



**Food  
Legume  
Improvement  
and  
Development**

Proceedings  
of a  
workshop  
held at The  
University  
of Aleppo,  
Syria,  
2-7 May  
1978

Geoffrey C.  
Hawtin  
and  
George J.  
Chancellor,  
Editors

**ARCHIV  
35914**



The International Development Research Centre is a public corporation created by the Parliament of Canada in 1970 to support research designed to adapt science and technology to the needs of developing countries. The Centre's activity is concentrated in five sectors: agriculture, food and nutrition sciences; health sciences; information sciences; social sciences; and communications. IDRC is financed solely by the Government of Canada; its policies, however, are set by an international Board of Governors. The Centre's headquarters are in Ottawa, Canada. Regional offices are located in Africa, Asia, Latin America, and the Middle East.

© 1979 International Development Research Centre  
Postal Address: Box 8500, Ottawa, Canada K1G 3H9  
Head Office: 60 Queen Street, Ottawa

Hawtin, G.C.  
Chancellor, G.J.

International Center for Agricultural Research in the Dry Areas, Aleppo SY  
IDRC-126e

Food legume improvement and development: proceedings of a workshop held at the University of Aleppo, Aleppo, Syria, 2-7 May 1978. Ottawa, Ont., IDRC, 1979. 216 p.:ill.

/IDRC publication/. Compilation of workshop papers on /legume/ /food production/ in the /Middle East/ and /North Africa/ — discusses agro/bio-climatology/ and /cultivation system/s, /nutrition/al value and /food composition/; /plant production/ (particularly of /chickpea/s, /lentil/s, and /faba bean/s), /agricultural research/, /cultivation practice/s for /plant protection/; /plant disease/s, /insect/ /pest/s, /disease resistance/, /weed control/ problems (use of /herbicide/s in /arid zone/s); /plant breeding/ and /genetic improvement/. /IDRC mentioned/, /list of participants/.

UDC: 633.3

ISBN: 0-88936-202-5

Microfiche edition available

## **Food Legume Improvement and Development**

Proceedings of a workshop held at  
the University of Aleppo,  
Aleppo, Syria, 2-7 May 1978

*Editors:* Geoffrey C. Hawtin and George J. Chancellor

*Published by the*  
International Center for Agricultural Research in the Dry Areas  
*and the*  
International Development Research Centre

*The views expressed in this publication are those of the individual author(s) and do not  
necessarily represent the views of ICARDA or IDRC.*

ARCHIV  
633.3  
H 3  
1978

# Contents

Preface .....	4
Foreword .....	5
<b>Section I An Introduction to Food Legumes in the Region</b>	
Some aspects of the agroclimatology of West Asia and North Africa <b>Hazel C. Harris</b> .....	7
Food legume production: the contribution of West Asia and North Africa to the world situation <b>F.M. Hamawi</b> .....	15
Food legumes in the farming system: a case study from Northern Syria <b>David Gibbon and Adrienne Martin</b> .....	23
Nutritional quality and importance of food legumes in the Middle Eastern diet <b>Raja Tannous, Salah Abu-Shakra, and Abdul Hamid Hallab</b> .....	29
<b>Section II The Present Production and Improvement Situation</b>	
Food legumes in Algeria <b>Walid Khayrallah and Lounes Hachemi</b> .....	33
Production and improvement of grain legumes in Egypt <b>Ali A. Ibrahim, Abdullah M. Nassib, and Mohamed El-Sherbeeney</b> .....	39
Food legume production in the Hashemite Kingdom of Jordan <b>M. Abi Antoun and A. Quol</b> .....	47
Food legume production and improvement in Iran <b>M.C. Amirshahi</b> .....	51
Food legumes in Iraq <b>Mahmoud A. Mayouf</b> .....	55
Food legume research and development in the Sudan <b>Farouk A. Salih</b> .....	58
Food legume improvement in Tunisia <b>M. Bouslama and M. Djerbi</b> .....	65
Food legume production and improvement in Lebanon <b>R. Lahoud, M. Mustafa, and M. Shehadeh</b> .....	69
Grain legume production in Turkey <b>D. Eser</b> .....	71
Food legume research and production in Cyprus <b>J. Photiades and G. Alexandrou</b> .....	75
Broad beans ( <i>Vicia faba</i> ) and dry peas ( <i>Pisum sativum</i> ) in Ethiopia <b>Asfaw Telaye</b> .....	80
Food legumes in Syria <b>Sadek El-Matt</b> .....	85
Food legume improvement in the People's Democratic Republic of Yemen <b>Shafiq Mohsin Atta</b> .....	88
Food legume production in Libya <b>Ali Salim</b> .....	90
Status of food legume production in Afghanistan <b>N. Wassimi</b> .....	91
Food legumes in India <b>A.S. Tiwari</b> .....	94
<b>Section III Disease Problems on Legume Crops</b>	
Diseases of major food legume crops in Syria <b>S.B. Hanounik</b> .....	98
Food legume diseases in North Africa <b>M. Djerbi, A. Mlaiki, and M. Bouslama</b> .....	103
Food legume diseases in Ethiopia <b>Alemu Mengistu</b> .....	106
Diseases of broad beans ( <i>Vicia faba</i> ) in the Sudan <b>Mustafa M. Hussein and Sami O. Freigoun</b> .....	109
<b>Section IV Major Pests and Weeds of Food Legumes</b>	
Insect pests of food legumes in the Middle East <b>Nasri S. Kawar</b> .....	112
Insect pests of chick-pea and lentils in the countries of the Eastern Mediterranean: a review <b>G. Hariri</b> .....	120
Some insect pests of leguminous crops in Syria <b>Ara A. Kemkemian</b> .....	124
The biology and control of <i>Orobanche</i> : a review <b>A.R. Saghir and F. Dastgheib</b> .....	126
Broomrape ( <i>Orobanche crenata</i> ) resistance in broad beans: breeding work in Egypt <b>Abdullah M. Nassib, Ali A. Ibrahim, and Hamdy A. Saber</b> .....	133
Accentuation of weed control problems in the dry areas with relevance to herbicides in food legumes <b>F. Basler</b> .....	136

