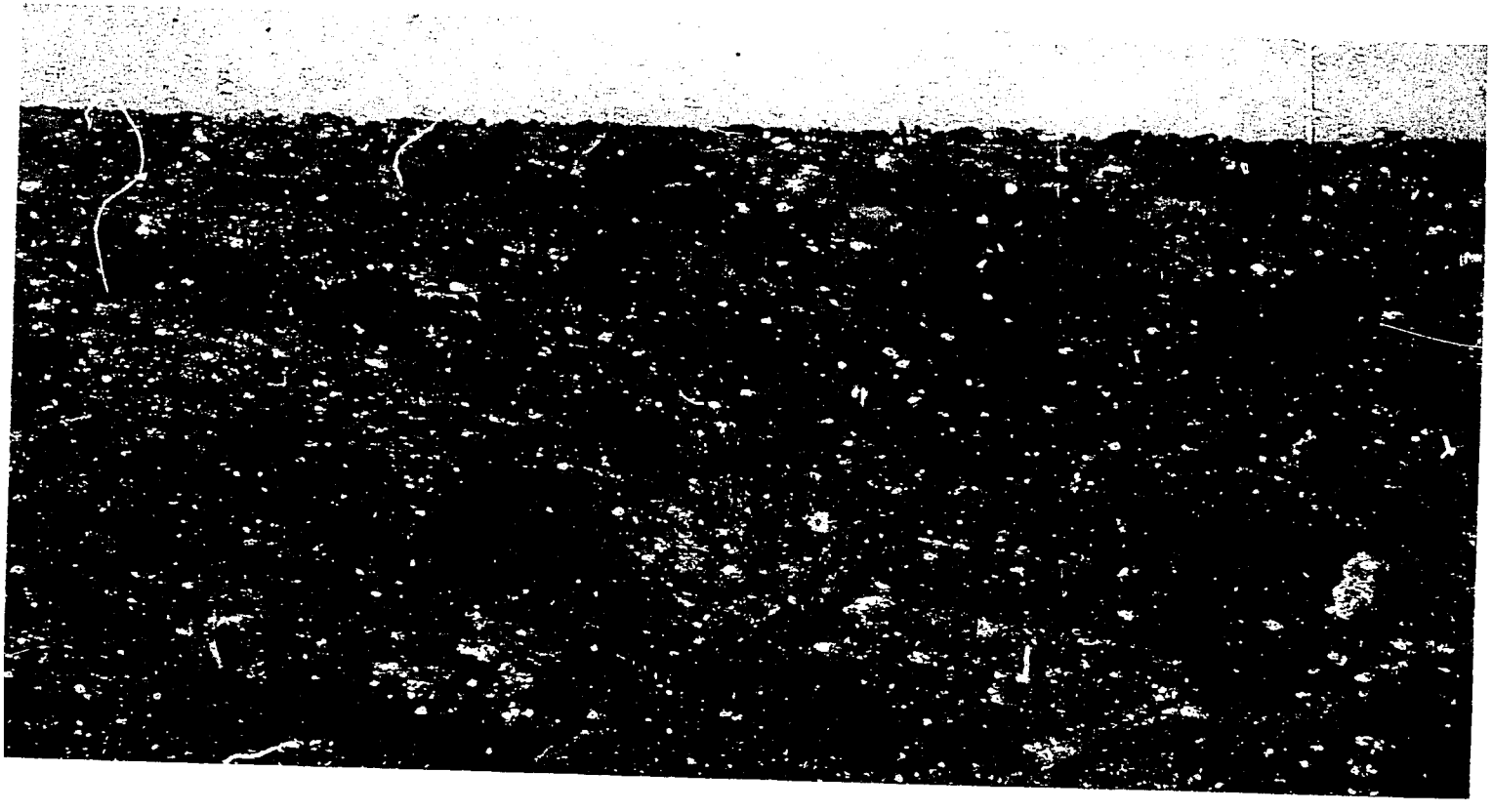
# ICRISAT Chickpea Germplasm Catalog Evaluation and Analysis



**Citation:** Pundir, R.P.S., Reddy, K.N., and Mengesha, Melak H. 1988. ICRISAT chickpea germplasm catalog: evaluation and analysis. Patancheru, A.P. 502 324. India: International Crops Research Institute for the Semi-Arid Tropics.

The International Crops Research Institute for the Semi-Arid Tropics is a nonprofit scientific educational institute receiving support from donors through the Consultative Group on International Agricultural Research. Donors to ICRISAT include governments and agencies of Australia, Belgium, Canada, Federal Republic of Germany, Finland, France, India, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States of America, and the following international and private organizations: Asian Development Bank, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), International Development Research Centre, International Fund for Agricultural Development, The European Economic Community, The Opec Fund for International Development, The World Bank, and United Nations Development Programme. Information and conclusions in this publication do not necessarily reflect the position of the aforementioned governments, agencies, and international and private organizations.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of ICRISAT concerning the legal status of any country, territory, city, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Where trade names are used this does not constitute endorsement of or discrimination against any product by the Institute.

**Cover photo:** Chickpea evaluation plots at ICRISAT Center, 1985.

**ISBN 92-9066-154-2**

FA-1-B-706

# ICRISAT Chickpea Germplasm Catalog: Evaluation and Analysis

R.P.S. Pundir, K.N. Reddy, and Melak H. Mengesha

ICRISAT
International Crops Research Institute for the Semi-Arid Tropics
Patancheru, A.P. 502 324, India.

1988

# Foreword

Plant genetic resources are irreplaceable assets for mankind. Their conservation is of prime importance. In recent years, supported by FAO, various national and international panels, committees, and research institutes have concerned themselves with collecting and maintaining germplasm. ICRISAT is one of them. At ICRISAT, genetic resources activities are given due importance in the Institute's objectives and long-term plans. Commendable progress has been made so far. A comprehensive chickpea collection has already been assembled in the ICRISAT gene bank. This has been achieved by assembling collections that already existed at other centers and by collecting new germplasm from priority areas. We are grateful to those who have given us duplicates of their collections.

The collections have been characterized and evaluated by using IBPGR/ICRISAT descriptors to identify genotypes that can be effectively used in chickpea improvement. The germplasm accessions have been evaluated and screened at ICRISAT Center and our cooperative research station at Hisar, Haryana, India. The results obtained to date have been summarized in the first part of this catalog.

Continued efforts will be made to identify new and useful types and fill geographical gaps in the world collection. We will in future test accessions at different locations. Adequate seed stocks will be maintained for distribution to present and future users. So far, 67 051 healthy and useful germplasm samples have been distributed free of charge to chickpea research workers in 68 countries. This service is provided for all our mandate crops and is one of the major contributions that ICRISAT makes to crop improvement.

This new catalog is an attempt to assemble chickpea germplasm information. It covers major aspects of germplasm collection, passport information, characterization, evaluation, diversity, documentation, and distribution for present and future utilization. I believe it is valuable reference material for all chickpea research scientists.

**L.D. Swindale**
**Director General**

# Preface

Chickpea is one of the important grain legumes cultivated mainly in southern Asia, Mediterranean countries, northeastern Africa, and Central and South America. Presently, it is being promoted in such countries as Australia, Canada, and USA.

In Mediterranean and American countries chickpea is grown in the spring, whereas in the subtropics — India, Pakistan, Bangladesh, Nepal, Burma, and Ethiopia it is cultivated in winter when the rains recede. Being a crop of subsistence agriculture, adequate research efforts have not been devoted to chickpea in the past. However, with the inclusion of chickpea in the research mandate of ICRISAT and ICARDA, the crop is now receiving the scientific attention it deserves.

As a part of this integrated research activity, chickpea germplasm has been assembled at ICRISAT, and the collection further enriched by the addition of local germplasm collected from priority areas. Presently the worldwide collection comprises over 15 000 accessions from 41 countries. Characterization and evaluation are carried out by multidisciplinary efforts that have resulted in the identification of several useful genotypes with resistance to diseases and pests. These resistant sources are being used in breeding programs at ICRISAT and other centers.

Characterization and screening work has been in progress for several years. Data obtained to date are summarized in the first part of this catalog. Accessions with high scores for desirable characteristics have been listed for easy access by users. We shall continue to test accessions for new characteristics. In the companion volume, passport information for all the chickpea accessions in the ICRISAT gene bank is listed.

I hope that the information presented here will help research workers acquire a broader view of chickpea germplasm, so that they can effectively select accessions for utilization in their research programs.

This catalog is the outcome of several years of multidisciplinary efforts. I am glad to be associated with the progress made so far. The Genetic Resources Unit and all the scientists and staff of Information Services deserve to be congratulated on this commendable work.

**J.S. Kanwar**
**Deputy Director General Emeritus**

# Acknowledgements

We are indebted to Dr L.D. Swindale, Director General, and Dr J.S. Kanwar, Deputy Director General Emeritus, of ICRISAT for their overall support and encouragement during the preparation of this catalog.

Several persons representing various institutions have supplied seed material and information to ICRISAT's Genetic Resources Unit. We acknowledge their generous assistance. Many scientists have cooperated with ICRISAT to bring together ideas and help sharpen our focus on the compilation of this catalog. We cannot list them all but we are specially grateful to:

Dr P.N. Bahl (IARI)
Dr S. Chandra (formerly Pulse Directorate, Kanpur, now ICAR)
Dr B.S. Dahiya (HAU)
Dr D. Eser (University of Ankara, Ankara, Turkey)
Sir Otto Frankel (Commonwealth Scientific and Industrial Research Organisation, Australia)
Dr G.C. Hawtin (formerly ALAD, now IDRC)
Dr J. Konopka (IBPGR)
Dr Laxman Singh (formerly AICPIP, now ICRISAT)
Dr G. Ladizinsky (Rehovot)
Dr B.P. Pandya (GBPUAT)
Dr I.S. Sandhu (PAU)
Dr D. Sharma (formerly JNKVV and ICRISAT, now Winrock International)
Dr K.B. Singh (formerly PAU, now ICRISAT)
Dr U. Singh (CSAUAT)
Dr J.S. Sindhu (formerly CSAUAT, now SKUA)
Dr G. White (ARS - USDA).

We owe special thanks to Dr L.J.G. van der Maesen, Professor of Plant Taxonomy, University of Wageningen, the Netherlands, who was with ICRISAT from 1975 to 1983, for his contributions to chickpea genetic resources activities and to Ms G. Shobha for her secretarial assistance. Finally we wish to express our appreciation to Information Services and particularly to Susan D. Hall, Research Editor, and B. J. Walby, Consultant Editor, for editing and improving the style and presentation of the catalog.

The following past and present ICRISAT staff have contributed to the assembly and evaluation of the chickpea germplasm.

| | |
|---|---|
| Genetic Resources | Melak H. Mengesha, L.J.G. van der Maesen[1], R.P.S. Pundir, N.K. Rao, K.N. Reddy, G.V. Reddy, Sai Reddy |
| Pathology | Y.L. Nene, M.P. Haware, M.V. Reddy, S.P.S. Beniwal[1], A.M. Ghanekar, J. Narayana Rao, F. Deena[1], G.M. Reddy, K.P. Reddy |
| Entomology | W. Reed[1], S.S. Lateef, S. Sithanantham, V.R. Bhagwat, K.V.P. Rao, P.R. Goud[1] |
| Biochemistry | R. Jambunathan, Umaid Singh, S.P. Yadav[1], N. Subramaniam, G.L. Waghray, G. Somaraju, G. Venkateswarlu |
| Breeding | J.M. Green[1], K.B. Singh, A.K. Auckland[1], J.B. Smithson[1], H.A. van Rheenen, K.C. Jain, Onkar Singh, S.C. Sethi, C.L.L. Gowda, Jagdish Kumar |
| Statistics | B. Gilliver, Murari Singh, G. Swaminathan, V.R. Prabhakar |
| Data processing | J.W. Estes, Nithi Devi Saxena[1], M. Rita Grace, K. Chandrakala |

1. No longer in ICRISAT service.

# Contents


| | Page |
|---|---|
| Foreword | ii |
| Preface | iii |
| Acknowledgements | iv |
| Introduction | 1 |
| Germplasm Assembly in ICRISAT Gene Bank | 3 |
| Wild *Cicer* Species | 8 |
| Evaluation Details | 8 |
| Data Documentation | 9 |
| Seed Distribution | 9 |
| Climatological and Topographic Details | 11 |
| Chickpea Descriptors | 11 |
| Passport Information | 11 |
| 1. ICRISAT chickpea accession number | 11 |
| 2. Pedigree or identity | 11 |
| 3. Precise location of origin | 11 |
| 4. Province of origin | 12 |
| 5. Country of origin | 12 |
| 6. Source | 12 |
| 7. Accession identity synonyms | 12 |
| Characterization | 12 |
| 1. Flower color | 12 |
| 2. Stem color | 12 |
| 3. Growth habit | 13 |
| 4. Seed color | 14 |
| 5. Seed shape | 14 |
| 6. Seed surface | 15 |
| Preliminary evaluation | 15 |
| 1. Days to 50% flowering | 16 |
| 2. Flowering duration | 17 |
| 3. Plant canopy height | 18 |
| 4. Plant canopy width | 23 |
| 5. Days to maturity | 24 |
| 6. Branching pattern | 25 |
| 7. Number of pods per plant | 31 |
| 8. Number of seeds per pod | 32 |
| 9. Seed mass | 33 |
| 10. Seed yield estimate | 34 |
| Specialized evaluation | 34 |
| Seed protein content | 35 |
| Screening against diseases | 36 |
| Correlations | 38 |
| Analysis of Variance by Country of Origin | 39 |
| Selection of Accessions for Utilization | 45 |
| Genetic Stocks of Special Interest | 48 |
| I. Accessions with absolute resistance to fusarium wilt | 48 |
| II. Accessions with absolute resistance to dry root rot | 52 |
| IIIa. Accessions resistant to ascochyta blight in isolation plant propagator screening at ICRISAT Center | 56 |
| IIIb. Accessions resistant to ascochyta blight screened at ICARDA Center, Syria | 58 |
| IIIc. Accessions tolerant to ascochyta blight in isolation plant propagator screening at ICRISAT Center | 62 |
| IV. Accessions resistant to botrytis gray mold | 66 |
| V. Accessions promising against stunt under natural epiphytotic conditions at Hisar, India | 68 |
| VI. Accessions less susceptible to pod borer (*Heliothis armigera* Hub.) | 70 |
| VII. Accessions with erect growth habit | 72 |
| VIII. Accessions with two pods per mode (twin-podded) | 78 |
| IX. Multiseeded accessions | 86 |
| X. Accessions with heavy seeds | 90 |
| Format of a Seed Request Application | 94 |

# Introduction

A broad genetic resources base is the key to crop improvement and is an insurance against nature's vagaries. The term 'genetic resources' covers the various genotypes of a crop or animal as well as those of its close relatives. Cultivar development is most successful when it is based on several diverse genotypes. Until recently, only a few disease-resistant sources were known in chickpea (*Cicer arietinum* L.) and none was known for resistance to pod borer (*Heliothis armigera*). When a large number of accessions assembled at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) were systematically screened, several resistant accessions were identified. This demonstrates the importance of germplasm collection in relation to crop improvement.

Traditional chickpeas are being replaced by other crops in some areas, or substituted by new breeding lines that are often uniform. That is why local landraces should be collected and preserved with some urgency. The traditional cultivars may be low yielding, but they are reservoirs of useful characteristics. They may differ in reaction to diseases and pests, some lines being resistant or tolerant to certain races of pathogens. This is a fairly effective defence against serious epiphytotics. Traditional cultivars are mostly adapted to subsistance agricultural practices and low soil fertility, and their potential is often not fully realized.

Chickpea occupies the third largest crop area among food legumes and is cultivated in more than 41 countries. The countries with cultivated area greater than 3000 ha are depicted in Figure 1. Self-sufficiency in nitrogen requirement, ability to grow in drier conditions, short-duration, and nutrient rich seeds make it an important agricultural crop. Chickpea is extensively cultivated in India, Pakistan, Burma, Ethiopia, Mexico, Nepal, Bangladesh, and countries around the Mediterranean. When ICRISAT Center was established in 1972, it assumed responsibility to serve as a world repository for the germplasm of its mandate crops, chickpea being one of them.

The world germplasm collection of chickpea, maintained at ICRISAT Center, now contains more than 15 000 accessions from 41 countries (Tables 1 and 2). The number of accessions continually increases as samples are added by collections from India and other countries through expeditions and by correspondence. To assist breeders in making more effective use of the available germplasm, evaluation for various characters has been an ongoing activity since 1974 at ICRISAT Center, Patancheru, and at the Haryana Agricultural University fields at Hisar. Analyses of information obtained up to 1983 at ICRISAT Center is

**Table 1. Chickpea germplasm accessions from different countries, the area under the crop, and extent of representation in the ICRISAT gene bank (as of 31 December 1987).**

| Country | Country code[1] | No. of accessions | Chickpea area[2] ('000 ha) | Accessions ('000 ha)$^{-1}$ |
|---|---|---|---|---|
| Afghanistan | AFG | 686 | - | - |
| Algeria | DZA | 16 | 43 | 0.37 |
| Bangladesh | BGD | 166 | 54 | 3.07 |
| Bulgaria | BGR | 5 | - | - |
| Burma | BUR | 10 | 221 | 0.04 |
| Chile | CHL | 138 | 12 | 11.50 |
| Colombia | COL | 1 | 23 | 0.04 |
| Cyprus | CYP | 44 | 1 | 44.00 |
| Czechoslovakia | CZK | 8 | - | - |
| Egypt | EGY | 53 | 43 | 1.23 |
| Ethiopia | ETH | 921 | 135 | 6.82 |
| France | FRA | 1 | - | - |
| German Democratic Republic | DDR | 11 | - | - |
| Greece | GRC | 25 | 10 | 2.50 |
| Hungary | HUN | 4 | - | - |
| India | IND | 6 555 | 7225 | 0.91 |
| Iran | IRN | 4 729 | 42 | 112.60 |

*Continued.*

**Table 1.** *Continued*

| Country | Country code[1] | No. of accessions | Chickpea area[2] ('000 ha) | Accessions ('000 ha)[-1] |
|---|---|---|---|---|
| Iraq | IRQ | 18 | 15 | 1.20 |
| Israel | ISR | 48 | 2 | 24.00 |
| Italy | ITA | 41 | 10 | 4.10 |
| Jordan | JOR | 25 | - | - |
| Kenya | KEN | 1 | - | - |
| Lebanon | LBN | 19 | 2 | 9.50 |
| Malawi | MWI | 10 | 30 | 0.33 |
| Mexico | MEX | 395 | 180 | 2.19 |
| Morocco | MAR | 62 | 65 | 0.95 |
| Nepal | NPL | 80 | 72 | 1.11 |
| Nigeria | NGA | 3 | - | - |
| Pakistan | PAK | 153 | 893 | 0.17 |
| Peru | PER | 3 | 3 | 1.00 |
| Portugal | PRT | 4 | 28 | 0.14 |
| Spain | ESP | 115 | 94 | 1.22 |
| Sri Lanka | LKA | 3 | - | - |
| Sudan | SDN | 12 | 3 | 4.00 |
| Syria | SYR | 15 | 94 | 0.16 |
| Tanzania | TZA | 2 | 29 | 0.07 |
| Tunisia | TUN | 33 | 50 | 0.66 |
| Turkey | TUR | 448 | 210 | 2.13 |
| USA | USA | 86 | - | - |
| USSR | SUN | 115 | - | - |
| Yugoslavia | YUG | 3 | 2 | 1.50 |
| No Information | NOI | 179 | - | - |
| Total | | 15 246 | | |

1. Name abbreviated according to the United Nations Statistical Office.
2. Source: FAO Production Year Book 1983

summarized in this publication. The users of this catalog are cautioned therefore, to consider this fact when selecting accessions based on these data. The agronomic expression of the chickpea genotypes can vary substantially with the agroecological conditions. Short-duration chickpeas express better when raised at ICRISAT Center, whereas long-duration types perform better at Hisar. In this publication, data presented are from characterization evaluation carried out only at ICRISAT Center.

**Table 2. Chickpea germplasm accessions from Indian states, chickpea growing area, and extent of representation in the ICRISAT gene bank (as of 31 December 1987).**

| State | No. of accessions | Chickpea area[1] ('000 ha) | Accessions ('000 ha)[-1] |
|---|---|---|---|
| Andhra Pradesh | 82 | 49 | 1.67 |
| Assam | 1 | 3 | 0.33 |
| Bihar | 217 | 192 | 1.13 |
| Gujarat | 147 | 157 | 0.94 |
| Haryana | 303 | 509 | 0.60 |
| Himachal Pradesh | 98 | 4 | 24.50 |
| Jammu and Kashmir | 41 | 2 | 20.50 |
| Karnataka | 107 | 156 | 0.69 |
| Madhya Pradesh | 688 | 2157 | 0.32 |
| Maharashtra | 396 | 436 | 0.91 |
| Orissa | 45 | 36 | 1.25 |
| Punjab | 701 | 124 | 5.72 |
| Rajasthan | 298 | 1803 | 0.16 |
| Tamil Nadu | 86 | 8 | 10.75 |
| Uttar Pradesh | 1663 | 1509 | 1.10 |
| West Bengal | 108 | 73 | 1.48 |
| Others | 1574 | 2 | - |
| Total | 6555 | 7220 | 0.91 |

1. Source: Agricultural Situation in India 34(6): 466-68 (1984).

## Germplasm Assembly in ICRISAT Gene Bank

A large part of the chickpea material in the ICRISAT gene bank was obtained from institutions in India and abroad. All donors are listed in the catalog maintained at ICRISAT Center and their contribution is gratefully acknowledged. The list of major contributors is given in Table 3. The former Regional Pulse Improvement Program (RPIP), a joint research effort of Indian Agricultural Research Institute (IARI), United States Agency for International Development (USAID) United States Department of Agriculture (USDA), and Karaj Agricultural University in Iran, assembled large collections of various pulses between 1964 and 1970. These collections were assembled by obtaining the germplasm collections of Indian and other agricultural institutions, and by an extensive collection effort. Germplasm samples from RPIP were identified with 'P' numbers. When RPIP was phased out in 1970, sets of this collection remained at the institutions mentioned above and at some other Indian Universities. After ICRISAT came into existence in 1972 and assumed responsibility as a world repository for genetic resources of chickpea, various institutions holding chickpea germplasm donated their collections to ICRISAT. Field collections by ICRISAT scientists from priority areas, such as Ethiopia, Afghanistan, Nepal, Bangladesh, Morocco, and some states in India have added 2202 accessions to the gene bank (Table 4). The countrywise area under the chickpea crop and representation in the ICRISAT gene bank are indicated in Figure 1.

The germplasm samples had various acronyms or codes (Table 5). We have attempted to trace the explanations or decode these with the help of chickpea research workers. The accessions are identified by these codes under 'pedigree or identity' and 'accession identity synonym' descriptors.

