This document is intended to serve as an introduction to the philosophy, objectives and early development of the Farming Systems Research Program at ICARDA. It provides some background information to the series of research reports that will be produced in the first few months of 1980.

CONTENTS

# AN INTRODUCTION TO THE FARMING SYSTEMS RESEARCH PROGRAM AT ICARDA

## BACKGROUND

The ICARDA mandate emphasises the need to improve the stability and productivity of rainfed farming systems of the Near East and North African Region. The Center is charged with the improvement of cereals, grain legumes and forages, that are grown in areas receiving between 200 and 600 mm of rainfall, falling mainly in the winter months, and with the development of integrated livestock/crop systems that can make more efficient use of existing and newly available resources and knowledge.

The Center was established with three Crop Improvement Programs, a Farming Systems Program and a Training and Communication Program. It is generally understood that, like ILCA, ICARDA should have an overall Farming Systems approach to its Research Programs and therefore any new plant material, technology or information coming from the Center must be tested for appropriateness in a systems context before it can be widely recommended.

The main purpose of having a strong farming systems orientation is to avoid the past emphasis on a narrowly based, rapid transfer of "modern" technology, with high yielding varieties of crops and high capital inputs, that sometimes exacerbated income inequalities, favoured already well endowed areas, and led to an increased dependence on externally supplied inputs. (Pearse, 1975).

The Near East and North African Region in some respects contrasts with other developing areas of the world, in that a number of countries are wealthy and agriculture is not of prime importance to the national economy, nor is it the principal occupation of the majority of the population. Also in many countries, agriculture is already highly mechanised and there is a clear understanding of the use of high input technologies. Nevertheless, the Region still contains many millions of poor people in rural and urban areas for whom the supply of food in sufficient quantities and at a reasonable cost, is of paramount importance. There are also significant numbers of poor farming families who earn the whole or the major part of their income from farming and produce most of their food from their own resources. Many governments of the Region are strongly supportive of agriculture through a variety of methods, but with a strong emphasis on highly capitalized, predominantly irrigated, systems. In rainfed agriculture, output is extremely variable and uncertain and it is this area in which ICARDA is considered to have a major role to play.

ICARDA has a unique opportunity to develop a Farming Systems Research Program that will serve the neglected majority of farming families, by basing the whole program on an initial and continuing study of existing farming systems, on the needs and aspirations of farmers and on a sympathetic understanding of national plans directed towards the same ends. (See also: Biggs, 1978; Bunting, 1978).

Many of the other Centers have evolved very different approaches to cropping and farming systems research and a recent meeting (CGIAR/TAC Workshop, Nairobi 1978) served to clarify current thinking on terminology, rationale and methodologies. The different approaches remain and ICARDA has developed its own, at the same time benefitting from the experience of other Centers and Farming Systems Research experience elsewhere. (Binswanger et al., 1976; C.A.T.I.E., 1978; Collinson, 1978; Norman, 1976).

## DEFINITIONS

Before outlining the objectives and rationale of the programme it may be appropriate to define a farming system.

A farming system is a complex, interrelated matrix of soils, plants, animals, implements, power, labour, capital and other inputs controlled, in part, by farming families and influenced to varying degrees, by political, economic, institutional and social forces that operate at many levels.

Farming families attempt to satisfy their needs for food, cash and other requirements by the manipulation of the inputs available to them in order to produce useful output. 1/

The main physical and cash flows that affect the operation of a farming system are represented in Figure 1. The study of these flows and of the factors that influence them is an important part of the Farming Systems Research Program.

A full understanding of the nature of farming systems is only possible, however, through a study of the structure of agriculture and the way in which structural factors interact with the production processes in farming. For this reason, the Farming Systems Research Program works from the framework represented in Figure 2. The diagram indicates the most important elements in this and in other programs and attempts to show how they are interrelated. It also illustrates the principle that alternative methods of utilizing resources cannot be developed without the continuous assembly and review of knowledge from many sources.

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1/ Modified version of definition in CGIAR/TAC Report on Farming Systems Research CGIAR/TAC (1978).

