and 16). In general, each approved research project is replicated at more than one center/station under the supervision of headquarters (average three locations per project). Each project is conducted by one to 16 researchers (average five scientists per project and one project per scientist). The number of projects has grown during the last decade at an annual average rate of 14% (Table 17). This growth is associated with an increase in researchers, funds, and facilities.

5.2 Human Resources

5.2.1 Present distribution and qualification situation

Researchers at MAAR are organized in categories similar to other qualified workers of MAAR. Therefore, there is no distinct categorization of the research cadre of MAAR. As mentioned earlier, however, DASR research staff are fully committed to research, while about half of the DCB staff and a minor number of DS and DIWU staff conduct research.

In mid 1988, DASR had 28 Ph.D., 6 M.Sc., 321 B.Sc., and 47 technicians of diploma and secondary-certificate level (Table 18). Other technical staff of DS, DIWU, DCB, and DAEX are shown in Table 18. The number of technical staff at DCB shown in Table 18 is those who are actually involved in research, while fewer of the technical staff of DS and DIWU shown in the same table are involved in research.

About 40% of total DASR researchers are at headquarters and the main stations at Douma and Damascus Mohafaza, while the remaining researchers are distributed at centers and stations in the Mohafazat -- about 15% for the Homs, Hama, and Al Ghab Centers (middle of the country), 12% for the Aleppo and Idleb Centers (north of the country), 10% for the Jableh and Tartous Centers (the coastal area), 8% for the Al Rakka and Dier-ez-Zor Centers (the Euphrates Basin), and 7% for the Al Hasakeh and Hemo Centers (northeastern plain) (Tables 19 and 20).

The number of DASR researchers has doubled during the last decade at an annual growth rate of about 6%. On the other hand, the number of technicians has been nearly stable, with the ratio of technicians to scientists decreasing from 0.23:1 to 0.13:1 between 1979 to 1988 (Table 21). The appropriate ratio of technicians to scientists should be 1:1 or more to support scientists in conducting their experiments and studies efficiently.

About 30% of researchers have less than five years of experience in research. Researchers with Ph.D. and M.Sc. degrees form about 10% of the total researchers of DASR. One-third of them are at headquarters, one-fifth at Jableh Center, and the remaining are at the Homs, Hama, Aleppo, Tartous, and Al Hasakeh Centers (Table 20).

5.2.2 Conditions of service

DASR personnel positions, promotions, grading, salary scales, and allowances are governed by the United Law for Public Service Workers. Therefore, salaries of technical staff at DASR are similar to salary scales in other sectors of civil service, except for universities and juridical services where salary scales are higher than in other civil service sectors. However, the relatively higher salaries for the academic staff at local universities and at other much better-paid institutions in neighboring countries or international and regional organizations tend to divert people with Ph.D.'s from the MAAR, including DASR. This tendency has recently accelerated because of the high rise in the cost of living. Those who continue to work at DASR or on other research in the MAAR are dedicated people despite this serious problem which affects their motivation.

In attempting to counteract excessive rates of turnover in research staff and to maintain high morale among staff, MAAR should develop good incentive structures for its researchers, including career plans that take the problems of researchers into account.

5.2.3 Planning of human resources

Planning of human resources is concerned with the assessment and provision of the types and amounts of skills required to attain research strategy objectives, for both long-term and short-term programs.

Once program decisions are made for research policies on a long-term basis, DASR can project staff needs and plan for staff training for graduate degrees and in-service training. While, in the case of short-term and annual research programs, DASR is in a position to make an assessment of current staff qualifications, and the allocation of staff to activities. The potential for short-term growth can then be achieved through recruitment and postgraduate training, at both local universities and abroad.

Efficient planning of human resources must have comprehensive and up-to-date information on all key aspects of the utilization of human resources. Therefore, the proposed PDC will provide up-to-date data on research program activities, budgets, and facilities as well as human resource inventories and utilization.

Planning and development of human resources should be organized for DASR to review future research program needs in terms of various skills, e.g., postgraduate, graduate, technical, support staff, etc.; organizing in-service training, including research management; assisting local educational institutions to meet DASR staff needs; and seeking fellowships for nondegree and postgraduate-degree training in the country and abroad in relation to the needs of short-term and long-term research programs.

5.3 Physical Resources

The consistency and quality of physical resources has a great influence on the quality of research output.

DASR has implemented 461 research projects during the 1987/88 season at headquarters, seven headquarters stations, and 14 centers and their seven stations (Tables 15 and 16). The land available to the DASR for research consists of about 700 ha of rainfed land and about 450 ha of irrigated land covering the first and second stabilization zones for rainfed experiments and nearly all stabilization zones for irrigated experiments (Table 22). While the number of hectares is not a reliable indicator for judging the efficiency of a research effort, amount of land dedicated to DASR for agricultural research for the entire country is the same as that operated by ICARDA's single station at Tel Hadya near Aleppo.

Despite substantial increases in recent years in the area available for DASR research projects, in buildings, and in various equipment and library facilities -- through the research station development project in the agricultural development plan -- the facilities available for DASR research are still insufficient in both quality and quantity to meet the rapidly growing demand for DASR research to meet the pressing agricultural development objectives.

5.3.1 Physical resource planning

In making decisions about the type and number of research stations, support services, and equipment, a fundamental consideration is sustainability, overtime, from national resources. Physical resources -- buildings, land, equipment, and other things -- will deteriorate and eventually become nonfunctional without strategies for:

- development and use of buildings, land, and equipment;
- maintenance and repairs;
- supplies and purchasing;
- development of physical resource personnel;
- centralization of some services at central headquarters and at center and station levels.

To maintain and sustain a good physical resource set-up, DASR should develop physical resource strategies to be used for developing a long-term physical resource plan. This plan must tackle issues such as regionalization of centers and stations by consolidating centers and/or stations to maximize the use of research resources. This could be done by developing and using buildings and land, sharing and centralizing some facilities and services (such as supply and purchasing, maintenance and repair), and training and developing physical resource personnel.

5.4 Financial Resources

As mentioned earlier, the financial resources committed by MAAR to agricultural research, in relative terms, are among the lowest in the world (0.35% of AGDP at 1986 current prices [Table 12] vs 0.94% of AGDP, the annual average for 52 developing countries during 1980-85, and 2.17% for developed countries [see 4.1.1]).

The allocation of DASR expenditures to commodity and subject research areas and the allocation of DCB expenditures to cotton research are shown in Table 23. Dry legumes received the highest allocation among commodities in regard to their share value in production (0.45% of dry legume production value). On the other hand, cereal (wheat, barley, sorghum, and maize) research expenditures formed 24% of total DASR allotments (Table 23).

DASR receives government funds in the ordinary and development budget, the combination of which makes the consolidated budget (Table 24). In the ordinary budget, salaries take up 90%, while the remaining 10% goes to indirect and direct operational costs. The bulk of expenditures on operation comes from the development budget, bringing direct operational costs from 4.6% of the ordinary budget to 56.5% of the consolidated budget (Table 24). This helps DASR implement its research program, because without the development budget, DASR would face a serious problem in implementing its research.

In many national agricultural research systems, the salary costs reach between 60% to 70% of the total budget, sometimes even 80% or more in exceptional cases; while direct operational costs (including operational and experimental inputs) vary between 15% to 35% of the total budget. The remaining 5% to 15% is for overhead costs (indirect operational costs). These ratios are efficient if the budget level is high enough to pay good salaries to the research staff (50% to 60% of the total budget) and still provide enough operational funds to use equipment efficiently, to conduct reliable experiments, and to ensure the required mobility of staff.

As mentioned earlier, salaries of researchers at the DASR have been less than those of academic staff at universities in Syria, and much less than those of researchers in neighboring countries and at international and regional research organizations located in Syria.

External financial support to DASR research programs is limited. ICARDA contributes limited financial support in the form of incentives to the participants in the DASR/ICARDA joint program.

Chapter 6.

SUMMARY OF PROPOSALS

DASR plays a key leadership role in developing and adapting the technologies required to meet the needs of agricultural development in Syria, but the technologies that are needed to achieve production targets, as stated in the development plans, are still not fully available. Thus, DASR will need to strengthen its present agricultural research capabilities in planning and implementing system-building strategies in the areas of agricultural research policy, organization, and management.

1. To achieve development objectives, there is a need for long-term commitment of resources to agricultural research. Research expenditures per AGDP, in relative terms, are among the lowest in the world. Government should increase spending on agricultural research in general as well as more per scientist to ensure that DASR will play its critical role in achieving its agricultural development objectives as stated in the development plans.

2. National development policy plays a critical role in shaping the structure of agricultural production, the efficient use of natural resources, and the context for technological development. However, national agricultural research can and should have an impact on national agricultural development policy. Therefore, DASR needs to strengthen its research capacity in developing agricultural policies to ensure that its research is consistent with the objectives of the agricultural sector.

3. There is a need for a set of strategic statements to form a bridge between agricultural development objectives and the research agenda, to establish very clearly the connection between the two. This calls for institutional mechanisms, whether at the level of MAAR or DASR, to develop a research strategy which clearly specifies agricultural research objectives and priorities and allocates existing and future resources to these priorities.

4. In the absence of a comprehensive research strategy and long-term research program plan, a number of weaknesses can be identified in the characteristics of the DASR research program, in the inputs necessary to formulate and implement it, and in the mechanisms to synthesize and implement the DASR annual work plan. Thus, there is a need to improve the research program planning process in DASR.
   (a) A catalog of research project areas should be prepared for use in resource projection for the long-term program plan, which, in turn, will guide the preparation of short-term and annual research programs. The long-term research program plan should be revised, as appropriate, to reflect the latest scientific findings and most urgent needs of agriculture in Syria.
   (b) Formulating efficient and effective short-term and annual research programs calls for institutionalizing annual research

planning to confirm the quality and relevance of research. The efficiency of this process depends on the availability of necessary inputs: long-term plans, well-trained scientists and technicians, appropriate facilities and funding, and information on the users of research results.

5. Formulating and implementing a research strategy and program is an ongoing goal-oriented process involving rational decision making and optimizing the means and use of resources to achieve agricultural development objectives. Therefore, necessary institutional arrangements are proposed to help formulate and implement (a) the research strategy, (b) the long-term program plan, and (c) the short-term and annual programs. Objectives and functions are outlined for a MAAR research committee (MRC) to formulate and implement research policy for national/MAAR agricultural research; a national task force (NTF) to prepare the research project areas for the long-term program plan; and a DASR technical committee (DTC) and program committees to implement, with scientists, the research strategy and long-term program plan by formulating and implementing the short-term and annual research programs. A project documentation unit is proposed to document the outcome of the evaluation of program committees, and to help in planning staff time, in monitoring progress and in assessing allocation of funds and research staff time to different disciplines, commodities, research centers and stations, stabilization zones, and irrigated and rainfed farming systems.

6. To maintain high morale among staff and to counteract excessive rates of turnover, especially Ph.D. and M.Sc. holders, MAAR should develop a good incentive structure for its researchers, including career plans that take into account the specific problems of researchers.