**Table 3. List of organizations that donated considerable numbers of chickpea germplasm accessions to ICRISAT.**

| | |
|---|---|
| **Within India** | |
| ARS | Agricultural Research Station, Niphad, Maharashtra |
| CSAUAT | Chandra Shekhar Azad University of Agriculture and Technology, Kanpur |
| GBPUAT | Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Nainital |
| HAU | Haryana Agricultural University, Hisar |
| IARI | Indian Agricultural Research Institute, New Delhi |
| JNKV | |
| JNKVV | Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur |
| NIPM | Agricultural Research Station, Niphad, Maharashtra |
| PAU | Punjab Agricultural University, Ludhiana |
| TNAU | Tamil Nadu Agricultural University, Coimbatore |
| **Outside India** | |
| ALAD | Arid Land Agriculture Development Program, Beirut, Lebanon |
| ARIE | Agricultural Research Institute, Eskisehir, Turkey |
| DZ-ARC | Debre Zeit Agricultural Research Center, Ethiopia |
| ICRD | |
| ICARDA | International Center for Agricultural Research in the Dry Areas, Aleppo, Syria |
| INIA | Instituto Nacional de Investigaciones Agricolas, Mexico City, Mexico |
| LPES | La Platina Experiment Station, INIA, Santiago, Chile |
| RARI | Regional Agricultural Research Institute, Izmir, Turkey |
| REHOVOT[1] | Hebrew University of Jerusalem, Rehovot, Israel |
| USDA ARS | United States Department of Agriculture, Agricultural Research Station, Pullman, Washington, USA |

1. Mainly wild *Cicer* species.

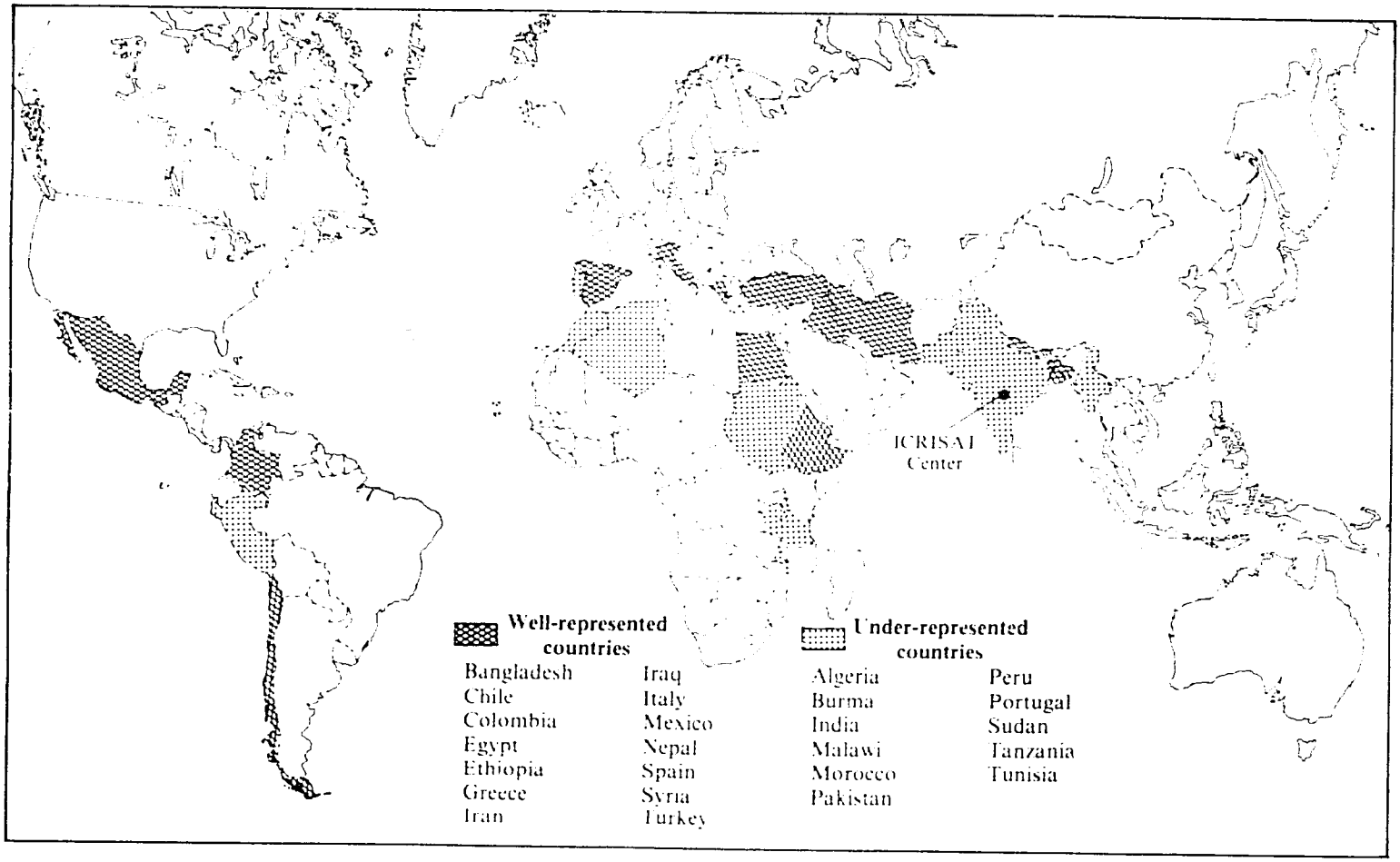



**Figure 1. Chickpea-growing regions of the world, indicating countries growing more than 3000 ha; and those with satisfactory (one accession per thousand ha) representation in ICRISAT gene bank. The location of ICRISAT Center where accessions are evaluated and conserved is indicated.**

**Table 4. Chickpea germplasm collections made by ICRISAT scientists up to 31 December 1987.**

| Year | Country (State) | No. of seed samples | Remarks |
|---|---|---|---|
| 1975 | Afghanistan | 22 | Wild *Cicer* species |
| | Pakistan | 30 | Desi, long-duration |
| | Turkey | 25 | Chickpea and wild *Cicer* |
| | India (West Bengal) | 115 | Desi, medium-duration |
| 1976 | Afghanistan | 13 | Chickpea and wild *Cicer* |
| | India (Rajasthan) | 131 | Desi, long-duration |
| 1977 | Afghanistan | 13 | Desi and kabuli |
| | Turkey, | 4 | Chickpea and wild *Cicer* |
| | India (northern Karnataka) | 84 | Desi, short-duration |
| | India (Gujarat) | 111 | Desi, short-duration |
| | India (Uttar Pradesh) | 15 | Desi, medium-duration |
| 1978 | Pakistan | 10 | Desi, long-duration |
| | India (Maharashtra, Gujarat and Karnataka) | 40 | Desi, short-duration |
| | India (Gujarat and Rajasthan) | 21 | Desi short- and medium-duration |
| 1979 | Bangladesh | 32 | Desi, medium-duration |
| | Nepal (central and eastern) | 45 | Desi, long-duration |
| | India (central Uttar Pradesh) | 53 | Desi, medium-duration |
| | India (Himachal Pradesh) | 104 | Desi, long-duration |
| 1980 | Burma | 4 | Desi, short-duration |
| | Nepal (western) | 85 | Desi, long-duration |
| | India (Punjab) | 146 | Desi, long-duration |
| | India (central Uttar Pradesh) | 15 | Desi, medium-duration |
| 1982 | Ethiopia (central region) | 210 | All types, short-duration |
| | India (Jammu) | 41 | Desi, long-duration |

*Continued.*

**Table** *Continued*

| Year | Country (State) | No. of seed samples | Remarks |
|---|---|---|---|
| 1983 | India (Haryana) | 47 | Desi, long-duration |
| 1984 | Ethiopia (eastern and southern regions) | 104 | All types, short-duration |
| 1985 | Bangladesh | 133 | Desi, medium-duration |
| | India (Tamil Nadu) | 73 | Desi, short-duration |
| 1986 | India (Madhya Pradesh) | 197 | Desi, medium- and short-duration |
| 1987 | Morocco | 122 | Kabuli, long-duration |
| | India (Madhya Pradesh) | 157 | Desi, medium- and short-duration |

**Table 5 Acronyms used in the passport information and their explanations.**

| Code | Explanation |
|---|---|
| A | Abohar (Punjab) |
| A ARNJ | Agricultural Research Station, Arnej (Gujarat) |
| ADT | Adhartal (Madhya Pradesh) |
| AKA | A.K. Auckland (ICRISAT) |
| ANM | N.M. Anishetty (ICRISAT, now IBPGR) |
| APAU | Andhra Pradesh Agricultural University, Rajendranagar (India) |
| ARS | Agricultural Research Station |
| B BERH | Pulses Research Station, Berhampore (West Bengal) |
| BDNG | Badnapur Gram |
| BC BEG | Bengal gram (IARI, New Delhi) |
| BR | Bihar |
| BGS | Bengal gram selection |
| BJ BIJA | Bijapur (Karnataka) |
| BN BDN | Badnapur (Maharashtra) |
| BN WR | Badnapur wilt resistant |

*Continued.*

Table 5. *Continued*

| Code | Explanation |
|---|---|
| BRIS | Department of Primary Industries, Brisbane (Australia) |
| C | Cross, collection, Cawnpore (Kanpur) |
| CALI | California (USA) |
| CDBA | Cordoba (USA) |
| CELA | Centro de Investigaciones Agricolas dele Bajio, Celeya, Guanajuato, (Mexico) |
| CLLG | C.L.L. Gowda |
| CM | Chickpea mutant |
| CO | Coimbatore (Tamil Nadu) |
| COG | Coimbatore Gram |
| CP | Central Province (earlier administrative unit of India) |
| CP(USA) | Chickpea (USA) |
| CPI | Commonwealth Plant Introduction (Australia) |
| CPS | Chickpea selection |
| CRIC | (Regional) Crgp Research and Introduction Center, Menemen, Izmir, Turkey (now Ege Zirai Arastirma Enstitusu, Aegean Agricultural Research Institute) |
| CULN | Encoregado Programa de Garbanzo, Culiacan, Sinaloa (Mexico) |
| DBB | Desi bold brown (Madhya Pradesh) |
| DJA | D.J. Andrews |
| DZ | Debre Zeit (Ethiopia) |
| EC | Exotic collection, sources outside India, Division of Plant Introduction, IARI (now National Bureau of Plant Genetic Resources) |
| F | Ferozpur, Faridkot (Punjab) |
| FAO | Food and Agricultural Organization of the United Nations |
| FC | Field collection |
| FG | Faridkot gram (Punjab) |
| G | Gram Gurdaspur (Punjab) |
| GA | Garbanzo |
| GAT | Gatersleben (German Democratic Republic) |
| GBS | Gulbarga selection |

*Continued.*

Table 5. *Continued*

| Code | Explanation |
|---|---|
| GC | Gram cross |
| GF | Gram Faridkot (Punjab) |
| GG | Gram Gurdaspur (Punjab) |
| GL | Gram Ludhiana (Punjab) |
| GNG | Ganganagar gram (Rajasthan) |
| GP | Garbanzo porquero (Mexico) |
| GS | Gram selection |
| H | Hisar (Haryana) |
| HD | H. Doggett (ICRISAT) |
| HMS | Hisar multi-seeded (Haryana) |
| HY | Hyderabad (Andhra Pradesh) |
| HYB | Hybrid |
| IARI BI | Indian Agricultural Research Institute |
| IC | Indigenous collection, source within India, Division of Plant Introduction, IARI (now National Bureau of Plant Genetic Resources) |
| ICAR | Indian Council of Agricultural Research, New Delhi |
| ICCC | ICRISAT chickpea cultivar |
| ICCL | ICRISAT chickpea line (strain) |
| IDHO | University of Idaho (USA) |
| IDRC | International Development Research Centre (Canada) |
| IG | Indore (West Bengal) |
| ILC | International legume chickpea accession number |
| INIA | Instituto Nacional de Investigaciones Agronomicas (Mexico) |
| IW | Indigenous wild |
| IZM | A.R.A. Research Institute, Izmir (Turkey) |
| JAIP | Jaipur (Rajasthan) |
| JG | Jawahar gram, Jabalpur gram (Madhya Pradesh) |
| JGC | Jabalpur gram Chhindwara (Madhya Pradesh) |
| JM | L.J.G. van der Maesen (ICRISAT, now Wageningen) |
| KARJ | Karaj (Iran) |
| K KANPK | Kanpur (Uttar Pradesh) |

*Continued.*

**Table 5.** *Continued*

| Code | Explanation |
|---|---|
| KWR | Kanpur wilt resistant (Uttar Pradesh) |
| L | Ludhiana (Punjab) |
| LAT | S.S. Lateef (ICRISAT) |
| LJR | L.J. Reddy (ICRISAT) |
| M | Mutation |
| MOHL | Mohol (Maharashtra) |
| MPKV | Mahatma Phule Krishi Vidyapeeth, Rahuri (Maharashtra) |
| MS DP | Multiseeded double poddeed |
| N | Niphad (Maharashtra) |
| NAGP | Nagpur (Maharashtra) |
| NAYA | Nayagarh (Orissa) |
| NBGR<br>NBPGR | National Bureau of Plant Genetic Resources, New Delhi |
| NEC | Near East chickpea |
| NKR | N. Kameswara Rao (ICRISAT) |
| NO | Number |
| NP | New Pusa (IARI, New Delhi) |
| PANT G | Pantnagar gram (Uttar Pradesh) |
| PARB | Parbhani (Maharashta) |
| PB | Punjab |
| PBNG | Parbhani Gram (Maharashtra) |
| PCH | Pois chiche |
| PG | Phule gram, Rahuri (Maharashtra) |
| PI | Plant introduction (USA) |
| PLGR | Public law 480 gram |
| PP | Plant pathology |
| PR | P. Remanandan (ICRISAT) |
| PRN | P. Remanandan, E.C.K. Nguigi |
| PRR | Porquero Resistante a Rabia |
| PYT | Preliminary yield trial |

*Continued.*

**Table 5.** *Continued*

| Code | Explanation |
|---|---|
| RAD | R.P.S. Pundir, Abebe Demisse |
| RAI | Agricultural Research Station, Raichur (Karnataka) |
| RAM | R.P.S. Pundir, Abebe Tulu, Mahteme Hail Giorgis |
| RAP | C. Rajagopal Reddy, V.A. Amalraj, K.E. Prasada Rao |
| RAUP | Rajendra Agricultural University Pulses (Bihar) |
| RBA | R.P.S. Pundir, Brook Abebe |
| RBH | R.P.S. Pundir, Bilayat Hussain Sikder |
| RC | R.P.S. Pundir, C.K. Rajagopalan |
| REHO<br>REHOVOT | Hebrew University of Jerusalem, Rehovot (Israel) |
| REA | R.P.S. Pundir, Fassil Kebebew, Asfaw Telaye |
| REG | R.P.S. Pundir, Fassil Kebebew, Geletu Bejiga |
| RG | Rahuri gram (Maharashtra) |
| RHUR | Rahuri Gram (Maharashtra) |
| RJ | R.P.S. Pundir, Jagdish Singh |
| RPIP P | RPIP, Regional Pulse Improvement Program |
| RPSP | R.P.S. Pundir (ICRISAT) |
| RS | Rajasthan selection |
| RSB | R.P.S. Pundir, S.W. Telang, Bhag Singh |
| RSG | Rajasthan selection gram |
| RSW | R.P.S. Pundir, S.W. Telang |
| SAD | P.K. Sabale, S. Appa Rao, I.R. Denton |
| SAR | S. Appa Rao (ICRISAT) |
| SSEL | Selection |
| SEEG | C.P.J. Seegler |
| SITM | S. Sithanantham (ICRISAT) |
| SKUA | Shere Kashmir University of Agricultural Sciences and Technology, Srinagar (India) |
| SPII | Seed and Plant Improvement Institute, Karaj (Iran) |
| T | Type, breeding products from Kanpur, Uttar Pradesh. Also designation of plant type, in the earliest classificataon of cultivars in India at Pusa, Bihar (India) |

*Continued.*

**Table 5.** *Continued*

| Code | Explanation |
|---|---|
| V | Variety |
| VRR | V. Ramanatha Rao (ICRISAT) |
| WAGG | Agricultural Research institute, Wagga Wagga (Australia) |
| WF | White flower |
| WIR/VIR | N.I. Vavilov Institute of Plant Industry, Leningrad (USSR) |
| WP | E. Westphal |

The meaning of the codes AF, AL, ANO, AYT, BA, B.CH, CIC, CPEB, FAAU, CPO, D, DW, E, GN, GNR, GR, G1, HP, I, ICP, IM, IP, JPJ, KC, KE, KW, NMO, NPD, NPG, PBR, PD, PI, PL GR, PLM GR, PLS, PR, PRH, PNT, RIH, RO, PR, S, SP, S[illegible]ST, S[illegible]R, TT, U, V (Mexico), WT, Y, is not clearly know... We invite readers to inform us if they have any information.

## Wild *Cicer* Species

Accessions of 16 of the 40 known wild species are available in the ICRISAT gene bank. They include the eight annual species and eight perennial species. Fifty-four samples have been assembled from Afghanistan, Ethiopia, India, Israel, Lebanon, and Turkey. Some of these wild species have several traits of economic importance which can possibly be utilized in chickpea improvement programs. For example, *Cicer cuneatum*, a wild annual species (origin: Ethiopia), has profuse growth, large pods, multiple seeds, and is free from wilt, dry root rot, and collar rot diseases (Plate 1). We are able to grow the annual species with good agronomic care and by providing extra light to plants to hasten initiation of flowering. Limited seeds of these annual wild species can be spared for research workers. The perennial species do not grow easily at ICRISAT Center. We are experimenting with different cultural practices to produce seeds of perennial species under controlled environmental conditions. The following wild species are available from the ICRISAT gene bank.

**Annual species** (seed and herbarium)

*C. bijugum* K.H. Rech.
*C. chorassanicum* (Bge) M. pop.
*C. cuneatum* Hochst. ex Rich
*C. echinospermum* P.H. Davis
*C. judaicum* Boiss.
*C. pinnatifidum* Jaub. et Sp.
*C. reticulatum* Ladizinsky
*C. yamashitae* Kitam.

**Perennial species** (herbarium material)

*C. anatolicum* Alef.
*C. floribundum* Fenzl.
*C. isauricum* P.H. Davis
*C. microphyllum* Benth.
*C. montbretii* Jaub. et Sp.
*C. pungens* Boiss.
*C. rechingeri* Podlech
*C. graecum* Orph.

## Evaluation Details

The chickpea accessions were sown around the fourth week of October at Patancheru. Each accession was sown on a 4-m long ridge (60 cm apart), with 10 cm spacing between plants. Three control cultivars, one each of desi short-, desi long-, and kabuli medium-duration types were sown in a block of 30 accessions. Fertilizer at the rate of about 20 kg N and 60 kg P $ha^{-1}$ was applied just before sowing. Irrigation was applied as necessary including one application to ensure seed germination (Table 6).

Observations on flower color were recorded in the morning hours because the color may fade later in the day. The ventral surface color of the vexillum in the freshly opened flowers was noted. Stem color and

**Table 6. Sowing dates, rainfall, and irrigations given to chickpea evaluations at ICRISAT Center.**

| Year | Sowing dates | Rainfall: During crop season (mm) | Rainfall: Annual (mm) | Irrigations |
|---|---|---|---|---|
| 1974 | 8- 9 Nov | 36 | 869 | 2 |
| 1975 | 13 Nov | 16 | 1104 | 2 |
| 1976 | 17 Oct | 30 | 823 | 1 |
| 1977 | 12 Oct | 80 | 618 | 0 |
| 1978 | 17-18 Oct | 52 | 1202 | 2 |
| 1979 | 30-31 Oct | 84 | 833 | 0 |
| 1980 | 21 Oct | 18 | 773 | 4 |
| 1981 | 23-24 Oct | 13 | 1172 | 1 |
| 1982 | 26-28 Oct | 18 | 740 | 1 |

growth habit were recorded at the pod-filling stage. The data on quantitative characters: plant canopy height, pod number and branches, etc., were based on three representative plants from each accession from 1974/75 to 1981/82. From 1982/83 onwards these quantitative characters were recorded on five plants. The observations on seeds were made from the dry mature seeds that had been stored for less than 3 months.

The accessions were evaluated by pulse pathologists for wilt and dry root rot resistance in fields under artificial epiphytotic conditions and in laboratories at ICRISAT Center. Foliar diseases, ascochyta blight, and botrytis gray mold do not occur at ICRISAT Center, so the evaluation for these diseases was carried out in greenhouses at ICRISAT Center, and in fields at Hisar and Pantnagar with augmented epiphytotics. Accessions resistant to various diseases are listed on pages 48-69, together with details of their passport information and evaluations.

Pod borer (*Heliothis armigera* Hubn.) is the most damaging field pest of chickpea. Replicated tests by pulse entomologists in the ICRISAT pesticide-free area indicated that some lines were consistently tolerant to pod borer. Accessions with low susceptibility to pod borer are listed on pages 70-71.

Whole-seed protein content was anaysed by biochemists, using the Dye Binding Capacity and Technicon Autoanalyser methods. Both methods showed a high positive correlation with the Micro-Kjeldahl method. Though the protein values tend to fluctuate with season and location, the high-protein accessions observed are listed on page 35.

Accessions with such specific characters as erect growth habit, twin podding, multiseeding, and large seeds are given on pages 72-93.

## Data Documentation

Passport and evaluation data are computerized using a VAX 11/780. Data are maintained under the ICRISAT Data Management and Retrieval System (IDMRS). These two files can be joined when necessary, and accessions with any combination of characters with or without passport information, can be retrieved. Data were analysed by computer using the GENSTAT statistical package.

## Seed Distribution

The world germplasm of chickpea assembled in ICRISAT gene bank is the largest in any one place. One of the responsibilities of this gene bank is to supply seeds of ICRISAT mandate crops to any research worker in the world. In the gene bank, it is possible to stock only a limited quantity of seed (maximum 350 g) of each individual accession. Sun-dried seeds (moisture 5-7%) are kept in aluminum cans and stored in medium-term cold rooms (4°C, 20% RH). Care is taken to produce fresh seeds before the seed viability of any accession can decline below 85%.

We generally supply about 100 seeds of each requested accession at a time, because of the limited stock available as well to reduce growout generations to minimize possible genetic drift in the accession.

**Table 7. Average monthly climatic data for ICRISAT Center, 1974 to 1983.**

| Date | Temperature Max. (°C) | Temperature Min. (°C) | Relative humidity 0717h (%) | Relative humidity 1417h (%) | Daily pan evaporation (mm) | Daily sunshine (h) |
|---|---|---|---|---|---|---|
| Oct 74 | 28.5 | 20.9 | 97 | 62 | 3.7 | 6.2 |
| 75 | 29.0 | 21.0 | 97 | 67 | 3.9 | 3.8 |
| 76 | 37.3 | 19.9 | 77 | 36 | 6.2 | 8.1 |
| 77 | 30.8 | 19.7 | 85 | 44 | 5.2 | 8.7 |
| 78 | 30.5 | 19.7 | 88 | 48 | 5.2 | 9.0 |
| 79 | 31.0 | 20.5 | 84 | 46 | 5.3 | 7.5 |
| 80 | 32.0 | 18.3 | 78 | 32 | 6.0 | 9.4 |
| 81 | 29.9 | 19.8 | 88 | 53 | 4.2 | 7.4 |
| 82 | 30.3 | 19.8 | 89 | 50 | 4.8 | 8.3 |
| 83 | 28.9 | 20.1 | 90 | 59 | 4.0 | - |
| Nov 74 | 28.0 | 12.9 | 88 | 38 | 4.8 | 9.9 |
| 75 | 27.1 | 14.2 | 92 | 43 | 4.3 | 8.7 |
| 76 | 29.2 | 18.8 | 87 | 49 | 4.3 | 7.5 |
| 77 | 29.0 | 20.5 | 87 | 49 | 4.5 | 6.8 |
| 78 | 29.2 | 18.6 | 86 | 49 | 4.3 | 8.2 |
| 79 | 28.8 | 19.4 | 91 | 55 | 4.1 | 7.6 |
| 80 | 29.8 | 16.4 | 78 | 35 | 5.5 | 8.8 |
| 81 | 28.3 | 15.0 | 82 | 40 | 4.5 | 9.0 |
| 82 | 28.5 | 17.3 | 91 | 49 | 4.3 | 8.1 |
| 83 | 27.7 | 13.8 | 82 | 38 | 4.5 | 9.8 |
| Dec 74 | 28.2 | 8.2 | 88 | 33 | 4.4 | 10.2 |
| 75 | 24.8 | 8.1 | 89 | 30 | 4.7 | 10.0 |
| 76 | 28.7 | 15.3 | 86 | 32 | 4.8 | 9.4 |
| 77 | 28.1 | 13.9 | 83 | 34 | 4.7 | 10.0 |
| 78 | 27.2 | 15.2 | 81 | 39 | 4.7 | 8.8 |
| 79 | 27.8 | 14.9 | 85 | 38 | 4.4 | 9.6 |
| 80 | 28.4 | 13.8 | 77 | 30 | 5.4 | 8.8 |
| 81 | 26.9 | 13.9 | 84 | 41 | 4.6 | 9.0 |
| 82 | 28.2 | 13.2 | 92 | 40 | 4.8 | 9.4 |
| 83 | 26.3 | 14.2 | 89 | 47 | 4.0 | 8.2 |

| Date | Temperature Max. (°C) | Temperature Min. (°C) | Relative humidity 0717h (%) | Relative humidity 1417h (%) | Daily pan evaporation (mm) | Daily sunshine (h) |
|---|---|---|---|---|---|---|
| Jan 75 | 28.0 | 12.9 | 85 | 31 | 5.2 | 9.9 |
| 76 | 26.1 | 11.2 | 86 | 36 | 4.8 | 10.3 |
| 77 | 29.2 | 13.8 | 74 | 26 | 5.6 | 10.6 |
| 78 | 28.2 | 16.0 | 82 | 37 | 5.0 | 8.8 |
| 79 | 28.8 | 16.4 | 86 | 36 | 5.5 | 9.5 |
| 80 | 28.9 | 15.0 | 80 | 34 | 5.4 | 9.9 |
| 81 | 27.0 | 14.1 | 81 | 38 | 5.0 | 8.8 |
| 82 | 28.5 | 15.6 | 88 | 39 | 5.4 | 9.2 |
| 83 | 28.8 | 13.1 | 86 | 33 | 5.5 | 10.0 |
| Feb 75 | 31.2 | 17.0 | 85 | 36 | 6.1 | 9.7 |
| 76 | 30.6 | 13.6 | 76 | 23 | 6.9 | 10.5 |
| 77 | 30.9 | 16.3 | 72 | 26 | 6.9 | 10.0 |
| 78 | 29.6 | 17.8 | 79 | 33 | 6.4 | 9.8 |
| 79 | 30.1 | 18.7 | 82 | 41 | 6.0 | 8.8 |
| 80 | 32.4 | 17.9 | 69 | 33 | 7.2 | 9.6 |
| 81 | 32.5 | 15.8 | 61 | 19 | 8.1 | 10.7 |
| 82 | 32.0 | 18.4 | 73 | 32 | 7.1 | 9.9 |
| 83 | 32.3 | 17.0 | 75 | 27 | 6.8 | 10.1 |
| Mar 75 | 34.8 | 18.7 | 69 | 26 | 8.4 | 8.7 |
| 76 | 35.8 | 18.8 | 56 | 17 | 9.1 | 9.3 |
| 77 | 35.5 | 20.2 | 66 | 22 | 9.6 | 9.5 |
| 78 | 34.4 | 19.7 | 60 | 32 | 10.3 | 9.6 |
| 79 | 34.6 | 19.0 | 59 | 21 | 9.4 | 9.5 |
| 80 | 35.4 | 20.0 | 66 | 31 | 9.4 | 9.4 |
| 81 | 33.6 | 19.8 | 70 | 27 | 9.3 | 9.6 |
| 82 | 35.0 | 20.9 | 69 | 27 | 9.2 | 10.1 |
| 83 | 36.5 | 19.9 | 61 | 22 | 9.8 | 10.3 |

Seeds can either be indented with ICRISAT chickpea accesion (ICC) numbers or the choice of accessions can be left to gene bank staff. If the second option is followed, the indenter may write characters that are desired in the germplasm. A seed import pemit, if needed, should be sent along with the request. To facilitate the supply process, indenters are requested to use the format given on page 94. Seed indents should be forwarded to the gene bank at least four weeks before the seeds are needed. Requests from abroad may require four more weeks to complete plant quarantine examination by the Government of India and issuance of a phytosanitary certificate. ICRISAT germplasm seeds are sent with relevant passport data. On special request, characterization data can also be supplied.