Farming systems research therefore differs from conventional, disciplinary and commodity oriented research, in that its basis is the study of existing farming systems. This type of research is most appropriately carried out by multidisciplinary teams of scientists (preferably with team members having experience in two or more related disciplines) who continually interact with farmers, extension agents and others, in the identification of problems and in devising ways of solving them. By adopting this approach, we can provide the essential links between agricultural development planners, research and extension workers and farmers.

A particularly important role for farming systems research scientists is to bring together commodity oriented research workers and farmers, on the farmers' lands. Through these contacts, future commodity research can be better tuned to real farm problems and also scientists can benefit from the farmers' valuable fund of knowledge.

This should also ensure that the range of alternative technologies, developed from these interactions, are appropriate to the needs of the majority of farming families in the areas for which they are intended.

## OBJECTIVES

The Program's main objective has already been stated, but there are also a number of more specific objectives, listed below, not necessarily in order of priority.

1) To understand the political, social and economic structure of agricultural production in the countries of the region.

FIGURE 1 SOME PHYSICAL AND CASH FLOW INTERRELATIONSHIPS IN A FARMING SYSTEM

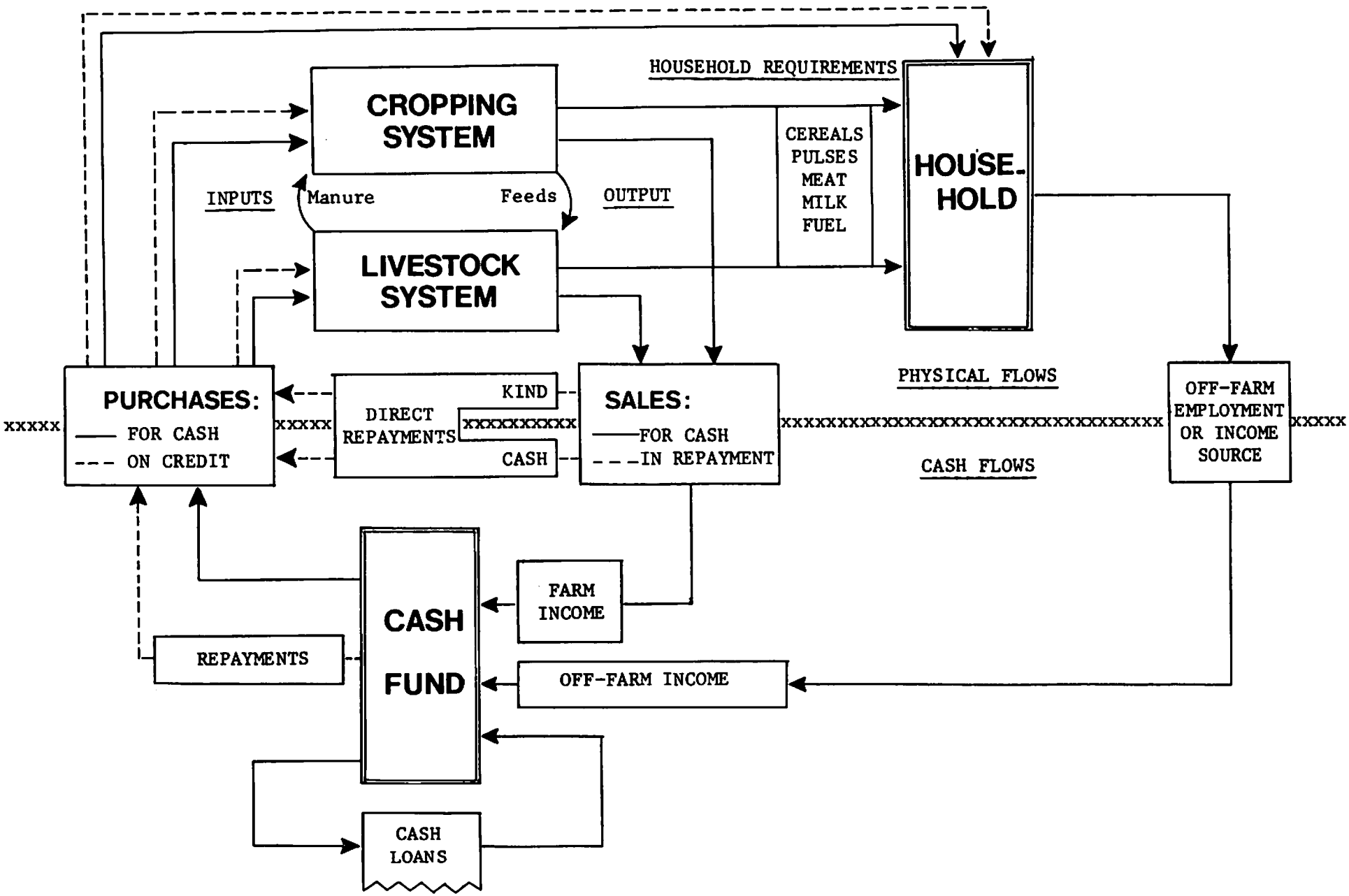
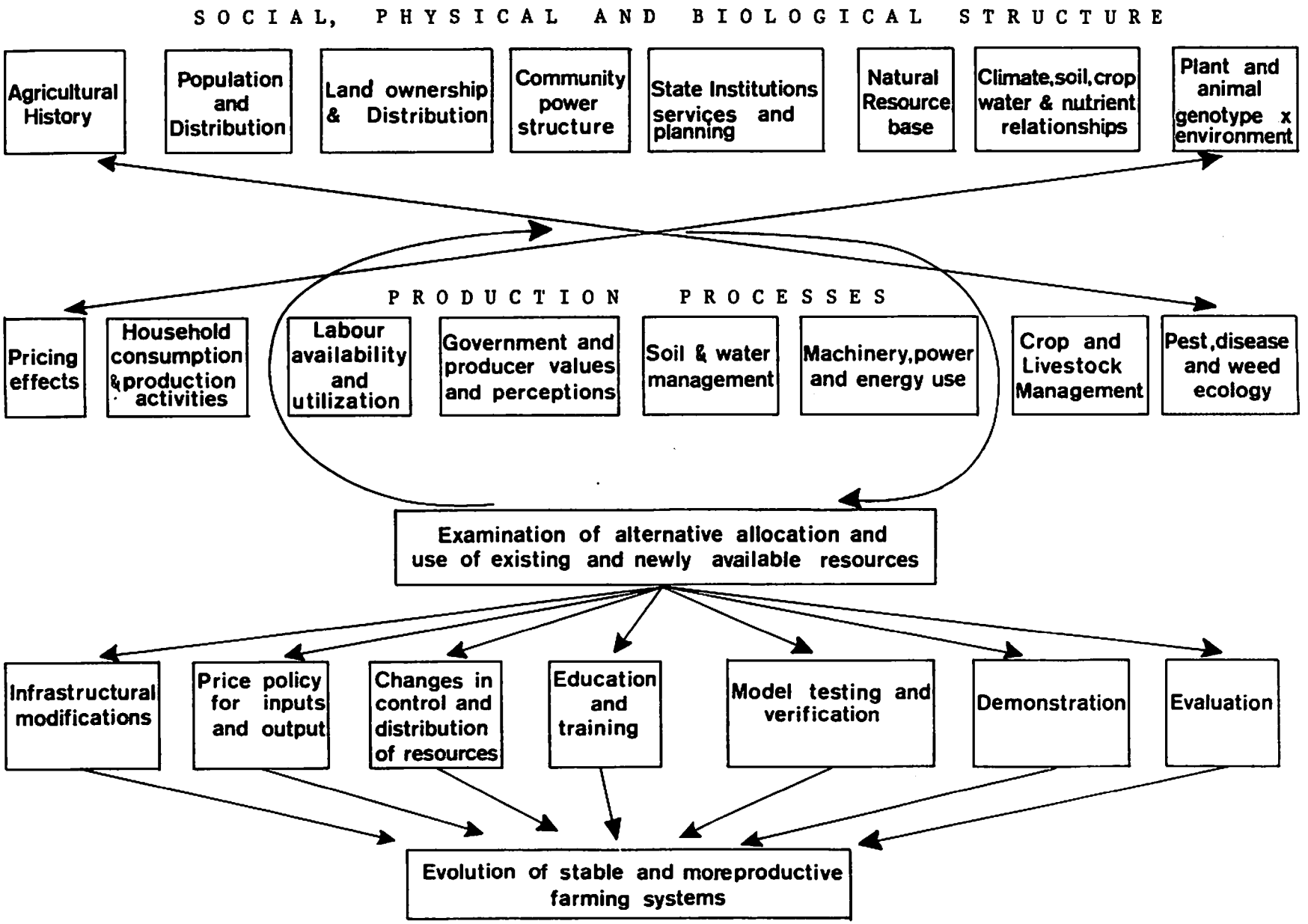


FIGURE 2

A FRAMEWORK FOR A FARMING SYSTEMS RESEARCH PROGRAM



2) To study existing production processes in the main agro-ecological zones and to assess the potential for alternatives. In this connection, an understanding of the rationale of decision making in agricultural production at farm, village, and national planning levels is important.