   Efficient planning of human resources must have comprehensive and up-to-date information on all key aspects of the utilization of human resources. Thus, DASR should develop a human resource plan to deal with reviewing future research program needs for various skills, organizing in-service training (including research management training) assisting local training institutions to meet DASR staff needs, and seeking fellowships for nondegree and postgraduate-degree training in the country and abroad in relation to short-term and long-term research programs.

7. To maintain and sustain a good physical resource set-up, DASR should develop physical resource strategies and long-term plans to tackle issues such as regionalization of centers and stations and to maximize the use of physical resources.

7- خلاصة المقترحـــــــــــــات

تلعب مديرية البحوث العلمية الزراعية دورا قياديا رئيسيا في تطوير وتطويع التقنيات المطلوبة لاحتياجات التنمية الزراعية في سورية ، ولكن التقنيات المطلوبة للوصول الـــــى الانتاج المستهدف كما هو محدد في خطط التنمية ما زالت غير متوفرة تماما . وعليـــــه ، فان مديرية البحوث تحتاج الى تقوية قدراتها البحثية الزراعية الحالية في تخطيـــــــط وتنفيذ استراتيجيات البناء - المنظومي في حقول سياسة وتنظيم وادارة البحوث الزراعية

١ - للوصول الى اهداف التنمية ، هناك حاجة الى تعهد بعيد المدى بتخصيص الموارد للبحوث الزراعية . ان نفقات البحوث لكل الانتاج المحلي الاجمالي الزراعي ، في الحدود النسبية ، هي بين الاقل في العالم . على الحكومة ان تزيد الانفاق علـــــى البحوث الزراعيه بصورة عامة وكذلك للمخصص لكل عالم لتضمن بأن مديرية البحوث ستلعب دورها الحرج في الوصول الى اهداف التنمية الزراعيه كما هي محددة فـــي خطط التنمية .

٢ - تلعب سياسة التنمية الوطنية دورا حرجا في تشكيل بنية الانتاج الزراعي والاستخدام الكفؤ للموارد الطبيعية ومحيط تطوير التقنيات . ومع ذلك ، فان البحوث الزراعيـة الوطنية يمكن بل ويجب ان يكون لها دورا مؤثرا في وضع سياسة التنميه الزراعيـــه الوطنية . لذلك تحتاج مديرية البحوث الى تقوية القدرة البحثية في تطويـــــــر السياسات الزراعية لتضمن تماسك بحوثها مع اهداف القطاع الزراعي

٣ - هناك حاجة الى مجموعة من البيانات الاستراتيجية التي تشكل جسر الربط بين اهداف التنمية الزراعيه وجداول اعمال البحوث ليؤسس الربط بينهما بصورة واضحة . ويستدعي هذا الى اليات مؤسساتيه ، ان كانت هذه على مستوى الوزارة او مديريه البحوث لتعمل على تطوير استراتيجية البحوث التي تبين بوضوح اهداف البحوث الزراعيـــة واولوياتها والتي تعمل على تخصيص الموارد الحالية والمستقبلية لهذه الاولويات

٤ - وفي غياب استراتيجية بحوث شاملة وخطة برنامج بحوث بعيدة المدى ، يمكن التعرف على عدد من نقاط الضعف في صفات برنامج بحوث مديرية البحوث ، وفي المدخلات الضرورية لصياغة وتنفيذ هذا البرنامج ، وكذلك في الاليات لبناء وتنفيذ خطة العمل السنوية لمديرية البحوث . وبالتالي ، هناك حاجة الى تحسين عملية تخطيط برنامج البحوث في مديرية البحوث .

آ - يجب تحضير بيان بمواضيع مشاريع البحوث ليستخدم في تقدير الاحتياجات المستقبلية من الموارد ليستخدم في وضع خطة البرنامج البعيدة المدى والتي بدورها ستكون الدليل في تحضير برامج البحوث قريبة المدى والسنوية . يجب ان تراجع خطة برنامج البحوث البعيدة المدى من وقت الى آخر لتعكس المستجدات العلمية الحديثه واهم الاحتياجات الطارئة على الزراعة في سورية .

ب - ان صياغة برامج البحوث القريبة المدى والسنويه الكفؤة والمؤثره تستدعي القيام بعمل مؤسساتي لتخطيط بحوث سنوية يؤكد على النوعية وعلى وثاقة صلة البحوث مع ما هو مطلوب . ان كفاءة هذه العملية تعتمد على توفر المدخلات الضرورية : خطة بعيدة المدى ، علماء ومساعدين فنيين ذوي تدريب عالي ، وامكانيات وتمويل مناسب ، ومعلومات متوفرة على مستخدمي نتائج البحوث .

٥ - ان صياغة وتنفيذ استراتيجية وبرنامج البحوث هي عمليه مستمره وموجهه الهدف تستلزم اتخاذ قرارات ترشيدية ووسائل مثالية واستخدام للموارد لتسهل الوصول الى اهداف التنمية الزراعية . لذلك فان الترتيبات المؤسساتيه الضروريه قد اقترحت لتساعد في صياغة وتنفيذ (آ) استراتيجية البحوث (ب) خطه برنامج بعيدة المدى و (جـ) برنامج قريب المدى وسنوي . لقد ذكرت بعض الاهداف والوظائف للجنه بحوث وزارة الزراعة والاصلاح الزراعي لتشرع وتعقد مناقشة البحوث الزراعية على المستوى الوطني او على مستوى وزارة الزراعه والاصلاح الزراعي، وكذلك لفرقة عمل وطنية لتحضير مواضيع المشاريع البحثية لخطة البرنامج بعيدة المدى ، وايضا اللجنه الفنية لمديرية البحوث وللجان البرامج البحثيه في مديرية البحوث لتنفذ ، مع الباحثين ، استراتيجية البحوث وخطة البرنامج بعيدة المدى وذلك بصياغة وتنفيذ برامج البحوث قريبة المدى السنويه . ولقد اقترحت وحدة توثيق المشاريع البحثيه لتوثق ما ينتج من تقييم عن لجان البرامج ولتساعد في تخطيط اوقات الباحثين ومساعديهم ، وفي رصد التقدم وفي تقدير محتاجات التمويل واوقات الباحثين المخصصة الى مختلف العلوم والسلع ومراكز ومحطات البحوث ومناطق الاستقرار والى نظم الزراعة البعلية والمروية .

٦ - ولكي يحافظ على معدلات عالية بين الباحثين ولتواجه المعدلات العالية في تحول الباحثين الى اعمال اخرى وخاصة منهم الحاملين لشهادات الدكتوراه و الماجستير على وزارة الزراعة والاصلاح الزراعي ان تطور هيكل حوافز جيد لباحثيها شاملا هذا الهيكل ايضا على خطط التقدم المهني لتواجه وتتغلب على مشاكل الباحثين .
ان التخطيط الكفؤ للموارد البشرية يجب ان يتوفر له المعلومات الشاملة والجديدة على كل المظاهر الرئيسية الخاصة في استخدام الموارد البشرية . وهكذا على مديرية البحوث ان تطور خطة مواردها البشرية التي تعالج بها مراجعة احتياج برنامج البحوث المستقبلية من مختلف المهارات ، والتي تنظم بها برامج التدريب اثناء الخدمة شاملا التدريب على ادارة البحوث ، والتي تساعد بها المؤسسات التعليمية المحلية لتفي باحتياج مديرية البحوث من العاملين ، وبها توضح ابواب السعي للحصول على المنح الزمالية والبعثات الدراسية التي لا تنتهي بدرجات علمية وكذلك للتي تنتهي بدرجات علمية عالية في سوريه وخارجها ، وكل ذلك يتم بالعلاقة مع برامج البحوث البعيدة والقريبة المدى .

٧ - ولكي يحافظ على بنية الموارد المادية (الفيزيائية) الجيدة ويطول بقاؤها ، على مديرية البحوث ان تطور استراتيجيات وخطة بعيدة المدى للموارد المادية التي تعالج بها مسائل مثل اعادة تنظيم المراكز والمحطات على اساس اقليمي وكذلك تنظم بها استخدام الموارد المادية .

Table 1: Land Use in 1982 and 1986 (1,000 hectares)

YEAR	CULTIVABLE LANDS							UNCULTIVABLE LANDS				Steppe and Pastures	Forests	Total Area
	Cultivated Lands					Uncultivated	Total	Buildings & Public Roads	Marshes and Lakes	Other Rock, & Sandy Lands	Total			
	Actual Cropped Lands			Fallow	Total									
	Rainfed	Irrigated	Total											
1982	3,432	555	3,987	1,814	5,801	394	6,195	345	113	3,062	3,520	8,312	491	18,518
1986	3,251	652	3,903	1,724	5,627	508	6,135	414	116	3,037	3,567	8,293	523	18,518

Source: Statistical Abstract, 1987, CBS (Syria).

Distribution of Lands	1982	1986
1. Cultivated lands of total area (%)	31.3	30.4
a) Rainfed lands of total cultivated lands (%)	59.2	57.8
b) Irrigated lands of total cultivated lands (%)	9.5	11.6
c) Fallow lands of total cultivated lands (%)	31.3	30.6
2. Steppe and pasture lands of total area (%)	44.9	44.8
3. Forest lands of total area (%)	2.7	2.8
4. Uncultivated lands (%)	2.1	2.7
5. Uncultivable lands (%)	19.0	19.3
Total (1,2,3,4 & 5)	100.0	100.0

Table 2: Annual Rainfall and Rainfed Cropping in the Agricultural Stabilization Zones

Zone	Annual Rainfall (mm)	Annual Rainfed Cropping
First	> 350	Wheat, legumes, and summer crops are grown.
A	> 600	Annual rainfed cropping.
B	350-600	Rainfall is not less than 300 mm during two-thirds of the related years, i.e., two successful cropping years each three years.
Second	250-350	Rainfall is not less than 250 mm during two-thirds of the related years, i.e., two successful barley cropping seasons each three years. Besides barley, wheat, legumes, and summer crops could be grown.
Third	> 250	Rainfall is not less than 250 mm during half of the related years, i.e., one to two successful barley seasons each three years. Barley is the main crop; legumes could be grown.
Fourth (Marginal)	200-250	Rainfall is not less than 200 mm during half of the related years. Barley is grown in this zone. The zone is a permanent grazing area.
Fifth (Steppe or Rangeland)	< 200	Rainfall is not enough to raise viable crops. It is suitable for grazing and for irrigated cropping where water resources (rivers and wells) are available.

Table 3: Land Use in the Five Agricultural Stabilization Zones in 1986 (1,000 hectares)

STABILIZATION ZONE	CULTIVABLE LANDS							UNCULTIVABLE LANDS				Steppe and Pastures	Forests	Total Area
	Cultivated Lands					Uncultivated	Total	Buildings & Public Roads	Marshes and Lakes	Other Rocky & Sandy Lands	Total			
	Actual cropped lands			Fallow	Total									
	Rainfed	Irrigated	Total											
First	1,127	246	1,373	67	1,440	286	1,726	131	15	339	485	180	307	2,698
Second	998	159	1,157	729	1,886	67	1,953	114	6	237	357	146	18	2,474
Third	404	39	443	457	900	28	928	48	12	142	202	166	10	1,306
Fourth	483	50	533	471	1,004	17	1,021	47	22	125	194	596	16	1,827
Fifth	239	158	397	-	397	110	507	74	61	2,194	2,329	7,205	172	10,213
Total	3,251	652	3,903	1,724	5,627	508	6,135	414	116	3,037	3,567	8,293	523	18,518

Source: Statistical Abstract, 1987, CBS (Syria).