## **Section V Food Legume Development**

Genetic resources of grain legumes in the Middle East <b>L.J.G. Van der Maesen</b> .....	140
Strategies for the genetic improvement of lentils, broad beans, and chick-peas, with special emphasis on research at ICARDA <b>Geoffrey C. Hawtin</b> .....	147
Some agronomic and physiological aspects of the important food legume crops in West Asia <b>M.C. Saxena</b> .....	155
The role of symbiotic nitrogen fixation in food legume production <b>Rafiqul Islam</b> .....	166
The ICARISAT chick-pea program with special reference to the Middle East <b>K.B. Singh</b> .....	170
Methods of population improvement in broad bean breeding in Egypt <b>Abdullah M. Nassib, Ali A. Ibrahim, and Shaaban A. Khalil</b> .....	176
Pollinating insects: a review <b>Ara A. Kemkemian</b> .....	179

## **Section VI Cooperative Approaches to Food Legume Improvement at the National Level**

The training and communications program at ICARDA <b>S. Barghouti</b> .....	181
FAO food legume programs in the Middle East and North Africa <b>Hazim A. Al-Jibouri and A. Bozzini</b> .....	185
The food legume improvement and development program of the field crops section at ACSAD <b>L.R. Morsi</b> .....	190
The role of IDRC in food legume improvement research <b>F. Kishk</b> .....	192

## **Section VII Recommendations for Future Research Priorities** .....

## **Bibliography** .....

## **Participants** .....

## **Food Legume Production and Improvement in Iran**

M. C. Amirshahi

*College of Agriculture, University of Tehran, Karaj, Iran*

The total land area of Iran is about 1.6 million km<sup>2</sup>, of which only 17.48 million ha are under cultivation. Because a large amount of land is left fallow every year, the annual cropped area is only approximately 11.288 million ha and the area devoted to the production of food legumes is about 423 000 ha per year, or 3.7% of the cropped area.

Due to its geographic location, the country experiences a very wide range of climatic conditions, ranging from very cold and arid in the northern mountainous areas to hot, tropical and subtropical climates around the Persian Gulf and the Oman Sea in the south. From an agroecological standpoint, Iran can be divided into a number of characteristic zones (Fig. 1):

- (1) the Caspian Sea area, in the north, which has a very high annual rainfall, varying from 700 to 1200 mm; broad beans and dry beans are the main legume crops produced;
- (2) the mountainous regions of the northwest and northeast, with high elevations and 350–500 mm annual precipitation, where the major legume crops are lentils, chick-peas, and dry beans;
- (3) the Central and Eastern Plateau, stretching from the mountain ranges to the desert areas. The precipitation varies from 250 mm in the vicinity of the mountains down to less than 100 mm near the deserts. Chick-peas, lentils, cowpeas, dry beans, and mungbeans are the main legume crops;
- (4) the southwestern plains of Khuzistan, which have a very hot and humid summer climate and an annual rainfall of about 200 mm and where broad beans, dry beans, cowpeas, and mungbeans predominate among the legumes;
- (5) the south and southeast of the country, where precipitation is very low and the climate is hot and dry in the summer period. The most important food legume crops are mungbeans, dry beans, and broad beans.