## Climatological and Topographic Details

Most of the evaluations were done at ICRISAT Center, located at 18° N, 78° E near Patancheru village, Andhra Pradesh, 26 km northwest of Hyderabad (Fig. 1). Chickpeas were sown during the postrainy season in October or November and harvested in February or March. The climatological data at ICRISAT Center during the chickpea season are provided in Table 7.

Vertisol (black soil) fields were used to evaluate chickpea germplasm. The soils belong to an association of Vertisols and Inceptisols. The top soil is 40-60% clay of montmorillonite type; deep cracks appear on drying and contribute to curtailing the chickpea season by moisture loss in the topsoil and severance of the plant roots. The soil pH ranges from 7.0 to 8.5

## Chickpea Descriptors

Every chickpea accession in the ICRISAT gene bank is described by 32 characteristics. This information has been grouped into four categories: passport information, characterization, preliminary evaluation, and specialized evaluation. Although the characterization was conducted before the 'Chickpea Descriptors' (IBPGR, ICARDA, and ICRISAT. 1985. Chickpea Descriptors. IBPGR Secretariat, Rome.) publication was finalized, the basic concept and description of characters were similar and compatible.

### Passport Information

This section lists data recorded at the time of collection of an accession together with identifying names. The scientist collecting the material records most of these decriptors. While registering the material in the gene bank, the accession number is assigned. We have recorded the following under passport information.

**1. ICRISAT chickpea accession number.** An accession number is assigned when a sample is registered in the gene bank. This is preceded by the acronym ICC which stands for 'ICRISAT Chickpea'. This is a unique and permanent identifier for each accession (e.g. ICC 5 is unique to that accession). Once assigned, this number will never be assigned to another sample. When an entry is lost, its ICC number is not re-used, and every effort is made to replace a lost accession by an identical one or a portion of the original sample from somewhere else.

**2. Pedigree or identity.** This is an original code number, or the number assigned by the collector or the institute that donated the sample (e.g. RPSP 552). For a line which has been developed by hybridization, mutation or selection technique, the information on parent(s) involved is also given. There are several codes related with this information, their explanations (to the authors' best knowledge) are given below.

**3. Precise location of origin.** This is name of the village, district, or exact distance and direction from a known place from which the sample was obtained. For most of the accessions assembled in the ICRISAT gene bank this information is not known. However, this information is com-

plete for all the accessions collected by ICRISAT scientists to date (e.g. Meemkheri Azamgarh).

**4. Province of origin.** This is the name of the administrative unit immediately below that of country. For example in India, the state's name is referred to in this descriptor (e.g. Haryana).

**5. Country of origin.** This provides information by code on the country of origin of an accession, not the name of the dispatcher. The country names are abbreviated in three letter codes according to the Statistical Office of the United Nations. Codes and full name of the countries where chickpea is grown are given on pages 1-2.

**6. Source.** This is the name of the institute from which samples were obtained. Codes and full names of institutes that have donated a considerable number of germplasm samples to ICRISAT and other cooperating institutions are given in Table 3.

**7. Accession identity synonyms.** An accession might be known by additional identity names. Most of these have codes. The possible explanations of these codes are similar to those given in Section 2 above. All the synonym names and additional identifying numbers and codes are on computer at ICRISAT and constitute a dynamic germplasm data base that is referable and retrievable.

Detailed passport information on all of the germplasm accessions is given in the companion volume ICRISAT Chickpea Catalog: Passport Information.

## Characterization

The section relates to diagnostic characteristics that are expressed in almost all environments. These characters can easily be scored in discrete classes by visual observation.

**1. Flower Color [FCOL].** Flower color was recorded from the ventral surface of the vexillum of the freshly opened flower. In most cases pink and blue flowers had veins of a darker shade in the vexillum while the tip of the keel was also darker. The flower color classes, code used, and a summary of their statistics are given in Table 8. The variability in flower shape, size, and color is exhibited in Plate 2.

**Table 8. Flower colors of chickpea accessions and their frequency in the germplasm collection (accessions scored = 12 018).**

| Color | Code | Royal Horticultural Society colour chart equivalent | No. of accessions | Frequency (%) |
|---|---|---|---|---|
| Blue | B | Violet-blue 97B | 46 | 0.38 |
| Light blue | LB | Violet-blue 97C | 4 | 0.03 |
| Pink | P | Red-purple 63D | 8315 | 69.19 |
| Dark pink | DP | Red-purple 64D | 56 | 0.47 |
| Light pink | LP | Red-purple 69C | 1041 | 8.66 |
| Very light pink | VLP | Violet-blue 97D | 10 | 0.08 |
| White | W | White 155D | 2533 | 21.08 |
| White, pink striped | WPS | Variegatoroseus | 13 | 0.11 |

**2. Stem Color [STCOL].** Anthocyanin pigments impart a purplish color to different parts of the plant. Mediterranean chickpeas have no anthocyanin and their foliage is green, while most desi chickpeas contain varying degrees of anthocyanin (Plate 3 and Table 9). The stem pigmenta-

**Table 9. Summary of statistics on stem color (accessions scored = 8 030).**

| Stem color | No. of accessions | Frequency (%) |
|---|---|---|
| High anthocyanin (HA) | 32 | 0.40 |
| Low anthocyanin (LA) | 5053 | 62.93 |
| No anthocyanin (NA) | 2945 | 36.67 |

tion was categorized into three classes namely, high, low, and no anthocyanin (HA, LA and NA, respectively), as observed at the pod-filling stage.

**3. Growth Habit [GRHB].** This was also noted at the pod-filling stage. The angle of the branches from the vertical axis was taken as the basis on which to group the accessions into erect, semi-erect, semi-spreading, and spreading growth habit classes (erect: 0-15° from vertical; semi-erect: 15-25° from vertical; semi-spreading: 25-60° from vertical; and spreading: 60-80° from vertical). Exceptionally, the branches of one accession (ICC 5434) lie on the ground and this characteristic is termed as prostrate growth habit (Fig. 2, Plate 4, and Table 10).

**Table 10. Summary of statistics on growth habit (accessions scored = 12 018).**

| Descriptor state | No. of accessions | Frequency (%) |
|---|---|---|
| Erect (E) | 86 | 0.72 |
| Semi-erect (SE) | 7650 | 63.65 |
| Semi-spreading (SS) | 4237 | 35.26 |
| Spreading (S) | 44 | 0.36 |
| Prostrate (P) | 1 | 0.01 |

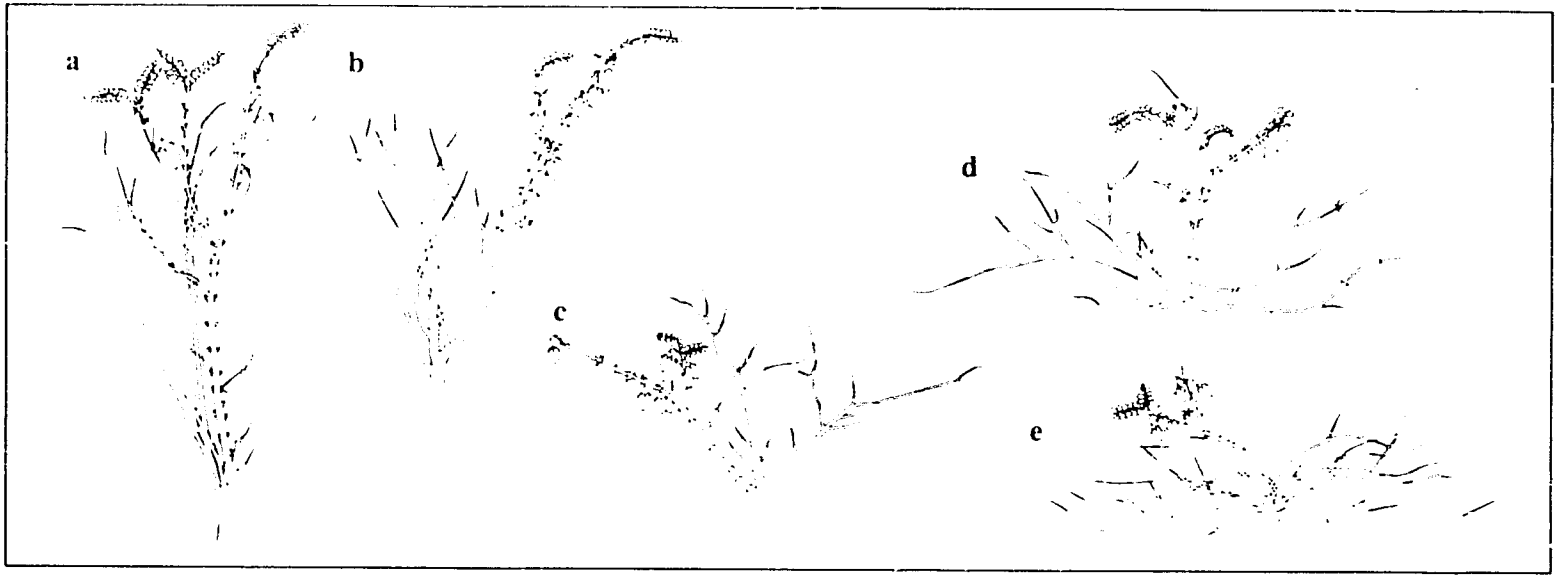



**Figure 2. Growth patterns in chickpea plants: a. erect (ICC 8923); b. semi-erect (ICC 5003); c. semispreading (ICC 552); d. spreading (ICC 11888); and e. prostrate (ICC 5434).**

**4. Seed Color [SCOL].** Seed color was recorded from mature seeds that had been stored for less than three months. Seed colors were expressed in popular familiar terms. The code used, the precise equivalents (according to the Royal Horticultural Society, London, Colour Chart) and frequencies are given in Table 11.

Accessions having seed colors brown beige, beige, yellow beige, or ivory; seeds of owl's head or pea shape; and white flowers are called 'kabuli' (Mediterranean type). Accessions with light seed colors, angular seed shape, and light pink flowers are called 'intermediate' types, and the remainder are commonly known as 'desi' types.

**Table 11. Seed colors of chickpea accessions and their frequency in the germplasm collection. (accessions scored = 11 985)**

| Color | Code | Royal Horticultural Society colour chart equivalent | No. of accessions | Frequency (%) |
|---|---|---|---|---|
| Black | BL | Black 202 A, B | 1279 | 10.68 |
| Brown | B | Greyed orange 177B | 2684 | 22.41 |
| Light Brown | LB | Greyed orange 177C | 1026 | 8.57 |
| Dark Brown | DB | Greyed orange 177A | 398 | 3.32 |
| Reddish Brown | RB | Greyed orange 166C | 41 | 0.34 |
| Grayish Brown | GB | Brown 200D | 54 | 0.45 |
| Salmon Brown | SB | Greyed orange 165C | 72 | 0.60 |
| Orange Brown | OB | Greyed orange 177B | 55 | 0.46 |
| Gray | GR | Greyed green 196A | 11 | 0.09 |
| Brown Beige | BB | Greyed orange 173D | 610 | 5.09 |
| Beige | BE | Greyed orange 165D | 2277 | 19.00 |
| Yellow | Y | Greyed orange 164B | 1412 | 11.79 |
| Light Yellow | LY | Greyed orange 164C | 177 | 1.48 |
| Yellow Brown | YB | Greyed orange 165C | 1519 | 12.69 |
| Orange Yellow | OY | Greyed orange 168D | 4 | 0.03 |
| Orange | O | Greyed orange 168C | 86 | 0.72 |
| Yellow Beige | YE | Orange white 159B | 92 | 0.77 |
| Ivory | I | Orange white 159C | 16 | 0.13 |
| Green | G | Greyed green 191A | 104 | 0.87 |
| Light Green | LG | Greyed green 193B | 24 | 0.20 |
| Brownish Red | BR | Greyed orange 165B | 1 | 0.01 |
| Variegated | M | - | 9 | 0.08 |
| Black Brown mosaic | BM | Black 202A, Greyed orange 177B | 7 | 0.06 |
| Light Orange | LO | Greyed orange 165C | 27 | 0.23 |

**5. Seed Shape [SSH].** Observations were made from dry, mature seeds and were classified into three groups: ram's head shape or angular, owl's head shape, and roundish or pea seed shape (Fig. 3 and Table 12).

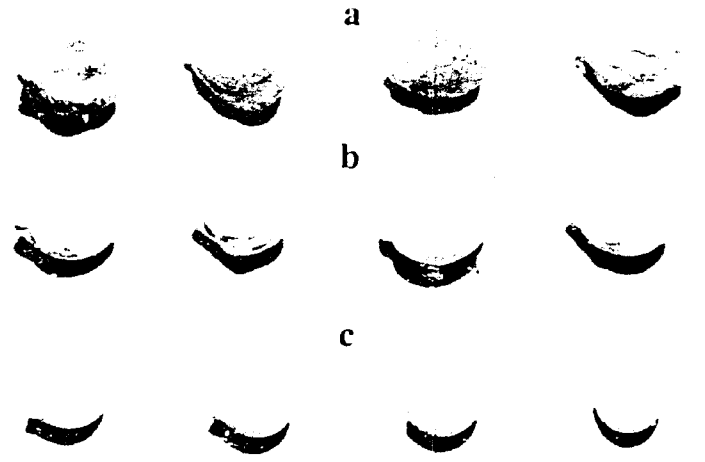



**Figure 3. Seed shapes of chickpea: a. angular (ICC 10301); b. owl's head (ICC 6833); and c. pea seed (ICC 8921).**

Table 12. Summary of statistics on seed shape (accessions scored = 11 984).

| Seed shape | Code | No. of accessions | Frequency (%) |
|---|---|---|---|
| Angular | ANG | 9163 | 76.46 |
| Owl's head | OWL | 2191 | 18.28 |
| Pea seed | PEA | 630 | 5.26 |

Table 13. Summary of statistics on seed surface (accessions scored = 11 984).

| Seed surface | Code | No. of accessions | Frequency (%) |
|---|---|---|---|
| Rough | R | 9270 | 77.35 |
| Smooth | S | 2487 | 20.75 |
| Tuberculated | T | 227 | 1.90 |

**6. Seed Surface [SSUR].** Surface observations were made from dry, mature seeds in three classes: rough or wrinkled, with uneven surface; smooth surface; and tuberculated, seeds somewhat sticky because tiny projections are present on the surface (Fig. 4 and Table 13).

The variability in seed color, shape, surface, and size of chickpea germplasm are exhibited in Plate 7.

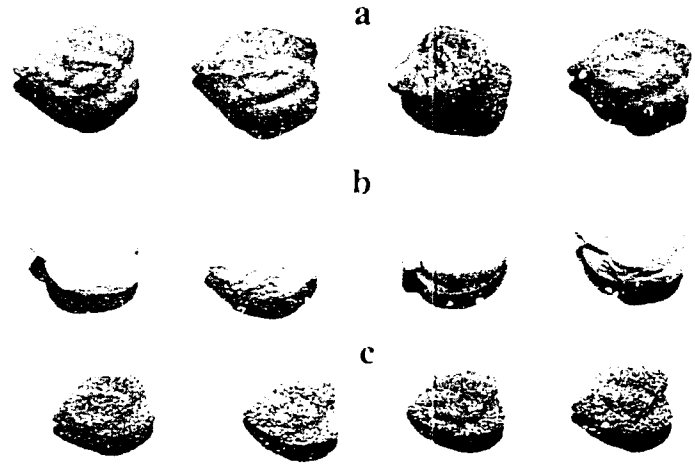



Figure 4. Seed surfaces of chickpea: a. rough or wrinkled (ICC 10301); b. smooth (ICC 6833); and c. tuberculated (ICC 571).

## Preliminary evaluation

Preliminary evaluation consists of recording agronomic traits that are considered desirable by users of the particular crop. This evaluation is often carried out by the genetic resources scientists. In chickpea, the following characters are recorded under this evaluation.

**1. Days to 50% Flowering [DAF].** This is the number of days from sowing to the day on which 50% plants of an accession have started flowering. Days to flowering is affected by temperature, day length etc., so this data may vary across locations. The variation of this characteristic in the chickpea germplasm is indicated in Figure 5 and Table 14. The numbers at the tops of the columns in the histograms that follow refer to the number of accessions in the interval concerned.

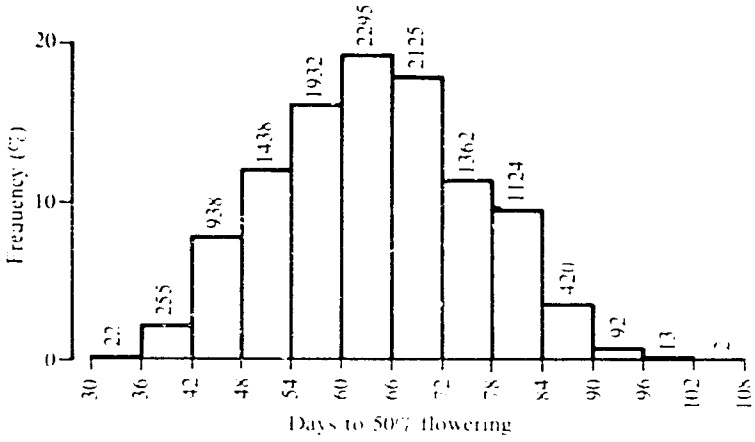



**Figure 5. Frequency distribution for days to 50% flowering.**

**Table 14. Summary of statistics on days to 50% flowering.**

| | | | |
|---|---|---|---|
| No. of observations | 12018 | Variance | 138.6 |
| Min. value | 33 | SD | 11.8 |
| Max. value | 107 | CV (%) | 18.4 |
| Mean | 64.2 | Skewness | 0.08 ± 0.022 |
| Median | 65.0 | Kurtosis | -0.61 ± 0.045 |

**Accessions flowering in ≥ 92 days**

| | | | |
|---|---|---|---|
| ICC 804 | ICC 1026 | ICC 2073 | ICC 2161 |
| ICC 3024 | ICC 5024 | ICC 5002 | ICC 5116 |
| ICC 5423 | ICC 5573 | ICC 5640 | ICC 7193 |
| ICC 7322 | ICC 7550 | ICC 7597 | ICC 7667 |
| ICC 7670 | ICC 7673 | ICC 7720 | ICC 7891 |
| ICC 8009 | ICC 8032 | ICC 8194 | ICC 8476 |
| ICC 8502 | ICC 8508 | ICC 8960 | ICC 9206 |
| ICC 9231 | ICC 9258 | ICC 9318 | ICC 9369 |
| ICC 9451 | ICC 9494 | ICC 9514 | ICC 10044 |
| ICC 10045 | ICC 10036 | ICC 10603 | ICC 11273 |
| ICC 11871 | ICC 11958 | | |

**Accessions flowering in ≤ 39 days**

| | | | |
|---|---|---|---|
| ICC 2205 | ICC 2214 | ICC 2348 | ICC 2855 |
| ICC 3782 | ICC 4852 | ICC 5097 | ICC 5677 |
| ICC 5757 | ICC 5810 | ICC 7344 | ICC 7425 |
| ICC 7533 | ICC 7577 | ICC 8599 | ICC 8618 |
| ICC 10446 | ICC 10623 | ICC 10629 | ICC 10820 |
| ICC 10886 | ICC 10969 | ICC 10971 | ICC 10973 |
| ICC 10993 | ICC 10994 | ICC 11104 | ICC 11141 |
| ICC 11150 | ICC 11152 | ICC 11172 | ICC 11183 |
| ICC 11205 | ICC 11572 | ICC 11573 | ICC 11575 |
| ICC 11888 | ICC 12197 | ICC 12199 | ICC 12207 |
| ICC 12394 | ICC 12423 | ICC 12424 | |

**2. Flowering Duration [FLD].** This record is the number of days from 50% flowering to the date when 50% of the plants of an accession stopped flowering. This characteristic can be influenced by several factors including climate, soil moisture availability, and pest attack. Among the chickpea accessions, there is considerable variability for this trait (Fig. 6 and Table 15).

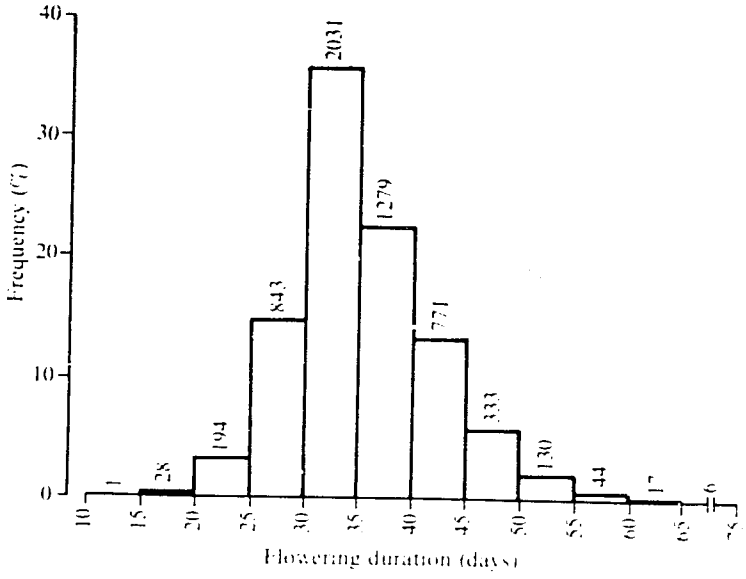



**Figure 6. Frequency distribution for flowering duration.**

**Table 15. Summary of statistics on flowering duration (d).**

| | | | |
|---|---|---|---|
| No. of observations | 5677 | Variance | 49.6 |
| Min. value | 13 | SD | 7.0 |
| Max. value | 75 | CV (%) | 19.6 |
| Mean | 35.9 | Skewness | 0.77 ± 0.033 |
| Median | 35.0 | Kurtosis | 1.18 ± 0.065 |

**Accessions with flowering duration > 56 days**

| | | | |
|---|---|---|---|
| ICC 686 | ICC 2122 | ICC 2136 | ICC 2487 |
| ICC 2491 | ICC 2493 | ICC 2701 | ICC 2748 |
| ICC 3146 | ICC 3154 | ICC 3156 | ICC 3169 |
| ICC 3303 | ICC 3326 | ICC 3394 | ICC 3408 |
| ICC 3644 | ICC 3729 | ICC 3892 | ICC 3902 |
| ICC 4076 | ICC 4487 | ICC 4489 | ICC 5588 |
| ICC 5840 | ICC 5871 | ICC 6160 | ICC 6845 |
| ICC 6864 | ICC 6873 | ICC 6981 | ICC 7090 |
| ICC 7400 | ICC 8011 | ICC 8115 | ICC 8351 |
| ICC 8484 | ICC 8651 | ICC 8672 | ICC 8786 |
| ICC 8809 | ICC 8896 | ICC 8909 | ICC 8920 |
| ICC 9566 | ICC 9606 | ICC 9617 | ICC 9620 |
| ICC 9907 | ICC 10082 | ICC 10866 | ICC 11052 |

**Accessions with flowering duration < 21 days**

| | | | |
|---|---|---|---|
| ICC 1970 | ICC 2819 | ICC 2939 | ICC 3000 |
| ICC 3482 | ICC 3913 | ICC 4610 | ICC 4634 |
| ICC 4963 | ICC 5183 | ICC 5352 | ICC 5428 |
| ICC 6247 | ICC 7309 | ICC 8150 | ICC 8453 |
| ICC 9283 | ICC 9451 | ICC 9593 | ICC 9806 |
| ICC 10056 | ICC 10316 | ICC 10339 | ICC 10707 |
| ICC 11450 | ICC 11464 | ICC 12280 | ICC 12286 |
| ICC 12300 | | | |

**3. Plant Canopy Height [PLHT].** This observation is the average canopy height (in cm) of three five representative plants of an accession. This characteristic is affected by soil fertility, moisture availability, length of growing season, etc. The variability for plant height is shown in Plate 5, Figure 7, and Table 16.