Table 4: Rainfed and Irrigated Cropping Patterns

Crops	Total Area (%)	Rainfed Area (%)	Irrigated Area (%)
1. Food cereals (mainly wheat)	37.3	34.1	27.9
2. Fodder crops (mainly barley)	33.4	43.1*	9.1
3. Food legumes	4.6	5.1	2.1
4. Industrial crops (cotton, sugarbeets & tobacco)	6.7	1.5	33.8
5. Vegetables	6.6	4.4	18.1
6. Fruit trees	11.4	11.8	9.0
Total	100.0	100.0	100.0

Source: El-Akhrass, H. (1986). Syria and the CGIAR Centers.

*Adjusted from the Annual Agricultural Abstract of MAAR.

Table 5: Area, Production, and Yield of Main Agricultural Crops, 1982 and 1986

Crop	Area (1,000 ha)		Production (1,000 tons)		Yield (t/ha)	
	1987	1986	1982	1986	1982	1986
Cereals & Dry Legumes						
Wheat	1,222.3	1,098.3	1,556.2	1,969.0	1.3	1.8
Barley	1,588.6	1,548.1	661.0	1,115.0	0.4	0.7
Maize	22.1	46.8	49.5	74.2	2.2	1.6
Sorghum	13.4	10.8	13.1	6.2	1.0	0.6
Lentils	57.6	67.4	52.6	63.2	0.9	0.9
Chickpeas	56.2	38.2	37.0	27.6	0.7	0.7
Dry Fababeans	7.7	8.5	14.2	14.4	1.8	1.7
Other Dry Food Legumes (1)	7.3	4.8	12.9	6.6	1.7	1.4
Dry Feed Legumes (2)	42.4	43.2	30.8	29.6	0.7	0.7
Vegetables						
Tomatoes	36.5	32.6	790.3	582.6	21.6	17.9
Potatoes	16.8	22.7	279.4	409.0	16.5	18.0
Eggplant	8.5	8.5	170.3	176.2	19.9	20.8
Watermelon	101.3	84.2	868.6	631.0	8.6	7.4
Melon	29.1	22.1	284.6	152.3	9.8	6.9
Cucumber	24.5	19.6	282.7	219.8	11.5	11.2
Squash	10.3	10.2	153.8	133.1	14.9	13.0
Onion	9.5	7.3	187.2	146.0	19.7	20.0
Total Vegetables	294.8	268.2	3,717.3	3,149.7	12.6	11.7
Industrial Crops						
Cotton	158.8	144.3	422.2	418.7	2.7	2.9
Sugar Beets	28.9	13.2	860.3	440.0	25.5	33.3
Tobacco	13.6	14.0	13.7	16.6	1.0	1.2
Groundnuts	9.7	9.6	19.6	19.6	2.0	2.0
Sesame	26.7	27.3	16.4	12.1	0.6	0.4
Others (3)	9.4	15.7	10.6	16.3	1.1	1.0
Pastoral Crops						
Barley	9.1	26.5	195.9	254.2	21.4	9.6
Alfalfa	16.8	6.3	206.2	150.0	12.2	23.7
Trefoil	0.7	0.8	22.2	24.4	34.1	32.3
Flowering Sern	9.7	30.8	156.2	184.6	16.1	6.0

Fruit Trees					1982 Fruit-bearing (1,000 trees)	1982 Total (1,000 trees)	1986 Fruit-bearing (1,000 trees)	1986 Total (1,000 trees)
Olives	266.1	307.9	471.0	414.5	22,033	29,220	25,547	33,716
Grapes	100.9	112.9	427.8	500.7	59,153	75,825	60,977	85,354
Apricots	13.4	14.2	81.4	63.7	2,360	3,139	2,395	3,436
Apples	25.7	34.9	139.3	144.9	4,089	7,852	5,322	10,433
Almonds	19.3	23.3	8.8	53.2	2,235	7,156	5,033	8,393
Figs	18.9	16.4	50.8	41.7	3,229	4,007	2,956	3,594
Pistachios	23.9	44.0	8.0	14.3	1,007	4,745	1,548	8,039
Other Stone Fruits	18.6	28.6	101.3	117.8	3,925	6,045	4,747	9,078
Other Pomes	3.7	5.2	17.6	17.8	721	1,162	809	2,420
Citrus	8.9	14.4	81.6	164.4	1,842	3,200	2,458	5,533
Walnuts	4.6	4.5	13.3	13.0	375	572	378	547
Pomegranates	7.4	8.4	56.9	48.9	2,645	4,035	3,259	4,515
Others	0.1	0.1	0.1	0.2	8	14	12	22
Total Fruit Trees	511.9	614.8	1,452.9	1,594.9	103,622	146,972	115,441	175,080

Source: Statistical Abstract, 1987, CBS (Syria).

(1) Dry Haricot Beans, Dry Peas, and Dry Cowpeas.
(2) Dry Rambling Vetch, Flowering Sern, and Bitter Vetch.
(3) Sunflower, Aniseed, Cumin, and Indian Millet.

Table 6: Livestock, Livestock Products, Fish, and Poultry

ANIMAL	TOTAL		PRODUCTION							
	1982	1986	Meat		Milk		Wool		Eggs	
			1982	1986	1982	1986	1982	1986	1982	1986
Cattle	791	706	}	}	599	615	x	x	x	x
Sheep	11,403	11,669	} 153	} 118*	446	420	13	13	x	x
Goats	1,150	1,006	}	}	86	72	x	x	x	x
Poultry	15,045	13,928	72	78	x	x	x	x	1,593	1,575
Fish	x	x	3	4	x	x	x	x	x	x

No. = 1,000 Head
Eggs = Million
Production (Meat Milk, and Wool)= 1,000 Tons
Fish = 1,000 Tons

* For 1984 (AOAD Yearbook of Agricultural Statistics, vol. 6, 1986)

Source: Statistical Abstract, 1987, CBS (Syria).

Table 7: Basic Development Indicators

1. Structural Indicators

• Area (square kilometers)		185,180
• Population (millions)	1987	10.97
	1980	8.70
	1970	6.26
	1960	4.53
• Annual growth rate of population (%)	1980-87	3.7
	1970-80	3.9
	1960-70	3.8
• Rural population (% of total population)	1987	50.5
	1981	53.0
	1970	56.5
	1960	63.1
• Population of people less than 15 years of age (%)	1987	49.3
• Population of people 15-64 years of age (%)	1987	46.3
• Labor force (% of total population)	1984	24.5
• Labor force in agriculture and forestry	1984	
- Males (% of total male labor force)		22.0
- Females (% of total female labor force)		47.4
- Both sexes (% of total labor force)		25.0
• Life expectancy at birth (years)	1985	64
• Literacy rate of people more than 10 years of age (%)	1984	67.9
	• Rural	57.6
	• Urban	75.6

2. Development and Agricultural Performance

• GNP per capita (US$)	1985	1,570
• Average annual growth rate of GNP (%)	1973-83	8.0
	1965-85	4.0
• Average annual growth rate of GDP (%)	1965-80	8.7
	1980-85	1.5
• Average annual growth rate of Agricultural GDP (%)	1965-80	4.8
	1980-85	(1.4)
• Average annual GDP (millions of US$)	1983-85	19,483
• Average annual contribution of agriculture to GDP (%)	1983-85	20.4
• Value added in agriculture (millions of 1980 US$)	1970	1,057
	1985	2,572
• Merchandise trade (millions US$)	1985	
	Export	1,640
	Import	3,844
- Share of agriculture in merchandise export (%)	1985	24
- Share of agriculture in merchandise import (%)	1985	20
- Share of food in merchandise import (%)	1985	13
• Calories supply per capita	1985	3,168
• Cereal imports (1,000 MT)	1974	339
	1985	1,081
• Cereal use per capita (kg/year)		328
• Fertilizer use (kg/ha of arable land)	1970	6.7
	1984	31.9
• Tractor density per 1000 ha of arable land		6.6
• Average index of land production per capita, (1979-81=100)	1983-85	108

(World Bank, CBS of Syria, and other available data)

Table 8: Gross Domestic Product at Market Prices by Sector, 1986

Sector	At current prices		At 1980 constant prices		Indices
	Million SP	%	Million SP	%	(1980=100)
1. Agriculture	23,621	24	11,062	17	107
2. Mining & Manufacturing	14,165	14	10,767	16	129
3. Building & Construction	6,704	7	5,853	9	164
4. Wholesale & Retail trade	20,114	21	15,743	24	124
5. Transport & Communication	9,802	10	5,184	8	146
6. Finance & Insurance	4,348	4	3,035	5	93
7. Social & Personal Serv.	2,519	3	1,313	2	142
8. Government Services	17,035	17	12,307	19	145
9. Private Nonprofit Services	66	0	55	0	162
Total	98,374	100	65,319	100	127

Source: Statistical Abstract, 1987, CBS (Syria).

Table 9: Value of Agricultural Production in 1986
(Current prices and 1980 constant prices
in million Syrian pounds)

	Production	Current Prices (1986)	Constant Prices (1980)
A.	Total Plant Products	21,599.5	9,856.3
	Cereals	5,552.8	2,581.9
	Industrial Crops	2,821.8	1,180.3
	Fruits	6,365.0	2,892.8
	Vegetables	5,349.1	2,581.8
	Dry Legumes	732.2	212.2
	Pastorals	202.6	64.2
	Others	249.5	188.5
	Rural Industries	326.5	154.6
B.	Total Animal Products	8,906.2	3,734.1
	Milk & Milk Products	3,523.9	1,586.1
	Livestock	3,569.8	1,358.2
	Eggs	1,178.0	546.5
	Wool	408.2	136.5
	Animal Hair	7.3	5.9
	Skin	81.5	45.9
	Fisheries	86.4	32.6
	Silk Cocoons	2.1	1.4
	Honey	45.7	19.1
	Beeswax	3.3	1.9
	Total Value of Agricultural Products	30,505.7	13,590.4

Source: Statistical Abstract, 1987, CBS (Syria).

Table 10: Food Self-Sufficiency (%), 1982-1984

	1982	1983	1984	Average 1982-84
Wheat	99.6	71.3	45.5	68.6
Barley	627.3	105.8	50.3	118.5
Maize	17.3	17.4	0.0	11.0
Rice	0.0	0.0	0.0	0.0
Total cereals	111.7	67.4	39.6	66.3
Potatoes	97.4	101.3	99.4	99.5
Total food legumes	137.9	115.4	229.2	140.5
Total vegetables	97.3	99.6	102.6	99.6
Total fruits	91.8	92.3	98.5	94.1
Refined sugars	51.9	26.4	48.8	38.2
Edible oil & fat	85.3	72.3	87.4	82.5
Red meat	94.1	96.7	105.3	97.5
White meat	100.0	100.0	100.0	100.0
Total meat	95.9	97.7	103.0	98.7
Fish	32.9	34.4	61.5	42.9
Eggs	100.0	100.0	100.0	100.0
Milk (liquid)	73.5	74.4	70.7	72.9

Source: AOAD Yearbook of Agricultural Statistics, Vol. 6, 1986.