Of the total pulse production area, approximately 69.5% is rainfed and 30.5% irrigated. The area, production, and yield of the main legume crops are given in Table 1. The very low average yields of pulse crops in Iran reflect the wide range of conditions under which they are grown and the difficulty of obtaining and recommending varieties and agronomic practices to fit these very varied ecological niches.

### **Utilization and Production**

Grain legumes provide a very useful source of protein to the diets of the population of Iran and are used mainly as dry seeds, with the exception of broad beans and dry beans, which are also consumed as green seed. In addition, the by-products of seed production, the pods and plant haulms, provide a very valuable animal fodder.

Chick-peas and lentils, the two most important pulse crops in the country, are predominantly grown in the mountainous regions under rainfed conditions where they are rotated with a cereal crop (wheat, barley, or rye) and a fallow period. The crops are normally sown from March to late April and the harvesting season extends from mid-July to mid-August.

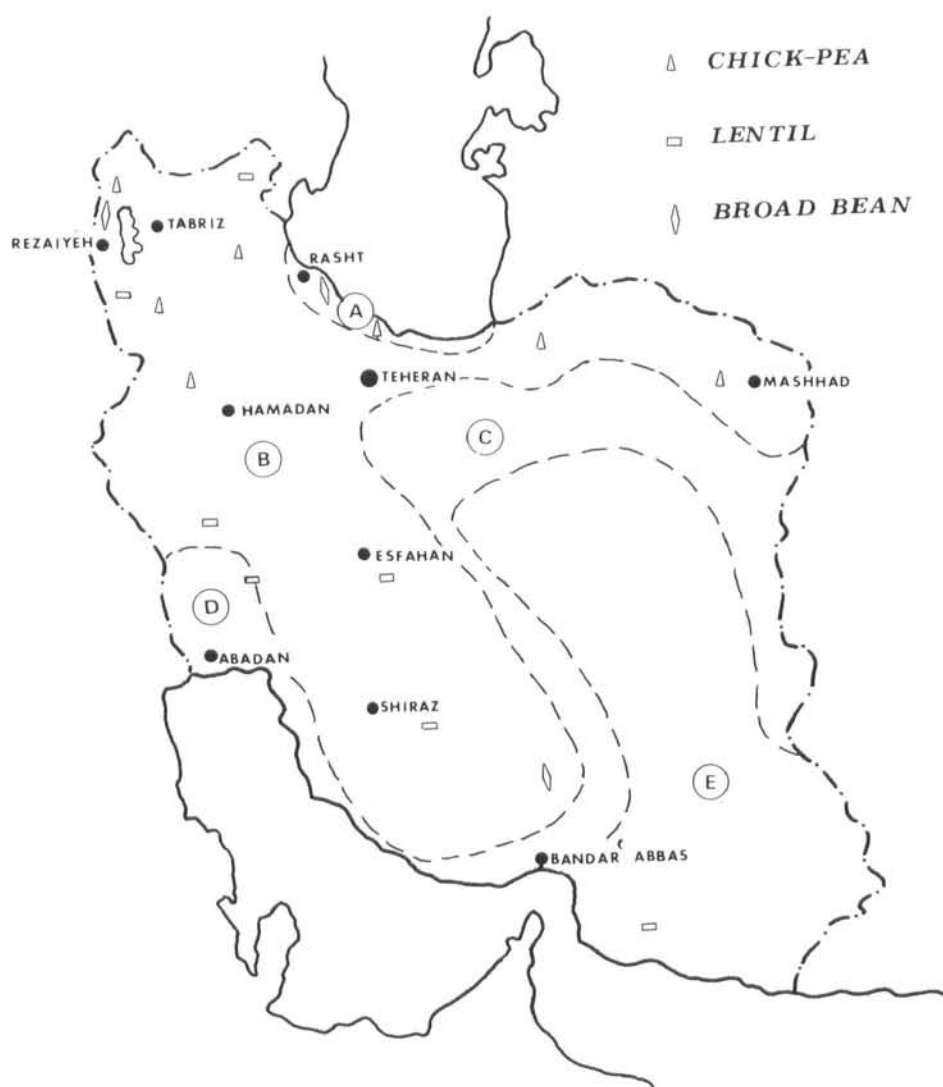


Fig. 1. Agroecological divisions and some pulse-growing areas of Iran. A, Caspian Sea area; B, mountain region; C, Central and Eastern Plateau; D, Khouzistan Plains; E, dry south and southeast.

TABLE 1. Estimated area ('000 ha), production ('000 metric tonnes), and average yield (kg/ha) of legume crops in Iran.