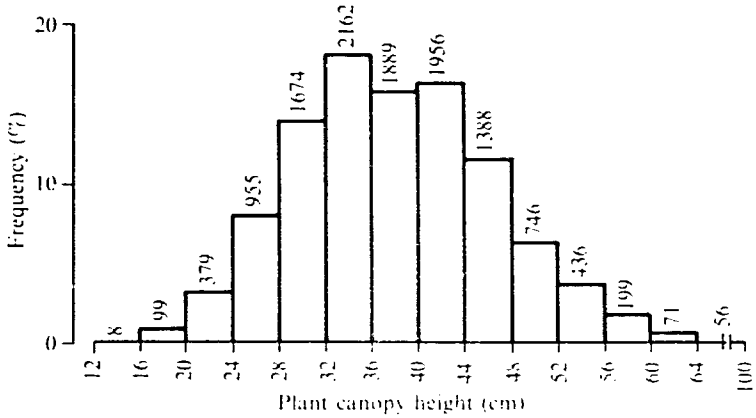



**Figure 7. Frequency distribution for plant canopy height.**

**Table 16. Summary of statistics on plant canopy height (cm).**

| | | | |
|---|---|---|---|
| No. of observations | 12 018 | Variance | 77.0 |
| Min. value | 14.3 | SD | 8.8 |
| Max. value | 96.3 | CV (%) | 19.6 |
| Mean | 38.3 | Skewness | 0.43 ± 0.022 |
| Median | 37.7 | Kurtosis | 0.58 ± 0.045 |

**Accessions with plant canopy height 65 cm**

| | | | |
|---|---|---|---|
| ICC 418 | ICC 683 | ICC 687 | ICC 733 |
| ICC 743 | ICC 2298 | ICC 2503 | ICC 2688 |
| ICC 3221 | ICC 6225 | ICC 6250 | ICC 6257 |
| ICC 6260 | ICC 6306 | ICC 6813 | ICC 7323 |
| ICC 7711 | ICC 8203 | ICC 8566 | ICC 8920 |
| ICC 8921 | ICC 8925 | ICC 8926 | ICC 8927 |
| ICC 8928 | ICC 8929 | ICC 9230 | ICC 9250 |
| ICC 9256 | ICC 9259 | ICC 9261 | ICC 9262 |
| ICC 9280 | ICC 9282 | ICC 9284 | ICC 9441 |
| ICC 9442 | ICC 11142 | ICC 11263 | ICC 11269 |
| ICC 11842 | ICC 11909 | ICC 12326 | |

**Accessions with plant canopy height 19 cm**

| | | | |
|---|---|---|---|
| ICC 2373 | ICC 2380 | ICC 2383 | ICC 2392 |
| ICC 2402 | ICC 2626 | ICC 2631 | ICC 2685 |
| ICC 3330 | ICC 3985 | ICC 4154 | ICC 4598 |
| ICC 4657 | ICC 4704 | ICC 5581 | ICC 6272 |
| ICC 6478 | ICC 6508 | ICC 6785 | ICC 7535 |
| ICC 7578 | ICC 7581 | ICC 8147 | ICC 8381 |
| ICC 8382 | ICC 8387 | ICC 8445 | ICC 8447 |
| ICC 8450 | ICC 8582 | ICC 8599 | ICC 8605 |
| ICC 9920 | ICC 9921 | ICC 9927 | ICC 9932 |
| ICC 9936 | ICC 9991 | ICC 10033 | ICC 10232 |
| ICC 10611 | ICC 10798 | ICC 11122 | ICC 11130 |
| ICC 11316 | ICC 11336 | ICC 11345 | ICC 11352 |
| ICC 11361 | ICC 11364 | ICC 11370 | ICC 11372 |
| ICC 11374 | | | |

Plate 1.

Plate 3.

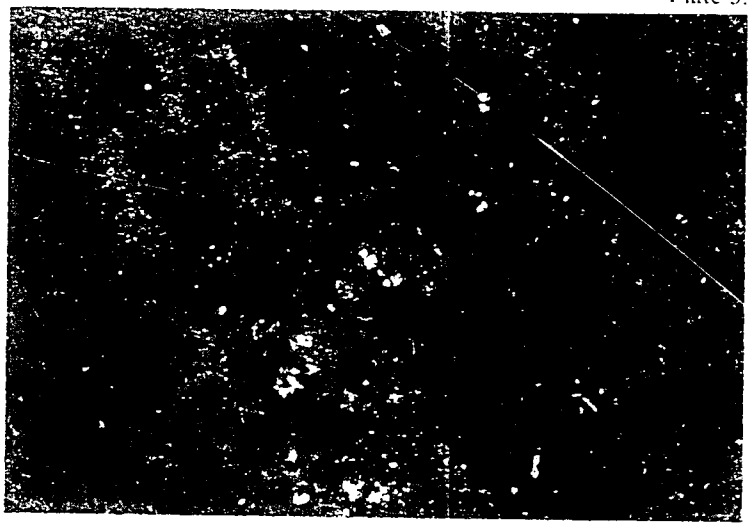


Plate 1. *Cicer cuneatum*, wild species of chickpea that has good traits such as profuse growth, large pods, multiple seeds, free from wilt, dry root rot, and collar rot diseases.

Plate 2. Variability in flower shape, size, and color.

Plate 3. Chickpea germplasm accessions showing variation in foliage color.

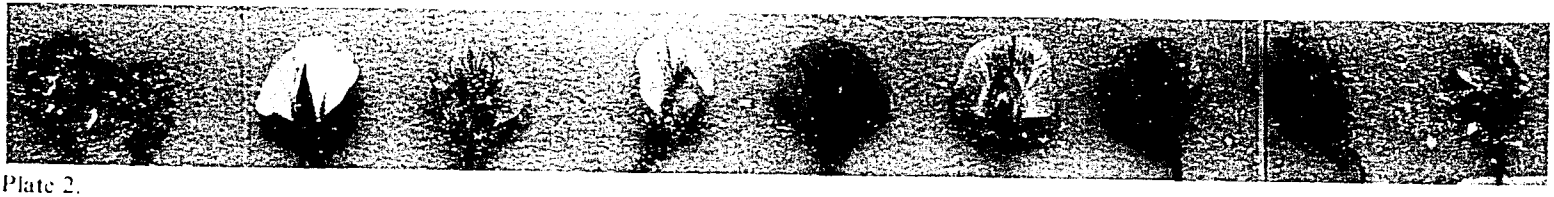


Plate 2.

Plate 4.

Plate 6.

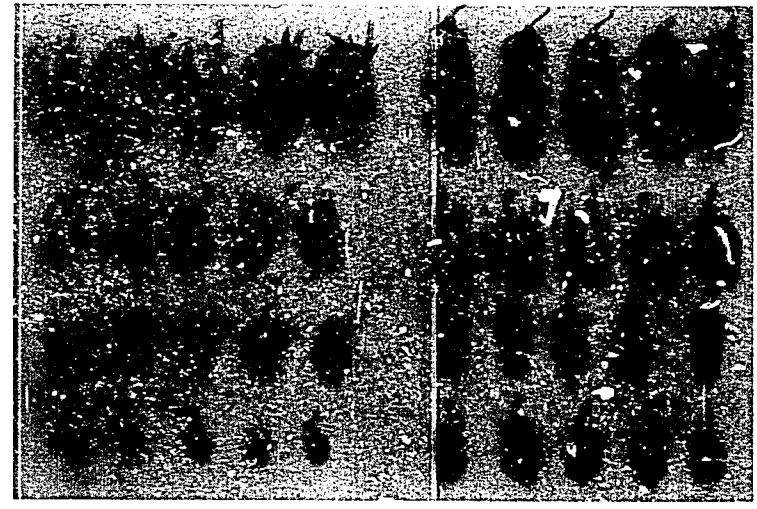


Plate 5.

Plate 4. Chickpea accessions reaching maturity showing left to right, upright, prostrate, and semi-spreading growth habits.

Plate 5. Chickpea accessions showing wide variation in plant canopy height.

Plate 6. Chickpea accessions showing variability in pod color, shape, and size.

Plate 7.

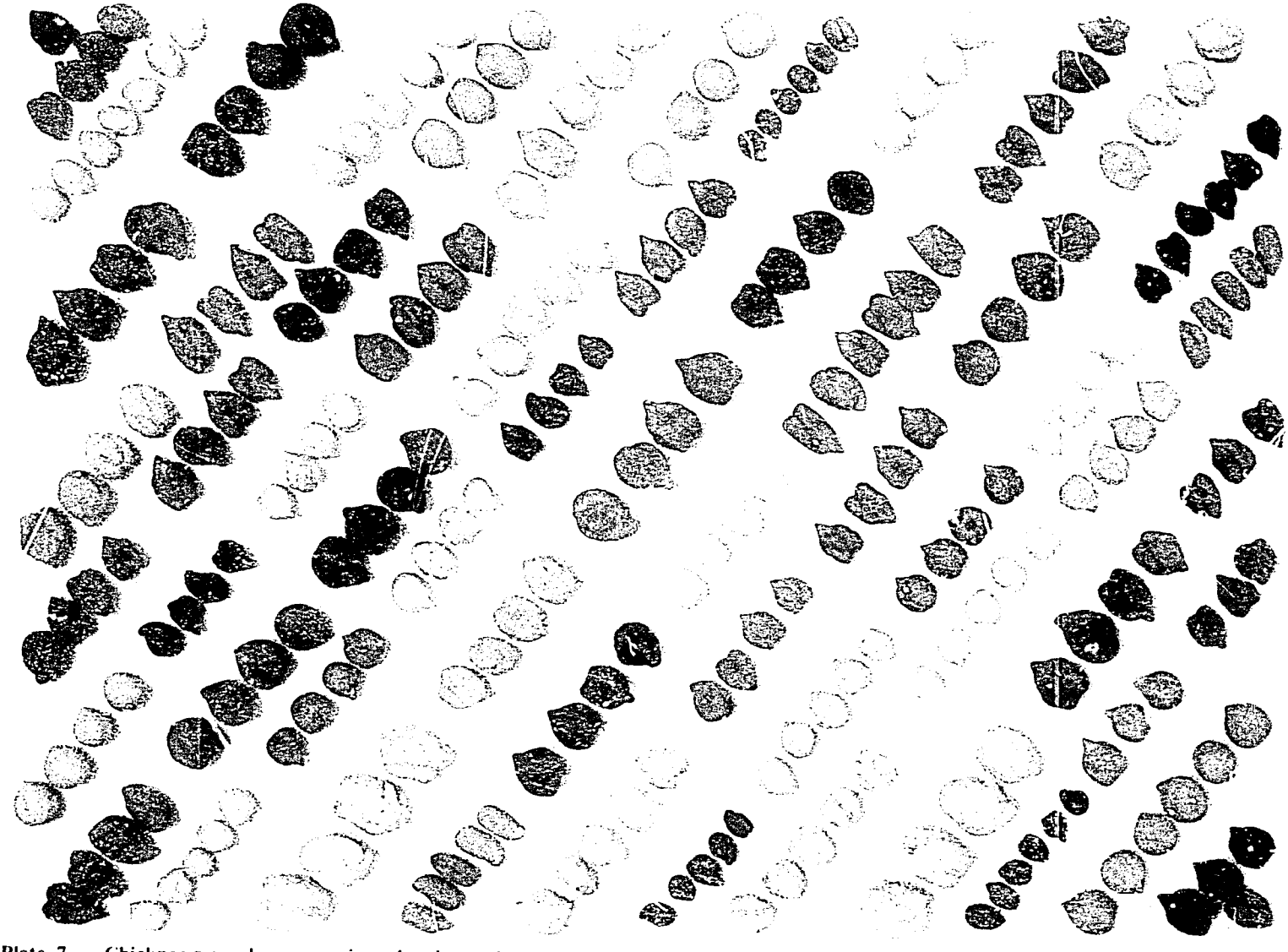


**Plate 7.** Chickpea germplasm accessions showing variability in seeds.

Plate 8.

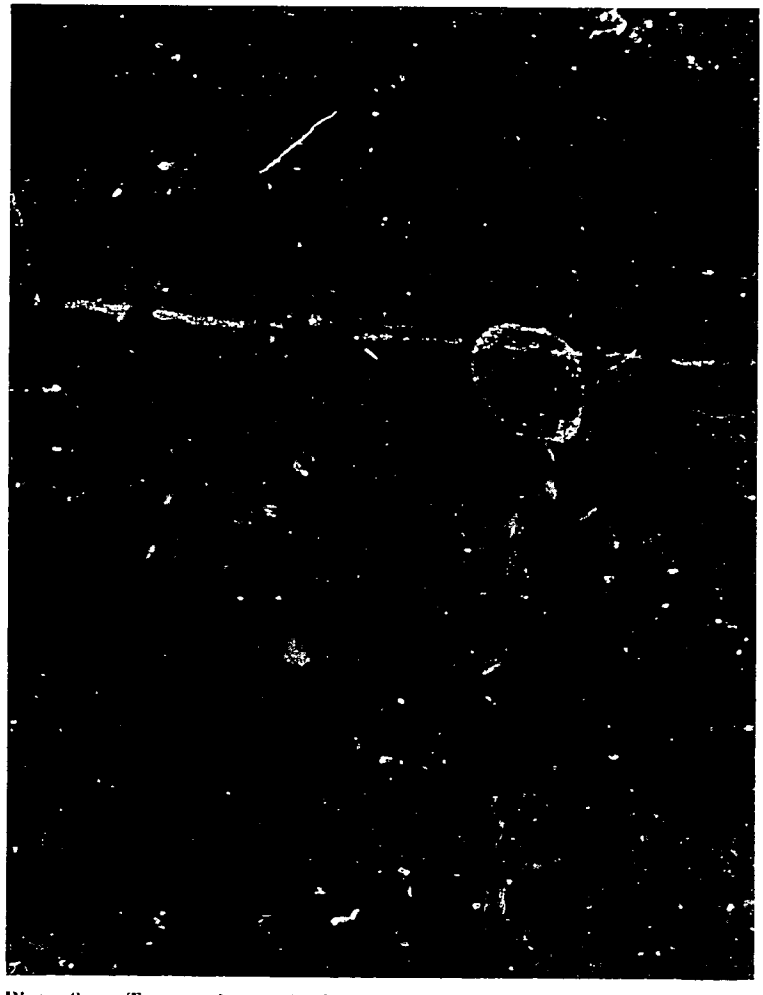


Plate 8. Two pods per leaf axil (left) in contrast to one (right); a desirable yield trait in chickpea.

Plate 9

Plate 9. ICC 8284, a multipodded accession which originated from Uttar Pradesh, India.

**4. Plant Canopy Width [PLWTH].** This observation is an average of canopy width (plant spread) of three/five representative plants of an accession recorded in centimeters (Fig. 8 and Table 17). This characteristic is affected by soil fertility, moisture availability, plant stand, etc.

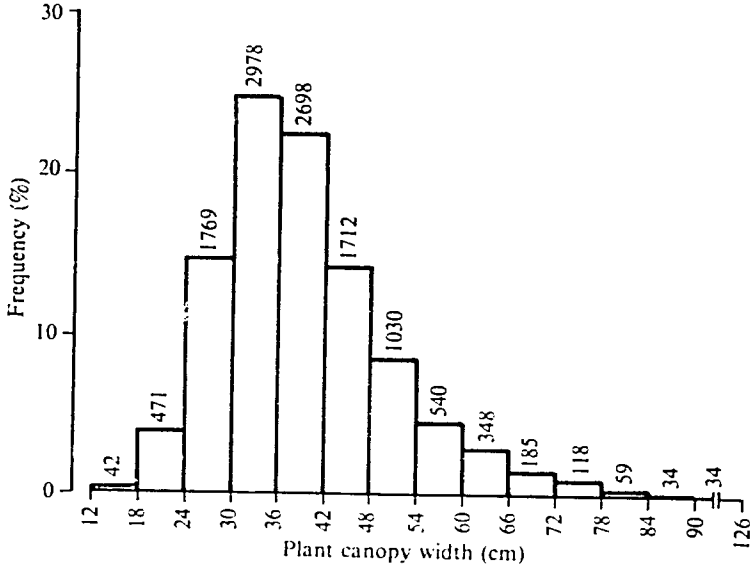



**Figure 8. Frequency distribution for plant canopy width.**

**Table 17. Summary of statistics on plant canopy width (cm).**

| | | | |
|---|---|---|---|
| No. of observations | 12018 | Variance | 143.2 |
| Min. value | 13.3 | SD | 12.0 |
| Max. value | 124.0 | CV (%) | 30.1 |
| Mean | 39.8 | Skewness | 1.28 ± 0.022 |
| Median | 37.7 | Kurtosis | 2.78 ± 0.045 |

**Accessions with plant canopy width >86 cm**

| | | | |
|---|---|---|---|
| ICC 149 | ICC 181 | ICC 182 | ICC 258 |
| ICC 280 | ICC 355 | ICC 359 | ICC 369 |
| ICC 377 | ICC 380 | ICC 392 | ICC 418 |
| ICC 506 | ICC 510 | ICC 522 | ICC 530 |
| ICC 534 | ICC 525 | ICC 546 | ICC 561 |
| ICC 593 | ICC 613 | ICC 643 | ICC 675 |
| ICC 677 | ICC 704 | ICC 724 | ICC 733 |
| ICC 743 | ICC 778 | ICC 800 | ICC 810 |
| ICC 814 | ICC 820 | ICC 844 | ICC 845 |
| ICC 847 | ICC 941 | ICC 952 | ICC 1141 |
| ICC 1142 | ICC 2268 | ICC 2270 | ICC 2275 |
| ICC 2525 | ICC 2772 | ICC 2773 | ICC 3959 |
| ICC 6044 | ICC 6239 | ICC 6260 | ICC 7102 |
| ICC 7217 | ICC 7710 | | |

**Accessions with plant canopy width <18 cm**

| | | | |
|---|---|---|---|
| ICC 1043 | ICC 1069 | ICC 2141 | ICC 2234 |
| ICC 2324 | ICC 2348 | ICC 3372 | ICC 3434 |
| ICC 5087 | ICC 5145 | ICC 5689 | ICC 5697 |
| ICC 6277 | ICC 6478 | ICC 7115 | ICC 7630 |
| ICC 7636 | ICC 7644 | ICC 7749 | ICC 7900 |
| ICC 8381 | ICC 9517 | ICC 10422 | ICC 10496 |
| ICC 10557 | ICC 10617 | ICC 10618 | ICC 10708 |
| ICC 10726 | ICC 10891 | ICC 11010 | ICC 11198 |
| ICC 11201 | ICC 11213 | | |

**5. Days to Maturity [MATR].** The number of days from date of sowing to date of maturity of the accession is recorded. This variability is indicated in Figure 9 and Table 18.

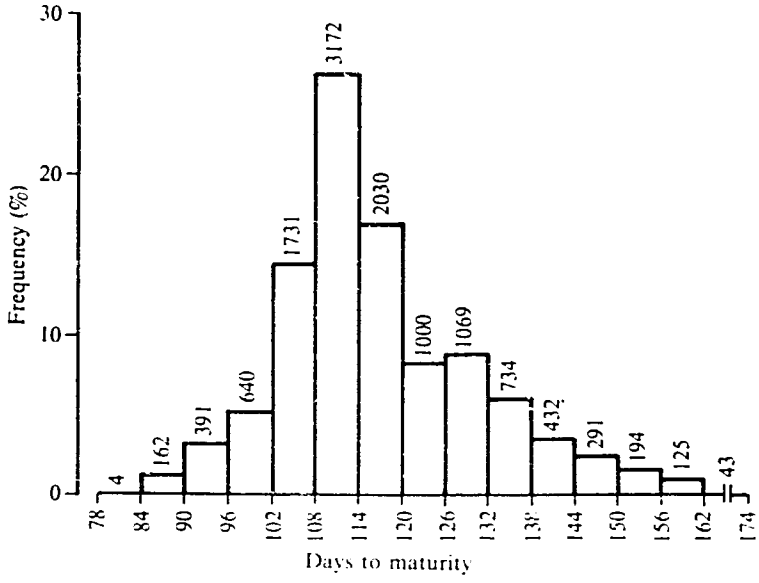



**Figure 9.** Frequency distribution for days to maturity.

**Table 18.** Summary of statistics on days to maturity.

| | | | |
|---|---|---|---|
| No. of observations | 12018 | Variance | 203.4 |
| Min. value | 84 | SD | 14.3 |
| Max. value | 169 | CV (%) | 12.1 |
| Mean | 117.5 | Skewness | 0.71±0.022 |
| Median | 114.0 | Kurtosis | 0.91 ± 0.045 |

**Accessions with days to maturity >162 days**

| | | | |
|---|---|---|---|
| ICC 3188 | ICC 5413 | ICC 6864 | ICC 6883 |
| ICC 6951 | ICC 7130 | ICC 7576 | ICC 7909 |
| ICC 7943 | ICC 7944 | ICC 7964 | ICC 7965 |
| ICC 7976 | ICC 7981 | ICC 8032 | ICC 8081 |
| ICC 8088 | ICC 8133 | ICC 8199 | ICC 8463 |
| ICC 8494 | ICC 8536 | ICC 8540 | ICC 9163 |
| ICC 9173 | ICC 9174 | ICC 9196 | ICC 9205 |
| ICC 9231 | ICC 9336 | ICC 9347 | ICC 9363 |
| ICC 9364 | ICC 9369 | ICC 9371 | ICC 9374 |
| ICC 9376 | ICC 9377 | ICC 9378 | ICC 9387 |
| ICC 9436 | ICC 10045 | ICC 10053 | |

**Accessions with days to maturity <86 days**

| | | | |
|---|---|---|---|
| ICC 2023 | ICC 2171 | ICC 2214 | ICC 4852 |
| ICC 5770 | ICC 6919 | ICC 7282 | ICC 7410 |
| ICC 7581 | ICC 8445 | ICC 9590 | ICC 10232 |
| ICC 10377 | ICC 10446 | ICC 10462 | ICC 10464 |
| ICC 10655 | ICC 10822 | ICC 10857 | ICC 10893 |
| ICC 10926 | ICC 10929 | ICC 10952 | ICC 10976 |
| ICC 10981 | ICC 10986 | ICC 10988 | ICC 10990 |
| ICC 10993 | ICC 10996 | ICC 10998 | ICC 11000 |
| ICC 11021 | ICC 11027 | ICC 11039 | ICC 11051 |
| ICC 11175 | | | |

**6. Branching Pattern.** The chickpea plant is a short bush with several major and minor branches. The two groups commonly used are primary and secondary branches, but this grouping does not appear to be logical botanically. We recognise five groups of branches in a chickpea plant as illustrated in Figure 10. The twig qualifies as a branch provided it bears at least one effective pod.

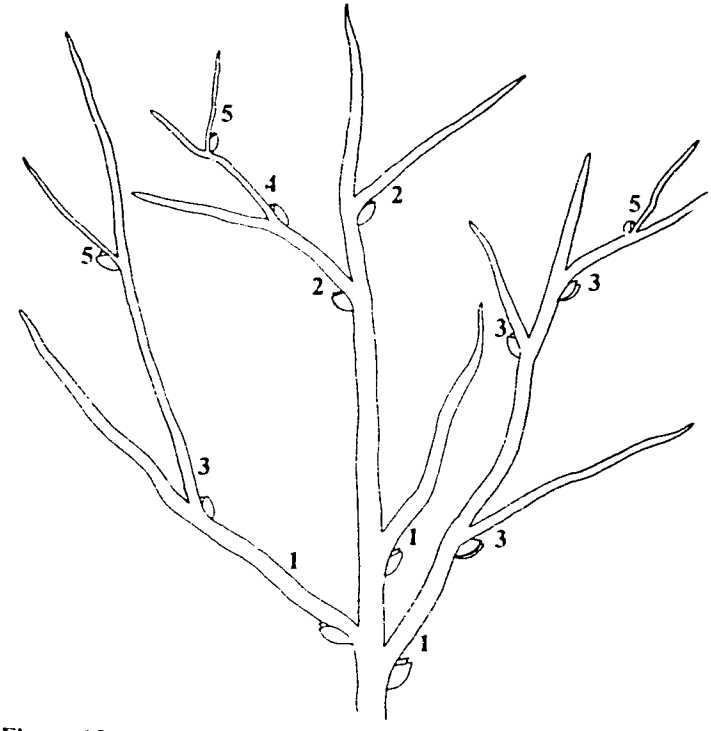



Figure 10. An illustration of branch groups in a chickpea plant.