3) To improve the identification of problems within existing farming systems by relating the farming family's own priorities and definition of problems to issues arising from studies of crop/livestock/household interactions.

4) To conduct research on responses of crops and animals to physical, biological and economic variables in a range of environments.

5) To evaluate alternative land and water management techniques, new crop varieties, cropping and crop/livestock systems and components of these systems, and to compare the returns and possible effects of a variety of resource combinations on living standards.

A number of these objectives clearly must relate, in the early stages of our research program, to a specific location, namely North-Western Syria. Our work focuses both on the study of existing farming systems in this area and also on the development of research approaches and methodologies that could be applied elsewhere in the Region.

It follows that the most important "products" of such a program are likely to be the dissemination of principles, ideas and approaches to research and technology development, rather than a system or even a series of systems or "packages of technology". We consider that the ultimate development of alternative systems must come about through the decisions made by farming families themselves, in each area of the region.

## RELATIONS WITH NATIONAL PROGRAMS

At present, few countries in the region have farming systems research programs and very few acknowledge the value of the kind of approach outlined above. However, it is hoped that through the work started in Syria, combined with experience from elsewhere, those responsible for planning research will be encouraged to develop a broader perspective in their research programs and adopt new methodologies. Two major obstacles seem to be hindering this development at present: 1) the structure and organisation of Ministries make multi-disciplinary approaches involving social, physical and biological scientists very difficult and 2) in most countries, education in science and technology instills into scientists, planners and decision makers, the belief that most poor farmers are backward, primitive and "traditional" (i.e. not modern) and that they can only progress by adopting "modern, scientific" methods of farming (generally based on Western models). The idea that farmers can make a major contribution to research programs is alien to many professional agriculturalists. This seems to be a singularly unfortunate attitude, particularly in this Region, in view of evidence to the contrary. (Chambers, 1979; ICARDA, 1980; Norman, 1978).

## TRAINING

These remarks imply that training in Farming Systems is a difficult task and must necessarily be slow. Our major, important contribution during the early years is an input into the commodity program training sessions, so that their focus on a single crop can be placed in the wider farming context. More specific training can be given in such topics as: the collection, analysis and interpretation of farm level information, cropping systems experimentation, soil water and nutrient studies, studies of livestock systems, on-farm trials-purpose, design, analysis and evaluation.

## ORGANISATION

The research program is organised so that groups of scientists can focus on relatively distinct work areas or projects. There is inevitably a degree of overlap and interdependence between these work areas and most scientists are involved in at least two projects.

During the first two years of the Program, six work areas have emerged:

1) An introduction to agriculture within the Syrian Economy

This study, principally relying on data collected from secondary sources, is of all aspects of the agricultural sector and their importance in the national economy. An indication is given of the relevance of this material to ICARDA's needs and the whole study provides the essential background to further work at province, district, village and farm level.

2) Studies of existing farming systems in Syria

This study has run for two cropping seasons, with the main objective of developing an understanding of farming systems in a range of agro-ecological zones in Aleppo Province. During 1978/9 it was supplemented by a special study of the interactions between rainfed and irrigated production systems in two villages in Hama Province. In addition, a study of livestock systems, from those based primarily in the steppe to those in predominantly arable cropping areas, began in 1978.

The main study has been of a sample of farming families from six villages and has involved monthly visits to each farming family to collect information on crops, livestock and household transactions. Meteorological records have been kept in each village and soil moisture changes under three crops have been monitored. The village studies information has been supplemented by visits to many other villages and farms in Aleppo and neighbouring provinces and special, additional studies, such as one on lentil production and harvesting, have been conducted.