Table 11: Institutions and Groups Involved in the Agricultural Sector in Syria

A. Government Institutions

- Cabinet level
  - Supreme Agricultural Council

- Office of the Prime Minister
  - Central Bureau of Statistics (CBS)
  - Atomic Energy Commission

- Ministries
  - Agricultural and Agrarian Reform (see its Organigram)
  - Higher Education
    - . University of Damascus, Faculty of Agriculture (Damascus)
    - . University of Aleppo, Faculty of Agriculture (Aleppo), & Faculty of Agriculture (Dier-ez-Zor)
    - . University of Tashreen at Lattakia, Faculty of Agriculture
    - . University of Al Baäth at Homs, Faculty of Veterinary Medicine (Hama)
    - . Supreme Council of Sciences
    - . Intermediate agricultural institutes
  - Local Administration and its agricultural councils at mohafaza level
  - Finance
  - Economy and Foreign Trade
    - . Cotton Ginning and Marketing Establishment
    - . Tobacco Establishment
    - . Foreign Trade Establishment (Food-Stuffs & Chemicals)
    - . Agricultural Cooperative Bank
    - . Commercial Bank of Syria
  - Supply and Internal Trade
    - . Cereal Trade and Processing Establishment
    - . Storage and Refrigeration Establishment
    - . Flour Mill and Bakery Establishments
    - . General Company for Meat
    - . General Company for Vegetables and Fruits
  - Industry
    - . Food Industry Establishment
    - . Sugar Establishment
    - . Chemical Industry Establishment
  - State Planning Commission
  - Irrigation
    - . General Organization for the Investment and Development of the Euphrates Basin
  - Defense
    - . Agricultural Production Establishment
    - . Directorate of Meteorology
  - Labor and Social Affairs
    - . Rural development centers

B. Parastatal Organizations

- Peasants' Union
- Labor Union
- Women's Union
- Agricultural Chambers
- Agricultural Engineers' Syndicate
- Scientific societies

C. Private and Joint Sector

- Farmers
- Public/private agricultural companies

D. Bilateral and Multilateral Agricultural Production Companies

- Arab Authority for Agricultural Investment and Development (AAAID) projects
- Arab Company for Livestock Development (ACOLID)
- Syrian-Saudi Company for Industrial and Agricultural Investments
- Arab Union for Agricultural Development
- Syrian-Libyan Company for Industrial and Agricultural Investments

E. Regional and International Organizations

- Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)
- Arab Organization for Agricultural Development (AOAD)--office in Syria
- International Center for Agricultural Research in the Dry Areas (ICARDA)
- UNDP and other UN Agency projects
- Other bilateral and multilateral projects

Table 12a: Estimated Expenditures in the Consolidated (Ordinary & Development) Budget, 1987

Sector	Expenditures (1,000 SP)	%
1. Community, Social & Personal Services	28,906,410	69.3
2. Agriculture, Forestry & Fisheries	3,819,437	9.2
3. Mining	1,600,352	3.8
4. Manufacturing	981,710	2.4
5. Electricit Gas & Water	2,399,545	5.8
6 Building & Construction	312,987	0.7
7. Trade	645,160	1.5
8. Transport, Communication & Storage	1,558,182	3.7
9. Finance, Insurance & Real Estate	279,217	0 7
10. Unallocated Funds	1,200,000	2.9
Total	41,703,000	100.0

Table 12b: Estimated Expenditures in the Consolidated Budget of Agriculture, Forestry, and Fisheries, 1987

Item	Expenditures (1,000 SP)
Agriculture, Forestry & Fisheries	3,819,437
1. Service Administration	2,232,860
1.1 Ministry of Irrigation	1,391,029
1.2 MAAR	841,831
2. Economic Establishments & Companies	1,586,577

Table 12c: Estimated Agricultural Research Expenditures in the Consolidated Budget of MAAR, 1987

Directorate	Expenditures (1,000 SP)
DASR	49,200
DCB	6,500
DS	8,200
DIWU	8,200
Directorate of Citrus Bureau	3,300
Directorate of Olive Bureau	3,300
Tobacco Research	3,300
Total	82,000*

* 2.1 % of total agricultural sector budget
9.3 % of MAAR budget
0.74 % of AGDP at market prices (1986, at constant prices of 1980)
0.35 % of AGDP at market prices (1986 current prices).

Source: 1. Statistical Abstract, 1987, CBS (Syria) for Tables a and b.
2. MAAR letter of 6 Dec 1988 for Table 12c

Table 13: Projected Rainfed and Irrigated Cropping Patterns for the Year 2000*

Crops	Total Area (%)	Rainfed Area (%)	Irrigated Area (%)
Wheat	24.8	27.6	20.8
Barley	22.3	38.7	-
Maize	4.9	0.5	11.0
Sorghum	0.5	0.2	0.9
Lentils	3.5	6.1	-
Chickpeas	1.1	2.0	-
Fababeans	0.2	-	0.4
Beans & peas	0.3	-	0.7
Feed legumes	9.7	3.1	18.8
Cotton	7.4	-	17.5
Sugar beets	2.8	-	6.6
Tobacco	0.4	0.5	0.3
Sunflowers	0.3	-	0.7
Sesame	2.0	-	4.6
Groundnuts	0.4	-	1.0
Soybeans	2.0	-	4.8
Other oil seeds	0.2	-	0.6
Vegetables	5.6	4.7	6.7
Fruit trees	11.6	16.6	4.6
TOTAL	100.0	100.0	100.0

* Total Cultivated Area 5,381,000 ha
Rainfed Area 3,098,000 ha
Irrigated Area 2,283,000 ha.

Table 14: Annual Planning Process at DASR

Item	Preparatory Meetings	The Annual Meeting
Date	• Before September	• September
Type of Meeting	• Specialized group meetings • Plenary at the end of the cropping season	• Plenary
Persons attending	• Involved in the research projects	• HQ management, heads of departments, experiment supervisors, selected researchers, Heads of centers & stations, invited directors from MAAR
Discussions	• Ongoing and proposed projects	• Reports and project proposals prepared in the prepatory meetings
Outcome	• Reports and project proposals for the annual meeting	• Annual Implementation Plan (AIP)

Table 15: DASR Research Projects for 1987-88

Commodity/Subject	No. of Scientists	No. of Projects	Scientist/ Project	Project/ Scientist	Location/ Project	Duration (years)
1. Field Crops Dept.	149	252	7	2	4	
Cereals						
Wheat (National Program)		25	5		4	1-3 to cont.
Wheat (with ICARDA)	30	11	8		6	3 to cont.
Wheat (with ACSAD)		1	3		1	3
Barley (National Program)		17	4		3	1-3 to cont.
Barley (with ICARDA)	11	3	9		7	3 to cont.
Barley (with ACSAD)		5	5		2	2-3
Legumes & Oil Seeds						
Groundnuts	3	5	5		3	2-3
Fababeans (National Program)	6	4	4		1	contin.
Fababeans (with ICARDA)		8	7		4	1-2 to cont.
Chickpeas (National Program)	7	12	5		8	2-3 to cont.
Chickpeas (with ICARDA)		10	12		6	2 to cont.
Lentils (National Program)	5	11	6		2	1-3 to cont.
Lentils (with ICARDA)		9	8		6	1-3 to cont.
Soyabeans	11	13	12		4	1-3
Sesame	3	5	8		5	2 to cont.
Safflower	2	7	3		1	cont.
Forage Crops	16					
National Program		30	3		2	2-5 to cont.
with ICARDA		9	2		3	cont.
Sugar Beets	15					
Sugar beets		5	14		5	1-4 to cont.
Forage beets		2	16		7	4
Genetic Resources	14	12	13		5	2 to cont.
Maize & Sorghum	26					
Maize		29	7		3	1-2 to cont.
Sorghum		8	4		3	1-2
2. Plant Protection Dept.	47	33	2	1	3	
Plant Diseases	10	11	2		5	cont.
Pl. Diseases (with ICARDA)		5	5		4	cont.
Nematodes	9	2	2		3	cont.
Entomology	27	12	2		1	cont.
Animal Pests	1	3	1		2	cont.

Table 15: continued

Commodity/Subject	No. of Scientists	No. of Projects	Scientist/ Project	Project/ Scientist	Location/ Project	Duration (years)
3. Pesticides Dept.	10	14	4	1	3	
Pesticides		14	4		3	1-3
4. Fruit Trees Dept.	62	70	3	1		
Pomes	12	18	3		1	3-12
Olives	10	11	2		1	1-15
Stone fruits	14	18	3		1	2-13
Grapes	12	9	4		2	5-10
Ornamentals	4	9	4		1	1 to cont.
Citrus	6	5	2		1	15
Others	4					
5. Vegetables Dept.	55	54	3	1	2	
Vegetables	30	28	4		3	1-3 to cont.
Potatoes	19	19	1		3	1-2 to cont.
Protected farming	6	7	4		1	3
6. Food Technology Dept.	8	14	3	2	2	
Food technology		14	3		2	2-4
7. Animal Production Dept.	17	24	4	1	1	
Breeding	8	10	3		1	1-10 to cont.
Nutrition	7	6	4		1	1-3
Health	2	4	3		1	1-2
with ICARDA		3	4		1	1-5
with ACSAD		1	4		2	2
Average			5	1	3	
TOTAL	348	461				

(Source: Implementation Plan of Agricultural Research for 1988. DASR, 1988)

Table 16: Distribution of Commodity Research among Centers and Stations of DASR, 1988

Center/Station	Commodity
HQ Stations	
Douma	Ornamentals, Genetic resources, Grapes, Protected farming
Karahta (1)	Wheat, Barley, Forage barley, Sesame, Maize
First of May	Maize, Sorghum
Karahta (2)	Animal production (Goats)
Die- Al-Hajar	Animal production (Shami cattle), Forage beets, Forage turnips
Serghaya	Pomes, Grapes, Wheat, Maize
Al-Taybeh	Tomatoes, Eggplants, Cucurbits, Beans, Onions, Potatoes, Cricifers
Centers & Stations	
Izraa Center	Wheat, Barley, Chickpeas, Lentils, Forage barley, Medic, Flowering sern, Grapes
Jileen Station	Wheat, Barley, Chickpeas, Fababeans, Lentils, Sesame, Maize, Olives, Grapes, Stone fruits, Cucurbits, Potatoes
Ain Al-Arab Center	Pomes, Stone fruits, Grapes
Ara Station	Animal production (Mountain goats)
Homs Center	Wheat, Groundnuts, Fababeans, Chickpeas, Lentils, Soyabeans, Sesame, Forage barley, Flowering sern, Sugar beets, Forage beets, Maize, Pomes, Stone fruits, Grapes, Tomatoes, Eggplants, Cricifers, Beans, Onions
Hama Center	Wheat, Fababeans, Chickpeas, Lentils, Soyabean, Sesame, Flowering sern, Forage barley, Medic, Maize, Potatoes, Stone fruits, Grapes, Tomatoes, Cucurbits, Onion, Animal production (Awas sheep)