1. Basal primary branches—emerge from the leaf axils on the lower half of the main stem
2. Apical primary branches—emerge on the leaf axils on the upper half of the main stem
3. Basal secondary branches—emerge from the leaf axils of basal primary branches
4. Apical secondary branches—emerge from the leaf axils of apical primary branches
5. Tertiary branches—emerge from the leaf axils of basal and apical secondary branches.

**Basal Primary Branches [BPB].** This record is an average number of basal primary branches per plant from data recorded on three/five representative plants from each accession at the time of harvest. Summary statistics are given in Figure 11 and Table 19.

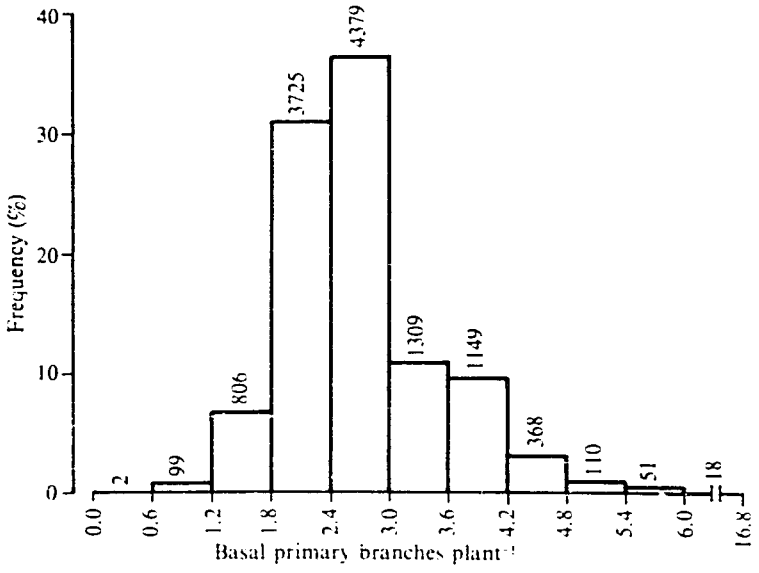



**Figure 11. Frequency distribution for basal primary branches per plant.**

**Table 19. Summary of statistics on number of basal primary branches per plant.**

| | | | |
|---|---|---|---|
| No. of observations | 12016 | Variance | 0.6 |
| Min. value | 0.3 | SD | 0.8 |
| Max. value | 15.7 | CV (%) | 28.4 |
| Mean | 2.8 | Skewness | 1.59 ± 0.022 |
| Median | 2.7 | Kurtosis | 13.89 ± 0.045 |

**Accessions with basal primary branches >5.9**

| | | | |
|---|---|---|---|
| ICC 42 | ICC 169 | ICC 184 | ICC 202 |
| ICC 261 | ICC 264 | ICC 353 | ICC 362 |
| ICC 1028 | ICC 1039 | ICC 1054 | ICC 1076 |
| ICC 1080 | ICC 1100 | ICC 1123 | ICC 1129 |
| ICC 1157 | ICC 1181 | ICC 1182 | ICC 1185 |
| ICC 1187 | ICC 1298 | ICC 1377 | ICC 1560 |
| ICC 1563 | ICC 1567 | ICC 1598 | ICC 2198 |
| ICC 2212 | ICC 2904 | ICC 3053 | ICC 3959 |
| ICC 4654 | ICC 4780 | ICC 4797 | ICC 4799 |
| ICC 5119 | ICC 5764 | ICC 6225 | ICC 6819 |
| ICC 6872 | ICC 7083 | ICC 7415 | ICC 8765 |

**Accessions with basal primary branches <1**

| | | | |
|---|---|---|---|
| ICC 976 | ICC 1497 | ICC 1532 | ICC 2383 |
| ICC 2384 | ICC 2640 | ICC 2653 | ICC 2722 |
| ICC 4162 | ICC 4257 | ICC 4479 | ICC 6936 |
| ICC 7866 | ICC 8724 | ICC 8740 | ICC 10346 |
| ICC 10360 | | | |

**Apical Primary Branches [APB].** This observation is the average number of apical primary branches per plant recorded from three five competitive plants from each accession at the time of harvest. A summary of statistics is given in Figure 12 and Table 20.

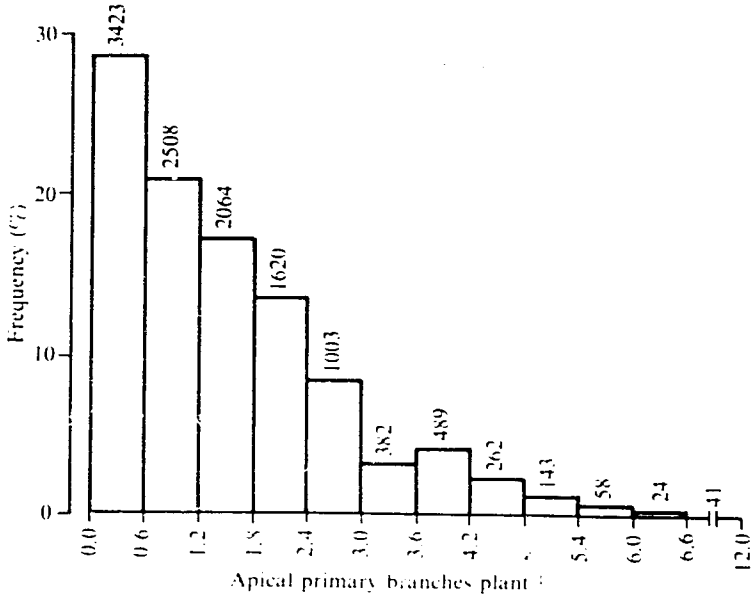



**Figure 12. Frequency distribution for apical primary branches per plant.**

**Table 20. Summary of statistics on number of apical primary branches per plant.**

| | | | |
|---|---|---|---|
| No. of observations | 12017 | Variance | 1.8 |
| Min. value | 0 | SD | 1.3 |
| Max. value | 12 | CV (%) | 92.0 |
| Mean | 1.5 | Skewness | 1.14 ± 0.022 |
| Median | 1.3 | Kurtosis | 1.68 ± 0.045 |

**Accessions with apical primary branches 6.6**

| | | | |
|---|---|---|---|
| ICC 157 | ICC 220 | ICC 378 | ICC 884 |
| ICC 1083 | ICC 1086 | ICC 1087 | ICC 1240 |
| ICC 1560 | ICC 1561 | ICC 2125 | ICC 2143 |
| ICC 2669 | ICC 3393 | ICC 3506 | ICC 3593 |
| ICC 3601 | ICC 3713 | ICC 3810 | ICC 3812 |
| ICC 3867 | ICC 3896 | ICC 4379 | ICC 4824 |
| ICC 5016 | ICC 5020 | ICC 5022 | ICC 5023 |
| ICC 5636 | ICC 5914 | ICC 7033 | ICC 7705 |
| ICC 8576 | ICC 8847 | ICC 9951 | ICC 9958 |
| ICC 10657 | ICC 10954 | ICC 11959 | ICC 11064 |
| ICC 11401 | | | |

A total of 2473 accessions had no effective apical primary branches.

**Basal Secondary Branches [BSB].** This is the average number of basal secondary branches per plant recorded on three five representative plants from each accession at the time of harvest. A summary of statistics is given in Figure 13 and Table 21.

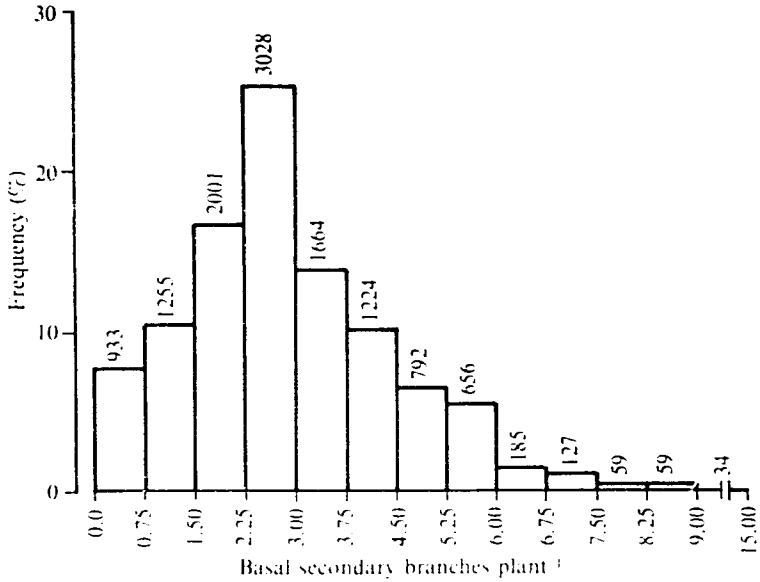



**Figure 13. Frequency distribution for basal secondary branches per plant.**

**Table 21. Summary of statistics on number of basal secondary branches per plant.**

| | | | |
|---|---|---|---|
| No. of observations | 12017 | Variance | 2.7 |
| Min. value | 0 | SD | 1.6 |
| Max. value | 13.7 | CV (%) | 56.1 |
| Mean | 2.9 | Skewness | 0.85 ± 0.022 |
| Median | 2.7 | Kurtosis | 1.58 ± 0.045 |

**Accessions with basal secondary branches >9**

| | | | |
|---|---|---|---|
| ICC 168 | ICC 1221 | ICC 1732 | ICC 2425 |
| ICC 2664 | ICC 5043 | ICC 5413 | ICC 5908 |
| ICC 5913 | ICC 6089 | ICC 7279 | ICC 7399 |
| ICC 8139 | ICC 8395 | ICC 8739 | ICC 9518 |
| ICC 10341 | ICC 10504 | ICC 10630 | ICC 10799 |
| ICC 10837 | ICC 10842 | ICC 10982 | ICC 11090 |
| ICC 11091 | ICC 11151 | ICC 11385 | ICC 11401 |
| ICC 11402 | ICC 11403 | ICC 11409 | ICC 11494 |
| ICC 11511 | ICC 11612 | | |

A total of 286 accessions had no effective basal secondary branches.

**Apical Secondary Branches [ASB].** This represents the average number of apical secondary branches per plant recorded on three five representative plants from each accession at the time of harvest. A summary of statistics is given in Figure 14 and Table 22.

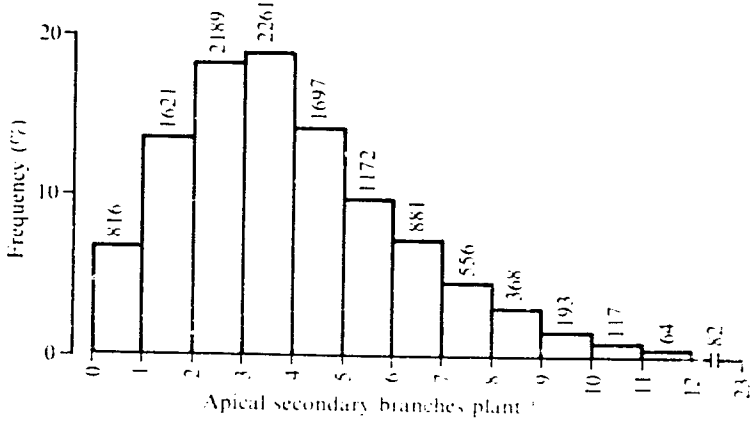



**Figure 14. Frequency distribution for apical secondary branches per plant.**

**Table 22. Summary of statistics on number of apical secondary branches per plant.**

| | | | |
|---|---|---|---|
| No. of observations | 12017 | Variance | 6.0 |
| Min. value | 0 | SD 2.4 | |
| Max. value | 22.7 | CV (%) | 58.6 |
| Mean | 4.2 | Skewness | 1.09 ± 0.022 |
| Median | 3.7 | Kurtosis | 2.41 ± 0.045 |

**Accessions with apical secondary branches >13**

| | | | |
|---|---|---|---|
| ICC 138 | ICC 178 | ICC 180 | ICC 196 |
| ICC 353 | ICC 370 | ICC 378 | ICC 509 |
| ICC 514 | ICC 578 | ICC 586 | ICC 663 |
| ICC 732 | ICC 735 | ICC 736 | ICC 737 |
| ICC 738 | ICC 740 | ICC 793 | ICC 881 |
| ICC 886 | ICC 858 | ICC 1221 | ICC 1231 |
| ICC 1243 | ICC 1244 | ICC 1275 | ICC 1720 |
| ICC 1721 | ICC 1731 | ICC 1732 | ICC 1751 |
| ICC 1780 | ICC 1784 | ICC 5034 | ICC 5036 |
| ICC 5995 | ICC 6018 | ICC 6121 | ICC 6266 |
| ICC 6271 | ICC 6293 | ICC 7422 | ICC 7503 |
| ICC 9687 | ICC 11425 | ICC 11564 | ICC 11565 |
| ICC 11612 | | | |

A total of 175 accessions had no apical secondary branches.

**Tertiary Branches [TRB].** This is based on the average number of tertiary branches per plant recorded on three five representative plants from each accession. A summary of statistics is given in Figure 15 and Table 23.

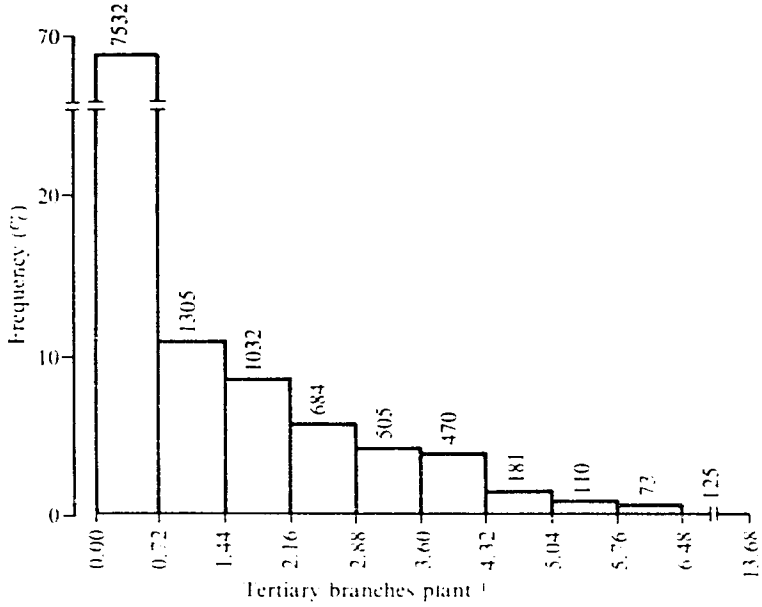



**Figure 15. Frequency distribution for tertiary branches per plant.**

**Table 23. Summary of statistics on number of tertiary branches per plant.**

| | | | |
|---|---|---|---|
| No. of observations | 12017 | Variance | 2.4 |
| Min. value | 0 | SD | 1.5 |
| Max. value | 13 | CV (%) | 154.6 |
| Mean | 1.0 | Skewness | 2.10 ± 0.022 |
| Median | 0 | Kurtosis | 5.58 ± 0.045 |

**Accessions with 8 tertiary branches per plant**

| | | | |
|---|---|---|---|
| ICC 1026 | ICC 2127 | ICC 2461 | ICC 2664 |
| ICC 3379 | ICC 3415 | ICC 3442 | ICC 3865 |
| ICC 4372 | ICC 4405 | ICC 5119 | ICC 5413 |
| ICC 5908 | ICC 6639 | ICC 6659 | ICC 6661 |
| ICC 6685 | ICC 6696 | ICC 6709 | ICC 6894 |
| ICC 7571 | ICC 7784 | ICC 7795 | ICC 7891 |
| ICC 8139 | ICC 8158 | ICC 8390 | ICC 8816 |
| ICC 8817 | ICC 8818 | ICC 8819 | ICC 8841 |
| ICC 8845 | ICC 8847 | ICC 8855 | ICC 8889 |
| ICC 8894 | ICC 8912 | ICC 9520 | ICC 9518 |
| ICC 9603 | ICC 9616 | ICC 9914 | ICC 10302 |
| ICC 10458 | ICC 10605 | ICC 10681 | ICC 10968 |
| ICC 11091 | | | |

A total of 6452 accessions had no effective tertiary branches.

**7. Number of Pods per Plant [PP].** This is the average number of fully formed pods per plant from three five representative plants of each accession at maturity. There is considerable variability in the germplasm for pod color, shape, and size (Plate 6). Some accessions produce two or three pods per leaf axil in contrast to one normally (Plates 8 and 9). The summary of statistics of number of pods is given in Figure 16 and Table 24. The number of pods per plant can greatly vary with plant spacing and with change in climatic, fertility, and biotic factors.

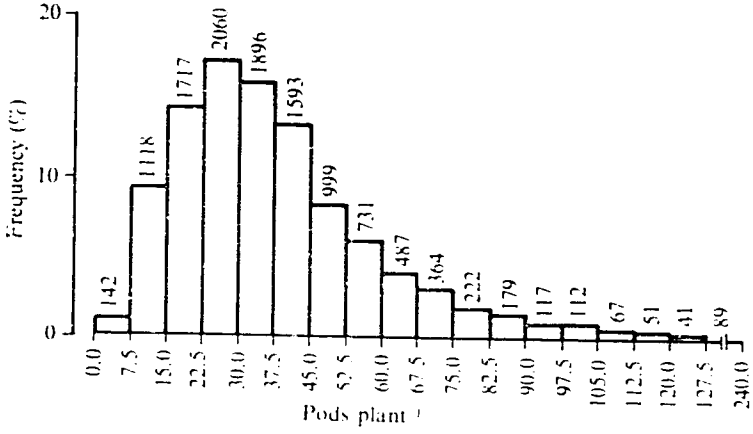



**Figure 16. Frequency distribution for number of pods per plant.**

**Table 24. Summary of statistics on number of pods per plant.**

| | | | |
|---|---|---|---|
| No. of observations | 11 985 | Variance | 564.7 |
| Min. value | 3 | SD | 23.8 |
| Max. value | 238 | CV (%) | 61.1 |
| Mean | 38.9 | Skewness | 1.79 ± 0.022 |
| Median | 34.0 | Kurtosis | 5.56 ± 0.045 |

**Accessions with >150 pods per plant**

| | | | |
|---|---|---|---|
| ICC 128 | ICC 136 | ICC 138 | ICC 155 |
| ICC 196 | ICC 205 | ICC 212 | ICC 220 |
| ICC 226 | ICC 230 | ICC 231 | ICC 232 |
| ICC 258 | ICC 259 | ICC 326 | ICC 333 |
| ICC 352 | ICC 353 | ICC 362 | ICC 378 |
| ICC 383 | ICC 386 | ICC 401 | ICC 465 |
| ICC 478 | ICC 534 | ICC 586 | ICC 793 |
| ICC 927 | ICC 1221 | ICC 1572 | ICC 1611 |
| ICC 1637 | ICC 2664 | ICC 4074 | ICC 7399 |
| ICC 7738 | ICC 8583 | | |

**8. Number of Seeds per Pod [SP].** This is a postharvest observation. The number of seeds per pod is estimated by dividing the total number of seeds by the total number of pods harvested from three five representative plants. The summary of statistics of this trait is given in Figure 17 and Table 25.

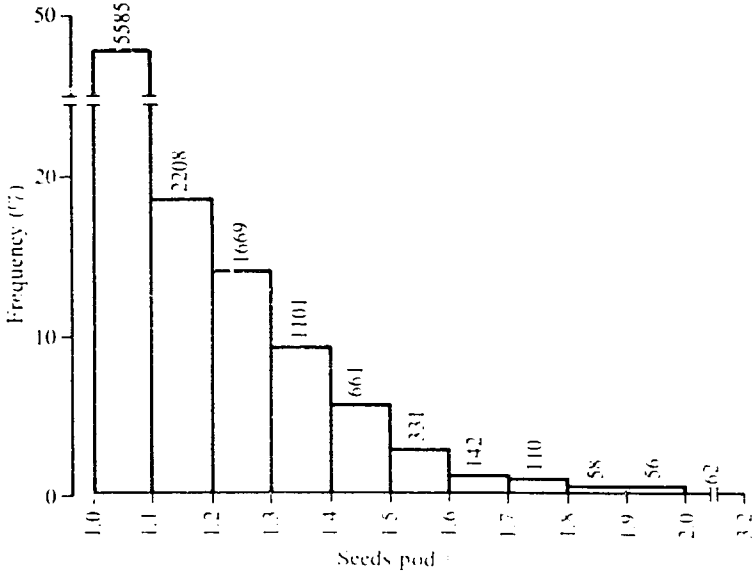



**Figure 17. Frequency distribution for number of seeds per pod.**

**Table 25. Summary of statistics on seed number per pod.**

| | | | |
|---|---|---|---|
| No. of observations | 11983 | Variance | 0.0 |
| Min. value | 1 | SD | 0.2 |
| Max. value | 3.2 | CV (%) | 17.1 |
| Mean | 1.2 | Skewness | 1.80 ± 0.022 |
| Median | 1.2 | Kurtosis | 7.04 ±0.045 |

**Accessions with >2.1 seeds per pod**

| | | | |
|---|---|---|---|
| ICC 9 | ICC 98 | ICC 295 | ICC 613 |
| ICC 1052 | ICC 1315 | ICC 1401 | ICC 1630 |
| ICC 1813 | ICC 1901 | ICC 2259 | ICC 2500 |
| ICC 2593 | ICC 3279 | ICC 3832 | ICC 3850 |
| ICC 3859 | ICC 4014 | ICC 4201 | ICC 4410 |
| ICC 5046 | ICC 5172 | ICC 5254 | ICC 5499 |
| ICC 5605 | ICC 5643 | ICC 5680 | ICC 5857 |
| ICC 7156 | ICC 7201 | ICC 7225 | ICC 7369 |
| ICC 7405 | ICC 7983 | ICC 9557 | ICC 9614 |
| ICC 9636 | ICC 10174 | ICC 11216 | ICC 11596 |
| ICC 11901 | ICC 12113 | ICC 12118 | |

There were 2365 accessions with only one seed per pod.

**9. Seed Mass [100 M].** After harvesting, the seed is sun-dried (moisture about 6%) and then the mass of 100 seeds (in grams) is recorded. There is much variability for this trait among the germplasm accessions (Plate 7, Fig. 18, and Table 26). Seed mass can be influenced by climate and soil factors, but it is a fairly consistent characteristic.

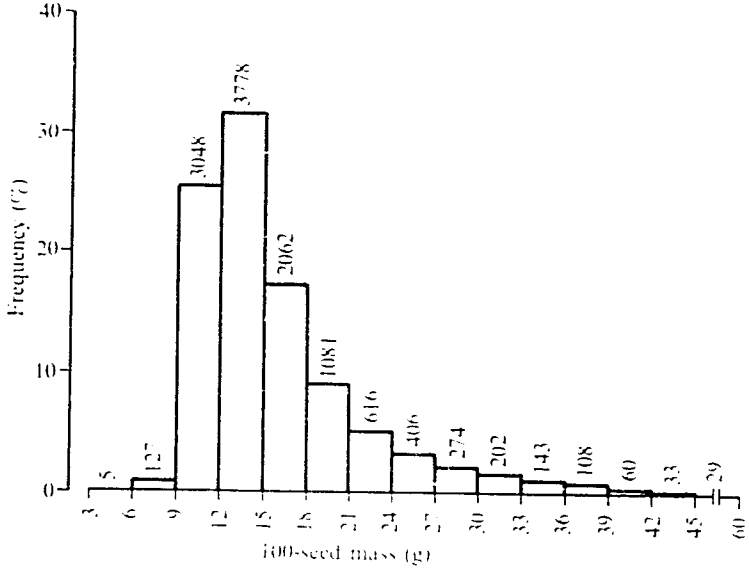



**Figure 18. Frequency distribution for 100-seed mass**

**Table 26. Summary of statistics on 100-seed mass (g)**

| | | | |
|---|---|---|---|
| No. of observations | 11972 | Variance | 40.4 |
| Min. value | 3.8 | SD | 6.3 |
| Max. value | 59.1 | CV (%) | 39.4 |
| Mean | 16.1 | Skewness | 1.95 ± 0.022 |
| Median | 14.1 | Kurtosis | 4.71 ± 0.045 |

**Accessions with 100-seed mass 44 g**

| | | | |
|---|---|---|---|
| ICC 4854 | ICC 4878 | ICC 4899 | ICC 6171 |
| ICC 6182 | ICC 6233 | ICC 6241 | ICC 6243 |
| ICC 7147 | ICC 7185 | ICC 7246 | ICC 7344 |
| ICC 7345 | ICC 7346 | ICC 7358 | ICC 7675 |
| ICC 7712 | ICC 7715 | ICC 7859 | ICC 8150 |
| ICC 8151 | ICC 8957 | ICC 10358 | ICC 10734 |
| ICC 10749 | ICC 11285 | ICC 11295 | ICC 11296 |
| ICC 11297 | ICC 11298 | ICC 11770 | ICC 11815 |
| ICC 11816 | ICC 11841 | ICC 12033 | |

**Accessions with 100-seed mass 8 g**

| | | | |
|---|---|---|---|
| ICC 801 | ICC 1772 | ICC 1773 | ICC 1776 |
| ICC 2945 | ICC 3296 | ICC 3323 | ICC 3582 |
| ICC 3671 | ICC 4043 | ICC 4066 | ICC 4075 |
| ICC 4134 | ICC 4631 | ICC 4667 | ICC 4926 |
| ICC 5002 | ICC 5590 | ICC 5717 | ICC 5874 |
| ICC 6013 | ICC 7542 | ICC 7666 | ICC 10373 |
| ICC 10673 | ICC 11255 | ICC 12286 | ICC 12297 |
| ICC 12430 | | | |

**10. Seed Yield Estimate [SYD].** Seed yield from all the plants of the plot is recorded (Fig. 19 and Table 27). Plant stand is also counted. If the plant stand is at least 60% of the optimum number (40 plants in 4-m long single rows spaced 60 cm apart), then the plot yield is converted to seed yield in kg ha$^{-1}$. No adjustment is made in yield with respect to the varying plant stand. If the stand is less than 60% of the optimum number, the accession is considered unevaluated.