Crop	Area			Production	Avg Yield
	Rainfed	Irrigated	Total		
Chick-peas	236	57	293	149	508
Beans (incl. cowpeas)	3	36	39	48	1231
Lentils	45	2.5	47.5	22	483
Mungbeans	—	25	25	12.5	500
Broad beans	9.9	8.6	18.5	23.2	1250

Dry beans, cowpeas, and broad beans are grown throughout the country, and with the exception of production in the Caspian region, are cultivated under irrigation. The high rainfall of the Caspian region enables these crops to be produced without supplementary watering. In this area they are grown in rotation with rice and are planted between late March and mid-May, depending on climatic conditions. In the Central Plateau areas and the south and southwestern parts of Iran, where production involves irrigation, the planting seasons are late April to late June and late December to early February respectively. Harvesting of green pods commences 2½–3 months after planting and of dry seed 1½ months after this, the season being very extended as a result of the wide range of planting dates.

Mungbeans are grown in very small plots and often follow cereal crops in a rotation. Planting starts from early June in the Central Plateau to mid-July in the Khuzistan plains, and the harvesting season extends from late September to late October.

### Diseases

The two diseases of major importance to chick-pea production in Iran are chick-pea blight caused by *Ascochyta rabiei* and root rot caused by *Rhizoctonia solani* and possibly also *Fusarium* and *Pythium* species. Both these diseases cause severe yield losses in the main chick-pea producing areas. Fungicides such as Captan, Dyrene, Benlate, and Zineb have been found to give good control of blight, and seed treatment with Thiabendazole or Benlate is effective in reducing root rot infections.

Root rot is also a major problem in dry (*Phaseolus*) beans, where, together with bean common mosaic virus (BCMV), it causes considerable damage to the crop. Fortunately bean varieties with varying degrees of resistance to these diseases have been found and are at present being used in the production of resistant cultivars as a control measure.

Viruses are also the main disease-causing organisms in cowpeas (common aphid-transferred mosaic virus (CAMV)), broad beans (bean yellow mosaic virus (BYMV)), and mungbeans (BCMV and BYMV). Viral diseases are very damaging and cause considerable yield reduction. They are especially important in the broad bean crop. Although some resistance to CAMV has been found in cowpeas and is being used in the production of hybrid varieties, no resistance to BYMV has yet been discovered in broad bean lines.

### Pests

Aphids, which include the green aphid (*Acyrtosiphon sesbaniae*), the broad bean aphid (*Aphis fabae*), and the chick-pea aphid (*Therioaphis trifolii*), are very damaging to all the pulse crops, both as a result of their infestation and due to their virus transmission abilities. Army worms (*Laphygma exigua*) are also a major pest of all the legumes.

Chick-peas are specifically affected by pod borers (*Heliothis armigera* and *H. dipsaceae*) and the seed corn maggot (*Hylemia cilicrura*), which may cause considerable crop losses under favourable conditions.

Other important field pests include the chick-pea fly (*Liriomyza congesta*) and thrips (*Thrips impurus*) on lentils; leaf hopper (*Empoasca fabae*), striped beetle (*Agrotis* sp.) and spider mite (*Tetranychus bimaculatus*) on beans; and bean butterfly (*Lycaena baeticae*) on cowpeas.

Cowpea beetle (*Callosobruchus maculatus*) and lentil beetle (*Bruchus lens*) are important pulse storage pests and can result in considerable losses in seed quality as well as quantity.

Each of these pests has been studied in detail and appropriate control measures developed through pesticides, cultural practices, and, in some cases, particularly in cowpea storage pests, through the evolution of resistant varieties.

### Research Activities

With the cooperation of the Ministry of Agriculture, the Planning Organization, USDA, and the University of Tehran, the Pulse Improvement Project was established at the



Karaj College of Agriculture in 1965. The main objective of this project is to produce high-yielding, good quality, disease-resistant varieties together with improved practices for their production. Since its inception, the project has built up a germ-plasm collection of over 12 000 lines of the major pulse crops in Iran and has produced and released over 17 improved varieties of chick-pea, lentil, cowpea, dry bean, and mungbean for production throughout the country. Varietal development has been geared mainly to cultivation under irrigation and it is estimated that 20 000 ha of land are now annually sown to these varieties, which yield two or three times the level of the traditionally grown types.

Experiments and tests are carried out at Karaj, in the experimental stations of the Ministry of Agriculture throughout the country, and at various other Agricultural Colleges, to ensure that the investigations are appropriate to the wide range of climatic conditions that exist within Iran. In this way, agronomic research, in support of varietal development, to determine crop water requirements, fertilizer needs, optimum planting dates, and planting densities and other cultural practices and requirements is being carried out across the country. Such work aims to promote the production and spread of the pulse crops, which play such an important role in the nutrition of such a large part of the population of Iran.