Table 16: continued

Center/Station	Commodity
Al-Ghab Center	Wheat, Fababeans, Chickpeas, Soyabeans, Sesame, Safflower, Sugar beets, Maize, Stone fruits
Tartous Center	Groundnuts, Fababeans, Chickpeas, Soyabeans, Sesame, Potatoes, Beans, Cucurbits, Tomatoes
Jableh Center	Groundnuts, Chickpeas, Soyabeans, Forage beets, Maize, Olives, Tomatoes, Cucurbits, Onions, Beans
Kasab Station	Pomes
Siamo Station	Citrus
Idleb Center	Wheat, Fababeans, Chickpeas, Lentils, Soyabeans, Sesame, Forage barley, Flowering sern, Medic, Olives, Tomatoes, Cucurbits, Potatoes
Aleppo Center	Wheat, Barley, lentils, Soyabeans, Sesame, Safflower, Forage barley, Flowering sern, Sugar beets, Forage beets, Maize, Sorghum, Olives, Stone fruits, Grapes, Cucurbits, Potatoes, Protected farming
Al Rakka Center	Wheat, Barley, Groundnuts, Soyabeans, Sesame, Sugar beets, Forage beets, Grapes, Tomatoes, Cucurbits, Potatoes
Dier-ez-Zor Center	Wheat, Groundnuts, Fababeans, Soyabeans, Sesame, Safflower, Forages, Sugarbeet, Forage beet, Maize, Grapes, Cucurbits, Tomatoes, Egg-plant, Beans
Kameshli (Hemo) Center	Wheat, Barley, Chickpeas, Lentils, Safflower, Forage barley, Flowering sern, Medic, Sorghum, Cucurbits, Animal production
Mojarja (Al-Hasakeh) Center	Wheat, Barley, Soyabeans, Forage barley, Medic, Maize, Tomatoes
Quneitra Center	Wheat, Pomes, Potatoes, Protected farming

Table 17: Number of DASR Research Projects, 1979, 1984, and 1988

Department	1979	1984	1988	% Annual Growth Rate (1979-1988)
Field Crops	82	250	252	23
Vegetables	35	18	54	6
Fruit Trees	38	24	70	9
Plant Protection	15	25	47	23
Food Technology	7	11	14	11
Animal Production	12	15	24	11
TOTAL	189	343	461	14

Table 18a: Technical Staff of MAAR Research Directorates, 1988

Directorate	Ph.D.	M.Sc.	B.Sc.	Sub-total	Technicians	Total
DASR	28	6	321	355	47	402
DS	6	2	112	120*	24	144
DIWU	2	2	71	75*	15	90
DCB	2	1	30	33**	25	58
Total	38	11	534	583	111	694

* Of which a minor number are involved in research.

** Actual number involved in research.

Table 18b: Technical Staff of MAAR Agricultural Extension, 1988

At Mohafaza Level		At District Level		At Village Level		Total	
B.Sc.	Technicians	B.Sc.	Technicians	B.Sc.	Technicians	B.Sc.	Technicians
72	18	135	19	1358	501	1565	538

Table 19: Distribution of Technical Staff of DASR, DS, DIWU, and DCB, 1988

HQ/Stations/ Mohafazat	Ph.D.	M.Sc.	B.Sc.	Sub-total	Techni-cians	Total
1. DASR						
HQ & HQ Stations	9	2	141	152	20	172
21 Centers & Stations	19	4	180	203	27	230
Total	28	6	321	355	47	402
2. DS						
HQ	2	2	56	60	12	72
Mohafazat	4	-	56	60	12	72
Total	6	2	112	120*	24	144
3. DIWU						
HQ	2	2	36	40	8	48
Seven Stations	-	-	35	35	7	42
Total	2	2	71	75*	15	90
4. DCB						
HQ	2	1	25	28	25	53
Nine Stations	-	-	5	5	-	5
Total	2	1	30	33**	25	58

* Of which a minor number are involved in research.

** Actual number involved in research.

Table 20: Distribution of Technical Staff of the Directorate of Agricultural Scientific Research (DASR), 1988

HQ/Dept./Centers	Ph.D.	M.Sc.	B.Sc.	Sub-total	Technicians	Total
A. HQ						
Management	1	-	3	4	3	7
Field Crop Dept.	2	-	44	46	3	49
Plant Protection & Pesticide Depts.	4	1	28	33	2	35
Fruit Tree Dept.	1	1	21	23	-	23
Vegetable Dept.	-	-	7	7	4	11
Food Tech. Dept.	-	-	6	6	-	6
Animal Prod. Dept.	1	-	7	8	1	9
Socioeconomic Dept.	-	-	3	3	1	4
HQ Stations						
• Douma Stn.	-	-	2	2	1	3
• First of May Stn.	-	-	11	11	1	12
• Karahta Stn.(crops)	-	-	1	1		1
• Serghaga	-	-	-	-	3	3
• Altaybeh	-	-	1	1	-	1
• Dier-al-Hajar	-	-	4	4	-	4
• Karahta Stn.(goats)	-	-	3	3	1	4
B. Centers & Stations						
Izra Center	-	-	11	11	3	14
• Jileen Stn.	-	-	3	3	2	5
Ain Al Arab Center	1	-	7	8	1	9
• Ara Stn.	-	-	2	2	2	4
Homs Center	4	1	18	23	1	24
Hama Center	2	1	18	21	4	25
Al-Ghab Center	-	-	8	8	1	9
Tartous Center	2	-	4	6	-	6
Idleb Center	-	-	4	4	1	5
Jableh Center	6	1	19	26	1	27
Aleppo Center	3	1	34	38	-	38
Dier-ez-Zor Center	-	-	21	21	4	25
Al Rakka Center	-	-	7	7	-	7
Al Hasakeh (Al Mujraja) Center	1	-	4	5	1	6
Kameshli (Hemo) Center	-	-	19	19	6	25
Quneitra Center	-	-	1	1	-	1
Total	28	6	321	355	47	402

Table 21: Number of Technical Staff of DASR, 1979, 1981, 1983, and 1988.

Year	Ph.D.	M.Sc.	B.Sc.	Subtotal	Technicians	Total
1979	12	10	165	187	44	231
1981	15	6	160	181	59	240
1983	24	9	217	250	n.a.	-
1988	28	6	321	355	47	402

Table 22: Location and Area of DASR Centers & Stations

Center/Station	Mohafaza	Mantika	Stabilization Zone	Area (ha) Rainfed	Irrigated	Total
HQ Stations						
Douma	Damascus	Douma	4	0	4	4
Karahta (1)	Damascus	Douma	5	0	20	20
First of May	Damascus	Douma	4	0	10	10
Karahta (2)	Damascus	Douma	5	0	n.a.	n.a.
Dier Al-Hajar	Damascus	Douma	5	0	n.a.	n.a.
Serghaya	Damascus	Zabadani	1	13	3	16
Al-Tayheh	Damascus	Katana	4	0	n.a.	n.a.
Centers & Stations						
Izraa Center	Dar'a	Izraa	2	50	0	50
Jileen Station	Dar'a	Dar'a	1 b	100	0	100
Ain Al-Arab Center	Sweida	Sweida	1 b	60	0	60
Ara Station	Sweida	Sweida	2	n.a.	0	n.a.
Homs Center	Homs	Homs	2	0	33	33
Hama Center	Hama	Hama	1 b	20	30	50
Al-Ghab Center	Hama	Al-Ghab	1 b	70	80	150
Tartous center	Tartous	Tartous	1 a	0	20	20
Jableh Center	Lattakia	Jableh	1 a	20	20	40
Kasab Station	Lattakia	Kasab	1 a	n.a.	0	n.a.
Idleb Center	Idleb	Idleb	1 b	45	0	45
Aleppo Center	Aleppo	Aleppo	1 b	35	20	55
Al-Rakka Center	Al-Rakka	Al-Rakka	4	0	120	120
Dier-ez-Zor Center	Dier-ez-Zor	Dier-ez-Zor	5	0	25	25
Kameshli (Hemo) Center	Al-Hasakeh	Kameshli	1 b	200	0	200
Al-Hasakeh (Mojarja) Center	Al-Hasakeh	Al-Hasakeh	2	70	40	110
Quneitra Center	Quneitra	Quneitra	1 b	n.a.	n.a.	n.a.

Table 23: Relative Research Expenditures*

Commodity/subject	% Commodity value of total production (1986)	% Research expenditure of value of prod. (1986-88)	% of DASR budget (1988)
Cereals	18	0.12	24
Wheat & Barley	-	-	16
Maize & Sorghum	-	-	8
Cotton	9	0.12	-
Sugar beets	1	0.06	1
Fruits	21	0.07	15
Vegetables	17	0.06	12
Dry Legumes	2	0.45	12
Oil Seeds	-	-	7
Pastoral Crops	1	-	9
Livestock	29	0.02	5
Plant Protection	-	-	10
Food Technology	-	-	3

* 0.38 % Research Expenditures of AGDP (1986, at constant prices of 1980).
0.17 % Research Expenditures of AGDP (1986 current prices).

