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A chapter from  
**Adaptation of Chickpea  
in the West Asia and North Africa Region**

Edited by

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## 1.2. Chickpea in WANA Project: Concepts and Approaches

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### Introduction

Increasing food production continues to be as high a priority in many national and international agricultural research programs, as in the 1960s and '70s. The task, however, has become more complex because agricultural technologies are now expected to be more profitable, sustainable, and environment-friendly in addition to being highly productive. Achieving this objective in SAT and in the dry areas of WANA is particularly challenging because these environments are poorly endowed for crop production. Also, the majority of farmers of these regions have small holdings, a poor resource base, and practice subsistence farming.

Legumes, in general, are accorded a secondary status; they receive, less funding for research and scientific manpower than cereals. Under these circumstance, greater efforts in prioritizing research activities, formulating well-focused programs, and increasing resource-use efficiency are essential to raise the production of legumes.

It is against this background that the Project 'Adaptation of Chickpea in the WANA Region' was conceived. The purpose was to review the current information on chickpea research and produce a synthesis on the subject. This would help to identify not only technology that could be transferred for enhancing yield, but also future thrust areas for research.

A brief description of the Project is presented here against the background of chickpea status in the WANA and SAT regions.

### Status of Chickpea in the WANA and SAT Production Systems

Chickpea has characteristic features which enable it to adapt well to low native soil nitrogen (N) and phosphorus (P) conditions, compared with other crops including some legumes. For example, it can fix large amounts of atmospheric N<sub>2</sub>, and add N to the cropping system (Rupela and Saxena 1987). The crop is known to be efficient in releasing P from calcareous soils (Ae et al. 1991). It is also particularly suited to dry areas. These factors together perhaps made low-input production systems with chickpea stable and profitable in the past. These systems were also more environment-friendly as low requirements for chemical fertilizer input reduced the scope for accumulation of undesirable residues from fertilizers not utilized by crops. Another aspect, which has not been quantified and is generally common to legumes in crop rotations, is their role in disrupting the cycle of soilborne diseases, insect pests, and nematodes, and recycling of soil nutrients.

However, at present, chickpea is perceived as a highly unstable, risk-prone, and unprofitable crop, because of its susceptibility to foliar disease, pod borers, and drought. Increasing labor costs for field operations have made it unprofitable to grow the crop. These factors have led to a continuously decreasing area and production of the crop in much of the WANA region.

### Project Planning and Development

The Project's aim was to make use of the available information on the crop in various national and international chickpea programs. It thus did not require any resource inputs for generating new data. National agricultural research system (NARS) participants were requested to document available information on applied and adaptive research on chickpea for their respective countries. They were asked to highlight

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problems that required solving or upstream research that would contribute to the expansion of the crop area and its production. Interactions of NARS with a multidisciplinary team of resource scientists from ICARDA and ICRISAT were planned to review the problems and prospects of the crop and to develop integrated crop management strategies.

The 2-year Project culminated in a workshop in Nov 1992. At the workshop, scientists from NARS and the resource team presented papers, which were discussed, reviewed, and revised. This book is a compilation of those papers. Following were the key aspects of the Project:

- Review of literature;
- Framing of objectives;
- Listing of expected outputs or impacts;
- Identification of partners; and
- Implementation of the Project.

## Literature Review

Chickpea is a relatively minor food crop on a global basis. It occupies around 0.07% of the world's arable area and 0.14% of the pulse area (FAO 1993). Despite this, many research publications on the crop are available. Chickpea literature published from the WANA countries was searched through bibliographies (e.g., Singh and van der Maesen 1977), and through the AGRICOLA, AGRIS, and CAB International databases. The comprehensive chickpea literature in the 'SATCRIS' database maintained by the ICRISAT Library, was especially useful.

More than 5000 publications on chickpea were available in literature from 1930 to the end of 1992 (Table 1.2.1a). In the last 2 decades, on average, 140 chickpea publications appeared every year. Findings reported in the early part of the century, such as on the acid secretions of chickpea plants (Sahasrebudhe 1914) and on the morphology and anatomy of the chickpea plant (Holm 1920), continue to

be important references even today. It also shows that chickpea has attracted research attention for a long time.

More publications originated from SAT than from WANA (Table 1.2.1b), which is not surprising because of the larger chickpea area in the chickpea-growing countries of the SAT region (FAO 1993). The SATCRIS database listed around 270 publications from the 11 WANA countries involved in this Project. A country-wise break up is given in Table 1.2.2. A literature search, using the AGRICOLA database from 1979 to Sep 1991, showed that chickpea literature covered almost all important crop disciplines (Table 1.2.3), including basic research on cell biology, physiology, and anatomy. Twenty-two publications specifically on drought were found.