Yields are subject to variation caused by many factors including climate, soil fertility, and many other abiotic and biotic factors. Most chickpea genotypes tend to have a narrow climatic range of adaptation. For example, in the south Indian climate the short-duration genotypes tend to give the maximum yields, but in the climate of northern India, the long-duration types give better yields.

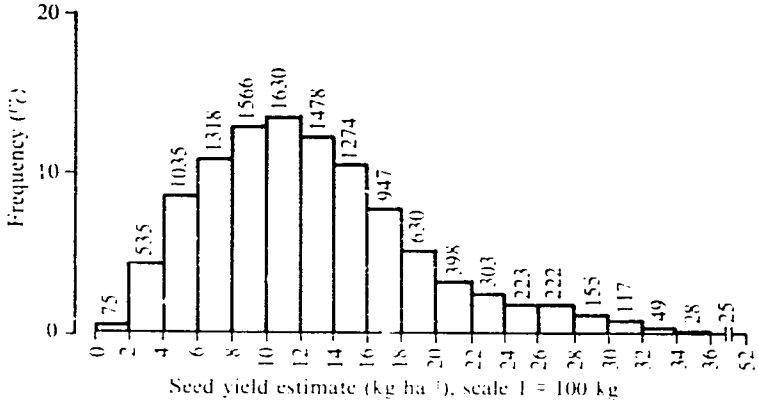



**Figure 19. Frequency distribution for seed yield estimate.**

**Table 27. Summary of statistics on seed yield estimate (kg ha$^{-1}$).**

| | | | |
|---|---|---|---|
| No. of observations | 12 008 | Variance | 422 571.5 |
| Min. value | 70 | SD | 650.1 |
| Max. value | 5130 | CV (%) | 50.5 |
| Mean | 1286.0 | Skewness | 0.90 ± 0.022 |
| Median | 1260.0 | Kurtosis | 0.93 ± 0.045 |

**Accessions with seed yield estimate 3400 kg ha$^{-1}$**

| | | | |
|---|---|---|---|
| ICC 60 | ICC 147 | ICC 180 | ICC 181 |
| ICC 182 | ICC 183 | ICC 184 | ICC 186 |
| ICC 214 | ICC 219 | ICC 250 | ICC 258 |
| ICC 259 | ICC 260 | ICC 335 | ICC 337 |
| ICC 343 | ICC 344 | ICC 345 | ICC 372 |
| ICC 374 | ICC 404 | ICC 409 | ICC 411 |
| ICC 412 | ICC 417 | ICC 421 | ICC 438 |
| ICC 439 | ICC 440 | ICC 515 | ICC 517 |
| ICC 535 | ICC 536 | ICC 553 | ICC 582 |
| ICC 612 | ICC 629 | ICC 630 | ICC 704 |
| ICC 724 | ICC 726 | ICC 772 | ICC 773 |
| ICC 795 | ICC 805 | ICC 820 | ICC 867 |
| ICC 915 | ICC 916 | ICC 943 | ICC 1503 |
| ICC 1613 | | | |

## Specialized evaluation

Evaluations that require specific skill and facilities come under this group. At ICRISAT Center, these evaluations are carried out by specialists in agronomy, biochemistry, entomology, and pathology. They have tested the chickpea accessions for seed quality and for their response to particular stresses. The data obtained are fed back to the germplasm data base.

**Table 28. Summary of statistics on seed protein content (%).**

| | | | |
|---|---|---|---|
| No. of observations | 7180 | Variance | 6.0 |
| Min. value | 12.1 | SD | 2.5 |
| Max. value | 29.6 | CV (%) | 12.4 |
| Mean | 19.8 | Skewness | 0.26 ± 0.029 |
| Median | 19.7 | Kurtosis | 0.20 ± 0.058 |

**Accessions with seed protein content >27%**

| | | | |
|---|---|---|---|
| ICC 958 | ICC 1932 | ICC 2317 | ICC 2918 |
| ICC 3276 | ICC 4981 | ICC 5168 | ICC 5270 |
| ICC 5353 | ICC 5428 | ICC 5912 | ICC 6969 |
| ICC 8397 | ICC 9125 | ICC 9262 | ICC 9320 |
| ICC 9922 | ICC 10600 | ICC 11255 | ICC 11393 |
| ICC 11410 | ICC 11599 | ICC 11943 | ICC 12288 |
| ICC 12291 | | | |

**Accessions with seed protein content <14%**

| | | | |
|---|---|---|---|
| ICC 990 | ICC 992 | ICC 1012 | ICC 1016 |
| ICC 3489 | ICC 8153 | ICC 11615 | ICC 11619 |
| ICC 11620 | ICC 11622 | ICC 11623 | ICC 11625 |
| ICC 11626 | ICC 11629 | ICC 11631 | ICC 11632 |
| ICC 11634 | ICC 11637 | ICC 11638 | |

**Seed Protein Content [PRT].** The percentage of crude protein was estimated in the freshly harvested seeds on a dry-weight basis (Fig. 20 and Table 28). The nitrogen content was analysed by the Autotechnicon Autoanalyser or by the Dye Binding Capacity method. Both procedures showed > 0.98 correlation with the Micro-Kjeldahl method, which is a perfect but more tedious process. The nitrogen was then multiplied by 6.25 to obtain the estimate of protein content. Protein content in a genotype can vary substantially with soil fertility differences, and tends to be substantially reduced if the soil is saline.

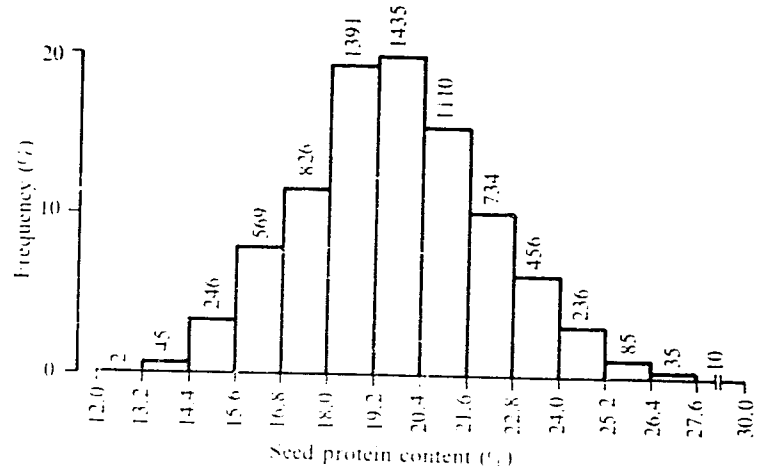



**Figure 20. Frequency distribution for seed protein content.**

**Screening against Diseases.** The germplasm accessions were screened for resistance to the following four diseases.

1. Fusarium Wilt

Causal organism: *Fusarium oxysporum* (Schlecht. emend. Synd. & Hans f.sp *ciceri* (Padwick).

The accessions were sown in a wilt-sick plot along with a highly wilt-susceptible genotype (JG 62) in every fifth row. The results presented are against the Hyderabad race (race 1) of *F. oxysporum* only. Plant mortality was counted at the end of the season, then converted into a percentage and finally into three classes: Resistant (R = < 10% mortality), Moderately resistant (MR = 10-20% mortality), and Susceptible (S = >20% mortality) (Table 29).

**Table 29. Summary of statistics on wilt screening scores (accessions screened = 9752).**

| Descriptor state | No. of accessions | Frequency (%) |
|---|---|---|
| Resistant (R) | 980 | 10.05 |
| Moderately resistant (MR) | 1986 | 20.36 |
| Susceptible (S) | 6786 | 69.59 |

2. Colletotrichum Blight

Causal Organism: *Colletotrichum dematium* Pers. ex Fr.

The disease generally occurs in early sown chickpea when there is rainfall and excessive moisture in the field. The screening was done by sowing the chickpea accessions in the field (Alfisol) in late August. The nursery was artificially inoculated with the disease twice in September and the scoring was done on 1-9 scale, where, 1 = no damage, and 9 = severe damage (Table 30).

**Table 30. Summary of statistics on colletotrichum blight screening scores (accessions screened = 9290).**

| Descriptor state disease score[1] | No. of accessions | Frequency (%) |
|---|---|---|
| 4 | 1 | 0.01 |
| 5 | 62 | 0.67 |
| 6 | 71 | 0.76 |
| 7 | 705 | 7.59 |
| 8 | 609 | 6.55 |
| 9 | 7842 | 84.41 |

1. Scores range from some damage (4) to severe damage (9).

**Accession with disease score 4 for colletotrichum blight**

ICC 2278

**Accessions with disease score 5 for colletotrichum blight**

| | | | |
|---|---|---|---|
| ICC 7 | ICC 341 | ICC 412 | ICC 693 |
| ICC 740 | ICC 758 | ICC 895 | ICC 1062 |
| ICC 1117 | ICC 1156 | ICC 1234 | ICC 1301 |
| ICC 1400 | ICC 1414 | ICC 1654 | ICC 1903 |
| ICC 1973 | ICC 2267 | ICC 2530 | ICC 2619 |
| ICC 3229 | ICC 3258 | ICC 3518 | ICC 3652 |
| ICC 3654 | ICC 4844 | ICC 4874 | ICC 4880 |
| ICC 4893 | ICC 4900 | 4956 | ICC 4974 |
| ICC 5107 | ICC 5119 | ICC 5165 | ICC 5173 |
| ICC 5257 | ICC 5321 | ICC 5340 | ICC 6103 |
| ICC 6174 | ICC 6304 | ICC 6609 | ICC 6671 |
| ICC 6708 | ICC 6718 | ICC 6725 | ICC 6804 |
| ICC 6813 | ICC 6825 | ICC 6832 | ICC 7567 |
| ICC 8174 | ICC 8184 | ICC 8227 | ICC 8238 |
| ICC 8241 | ICC 8497 | ICC 8920 | ICC 9001 |
| ICC 9150 | ICC 10259 | | |

3. Ascochyta Blight

Causal Organism: *Ascochyta rabiei* (Pass.) Lab.

The screening was done at ICRISAT Center using an isolation plant propagator. The inoculum used was isolated from diseased material collected from Hisar. Ten day-old seedlings were inoculated and the disease severity rated 15 days after inoculation on a 1-9 scale, where 1 = no damage, and 9 = dead (Table 31).

**Table 31. Summary of statistics on ascochyta blight screening scores (accessions screened = 331).**

| Descriptor state disease score[1] | No. of accessions | Frequency (%) |
|---|---|---|
| 3 | 1 | 0.30 |
| 4 | 1 | 0.30 |
| 5 | 12 | 3.63 |
| 6 | 5 | 1.51 |
| 7 | 67 | 20.25 |
| 8 | 97 | 29.30 |
| 9 | 148 | 44.71 |

1. Scores range from little damage (3) to dead (9).

**Accession with disease scores 3, 4, and 5 for ascochyta blight**

Disease Score 3

ICC 120

Disease Score 4

ICC 1416

Disease Score 5

| | | | |
|---|---|---|---|
| ICC 12 | ICC 478 | ICC 567 | ICC 652 |
| ICC 657 | ICC 665 | ICC 781 | ICC 813 |
| ICC 816 | ICC 838 | ICC 1069 | ICC 4939 |

4. Botrytis Gray Mold

Causal Organism: *Botrytis cinerea* Pers. ex Fr.

The screening was done at ICRISAT Center using the isolation plant propagator. The isolate used was from diseased material collected from the research farm of G.B. Pant University of Agriculture and Technology, Pantnagar (Nainital). Ten day-old seedlings were inoculated and the disease severity rated 15 days after inoculation on 1-9 scale, where 1 = no damage, and 9 = dead (Table 32).

**Table 32. Summary of statistics on botrytis gray mold screening scores (accessions screened = 402).**

| Descriptor state disease score[1] | No. of accessions | Frequency (%) |
|---|---|---|
| 3 | 1 | 0.25 |
| 4 | 4 | 1.00 |
| 5 | 11 | 2.74 |
| 6 | 18 | 4.48 |
| 7 | 138 | 34.32 |
| 8 | 145 | 36.07 |
| 9 | 85 | 21.14 |

1. Scores range from little damage (3) to dead (9).

**Accession with scores 3, 4, and 5 for botrytis gray mold resistance**

Resistance Score 3

ICC 4014

Resistance Score 4

| | | | |
|---|---|---|---|
| ICC 3540 | ICC 4013 | ICC 4075 | ICC 11321 |

Resistance Score 5

| | | | |
|---|---|---|---|
| ICC 739 | ICC 880 | ICC 922 | ICC 1069 |
| ICC 1084 | ICC 1093 | ICC 1400 | ICC 1467 |
| ICC 4055 | ICC 4065 | ICC 8383 | |

## Correlations

Simple correlation coefficients calculated from the evaluation data (of 12018 accessions) are shown in Table 33. Almost all values are statistically significant (even at the 0.1% level). In the present analysis, since the population size is very large (12 018), the use of the available statistical tables to test the significance of correlation coefficients is limited. In order to concentrate further only on some of the cases having relatively higher magnitude, we have arbitrarily considered the group of characters having strong correlation ($r > 0.3$), moderate correlation ($r > 0.2$, to $r = 0.3$) and weak correlation ($r < 0.2$). However, it should be remembered, that these values are tenable only under the short chickpea-growing season at ICRISAT Center. Scores for several relationships may change if the accessions are grown where there is a longer growing period. The correlation matrix is of help when certain queries are made from the data base. It is of use in estimating whether any accession will qualify when a complex query is made, and can indicate the likely characteristics of accessions that do qualify. For example, since days to 50% flowering, and days to maturity, are positively and strongly correlated, it is unlikely to find accessions with both early flowering and late-maturing traits.

This correlation matrix is designed to effectively answer the relevant queries from the data base. Several relationships likely interest to the plant breeder are pointed out below:

a. Days to 50% flowering has strong positive correlation with plant canopy height and maturity, strong negative association with seed

**Table 33. Correlation matrix of continuously varying characters[1].**

| | DAF | FLD | MATR | PLHT | PLWTH | BPB | APB | BSB | ASB | TRB | PP | SP | SYD | 100M | PRT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DAF | 1.00 | | | | | | | | | | | | | | |
| FLD | -0.26 | 1.00 | | | | | | | | | | | | | |
| MATR | 0.68 | 0.28 | 1.00 | | | | | | | | | | | | |
| PLHT | 0.39 | 0.09 | 0.32 | 1.00 | | | | | | | | | | | |
| PLWTH | 0.06 | 0.03 | -0.04 | 0.59 | 1.00 | | | | | | | | | | |
| BPB | -0.05 | -0.13 | -0.19 | 0.05 | 0.15 | 1.00 | | | | | | | | | |
| APB | -0.28 | -0.03 | -0.22 | -0.21 | -0.16 | 0.01 | 1.00 | | | | | | | | |
| BSB | 0 | -0.07 | -0.04 | -0.02 | 0.09 | 0.33 | -0.06 | 1.00 | | | | | | | |
| ASB | -0.09 | -0.06 | -0.16 | -0.06 | 0 | 0.10 | 0.03 | 0.15 | 1.00 | | | | | | |
| TRB | 0.14 | -0.02 | 0.17 | -0.05 | -0.10 | -0.09 | 0.09 | 0.09 | -0.01 | 1.00 | | | | | |
| PP | -0.28 | 0.02 | -0.31 | -0.17 | 0.07 | 0.19 | 0.07 | 0.26 | 0.31 | 0.19 | 1.00 | | | | |
| SP | 0.09 | -0.01 | 0.05 | 0 | 0.05 | 0 | -0.12 | 0.05 | 0.04 | 0.06 | 0.02 | 1.00 | | | |
| SYD | -0.32 | -0.03 | -0.43 | -0.12 | 0.07 | 0.11 | 0.09 | 0.04 | 0.20 | 0.10 | 0.46 | 0.01 | 1.00 | | |
| 100M | 0.16 | 0.05 | 0.23 | 0.39 | 0.17 | -0.08 | -0.02 | -0.12 | -0.10 | -0.12 | -0.40 | -0.36 | -0.20 | 1.00 | |
| PRT | -0.02 | -0.30 | -0.25 | -0.01 | 0.16 | 0.10 | 0.03 | 0.12 | 0.10 | 0 | -0.05 | 0.03 | -0.08 | -0.03 | 1.00 |

1. Abbreviations are defined in Table 38.

yield, and moderately negative association with pod number, flowering duration, and number of apical primary branches.

b. A longer flowering period is associated with an increase in maturity time and a decrease in seed protein content. Flowering duration seems to have no reliable association with the other characters.

c. Days to maturity has a strong positive correlation with plant height and a moderate correlation with seed mass. Increase in maturity time is associated with a substantial decrease in pod number and seed yield. Apical primary branch number and seed-protein content have moderate negative correlation with days to maturity.

d. Increase in plant height is associated with an increase in seed mass and plant canopy spread. Plant height and number of apical primary branches are negatively associated.

e. The number of basal primary branches is positively and strongly correlated with the number of basal secondary branches.

f. The number of basal secondary branches is moderately positively associated with pod numbers per plant.

g. The number of apical secondary branches is strongly and positively correlated with pod number and has moderately positive correlation with seed yield.

h. The number of tertiary branches showed no strong correlation with any other characteristic.

i. As would be expected, pod number and seed yield revealed strong positive correlations, whereas pod number had strong negative correlation with seed mass.

j. The number of seeds per pod has a strongly negative correlation with seed mass.

## Analysis of Variance by Country of Origin

Analysis of variance for chickpea characters was carried out for those countries from which at least 10 accessions have been evaluated. The range, mean, and standard error for the quantitative characters are given in Table 34. The frequency of the wilt-resistant accessions is summarized in Table 35, whereas the minimum and maximum score and mean of the accessions for colletotrichum blight screening are presented in Table 36. The frequencies of the classes of plant growth habit are indicated in Table 37.

The descriptor abbreviations used in Tables 33 and 34 are summarized in Table 38. Perusal of Tables 34-36 reveals the following points.

a. Chile seems to be a better source for accessions of long-duration, higher plant height, greater seed mass, and semi-erect growth habit, although they are unadapted to ICRISAT Center conditions and produce fewer pods and lower seed yield.

b. Bangladesh appears to be a better source for accessions with high pod number and resistance to fusarium wilt. They are also conspicuous for their shorter plant height.

c. Accessions from Nepal produce a high number of basal secondary branches and seeds per pod, but they produce minimum apical secondary branches, exhibit shorter flowering duration and produce small seeds.

d. Sudanese accessions seem to be the best source for high numbers of apical secondary branches and seed protein content, but these accessions produce a minimum number of basal secondary and tertiary branches. On average, these accessions are the earliest to flower and mature.

e. Longer flowering duration was noticed in the accessions from Spain and Syria.

f. Accessions of Indian origin produced highest average seed yield at ICRISAT Center. One of the reasons for the highest yield might be local adaptability.

g. Accessions from Egypt showed maximum mean for plant spread, and number of apical primary branches. Italian materials gave the highest mean for basal primary branches. Accessions from Israel revealed reduced susceptibility to colletotrichum blight.

h. The accessions from Greece and USSR commonly had erect growth habit, whereas the major proportion of the Jordanian germplasm had spreading habit. There is only one accession with prostrate growth habit in the germplasm and this originated from India.

**Table 34. Variation according to country of origin[1] for continuously varying characters[2].**

| | DAF | | | FLD | | | MATR | | | PLHT | | | PLWTH | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country[1] | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE |
| AFG | 39-92 | 61.1±0.40 | | 20-66 | 39.7±0.30 | | 85-162 | 121.9±0.56 | | 19.0-77.0 | 40.4±0.28 | | 18.3-63.7 | 37.3±0.31 | |
| BGD | 50-67 | 57.2±0.78 | | 30-43 | 36.8±0.62 | | 104-118 | 112.4±0.71 | | 23.7-35.0 | 30.0±0.39 | | 31.0-42.7 | 37.0±0.47 | |
| CHL | 60-87 | 82.1±0.57 | | 24-43 | 37.2±0.43 | | 120-151 | 140.9±0.83 | | 33.7-66.0 | 54.4±0.78 | | 35.3-53.4 | 41.1±0.41 | |
| CYP | 43-89 | 64.6±2.72 | | 21-57 | 39.7±2.47 | | 93-159 | 124.9±3.30 | | 16.7-54.0 | 35.3±1.96 | | 19.3-48.0 | 32.8±1.41 | |
| DZA | 37-81 | 63.4±4.09 | | 33-56 | 41.8±1.85 | | 100-142 | 126.7±3.53 | | 21.0-48.3 | 35.8±1.86 | | 20.7-66.0 | 35.1±2.83 | |
| EGY | 36-96 | 53.9±1.52 | | 27-52 | 36.9±1.14 | | 85-153 | 109.5±2.21 | | 29.0-52.0 | 41.4±0.74 | | 25.0-88.3 | 46.5±2.16 | |
| ESP | 51-86 | 72.8±1.76 | | 28-67 | 42.3±1.66 | | 106-144 | 136.6±1.73 | | 35.0-82.0 | 53.3±1.75 | | 30.0-82.3 | 40.5±1.64 | |
| ETH | 33-91 | 52.2±0.89 | | 13-51 | 33.3±0.50 | | 85-157 | 107.2±1.18 | | 15.7-61.7 | 33.4±0.73 | | 19.0-83.3 | 34.6±0.71 | |
| GRC | 59-86 | 74.4±2.33 | | 31-54 | 39.4±1.41 | | 116-147 | 136.4±2.07 | | 34.3-60.0 | 49.4±1.79 | | 25.0-49.8 | 38.2±1.36 | |
| IND | 33-100 | 61.4±0.15 | | 16-70 | 33.7±0.13 | | 84-169 | 112.2±0.26 | | 16.0-73.3 | 35.2±0.10 | | 13.3-124.0 | 40.2±0.19 | |
| IRN | 37-101 | 66.4±0.16 | | 16-75 | 36.9±0.20 | | 85-164 | 119.6±0.22 | | 14.3-72.0 | 49.3±0.13 | | 15.0-109.0 | 41.0±0.17 | |
| IRQ | 47-98 | 65.5±3.68 | | 26-43 | 35.3±1.42 | | 104-147 | 127.0±2.75 | | 31.3-49.0 | 37.5±1.23 | | 15.3-98.0 | 36.8±4.66 | |
| ISR | 36-98 | 71.4±2.10 | | 22-47 | 34.4±0.98 | | 96-157 | 128.2±2.56 | | 20.0-56.0 | 42.4±1.48 | | 20.3-53.6 | 37.2±1.10 | |
| ITA | 60-98 | 76.3±2.50 | | 27-48 | 37.0±1.84 | | 114-157 | 134.9±3.04 | | 35.3-66.7 | 51.6±2.15 | | 33.3-82.3 | 43.0±2.96 | |
| JOR | 48-75 | 62.1±1.32 | | 31-43 | 34.6±1.17 | | 102-132 | 114.2±1.46 | | 29.0-51.6 | 36.3±1.44 | | 15.3-59.0 | 42.7±2.19 | |
| LBN | 47-88 | 61.5±2.43 | | 21-54 | 38.0±1.71 | | 110-138 | 124.4±2.04 | | 27.0-43.7 | 34.5±0.94 | | 30.7-41.0 | 34.7±0.64 | |
| MAR | 36-94 | 73.8±1.69 | | 29-56 | 36.6±0.92 | | 105-164 | 129.5±1.79 | | 25.7-67.7 | 45.5±1.36 | | 24.0-53.0 | 37.3±1.11 | |
| MEX | 35-94 | 68.6±0.62 | | 24-64 | 40.4±0.41 | | 85-157 | 126.5±0.72 | | 17.7-61.3 | 41.0±0.40 | | 17.7-64.7 | 37.7±0.39 | |
| NPL | 42-83 | 68.4±0.84 | | 19-44 | 31.4±0.52 | | 100-142 | 119.8±0.89 | | 24.0-48.4 | 34.1±0.68 | | 21.3-49.6 | 38.9±0.58 | |
| PAK | 39-107 | 76.6±1.02 | | 20-54 | 31.9±0.65 | | 88-164 | 126.3±1.21 | | 29.0-62.6 | 38.7±0.66 | | 19.7-82.3 | 36.9±0.97 | |
| SDN | 42-56 | 47.7±1.40 | | 31-44 | 39.6±1.64 | | 88-109 | 103.1±1.72 | | 37.3-59.4 | 46.4±1.88 | | 30.3-52.3 | 43.0±1.83 | |
| SUN | 39-100 | 72.8±1.58 | | 26-59 | 38.2±0.86 | | 88-162 | 130.5±1.80 | | 25.7-96.3 | 49.1±1.66 | | 17.0-91.0 | 38.1±1.36 | |
| SYR | 53-85 | 68.3±2.52 | | 28-63 | 42.3±3.09 | | 114-141 | 130.2±1.82 | | 28.0-53.0 | 43.6±1.58 | | 20.6-50.6 | 35.5±2.08 | |
| TUN | 57-85 | 73.0±1.45 | | 17-49 | 38.8±1.32 | | 112-148 | 131.9±1.70 | | 37.0-59.2 | 47.9±1.07 | | 26.0-107.7 | 40.4±2.56 | |
| TUR | 44-93 | 69.1±0.60 | | 16-59 | 36.3±0.34 | | 94-159 | 132.5±0.59 | | 22.3-60.0 | 41.0±0.36 | | 14.3-65.0 | 34.5±0.39 | |
| USA | 39-89 | 66.7±2.06 | | 17-48 | 35.2±1.03 | | 88-148 | 125.1±1.89 | | 24.3-58.7 | 40.2±1.15 | | 22.0-59.7 | 36.9±1.20 | |