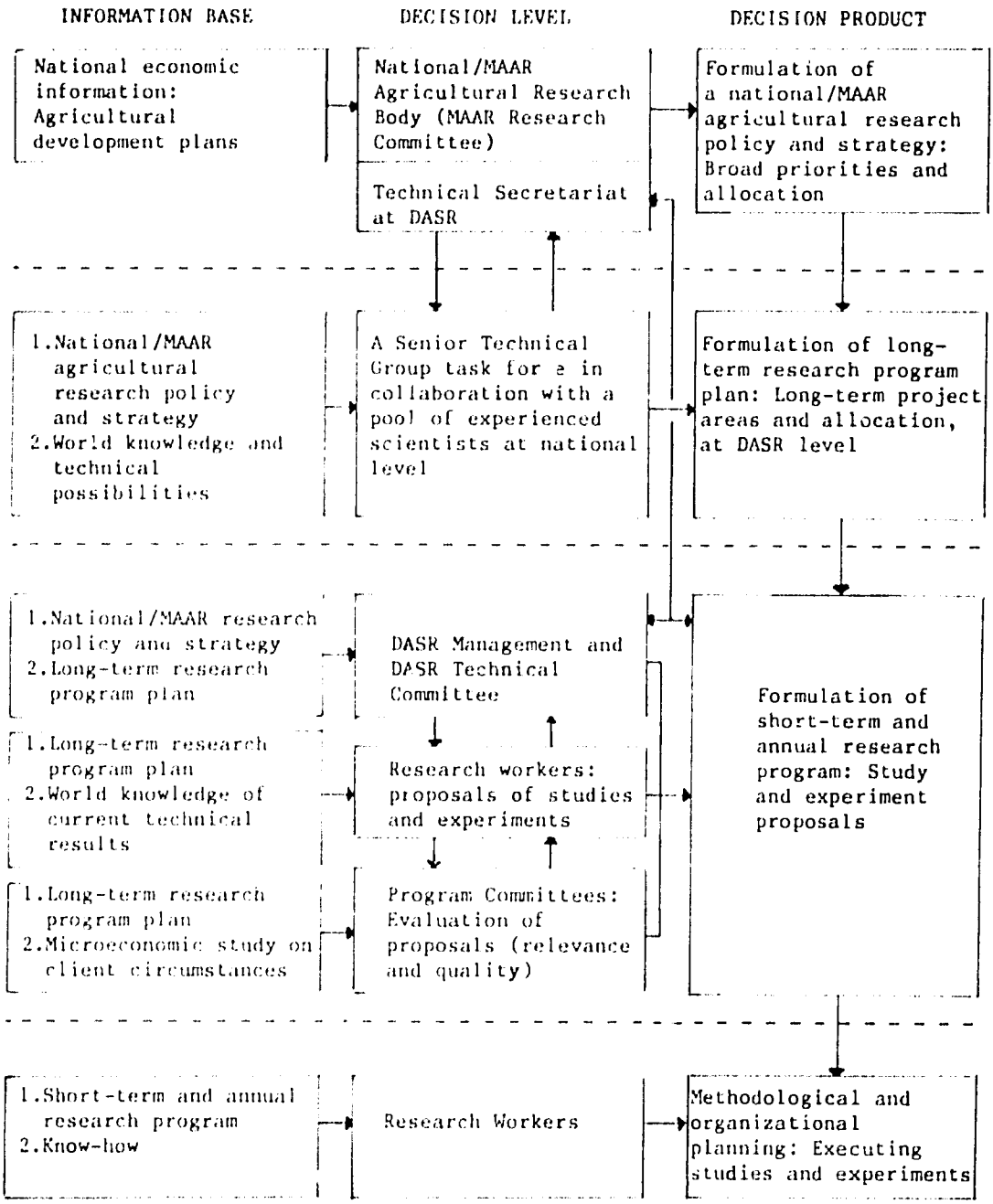
Table 24: 1988 Investment Components of DASR and DCB (1000 SP)

Directorate	Salaries & Allowances	% of Subtotal	Direct Operational Costs (1)	% of Subtotal	Indirect Operational Costs (2)	% of Subtotal	Subtotal	Capital Investment (3)	Total
DASR	11,800	41.2	16,191	56.5	670	2.3	28,661	13,409	42,070
Consolidated Budget (Ordinary & Development)*									
DASR	11,800	90.3	600	4.6	670	5.1	13,070	-	13,070
Ordinary Budget*									
DCB	1,700	34.0	2,800	56.0	500	10.0	5,000	-	5,000
Estimated by the Director**									

* Actual figures from the budget of 1988.
** For research only (Ordinary Budget and Cotton Festival Committee Contribution).

(1) Logistics, capital for operations, wages of temporary laborers, experiment inputs, etc.
(2) Overhead costs: Infrastructure maintenance, administrative expenditures, etc.
(3) New infrastructure: Land, buildings, equipment (general and specific), livestock for research, etc.

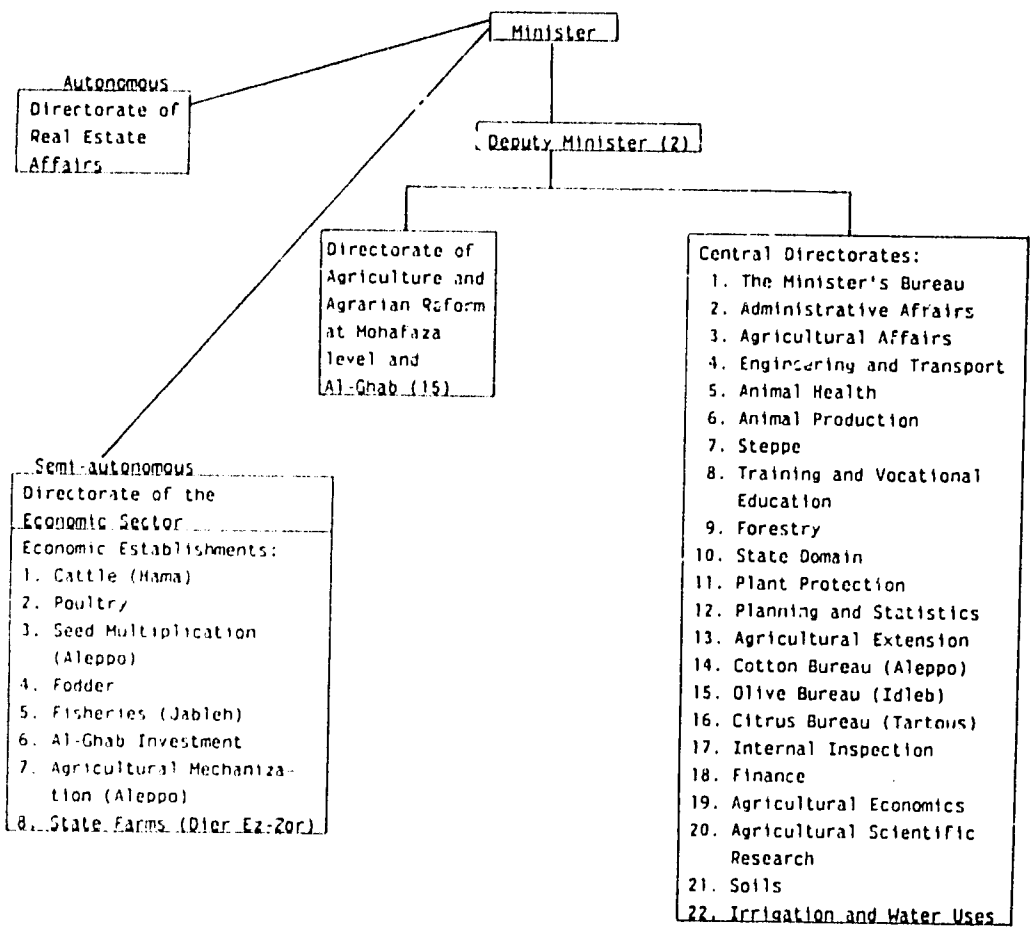
Figure 1: Principles of Formulating and Implementing Agricultural Research Strategy and Program: A Proposal for DASR



ANNEX I: Organizational Structure of MAAR, DASR, DS, DIWU, DCB, DAEC, DAEX, and GOSM

1. Ministry of Agriculture and Agrarian Reform (MAAR)

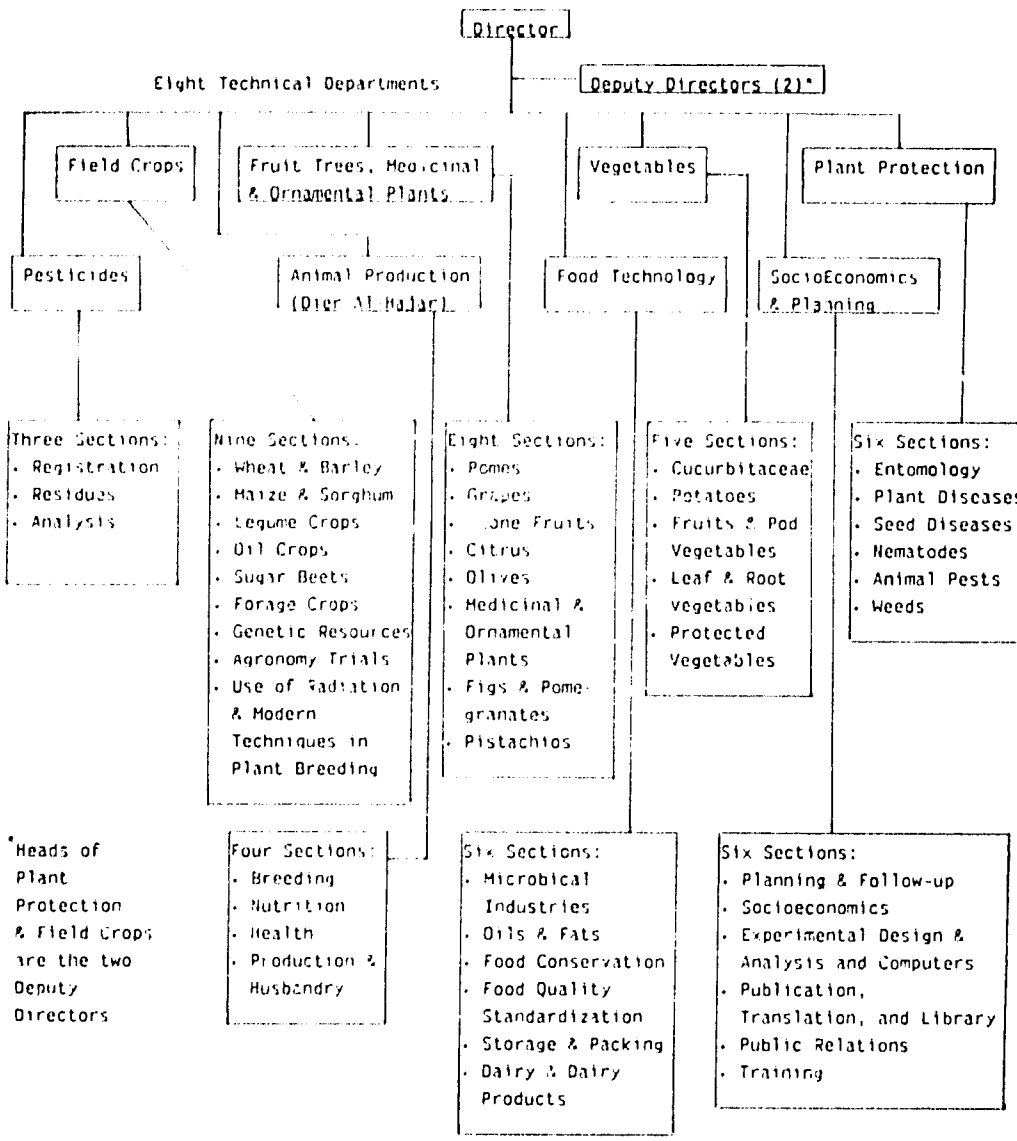
ORGANIZATIONAL STRUCTURE



2. Directorate of Agricultural Scientific Research (DASR)

ORGANIZATIONAL STRUCTURE

A. Headquarters



B. Center and Station Network

Headquarter Stations (7):
- Douma (ornamental & fruit trees & genetic resources
- Karahta (field crops)
- First of May (maize & sorghum)
- Karahta (goats)
- Dier Al Hajar (shami cattle)
- Serghaya (fruit trees, pomes & stone fruits)
- Al-Taybeh (vegetables)