3) Climate/soil water and nutrient/crop interrelationships and water nutrient management

This project began with the compilation and summary of meteorological data from the region and this will be used as a base for the study of the seasonal variability of climatic parameters and for building crop productivity models. The project is now supported by a grant from UNDP, and staff build up began during 1979. Detailed soil moisture studies, agronomic and crop physiological research has begun at the Tal Hadiyeh site and at four off-station sites during the 1979/80 season.

4) Cropping systems and crop/livestock systems

This project, started during 1978/9, provides the integrating base for the testing of new plant materials, agronomic practices and crop sequences, crop/livestock interactions and alternative combinations of crops and livestock.

A series of rotation trials have been established at Tal Hadiyeh with a number of alternative sequences of crops and different types of management. In every trial, one treatment is as close as possible to existing practice so that the benefits, if any, of the alternatives may be immediately apparent and can be measured.

A number of "unit farms" are used to simulate whole farm alternatives with a variety of arable and livestock "mixes".

5) Weed control

The weed control program has been running since early 1977 and has concentrated on: the selection of suitable herbicides for selective weed control in cereals, legumes and forages; grass weed problems; crop tolerance to herbicides; cultural and biological weed control. The problem of the parasitic weed Orobanche has also been the subject of a special project.

6) Cooperative studies

This work area consists of a series of projects, conducted at the request of other ICARDA programs, or jointly with other programs, or with outside Institutes or Ministries. They vary considerably in the staff and other resources that are devoted to them. Generally they are short term (less than one year) and they are always linked to one or more of the work areas above.

The projects due for completion during 1979 are as follows:

6.1. Food Legumes in the Region.
This study was made at the request of the Food Legume program and is a review of Legume production and research in four countries of the Region. (Morocco, Tunisia, Algeria and Iraq).

6.2. Evaluation of the farmers' field verification trials in the 1977/8 and 1978/9 seasons.
These trials were a series of cereal variety plots grown at a large number of locations (40 +) throughout Syria. They were conducted jointly by the Cereals Program and the Ministry of Agriculture. The evaluation was carried out by members of the Farming Systems Research Program, following the harvest of the trials in each year.

6.3. Lentil and Chickpea production in Syria.
This is a study of production technology, using questionnaires with a representative sample of growers, visited once by interview teams from the Farming Systems and Food Legume Programs.

6.4. Livestock Cooperative income/credit study.

This study, conducted at the request of the Ministry of Agriculture and the World Bank, is designed to establish criteria to guide the Ministry and the Bank in administering a loan for livestock feed.

Each of these projects and sub-projects (except Project 3) will be the subject of separate reports which will be available from ICARDA early in 1980.

## REFERENCES

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## APPENDIX I

Main developments and events in the Farming Systems Research Program 1977/79.

| | |
|---|---|
| June, 1977 | Weed Control Group established. |
| Aug./Sept. | Farming Systems Study team (agronomist, farm management agriculturalist, sociologist and agricultural engineer) arrived. |
| | Recruitment of regional and local staff. |
| Sept./Oct. | Preliminary survey of Aleppo Province. Selection of 6 village sites. Monthly visits began. "Agriculture in the Syrian Economy" study began. |
| Jan., 1978 | Program presented to Program Committee of Board. Seminar on Soil water/crop utilization research. |
| March | Recording in one study village stopped (Zone 1) |
| April/May | Study of lentil harvesting -- 22 village study in Aleppo Province. |
| June | Draft of UNDP/ICARDA Project on Soil water/nitrogen written. |
| July/Aug. | Field Verification Trials evaluation and selection of 1978/79 sites. |
| September | Training seminar for Ministry Personnel on verification and agronomy trials. |
| September | Recording in 2 additional villages in Hama Province began (mixed irrigated/rainfed). New staff in economics and agricultural economics arrived. |
| October | Legume study in region began. Recording in new zone 1 village began. |
| December | In-house review -- Program presented and discussed. Projects defined more closely. |
| Jan., 1979 | Arrival of Soil Physicist. UNDP/ICARDA Project. Program Committee meeting. Planning of UNDP/ICARDA workshop (for Jan. 1980) on Soil water/nitrogen. Supplementary livestock study began. |