*Continued.*

**Table 34.** *Continued*

| Country | BPB | | | APB | | | BSB | | | ASB | | | TRB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE |
| AFG | 0.7-6.0 | 2.36±0.027 | | 0-6.7 | 2.02±0.053 | | 0-9.3 | 2.50±0.056 | | 0-14.0 | 4.17±0.090 | | 0-11.7 | 2.36±0.079 | |
| BGD | 1.7-4.3 | 2.62±0.098 | | 0-2.0 | 0.54±0.105 | | 1.0-4.7 | 2.98±0.187 | | 2.3-7.7 | 4.46±0.223 | | 0-4.7 | 2.33±0.218 | |
| CHI | 1.3-4.3 | 2.65±0.063 | | 0-3.0 | 0.66±0.082 | | 0-5.7 | 2.73±0.136 | | 0.4-7.7 | 3.46±0.154 | | 0-4.0 | 0.69±0.117 | |
| CYP | 1.3-3.7 | 2.49±0.137 | | 0-3.7 | 1.44±0.237 | | 0-7.0 | 2.56±0.467 | | 0.3-9.3 | 4.04±0.604 | | 0-7.0 | 1.42±0.455 | |
| DZA | 1.0-3.7 | 2.43±0.206 | | 0-3.3 | 1.24±0.320 | | 0.7-5.7 | 2.84±0.363 | | 0.7-7.3 | 3.90±0.574 | | 0-6.0 | 1.69±0.493 | |
| EGY | 1.0-4.3 | 2.53±0.103 | | 0.3-5.3 | 2.68±0.180 | | 0-9.7 | 2.16±0.272 | | 0-10.3 | 4.57±0.346 | | 0-6.7 | 0.90±0.230 | |
| ESP | 1.7-6.0 | 2.85±0.159 | | 0-4.3 | 1.09±0.187 | | 0-7.0 | 2.97±0.253 | | 0-9.0 | 3.54±0.330 | | 0-3.3 | 0.68±0.181 | |
| ETH | 1.0-4.7 | 2.39±0.061 | | 0-7.0 | 2.30±0.111 | | 0-8.0 | 2.22±0.141 | | 0-11.7 | 3.70±0.144 | | 0-7.3 | 1.32±0.133 | |
| GRC | 2.0-4.3 | 2.72±0.145 | | 0-3.0 | 0.93±0.201 | | 0.3-5.0 | 2.64±0.287 | | 0.7-6.8 | 3.92±0.393 | | 0-4.7 | 0.84±0.289 | |
| IND | 0.3-15.7 | 2.93±0.011 | | 0-12.0 | 1.64±0.019 | | 0-13.7 | 3.22±0.023 | | 0-22.7 | 4.84±0.032 | | 0-12.0 | 0.76±0.018 | |
| IRN | 0-10.0 | 2.68±0.011 | | 0-8.3 | 1.25±0.019 | | 0-13.0 | 2.65±0.024 | | 0-13.3 | 3.54±0.032 | | 0-13.0 | 1.01±0.025 | |
| IRQ | 1.3-4.3 | 2.71±0.214 | | 0-4.7 | 2.13±0.373 | | 0.3-6.0 | 2.83±0.430 | | 1.3-10.0 | 4.03±0.548 | | 0-9.3 | 1.53±0.675 | |
| ISR | 1.7-6.0 | 3.02±0.168 | | 0-6.0 | 1.54±0.187 | | 0.7-7.7 | 3.41±0.280 | | 0-9.0 | 3.26±0.325 | | 0-11.3 | 1.83±0.428 | |
| ITA | 2.7-6.0 | 3.12±0.273 | | 0-4.0 | 1.18±0.319 | | 0.3-6.7 | 3.18±0.358 | | 2.3-16.0 | 5.04±0.801 | | 0-3.3 | 0.54±0.229 | |
| JOR | 1.3-4.0 | 2.72±0.125 | | 0-6.0 | 1.48±0.331 | | 0-8.3 | 3.09±0.339 | | 0.7-9.0 | 3.95±0.396 | | 0-5.3 | 0.75±0.304 | |
| LBN | 1.7-3.7 | 2.52±0.118 | | 0-3.7 | 1.69±0.308 | | 0.7-6.0 | 2.64±0.332 | | 1.0-7.0 | 3.42±0.351 | | 0-6.0 | 0.55±0.338 | |
| MAR | 1.0-6.0 | 2.66±0.126 | | 0-5.0 | 1.43±0.186 | | 0.3-5.7 | 2.80±0.169 | | 0.7-7.7 | 3.82±0.228 | | 0-5.7 | 0.96±0.212 | |
| MEX | 1.3-5.7 | 2.64±0.034 | | 0-7.7 | 0.86±0.065 | | 0-7.0 | 2.92±0.071 | | 0-12.3 | 3.80±0.106 | | 0-10.7 | 1.14±0.077 | |
| NPL | 1.7-4.3 | 2.86±0.060 | | 0-2.3 | 0.36±0.065 | | 1.3-7.2 | 3.74±0.142 | | 0-12.8 | 3.69±0.227 | | 0-4.3 | 1.29±0.157 | |
| PAK | 1.0-7.0 | 3.05±0.082 | | 0-6.3 | 1.26±0.104 | | 0-9.0 | 3.65±0.143 | | 0-11.3 | 3.68±0.196 | | 0-8.7 | 1.09±0.151 | |
| SDN | 1.3-3.7 | 2.35±0.206 | | 0-5.3 | 2.52±0.469 | | 0-4.0 | 1.85±0.501 | | 0-14.3 | 5.86±1.108 | | 0-3.4 | 0.22±0.149 | |
| SUN | 1.3-4.7 | 2.76±0.073 | | 0-5.7 | 0.91±0.109 | | 0.7-6.7 | 3.20±0.155 | | 0-11.3 | 3.88±0.199 | | 0-6.0 | 0.99±0.142 | |
| SYR | 2.0-3.7 | 2.67±0.140 | | 0-4.0 | 1.29±0.288 | | 0-5.8 | 2.52±0.403 | | 1.7-6.3 | 3.54±0.317 | | 0-7.3 | 1.41±0.503 | |
| TUN | 1.3-3.0 | 2.33±0.080 | | 0-4.3 | 1.03±0.175 | | 0-5.3 | 2.52±0.230 | | 1.3-7.0 | 3.38±0.242 | | 0-4.0 | 0.60±0.212 | |
| TUR | 0.7-5.0 | 2.37±0.032 | | 0-7.0 | 1.28±0.055 | | 0-9.7 | 2.73±0.080 | | 0-9.7 | 3.19±0.088 | | 0-9.3 | 1.14±0.074 | |
| USA | 1.7-5.0 | 2.75±0.097 | | 0-5.3 | 1.12±0.159 | | 0-6.7 | 3.25±0.219 | | 0-9.0 | 3.44±0.234 | | 0-11.0 | 0.65±0.255 | |

*Continued.*

**Table 34.** *Continued*

| Country | PP | | | SP | | | SYD | | | 100M | | | PRT | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE | Range | Mean | SE |
| AEG | 6-136 | 34.6±0.62 | | 1.0-3.0 | 1.19±0.007 | | 130-2240 | 1096± 15.2 | | 8.5-31.3 | 17.0±0.13 | | 16.3-26.0 | 19.8±0.08 | |
| BGD | 37-97 | 58.8±2.60 | | 1.0-1.8 | 1.26±0.025 | | 830-1570 | 1216± 37.0 | | 9.1-13.2 | 11.7±0.18 | | 15.2-17.7 | 16.6±0.11 | |
| CHI | 3-37 | 17.0±0.88 | | 1.0-1.5 | 1.08±0.127 | | 210-1570 | 794± 34.7 | | 17.7-58.1 | 35.5±0.76 | | 15.7-23.9 | 19.2±0.17 | |
| CYP | 10-71 | 33.4±4.02 | | 1.0-1.6 | 1.24±0.043 | | 230-2200 | 1007±124.8 | | 7.6-29.4 | 15.3±1.12 | | 15.6-23.6 | 18.7±0.54 | |
| DZA | 5-68 | 31.4±4.48 | | 1.0-2.1 | 1.21±0.080 | | 300-2070 | 1164±132.0 | | 12.0-43.9 | 26.6±3.00 | | 15.0-20.1 | 17.3±0.48 | |
| EGY | 9-93 | 33.2±2.88 | | 1.0-2.6 | 1.33±0.040 | | 430-1960 | 1094± 42.3 | | 8.6-35.2 | 14.9±1.05 | | 17.7-23.4 | 19.8±0.47 | |
| ESP | 5-72 | 28.3±2.81 | | 1.0-1.7 | 1.10±0.028 | | 440-2330 | 1160± 74.2 | | 9.1-49.9 | 32.4±2.07 | | 14.5-20.7 | 17.0±0.27 | |
| ETH | 6-163 | 40.0±1.81 | | 1.0-2.3 | 1.28±0.017 | | 260-2530 | 1043± 43.5 | | 7.7-36.8 | 13.2±0.42 | | 15.6-26.1 | 19.7±0.21 | |
| GRC | 15-45 | 27.8±1.98 | | 1.0-1.6 | 1.13±0.030 | | 270-1380 | 956± 75.4 | | 9.2-36.9 | 22.6±1.53 | | 16.3-23.4 | 19.3±0.47 | |
| IND | 5-238 | 47.1±0.37 | | 1.0-2.9 | 1.21±0.000 | | 200-5130 | 1550± 9.8 | | 3.8-48.2 | 14.5±0.06 | | 13.4-29.6 | 19.9±0.05 | |
| IRN | 3-165 | 31.1±0.28 | | 1.0-2.9 | 1.23±0.000 | | 70-3270 | 1064± 8.2 | | 7.2-51.2 | 15.8±0.09 | | 15.2-27.8 | 20.4±0.04 | |
| IRQ | 6-53 | 25.2±3.47 | | 1.0-1.2 | 1.08±0.020 | | 330-1640 | 863± 97.0 | | 11.3-45.3 | 31.7±3.14 | | 18.1-21.1 | 19.5±0.65 | |
| ISR | 5-122 | 27.7±3.05 | | 1.0-1.7 | 1.16±0.026 | | 200-2490 | 931± 87.6 | | 8.8-41.2 | 22.6±1.37 | | 16.8-24.2 | 19.6±0.38 | |
| ITA | 11-117 | 37.7±6.01 | | 1.0-2.0 | 1.18±0.062 | | 250-1700 | 1021± 97.2 | | 10.4-35.5 | 21.4±1.99 | | 16.4-21.3 | 18.8±0.42 | |
| JOR | 15-76 | 31.8±2.82 | | 1.0-1.6 | 1.13±0.039 | | 580-2090 | 1222± 92.4 | | 12.6-40.8 | 25.7±1.63 | | 18.1-22.3 | 20.0±0.25 | |
| LBN | 12-97 | 26.6±4.15 | | 1.0-1.7 | 1.11±0.037 | | 670-1700 | 1159± 78.9 | | 10.4-46.0 | 29.1±1.93 | | 15.1-21.6 | 16.9±0.55 | |
| MAR | 5-79 | 34.5±2.45 | | 1.0-1.6 | 1.22±0.024 | | 230-2110 | 1136± 54.6 | | 9.2-38.1 | 20.1±1.19 | | 13.8-22.0 | 16.8±0.32 | |
| MEX | 5-117 | 33.8±0.84 | | 1.0-3.2 | 1.30±0.012 | | 330-2430 | 1271± 21.8 | | 9.6-59.1 | 17.5±0.30 | | 12.1-26.8 | 17.2±0.13 | |
| NPL | 8-97 | 54.1±2.22 | | 1.0-1.9 | 1.39±0.021 | | 210-3130 | 1151± 49.6 | | 7.6-29.8 | 11.1±0.32 | | 15.3-27.8 | 20.1±0.55 | |
| PAK | 8-100 | 35.2±1.71 | | 1.0-3.0 | 1.25±0.021 | | 230-2890 | 1058± 49.7 | | 4.9-31.4 | 14.0±0.32 | | 15.9-27.9 | 20.8±0.26 | |
| SDN | 17-87 | 48.0±7.05 | | 1.0-2.2 | 1.26±0.102 | | 430-1880 | 1384±132.0 | | 10.5-14.7 | 12.4±0.40 | | 20.0-22.9 | 21.7±0.41 | |
| SUN | 5-102 | 36.9±2.52 | | 1.0-1.7 | 1.21±0.018 | | 120-2130 | 900± 50.7 | | 8.4-34.6 | 20.3±0.70 | | 14.1-24.3 | 18.3±0.30 | |
| SYR | 11-54 | 25.3±3.45 | | 1.0-1.5 | 1.10±0.036 | | 730-1500 | 1144± 62.3 | | 19.7-40.1 | 28.5±2.03 | | 14.5-21.0 | 17.0±0.62 | |
| TUN | 14-46 | 25.3±1.90 | | 1.0-1.5 | 1.10±0.024 | | 620-1970 | 1271± 71.8 | | 20.2-51.3 | 32.7±1.34 | | 16.4-22.9 | 17.9±0.34 | |
| TUR | 3-153 | 27.4±0.97 | | 1.0-2.2 | 1.13±0.009 | | 100-2560 | 1000± 24.1 | | 7.4-49.8 | 27.8±0.51 | | 13.8-24.5 | 18.1±0.12 | |
| USA | 7-81 | 30.5±2.23 | | 1.0-2.0 | 1.18±0.029 | | 300-2090 | 973± 59.7 | | 9.8-57.6 | 24.6±2.07 | | 13.7-25.2 | 18.3±0.46 | |

1. Country codes are defined in Table 1.
2. Abbreviations are defined in Table 38.

Table 35. Distribution of accessions resistant (< 10% mortality) to fusarium wilt and their frequency expressed as percentage of those tested.

| Country | No. of accessions | Frequency (%) |
|---|---|---|
| Afghanistan | 27 | 5.64 |
| Algeria | 1 | 11.11 |
| Bangladesh | 13 | 39.39 |
| Cyprus | 1 | 8.33 |
| Egypt | 1 | 2.27 |
| Ethiopia | 19 | 17.76 |
| India | 432 | 9.37 |
| Iran | 436 | 13.21 |
| Israel | 2 | 6.06 |
| Jordan | 1 | 5.56 |
| Morocco | 2 | 6.06 |
| Mexico | 9 | 4.31 |
| Nepal | 1 | 1.43 |
| Pakistan | 11 | 10.68 |
| Turkey | 9 | 3.54 |
| USA | 2 | 6.67 |
| USSR | 2 | 3.57 |

Table 36. Colletotrichum blight disease scores.

| Country | No. of accessions screened | Disease score[1] | | |
|---|---|---|---|---|
| | | Range | Mean | SE |
| Afghanistan | 455 | 6-9 | 8.98 | ± 0.01 |
| Algeria | 9 | 7-9 | 8.78 | ± 0.22 |
| Bangladesh | 33 | 9 | 9.00 | ± 0 |
| Chile | 52 | 9 | 9.00 | ± 0 |
| Cyprus | 12 | 7-9 | 8.58 | ± 0.19 |
| Egypt | 44 | 8-9 | 8.98 | ± 0.02 |
| Ethiopia | 100 | 7-9 | 8.90 | ± 0.04 |
| Greece | 6 | 7-9 | 8.67 | ± 0.33 |
| India | 4505 | 5-9 | 8.68 | ± 0.01 |
| Iran | 3181 | 4-9 | 8.79 | ± 0.01 |
| Iraq | 5 | 5-9 | 8.00 | ± 0.77 |
| Israel | 33 | 5-9 | 7.94 | ± 0.23 |
| Italy | 7 | 9 | 9.00 | ± 0 |
| Jordan | 18 | 6-9 | 8.[illegible] | ± 0.23 |
| Lebanon | 11 | 7-9 | 8.82 | ± 0.18 |
| Mexico | 207 | 6-9 | 8.48 | ± 0.06 |
| Morocco | 26 | 5-9 | 8.54 | ± 0.21 |
| Pakistan | 95 | 5-9 | 8.66 | ± 0.09 |
| Nepal | 49 | 9 | 9.00 | ± 0 |
| Spain | 22 | 6-9 | 8.27 | ± 0.21 |
| Sudan | 10 | 8-9 | 8.80 | ± 0.13 |
| Syria | 8 | 9 | 9.00 | ± 0 |
| Tunisia | 22 | 7-9 | 8.86 | ± 0.10 |
| Turkey | 194 | 5-9 | 8.79 | ± 0.05 |
| USA | 25 | 8-9 | 8.96 | ± 0.04 |
| USSR | 51 | 5-9 | 8.50 | ± 0.15 |

1. Scored on a 1-9 scale where 1 = disease-free, 9 = killed.

**Table 37. Distribution of plant growth habit classes.**

| Country | No. of accessions screened | Frequencies of growth habit classes (%)[1] | | | | |
|---|---|---|---|---|---|---|
| | | E | SE | SS | S | P |
| Afghanistan | 679 | 0 | 78.94 | 21.06 | 0 | 0 |
| Algeria | 14 | 0 | 85.71 | 14.29 | 0 | 0 |
| Bangladesh | 33 | 0 | 90.91 | 9.09 | 0 | 0 |
| Chile | 75 | 1.33 | 98.66 | 0 | 0 | 0 |
| Cyprus | 21 | 0 | 71.43 | 28.57 | 0 | 0 |
| Egypt | 52 | 0 | 96.15 | 3.85 | 0 | 0 |
| Ethiopia | 161 | 0 | 69.57 | 30.43 | 0 | 0 |
| Greece | 19 | 21.05 | 78.95 | 0 | 0 | 0 |
| India | 5362 | 0.52 | 52.77 | 46.24 | 0.43 | 0.02 |
| Iran | 4070 | 0.22 | 67.59 | 31.77 | 0.42 | 0 |
| Iraq | 15 | 0 | 53.33 | 46.66 | 0 | 0 |
| Israel | 44 | 9.09 | 81.82 | 9.09 | 0 | 0 |
| Italy | 17 | 11.76 | 76.47 | 11.76 | 0 | 0 |
| Jordan | 24 | 0 | 25.00 | 70.83 | 4.17 | 0 |
| Lebanon | 19 | 0 | 47.37 | 52.63 | 0 | 0 |
| Mexico | 355 | 0 | 76.90 | 23.10 | 0 | 0 |
| Morocco | 53 | 5.66 | 83.02 | 11.32 | 0 | 0 |
| Nepal | 70 | 0 | 70.00 | 27.14 | 2.86 | 0 |
| Pakistan | 135 | 0 | 88.89 | 11.11 | 0 | 0 |
| Spain | 32 | 3.13 | 84.38 | 12.50 | 0 | 0 |
| Sudan | 11 | 0 | 61.82 | 18.18 | 0 | 0 |
| Syria | 15 | 0 | 86.67 | 13.33 | 0 | 0 |
| Tunisia | 29 | 0 | 79.66 | 10.34 | 0 | 0 |
| Turkey | 374 | 0 | 93.73 | 12.82 | 0 | 0 |
| USA | 51 | 0 | 88.24 | 11.76 | 0 | 0 |
| USSR | 88 | 19.32 | 67.04 | 12.64 | 0 | 0 |

1. Classes are defined in Table 10.

**Table 38. Chickpea descriptor abbreviations.**

| | |
|---|---|
| APB | Apical primary branches per plant (no.) |
| ASB | Apical secondary branches per plant (no.) |
| BPB | Basal primary branches per plant (no.) |
| BSB | Basal secondary branches per plant (no.) |
| DAF | Days to 50% flowering |
| EVS | Evaluation season |
| FCOL | Flower color |
| FLD | Flowering duration (d) |
| GRHB | Growth habit |
| ICC | ICRISAT chickpea accession |
| MATR | Days to maturity |
| PLHT | Plant canopy height (cm) |
| PLWTH | Plant canopy width (cm) |
| PP | Pods per plant (no.) |
| PRT | Seed protein content (%) |
| SCOL | Seed color |
| SP | Seeds per pod (no.) |
| SSH | Seed shape |
| SSUR | Seed surface |
| STCOL | Stem color |
| SYD | Seed yield estimate (kg $ha^{-1}$) |
| TRB | Tertiary branches per plant (no.) |
| 100M | 100-seed mass (g) |

## Selection of Accessions for Utilization

The evaluation data have been summarized character by character in Tables 8 to 37. Often two extremes of the ranges are shown, such as accessions with 100-seed mass >44 g and accessions with 100-seed mass <8 g, along with each summary.

It is also possible to make selections that combine two or more characteristics. Examples of such selections are listed below (Requests 1-17) as guides to the type of requests that can usefully be directed towards the germplasm for materials that may be of utility for breeders or other scientists.