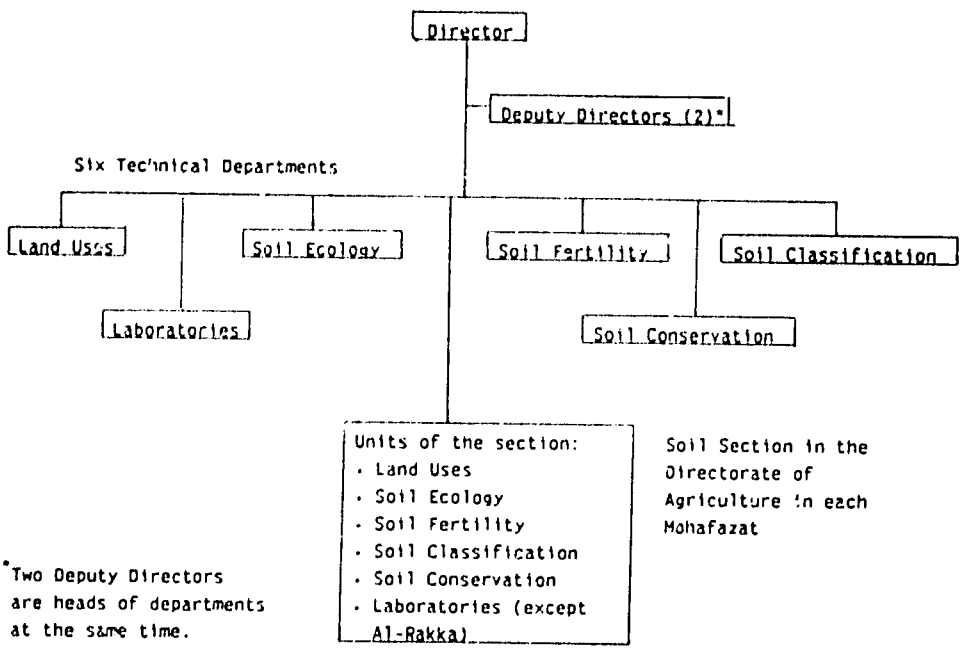
Central Technical Departments (except pesticides) are represented, where appropriate, in sections in each center:
- Field Crops
- Fruit Trees
- Vegetables
- Plant Protection
- Animal Production
- Food Technology
- Socioeconomics & Planning

14 Centers and 7 Stations in the Mohafazat:

1. Izraa Center (rainfed field crops & fruit trees)
   - Jileen Station (rainfed)
2. Ain Al-Arab Center (rainfed fruit trees)
   - Ara Station (mountain goats)
3. Homs Center (irrigated crops)
   - Hasoor Station (rainfed fruit trees)
4. Hama Center (irrigated crops)
5. Al-Ghab Center (irrigated field & vegetable crops)
6. Tartous Center (irrigated field & vegetable crops)
7. Jableh Center (irrigated crops)
   - Kasab Station (rainfed apples)
   - Siano Station (irrigated citrus) transferred to Citrus Bureau
8. Idleb Center (irrigated field crops)
9. Aleppo Center (irrigated & rainfed crops)
   - Yahmool Station (rainfed & irrigated field crops)
10. Al Rakka Center (irrigated crops)
11. Dier-ez-Zor Center (irrigated crops)
12. Kameshli (Hemol Center (rainfed field crops)
13. Mojarja (Al-Hasakeh) Center (irrigated field crops)
    - Tartab Station (irrigated fruit trees)
14. Quneitra Center (irrigated field crops)

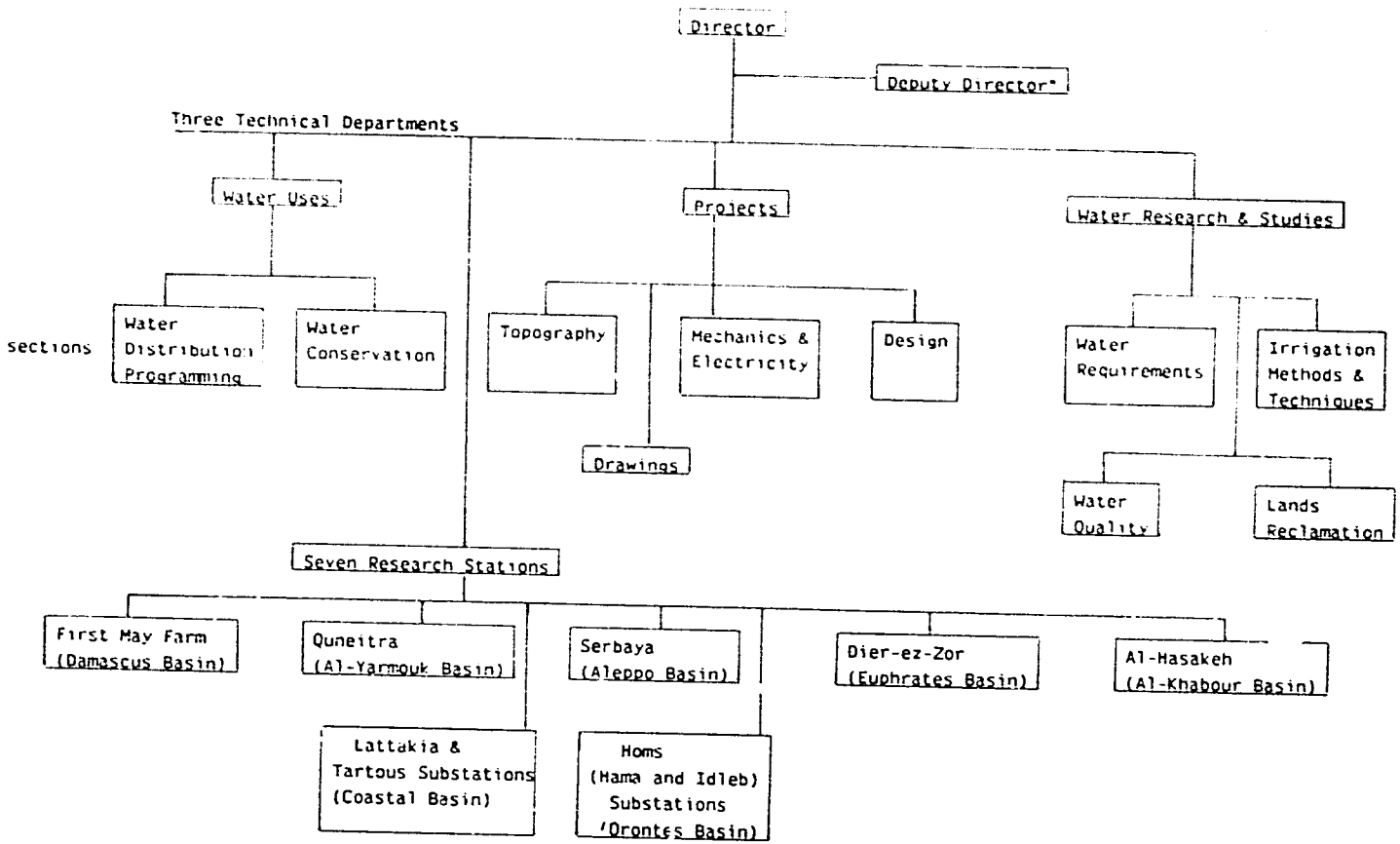
3. Directorate of Soils (DS)

ORGANIZATIONAL STRUCTURE



4. Directorate of Irrigation & Water Uses (DIWU)

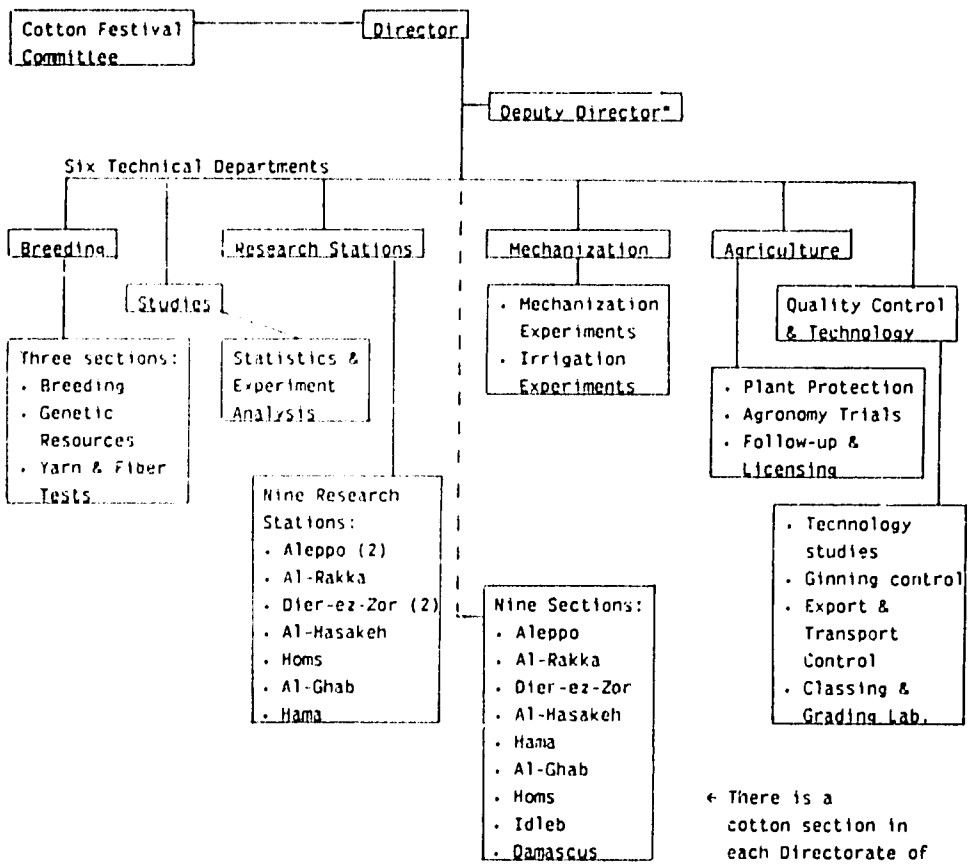
ORGANIZATIONAL STRUCTURE



*Deputy Director is one of the heads of the departments.