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|---|---|
| April, 1979 | Livestock Credit/Income study began. |
| May | Lentil and chickpea production in Syria study started.<br>Lentil Workshop, Aleppo. |
| August | Agronomist (UNDP/ICARDA Project) arrived. |
| September | Field program UNDP/ICARDA Project began on 4 off station sites and at Tal Hadiyeh.<br>Lentil harvesting/mechanisation meeting. |
| Sept./Dec. | Summary and analysis of data from village studies.<br>Report writing. |
| October | Revision of data collection methods and continuation of study in eight villages, Aleppo and Hama.<br>On-farm trials program. |
| December | In-house review, No. 2. |

## APPENDIX II

### Farming Systems Staff October 1, 1979

| | |
|---|---|
| David Gibbon | Agronomist (Leader) |
| Alister Allan | Agronomist |
| Fritz Basler | Weed Control Scientist |
| Peter Cooper | Soil Physicist |
| John Doolette | Agronomist (left Sept. 1979) |
| Rog Fredenburgh | Agricultural Engineer |
| James Harvey | Agriculturalist (Farm Management) |
| Adrienne Martin | Sociologist |
| David Nygaard | Agricultural Economist |
| Roger Petersen | Biometrican/Statistician |
| Andrew Watson | Economist (left Sept. 1979) |

#### Research Associates

Faik Bahhady
Sobhi Dozem
Patrick Houdiard
Mahmoud Oglah
Yousef Sabet
Abdul Bari El-Salkini

#### Research Assistants

Elizabeth Bailey
Afif Dakermenji
Abdel Karim Ferdawi
Atef Haddad
Maria Halajian
Haitham Halimeh
Hasan Jokhadar
Ahmad Mazid
Ahmad Rashwani
Andree Rassam
Glenn Rogers
Hisham Salahieh
(Study leave from Sept. 1)
Keith Shepherd
Oreib Tahhan

#### Technicians/Drivers

Hisham Heritani
Baha Kassem
Suleiman Kharboutli
Nazir Obaji
Muzafar Abu Shakra

#### Secretarial Staff

Marica Boyagi

Leila Brahamsha

Haifa Nashawati

## APPENDIX III

### Projects and Staff Members' Involvement 1978/9

| | |
|---|---|
| 1. An Introduction to Agriculture in the Syrian Economy | A. Watson; A. Mazid; A. Rassam; I. Hayani 1/; J. Harvey; A. Martin; D. Gibbon. |
| 2. Studies of Existing Farming Systems in: | D. Gibbon; J. Harvey; A. Martin |
| Aleppo Province | M. Halajian; H. Halimeh; H. Salahieh; H. Jokhadar; A.K. Ferdawi |
| Hama Province | E. Bailey; A.K. Ferdawi |
| Livestock Study | A. Martin; F. Bahhady |
| Lentil Study | J. Harvey |
| 3. Climate/Soil Water and Nutrient/ Crop Interrelationships and Water and Nutrient Management | A. Allan; P. Cooper; P. Houdiard; Y. Sabet; H. Harris 1/; K. Shepherd |
| 4. Cropping Systems and Crop/ Livestock Systems | R. Fredenburgh; J. Doolette; M. Oglah; F. Bahhady; H. Heritani |
| 5. Weed Control | F. Basler; A. Dakermenji; A. Haddad; S. Dozem |
| 6. Cooperative Studies: | |
| 1) Food Legumes in Region | A. Watson; A. Mazid; A. Rassam |
| 2) Evaluation of Farmers' Field Verification Trials | A. Martin; F. Bahhady |
| 3) Lentil & Chickpea Production in Syria | D. Nygaard; A. Mazid; A.B. El-Salkini; A. Rassam |
| 4) Livestock Cooperatives Income/ Credit Study | A. Martin; D. Nygaard; F. Bahhady; A. Rassam; W. Sardar 2/; A. Ghani Ezzedin; R. Mahrus 2/ |
| 5) Entomology Support (Cereals/ Legumes) | O. Tahhan; A. Rashwani; G. Hariri 1/ |

1/ Consultants

2/ From Ministry of Agriculture

## APPENDIX IV

## Conferences and Meetings Attended 1978/79

SYRIA

Grain Legume Workshop, Aleppo
May, 1978

KENYA

Workshop on a Farming Systems Research at the IARC's, Nairobi
May, 1978

SUDAN

Striga/Orobanche Workshop, Khartoum
November, 1978

IRAQ

ECWA/FAO Meeting on Irrigation and Agricultural Development, Baghdad
February, 1979