**Table 1.2.1a. Total number of chickpea publications from different sources.**

Year	Number of publications
1930-74 <sup>1</sup>	3146
1975-79 <sup>2</sup>	704
1979-91 <sup>3</sup>	1441
<b>Total</b>	<b>5291</b>

1. Singh and van der Maesen (1977).

2. SATCRIS database, ICRISAT.

3. AGRICOLA database, US National Agricultural Library.

**Table 1.2.1b. Chickpea publications according to region.**

Year	WANA	SAT
1979-82	1	79
1983-86	30	114
1987 to Sep 1991	25	101
<b>Total</b>	<b>56</b>	<b>294</b>

Source: AGRICOLA database, US National Agricultural Library.

**Table 1.2.2. Chickpea publications according to WANA region and countries participating in the Project.**

Region/Country	Number of publications
<b>West Asia</b>	141
Iran	7
Iraq	8
Jordan	17
Syria	74
Turkey	35
<b>North Africa</b>	50
Algeria	12
Morocco	22
Tunisia	16
<b>Nile Valley</b>	82
Egypt	30
Ethiopia	39
Sudan	13
<b>Total</b>	273

Source: SATCRIS database, ICRISAT.

**Table 1.2.3. Chickpea publications according to discipline.**

Discipline	Number of publications
Physiology	380
Breeding	355
Pathology	270
Agronomy	228
Entomology	106
Cell biology	30
Drought	22
Economics and marketing	10
Microbiology	2

Source: AGRICOLA database, US National Agricultural Library.

## Objectives

The objectives of the Project were to:

- Document the current knowledge and understanding of chickpea cultivation, and map the production constraints of the crop in WANA, at national, regional, and global scales.
- Identify potential areas for chickpea expansion and the lacunae in our knowledge of the crop.
- Formulate and recommend short- and long-term research strategies for sustainable increases in chickpea production.

## Expected Outputs

The major focus of the Project was to prepare the Project document that would synthesize present knowledge of chickpea cultivation, document progress made in research, and quantify constraints across national, regional, and agroecological boundaries. We also aimed to present and discuss technologies or methodologies that could be more widely applicable across regions.

This book is aimed as a reference for determining research priorities and resource allocation, particularly for the WANA countries. For research workers and administrators, it may be useful for developing and seeking support for selective and well-focused research projects on chickpea, both in basic and applied areas, and in decision-making.

## Identification of Partners

The Project involved the participation of ICARDA, ICRISAT, and NARS. Eleven out of 23 WANA countries were identified on the basis of relative importance of chickpea (area and production) (FAO 1990). ICARDA (with an agroecological mandate for WANA and a regional mandate for kabuli chickpea), ICRISAT (with a global mandate for

chickpea), and scientists of 11 chickpea-growing countries in WANA agreed to participate in this collaborative Project.

## Project Implementation

A network of multidisciplinary teams of scientists was organized, and a draft of the Project proposal prepared by the coordinator was discussed and reviewed by a multidisciplinary team of resource persons from ICRISAT and ICARDA. It was recognized that identifying and retrieving required databases and maps with the help of NARS would be a major task.

A revised Project proposal was then circulated to the NARS collaborators, seeking their suggestions and inviting them to participate in the Project. Positive responses from scientists of all the 11 WANA countries were received. Formats were then circulated to them for assembling and providing data on chickpea area, production, and occurrence of abiotic and biotic stresses, and a list of various maps required. Most of the maps were identified from published sources, and those not available were prepared by NARS participants.

A mid-term review of progress of work was undertaken at an informal session convened during the Second International Food Legumes Conference, 5–13 Apr 1992, Cairo, Egypt as NARS participants from all the 11 WANA countries and the regional coordinators of ICARDA were attending. Outputs of literature searches on chickpea, photocopies of most of the relevant papers, and maps considered useful in preparing the country case studies were circulated to NARS participants. A sample report 'Chickpea in Syria' based on the format proposed by the Project was also distributed. The Project was structured around country case studies. These were presented at the workshop in three sessions:

- West Asia (Iran, Iraq, Jordan, Syria, and Turkey);
- North Africa (Algeria, Morocco, and Tunisia); and
- Nile Valley (Egypt, Ethiopia, and Sudan).

The chairpersons and rapporteurs of each session were identified and informed in advance of the need to prepare a regional synthesis and present it at the plenary session of the workshop and were given copies of the country case studies beforehand.

An overview of biotic, abiotic, and socioeconomic constraints to production was done through a critical review of the information presented in various country case studies and the knowledge and experience of the authors on the subject. The authors of the overview papers were members of a multidisciplinary resource team of scientists drawn from ICARDA and ICRISAT. Literature search outputs on chickpea, and the country case studies were provided to the authors of the overview papers. They were requested to suggest future thrust areas of research in their areas of specialization.

An overall synthesis of constraints and opportunities for increasing chickpea production in the WANA region was prepared by the editorial team. This is included here as Chapter 6.

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