5. Directorate of Cotton Bureau (DCB)

ORGANIZATIONAL STRUCTURE

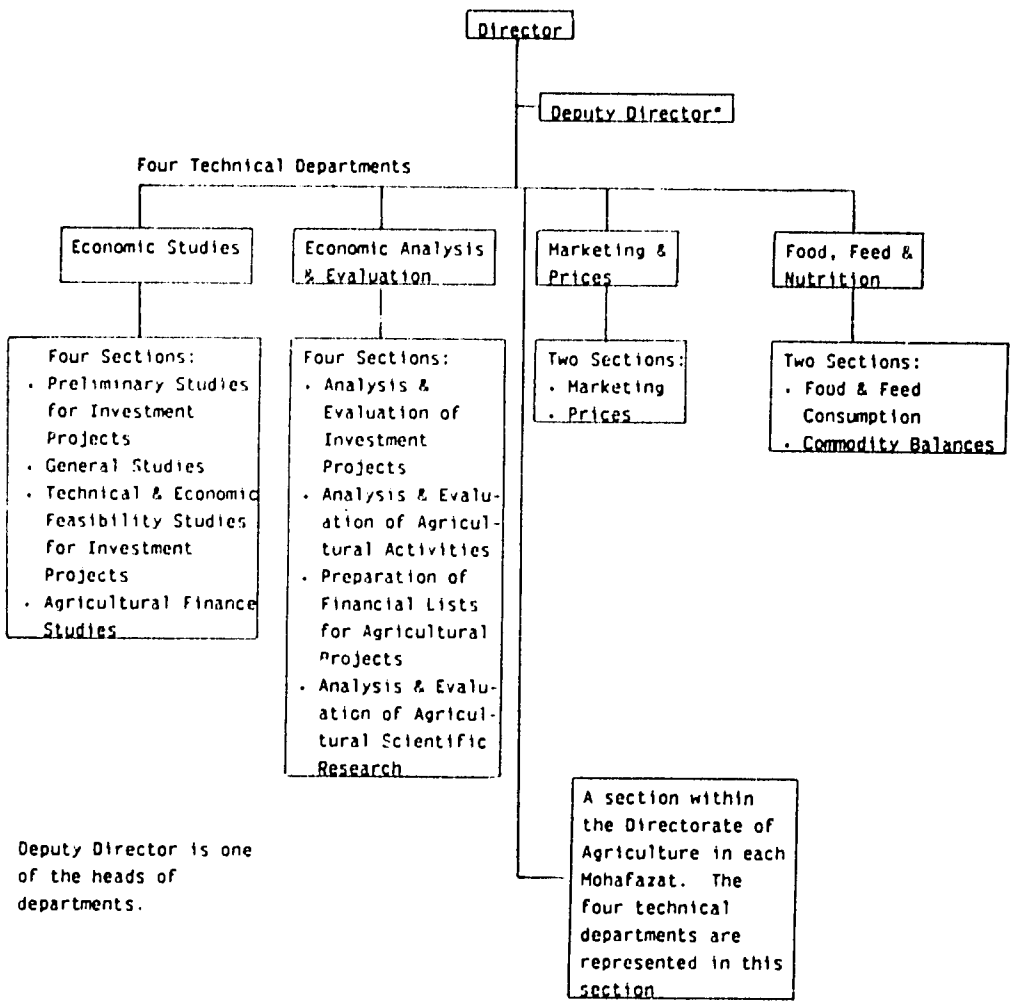


Deputy Director is the Head of Quality Control & Technology Department.

← There is a cotton section in each Directorate of Agriculture in cotton producing Mohafazat & other areas

6. Directorate of Agricultural Economics (DAEC)

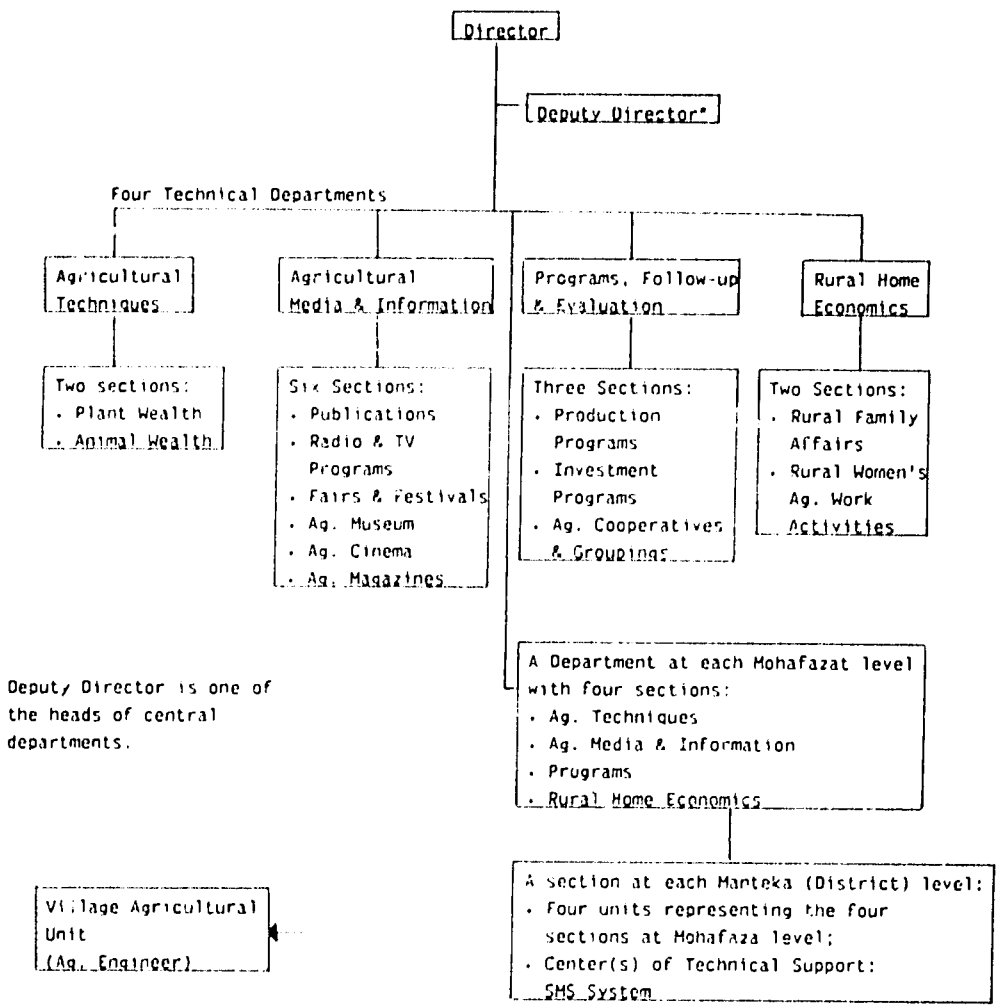
ORGANIZATIONAL STRUCTURE



Deputy Director is one of the heads of departments.

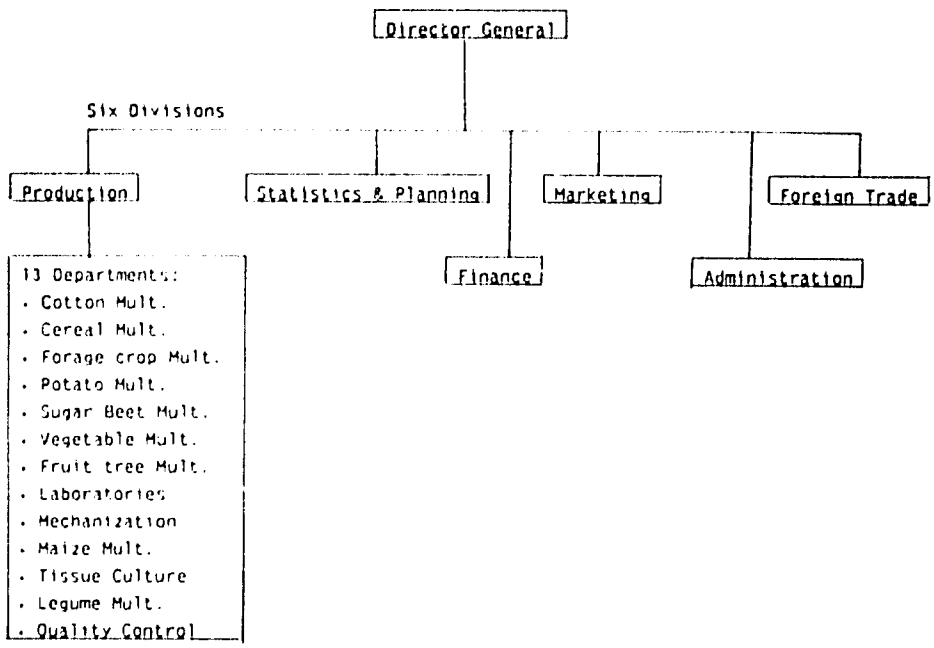
7. Directorate of Agricultural Extension (DAEX)

ORGANIZATIONAL STRUCTURE



8. General Organization for Seed Multiplication (GOSM)

ORGANIZATIONAL STRUCTURE



ANNEX II: Main Objectives of DASR, DS, DIWU, and DCB

Directorate of Agricultural Scientific Research (DASR)

The main objectives of DASR are:

1. to conduct surveys and analyses of the country's agricultural resources and to identify constraints limiting the development of agriculture in both the plant and animal subsectors;

2. to carry out research to improve the productivity of agricultural commodities;

3. to develop methods and techniques to improve agricultural land uses, including introduction of new crops and new technologies and integration of the animal and plant subsectors of the agricultural sector;

4. to carry out adaptive research and to transfer research results to agricultural producers through the coordination of agricultural extension and the public and private sectors;

5. to coordinate, when necessary, with local institutions as well as with Arab and international agricultural research institutions working in the country;

6. to collaborate with regional and international agricultural research institutions;

7. to develop research skills through training programs, information and communication services, and development of research infrastructure.

Directorate of Soils (DS)

The main objectives of DS are:

1. to provide services (major) to government institutions and to farmers on Syrian soils in the fields of soil classification, analysis, fertility, pollution, and uses through developing a data base on Syrian soils and flora, fertilizers, climatic records, and soil and water pollutants;

2. to conduct research (minor) on macro- and micronutrient needs by planting crops.

Directorate of Irrigation and Water Uses (DIWU)

The main objectives of DIWU are:

1. to provide services (major) to government institutions and to farmers on irrigation and water use in the areas of irrigation methods and techniques, and water requirements and distribution;

2. to carry out research (minor) on the water requirements of plant crops, and on irrigation techniques to improve the service.

Directorate of Cotton Bureau (DCB)

The main objectives of DCB are:

1. to participate in developing the plans and programs needed to develop cotton farming;

2. to organize cotton farming in Syria; supervise cotton licensing, funding, growing, harvesting, and ginning; promote cotton production and export; and control cotton quality;

3. to conduct research on cotton breeding to ensure the availability of suitable cotton seeds through developing breeder, nucleus, and foundation seeds;

4. to carry out agronomic research leading to improvement of cotton growing, harvesting, and ginning.

ANNEX III: Members and Objectives of the Technical Committee for the Endorsement of New Varieties of Cereal, Legume, and Forage Crops

Members

Deputy Minister of Agriculture and Agrarian Reform
Director General of General Organization for Seed Multiplication
Director of Agricultural Scientific Research
Director of Statistics and Planning
Director of Soils
Director of Steppe and Sheep
Head of Field Crops Research Department of DASR
Representative of the Faculty of Agriculture, University of Aleppo
Representative of the Faculty of Agriculture, University of Damascus
Representative of ICARDA
Representative of ACSAD

Objectives

1. Coordination of research and studies, which are conducted at DASR, with those of ICARDA and ACSAD to ensure that research and studies are matched with the country's agricultural problem priorities and to prevent duplication of some activities;

2. Endorsement of the nuclei of new improved varieties of cereal, legume, and forage crops.

(Source: MAAR Decree No. 569, 1982)