INDIA

Socio-Economic Constraints to Development of Semi-Arid Tropical Agriculture, ICRISAT, Hyderabad
February, 1979

CYPRUS

Cereals Meeting, Nicosia
February, 1979

JORDAN

FAO Reg. Seminar on Rainfed Agriculture
May, 1979

SYRIA

Lentil Workshop, Aleppo
May, 1979

ALGERIA

5th Reg. Cereal Workshop, Algiers
May, 1979

PHILIPPINES

Priorities for Alleviating Soil-related Constraints to Food Production in the Tropics, IRRI, Los Banos
June 4-8, 1979

USA

Symposium on Parasitic Weeds, Raleigh N.C.
July, 1979

CANADA

17th Int. Conf. of Agric. Economists, Banff
September, 1979

## APPENDIX V

### Papers, Reports and Training Materials

1. Conference or Workshop Papers

Grain Legumes in the Farming System: A Case Study from Northern Syria.
Gibbon, D. and Martin, A. Grain Legume Workshop, Aleppo, May 1978.

Accentuation of Weed Control Problems in the Dry Areas with Relevance to Herbicides in Food Legumes.
Basler, F. Grain Legume Workshop, Aleppo, May 1978.

Rainfed and Irrigated Systems: The Need for Alternative Approaches in Research and Development.
Gibbon, D. ECWA/FAO Meeting on Irrigation and Agricultural Development, Baghdad, February 1979.

Farming Systems Research: An Approach to the Improvement of Rainfed Agricultural Systems in the Mediterranean Region.
Gibbon, D. FAO Reg. Sem. on Rainfed Agriculture, Jordan, May 1979.

Chemical Weed Control as an Integrated Part in Cereal Production.
Basler, F. 5th Reg. Cereal Workshop, Algiers, May 1979.

Selection of Orobanche Resistant Cultivars of Broadbean and Lentils.
Basler, F. 2nd Int. Symp. on Parasitic Weeds. Raleigh, N.C., U.S.A. July 1979.

Lentil Harvest - Some Alternatives.
Harvey, J. Lentil Workshop, Aleppo, May 1979.

Whither Lentils?
Watson, A. Lentil Workshop, Aleppo, May 1979.

Subjective Production Function Parameters and Risk: Wheat Production in Tunisia.
Roe, T. and Nygaard, D. 17th Int. Conf. Agrci. Econs. Banff. September 3-12,1979.

Farming Systems in the Mediterranean Region.
Gibbon, D. ICARDA/UNDP Workshop on Soil water/nitrogen. Aleppo, January 1980.

2. Programme Papers

(1) Forms, Checklists, Questionnaires and notes used in village studies in Aleppo Province during 1977-78 (Arabic and English)

(2) Farming Systems and the Rural Economy in Aleppo Province. Interim Report, April 1978

(3) Informal Summary Report, September 1978

(4) Farming Systems Research Program. In-House Review Presentation. Aleppo, December 2, 1978

(5) Farming Systems Research Program 1978/9. Program Outline. February 1979

(6) Factors Affecting Lentil Production in Syria. July 1978

(7) Weed Control Report 1977/8. July 1978

(8) Farmers Field Verification Trials. ICARDA Project Report No. 1, 1978 (contribution)

3. Training Materials

(1) An Introduction to the Major Pests of Food Legume Crops in West Asia. Tech. Man. No. 4

(2) Introduction to Agriculture in West Asia and North Africa. Tech. Man. No. 6 - contribution

(3) Economics Notes

(4) Statistics and Field Experimentation

4) Research Reports (Available early 1980)

| | | ICARDA Project Report Number |
|---|---|---|
| (1) | An Introduction to Agriculture within the Syrian Economy | 2 |
| (2) | Studies of Existing Farming Systems in Syria | 3 |
| (3) | Cropping Systems and Crop/Livestock Systems Research | 4 |
| (4) | Weed Control | 5 |
| (5) | Legume Production in Algeria, Iraq, Morocco and Tunisia | 6 |
| (6) | An Evaluation of Farmers Field Verification Trials | 7 |
| (7) | Production of Lentils and Chickpeas in Syria | 8 |