**Request 1. Short-duration accessions with large seeds (DAF < 40 days and 100M >20 g).**

| | | | | |
|---|---|---|---|---|
| ICC 812 | ICC 2859 | ICC 3782 | ICC 5097 | ICC 5676 |
| ICC 5677 | ICC 5686 | ICC 5689 | ICC 5695 | ICC 5744 |
| ICC 5954 | ICC 5956 | ICC 6001 | ICC 6101 | ICC 6121 |
| ICC 6126 | ICC 7344 | ICC 7345 | ICC 7393 | ICC 7410 |
| ICC 7423 | ICC 7424 | ICC 7425 | ICC 7427 | ICC 7458 |
| ICC 7496 | ICC 7802 | ICC 8095 | ICC 10927 | ICC 11104 |
| ICC 11150 | ICC 11152 | ICC 11155 | ICC 11483 | ICC 12197 |

**Request 2. Short-duration accessions with white flowers (FCOL W and DAF < 40 days).**

| | | | | |
|---|---|---|---|---|
| ICC 2404 | ICC 2626 | ICC 2648 | ICC 2665 | ICC 5790 |
| ICC 5954 | ICC 5956 | ICC 7282 | ICC 7344 | ICC 7345 |
| ICC 7453 | ICC 7534 | ICC 7540 | ICC 7802 | ICC 8095 |
| ICC 8147 | ICC 8622 | ICC 8789 | ICC 8795 | ICC 8810 |
| ICC 8813 | ICC 8861 | ICC 8864 | ICC 8898 | |

**Request 3. Short-duration accessions with resistance to fusarium wilt (DAF <45 days and resistance to fusarium wilt).**

| | | | | |
|---|---|---|---|---|
| ICC 1097 | ICC 1294 | ICC 1361 | ICC 2810 | ICC 3396 |
| ICC 3782 | ICC 4961 | ICC 5686 | ICC 5689 | ICC 5810 |
| ICC 6922 | ICC 7535 | ICC 7540 | ICC 8454 | ICC 8612 |
| ICC 8622 | ICC 8679 | ICC 10655 | ICC 11021 | ICC 11134 |
| ICC 11141 | ICC 11157 | ICC 11160 | ICC 11169 | ICC 11345 |
| ICC 11544 | ICC 11557 | ICC 12245 | ICC 12256 | ICC 12257 |
| ICC 12265 | ICC 12273 | ICC 12425 | ICC 12434 | ICC 12437 |
| ICC 12440 | ICC 12457 | | | |

**Request 4. Long-duration accessions with white flower and erect growth habit (DAF > 80 days, FCOL W and GRHB E).**

| | | | | |
|---|---|---|---|---|
| ICC 6235 | ICC 7722 | ICC 8507 | ICC 8920 | ICC 8925 |
| ICC 8926 | ICC 9206 | ICC 10881 | ICC 11142 | ICC 11264 |
| ICC 11269 | ICC 11846 | | | |

**Request 5. Long-duration accessions with fusarium wilt resistance (DAF >80 days and resistance to fusarium wilt).**

| | | | | |
|---|---|---|---|---|
| ICC 958 | ICC 1903 | ICC 2061 | ICC 2278 | ICC 2350 |
| ICC 3273 | ICC 3274 | ICC 3428 | ICC 4640 | ICC 4987 |
| ICC 5024 | ICC 6718 | ICC 6875 | ICC 6879 | ICC 7807 |
| ICC 7827 | ICC 7840 | ICC 7854 | ICC 7856 | ICC 7882 |
| ICC 7883 | ICC 7886 | ICC 7891 | ICC 7931 | ICC 8058 |
| ICC 8070 | ICC 8071 | ICC 8090 | ICC 8097 | ICC 8124 |
| ICC 8139 | ICC 8193 | ICC 8470 | ICC 8565 | ICC 9335 |
| ICC 9337 | ICC 9364 | ICC 9383 | ICC 9387 | ICC 9400 |
| ICC 9457 | ICC 11523 | ICC 11669 | ICC 11772 | ICC 12162 |
| ICC 12202 | ICC 12444 | | | |

**Request 6. Accessions with high number of basal primary branches and high seed yield (BPB >5 and SYD >2500 kg ha$^{-1}$).**

| | | | | |
|---|---|---|---|---|
| ICC 42 | ICC 43 | ICC 132 | ICC 148 | ICC 168 |
| ICC 169 | ICC 184 | ICC 202 | ICC 242 | ICC 261 |
| ICC 264 | ICC 310 | ICC 318 | ICC 727 | ICC 345 |
| ICC 353 | ICC 362 | ICC 586 | ICC 884 | ICC 885 |
| ICC 891 | ICC 903 | ICC 1128 | ICC 1129 | ICC 1560 |
| ICC 1563 | ICC 1567 | ICC 1840 | | |

**Request 7. Accessions with high number of basal secondary branches and high seed yield (BSB >8 and SYD >1500 kg ha$^{-1}$).**

| | | | | |
|---|---|---|---|---|
| ICC 53 | ICC 168 | ICC 1221 | ICC 1244 | ICC 1732 |
| ICC 2664 | ICC 3034 | ICC 5060 | ICC 5176 | ICC 5949 |
| ICC 6140 | ICC 6510 | ICC 6519 | ICC 7060 | ICC 7081 |
| ICC 7818 | ICC 8326 | ICC 8931 | ICC 10474 | ICC 10495 |
| ICC 10630 | ICC 10799 | ICC 10982 | ICC 11019 | ICC 11355 |
| ICC 11524 | ICC 12366 | | | |

**Request 8. Accessions with high number of apical secondary branches and high seed yield (ASB >10 and SYD >3000 kg ha$^{-1}$).**

| | | | | |
|---|---|---|---|---|
| ICC 25 | ICC 136 | ICC 178 | ICC 179 | ICC 180 |
| ICC 183 | ICC 184 | ICC 186 | ICC 201 | ICC 216 |
| ICC 217 | ICC 231 | ICC 341 | ICC 350 | ICC 352 |
| ICC 353 | ICC 362 | ICC 370 | ICC 451 | ICC 466 |
| ICC 514 | ICC 517 | ICC 534 | ICC 536 | ICC 582 |
| ICC 610 | ICC 724 | ICC 735 | ICC 738 | ICC 788 |
| ICC 794 | ICC 795 | ICC 797 | ICC 805 | ICC 887 |
| ICC 891 | ICC 915 | ICC 930 | ICC 935 | ICC 1231 |
| ICC 1268 | ICC 1550 | ICC 1726 | ICC 12159 | |

**Request 9. Multi-seeded accessions with high seed yield (SP >2 and SYD >1500 kg ha$^{-1}$).**

| | | | | |
|---|---|---|---|---|
| ICC 9 | ICC 613 | ICC 841 | ICC 1315 | ICC 1401 |
| ICC 1630 | ICC 1813 | ICC 1901 | ICC 2259 | ICC 2400 |
| ICC 10174 | ICC 11901 | | | |

**Request 10. High-yielding accessions with semi-erect growth habit (SYD >3000 kg ha$^{-1}$ and GRHBSE).**

| | | | | |
|---|---|---|---|---|
| ICC 60 | ICC 132 | ICC 159 | ICC 187 | ICC 345 |
| ICC 366 | ICC 510 | ICC 514 | ICC 575 | ICC 577 |
| ICC 612 | ICC 861 | ICC 1238 | ICC 1265 | ICC 1268 |
| ICC 1503 | ICC 1565 | ICC 1612 | ICC 1613 | ICC 1619 |
| ICC 1624 | ICC 1625 | ICC 1628 | ICC 1631 | ICC 2866 |
| ICC 9117 | ICC 12159 | | | |

**Request 11. High-yielding kabuli[1] accessions (SSH OWL and SYD >2000 kg ha$^{-1}$).**

| | | | | |
|---|---|---|---|---|
| ICC 169 | ICC 377 | ICC 929 | ICC 1150 | ICC 1141 |
| ICC 1703 | ICC 2570 | ICC 2654 | ICC 2689 | ICC 2716 |
| ICC 3410 | ICC 3419 | ICC 4754 | ICC 4834 | ICC 4870 |
| ICC 6012 | ICC 7569 | ICC 7801 | ICC 7818 | ICC 7848 |
| ICC 7972 | ICC 8465 | ICC 9145 | ICC 9148 | ICC 9244 |
| ICC 9246 | ICC 10369 | ICC 10776 | ICC 11640 | ICC 11704 |
| ICC 12097 | | | | |

1. Kabuli chickpea are defined on page 14.

**Request 12. Kabuli accessions with extra large seeds (SSH OWL and 100M >45 g).**

| | | | | |
|---|---|---|---|---|
| ICC 4854 | ICC 4899 | ICC 6171 | ICC 6233 | ICC 6241 |
| ICC 6243 | ICC 7147 | ICC 7246 | ICC 7344 | ICC 7345 |
| ICC 7346 | ICC 7675 | ICC 7712 | ICC 7715 | ICC 7859 |
| ICC 8150 | ICC 8151 | ICC 8957 | ICC 10749 | ICC 11295 |
| ICC 11296 | ICC 11297 | ICC 11298 | ICC 11770 | ICC 11815 |
| ICC 11816 | ICC 11841 | ICC 12033 | | |

**Request 13. Kabuli accessions with more than two seeds per pod (FCOL W, SSH, OWL, and SP>2).**

| | | | | |
|---|---|---|---|---|
| ICC 2496 | ICC 2593 | ICC 2671 | ICC 5046 | ICC 7156 |
| ICC 7907 | ICC 7983 | ICC 8040 | ICC 8757 | ICC 11596 |
| ICC 11901 | ICC 12113 | | | |

**Request 14. Desi accessions originating from Mediterranean countries[1] (FCOL P).**

| | | | | |
|---|---|---|---|---|
| Egypt | ICC 1017 | ICC 2215 | ICC 2216 | ICC 3429 |
| | ICC 8943 | | | |
| Iraq | ICC 2233 | ICC 2234 | ICC 5021 | |
| Italy | ICC 1027 | ICC 1028 | ICC 6293 | ICC 8189 |
| | ICC 8521 | ICC 8526 | | |
| Jordan | ICC 3485 | ICC 3486 | ICC 4869 | ICC 6150 |
| | ICC 6152 | ICC 6153 | ICC 9517 | |
| Spain | ICC 1071 | ICC 1072 | ICC 1073 | ICC 7678 |
| Morocco | ICC 1003 | ICC 1004 | ICC 1005 | ICC 1006 |
| | ICC 1007 | ICC 1009 | ICC 1010 | ICC 1011 |
| | ICC 1012 | ICC 1013 | ICC 1016 | ICC 1122 |
| | ICC 1123 | ICC 1125 | ICC 1902 | ICC 1903 |
| | ICC 1904 | ICC 3413 | ICC 3414 | ICC 4884 |
| | ICC 4888 | ICC 7573 | ICC 7575 | ICC 7577 |
| | ICC 8481 | ICC 9559 | ICC 9560 | ICC 9561 |

1. Desi accessions from Turkey are listed separately in Request 15.

**Request 15. Desi accessions originating from Turkey with large seeds (FCOL Pink and 100M >15 g).**

| | | | | |
|---|---|---|---|---|
| ICC 3425 | ICC 3428 | ICC 3499 | ICC 3500 | ICC 3502 |
| ICC 3504 | ICC 3507 | ICC 4479 | ICC 4480 | ICC 4490 |
| ICC 4493 | ICC 4494 | ICC 5622 | ICC 5625 | ICC 5626 |
| ICC 5627 | ICC 6307 | ICC 6359 | ICC 7178 | ICC 7183 |
| ICC 8204 | ICC 8268 | ICC 10333 | ICC 10334 | ICC 10680 |
| ICC 10681 | ICC 10685 | | | |

**Request 16. Large-seeded accessions with black seed coat color (SCOL BL, and 100M >25 g).**

| | | | | |
|---|---|---|---|---|
| ICC 1069 | ICC 2278 | ICC 3221 | ICC 6103 | ICC 6336 |
| ICC 6813 | ICC 7322 | ICC 7524 | ICC 7573 | ICC 7670 |
| ICC 7673 | ICC 8476 | ICC 8508 | ICC 8540 | ICC 9494 |
| ICC 9514 | ICC 12023 | | | |

**Request 17. Chickpea accessions with multiple disease resistance.**

**Wilt and dry root rot**

| | | | | |
|---|---|---|---|---|
| ICC 925 | ICC 11315 | ICC 12237 | ICC 12241 | ICC 12257 |
| ICC 12268 | ICC 12276 | ICC 12273 | ICC 12428 | ICC 12430 |
| ICC 12435 | ICC 12437 | ICC 12444 | ICC 12450 | ICC 12454 |
| ICC 12460 | ICC 12467 | ICC 12472 | | |

**Wilt and black root rot**

| | | | | |
|---|---|---|---|---|
| ICC 11313 | ICC 11316 | ICC 11317 | ICC 11320 | ICC 11324 |
| ICC 12236 | ICC 12237 | ICC 12239 | ICC 12242 | ICC 12245 |
| ICC 12249 | ICC 12255 | ICC 12256 | ICC 12258 | ICC 12259 |
| ICC 12269 | ICC 12274 | ICC 12275 | | |

**Wilt and botrytis gray mold**

ICC 11321

**Wilt and ascochyta blight[2]**

ICC 3935

**Wilt and sclerotinia stem blight**

| | | | | |
|---|---|---|---|---|
| ICC 858 | ICC 959 | ICC 4651 | ICC 4918 | ICC 6671 |
| ICC 6680 | ICC 8933 | ICC 900[illegible] | | |

**Botrytis gray mold and ascochyta blight[2]**

ICC 1069 ICC 11321

**Botrytis gray mold and colletotrichum blight**

ICC 1400 ICC 7574

**Ascochyta blight[1] and stunt**

ICC 693 ICC 1136 ICC 3127

1. Ascochyta blight tolerance to IARI isolate
2. Ascochyta blight tolerance to Hisar isolate

# Genetic Stocks of Special Interest[1].

## I. Accessions with absolute resistance to fusarium wilt[2].

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 11311 | ICC 202 WR | Uttar Pradesh | IND | PATHOLOGY SEL. |
| 11312 | ICC 391 WR | Bihar | IND | PATHOLOGY SEL. |
| 11313 | ICC 658 WR | New Delhi | IND | PATHOLOGY SEL. |
| 11314 | ICC 858 WR | Uttar Pradesh | IND | PATHOLOGY SEL. |
| 11315 | ICC 1443 WR | Uttar Pradesh | IND | PATHOLOGY SEL. |
| 11316 | ICC 1450 WR | Uttar Pradesh | IND | PATHOLOGY SEL. |
| 11317 | ICC 1611 WR | Uttar Pradesh | IND | PATHOLOGY SEL. |
| 11318 | ICC 3439 WR | Uttar Pradesh | IND | PATHOLOGY SEL. |
| 11319 | ICC 4552 WR | New Delhi | IND | PATHOLOGY SEL. |
| 11320 | ICC 6098 WR | Madhya Pradesh | IND | PATHOLOGY SEL. |
| 11321 | ICC 6671 WR | - | IND | PATHOLOGY SEL. |
| 11322 | ICC 8933 WR | - | IND | PATHOLOGY SEL. |
| 11323 | ICC 10139 WR | Andhra Pradesh | IND | PATHOLOGY SEL. |
| 11324 | ICC 11088 WR | New Delhi | IND | PATHOLOGY SEL. |
| 12233 | ICC 229 WR | Uttar Pradesh | IND | P 180-1 WR |
| 12234 | ICC 336 WR | Uttar Pradesh | IND | P 253 WR |
| 12235 | ICC 516 WR | Andhra Pradesh | IND | P 392 WR |
| 12236 | ICC 519 WR | Andhra Pradesh | IND | P 394 WR |
| 12237 | ICC 554 WR | New Delhi | IND | P 436-2 WR |
| 12238 | ICC 867 WR | Uttar Pradesh | IND | P 690 WR |
| 12239 | ICC 1891 WR | New Delhi | IND | P 1514 WR |
| 12240 | ICC 2072 WR | - | IND | P 1670 WR |
| 12241 | ICC 2086 WR | - | MEX | P 1683 WR |
| 12242 | ICC 2089 WR | - | MEX | P 1684 WR |
| 12243 | ICC 2104 WR | - | MEX | P 1696-1 WR |

1. For explanations, refer to Tables 1, 9, 10, 11, 12, 13, and 38. 2. Pathologists applied selection pressure to obtain absolute resistance in these materials.

*Continued.*

I. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11311 | 50 | 35 | P | LA | 22.0 | 22.3 | SE | 110 | 27 | 1.1 | 370 | 14.0 | YB | ANG | R | - | 79-80 |
| 11312 | 61 | 31 | P | LA | 27.3 | 26.3 | SS | 115 | 42 | 1.1 | 1100 | 11.3 | LB | ANG | R | 24.3 | 81-82 |
| 11313 | 57 | 36 | P | LA | 41.2 | 48.0 | SS | 105 | 101 | 1.1 | 1880 | 16.9 | YB | ANG | R | 23.1 | 82-83 |
| 11314 | 50 | 31 | P | LA | 19.7 | 26.0 | SE | 110 | 25 | 1.1 | 470 | 13.6 | YB | ANG | R | - | 79-80 |
| 11315 | 59 | 31 | P | LA | 24.0 | 27.3 | SE | 110 | 19 | 1.3 | 370 | 14.0 | YB | ANG | R | - | 79-80 |
| 11316 | 52 | 33 | P | LA | 17.7 | 19.7 | SE | 101 | 25 | 1.0 | 330 | 13.0 | YB | ANG | R | - | 79-80 |
| 11317 | 53 | 36 | P | LA | 31.0 | 30.7 | SE | 119 | 41 | 1.0 | 730 | 12.6 | YB | ANG | R | 21.5 | 81-82 |
| 11318 | 50 | 32 | P | LA | 23.7 | 26.7 | SE | 95 | 29 | 1.3 | 1000 | 13.6 | YB | ANG | R | - | 79-80 |
| 11319 | 58 | 36 | P | LA | 43.4 | 44.4 | SE | 114 | 48 | 1.0 | 1670 | 20.2 | YB | ANG | R | 21.0 | 82-83 |
| 11320 | 46 | 38 | P | LA | 35.7 | 37.7 | SE | 108 | 51 | 1.0 | 1700 | 15.2 | YB | ANG | T | 24.2 | 81-82 |
| 11321 | 45 | 36 | P | LA | 42.6 | 44.6 | SS | 106 | 39 | 1.2 | 1880 | 22.9 | LB | ANG | R | 20.1 | 82-83 |
| 11322 | 49 | 37 | P | LA | 41.6 | 46.6 | SE | 105 | 65 | 1.0 | 2080 | 15.9 | YB | ANG | R | 23.0 | 82-83 |
| 11323 | 47 | 33 | P | LA | 24.3 | 25.3 | SE | 93 | 19 | 1.2 | 470 | 16.8 | YB | ANG | R | - | 79-80 |
| 11324 | 57 | 35 | P | LA | 33.8 | 34.6 | SS | 107 | 62 | 1.3 | 1670 | 13.5 | YB | ANG | R | 21.4 | 82-83 |
| 12233 | 55 | 41 | P | LA | 31.3 | 33.7 | SE | 120 | 38 | 1.1 | 1600 | 13.8 | DB | ANG | R | 16.7 | 80-81 |
| 12234 | 51 | 42 | P | LA | 30.3 | 35.3 | SE | 120 | 45 | 1.1 | 1400 | 12.2 | YB | ANG | R | 16.5 | 80-81 |
| 12235 | 69 | 29 | P | LA | 28.3 | 29.0 | SS | 130 | 57 | 1.2 | 1300 | 11.1 | B | ANG | R | 15.0 | 80-81 |
| 12236 | 49 | 37 | P | LA | 34.6 | 37.4 | SS | 102 | 78 | 1.1 | 2380 | 13.7 | YB | ANG | R | 24.0 | 82-83 |
| 12237 | 44 | 44 | P | LA | 45.6 | 39.2 | SE | 104 | 74 | 1.1 | 2250 | 18.6 | YB | ANG | R | 20.8 | 82-83 |
| 12238 | 47 | 46 | P | LA | 31.0 | 35.0 | SE | 118 | 52 | 1.0 | 1470 | 15.5 | B | ANG | R | 17.5 | 80-81 |
| 12239 | 67 | 31 | P | LA | 32.7 | 35.3 | SS | 133 | 124 | 1.1 | 2100 | 12.6 | YB | ANG | R | 15.2 | 80-81 |
| 12240 | 49 | 44 | P | LA | 35.6 | 40.8 | SE | 107 | 57 | 1.4 | 1630 | 12.9 | YB | ANG | R | 24.2 | 82-83 |
| 12241 | 58 | 36 | P | LA | 33.4 | 51.4 | SE | 108 | 120 | 1.1 | 1880 | 13.6 | YB | ANG | R | 23.8 | 82-83 |
| 12242 | 60 | 33 | P | LA | 31.0 | 29.7 | SS | 121 | 43 | 1.5 | 1300 | 11.0 | YB | ANG | R | 16.9 | 80-81 |
| 12243 | 54 | 37 | P | LA | 37.6 | 30.0 | SE | 109 | 37 | 1.9 | 1200 | 11.5 | B | ANG | R | 15.7 | 80-81 |

*Continued*

I. *Continued.*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 12244 | ICC 2566 WR | Neyshabur | IRN | P 2559 WR |
| 12245 | ICC 2660 WR | Neyshabur | IRN | P 2686-2 WR |
| 12246 | ICC 2883 WR | Varmin | IRN | P 3251 WR |
| 12247 | ICC 3099 WR | Karaj | IRN | P 3614 WR |
| 12248 | ICC 3103 WR | - | IRN | P 3617 WR |
| 12249 | ICC 3539 WR | - | IND | P 4237 WR |
| 12250 | ICC 3684 WR | Neyshabur | IRN | P 4321-2 WR |
| 12251 | ICC 4519 WR | - | IND | P 6067 WR |
| 12252 | ICC 4918 WR | Karnataka | IND | ANNIGERI WR |
| 12253 | ICC 5864 WR | Madhya Pradesh | IND | T 3 WR |
| 12254 | ICC 6880 WR | - | IRN | NEC 1089 WR |
| 12255 | ICC 7111 WR | - | IRN | NEC 1470 WR |
| 12256 | ICC 7248 WR | - | IND | NEC 1621 WR |
| 12257 | ICC 7681 WR | Uttar Pradesh | IND | P 1179 WR |
| 12258 | ICC 9001 WR | - | IRN | P 426 WR |
| 12259 | ICC 10104 WR | - | IND | P 6131 WR |
| 12267 | ICC 267 WR | Uttar Pradesh | IND | P 212-1 WR |
| 12268 | ICC 1910 WR | - | IND | P 1542 |
| 12269 | ICC 1913 WR | - | IND | P 1546 |
| 12270 | ICC 2461 WR | Ghochan | IRN | P 2249 WR |
| 12271 | ICC 6366 WR | - | IRN | NEC 312 WR |
| 12273 | ICC 6926 WR | - | IRN | NEC 1166 WR |
| 12275 | ICC 11531 WR | - | IND | ICCC 10 WR |
| 12428 | ICC 537 WR | New Delhi | IND | P 422 WR |
| 12429 | ICC 2083 WR | - | MEX | P 1679-2 WR |
| 12430 | ICC 2299 WR | - | ESP | P 1954 WR |
| 12432 | ICC 8446 WR | - | ETH | P 10-4 WR |
| 12433 | ICC 8454 WR | - | ETH | JM 473 WR |
| 12434 | ICC 8622 WR | Shoa | ETH | WP 2984 WR |
| 12435 | ICC 10466 WR | Orissa | IND | ANM 570 WR |

*Continued.*

I. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12244 | 48 | 44 | P | LA | 34.3 | 39.7 | SE | 121 | 58 | 1.0 | 1500 | 18.2 | B | ANG | R | 16.1 | 80-81 |
| 12245 | 43 | 38 | P | LA | 28.0 | 35.7 | SE | 107 | 24 | 1.3 | 570 | 15.9 | B | ANG | R | 17.2 | 80-81 |
| 12246 | 49 | 41 | P | LA | 39.4 | 44.8 | SS | 103 | 78 | 1.6 | 2250 | 13.2 | YB | ANG | R | 23.5 | 82-83 |
| 12247 | 42 | 35 | P | LA | 37.2 | 44.0 | SS | 104 | 92 | 1.1 | 1830 | 17.1 | YB | ANG | R | 22.2 | 82-83 |
| 12248 | 60 | 33 | P | LA | 26.0 | 38.3 | SS | 121 | 37 | 1.1 | 1270 | 12.0 | YB | ANG | R | 17.3 | 80-81 |
| 12249 | 42 | 44 | P | LA | 37.8 | 46.2 | SE | 102 | 82 | 1.1 | 2460 | 17.6 | YE | ANG | T | 23.2 | 82-83 |
| 12250 | 57 | 35 | P | LA | 30.6 | 44.8 | SS | 105 | 81 | 1.4 | 1330 | 13.4 | YB | ANG | R | 24.9 | 82-83 |
| 12251 | 61 | 35 | P | LA | 27.0 | 35.7 | SS | 120 | 57 | 1.3 | 1830 | 11.8 | B | ANG | R | 16.9 | 80-81 |
| 12252 | 42 | 45 | P | LA | 36.4 | 33.2 | SS | 102 | 66 | 1.1 | 2380 | 20.1 | YB | ANG | R | 19.5 | 82-83 |
| 12253 | 46 | 47 | P | LA | 31.3 | 36.7 | SE | 121 | 61 | 1.1 | 1350 | 13.4 | YB | ANG | R | 16.5 | 80-81 |
| 12254 | 60 | 33 | P | LA | 29.0 | 38.7 | SS | 121 | 57 | 1.3 | 1370 | 11.9 | YB | ANG | R | 16.0 | 80-81 |
| 12255 | 47 | 44 | P | LA | 29.0 | 34.0 | SS | 107 | 26 | 1.8 | 1100 | 12.9 | YB | ANG | T | 17.1 | 80-81 |
| 12256 | 44 | 49 | P | LA | 29.7 | 34.0 | SE | 120 | 31 | 1.1 | 1230 | 13.1 | B | ANG | R | - | 80-81 |
| 12257 | 44 | 45 | P | LA | 32.7 | 37.3 | SE | 128 | 33 | 1.2 | 1570 | 15.9 | YB | ANG | T | 16.0 | 80-81 |
| 12258 | 53 | 40 | P | LA | 33.7 | 43.3 | SE | 119 | 69 | 1.1 | 1200 | 13.8 | DB | ANG | R | 16.3 | 80-81 |
| 12259 | 53 | 40 | P | LA | 31.0 | 34.7 | SE | 118 | 92 | 1.0 | 900 | 12.5 | B | ANG | R | 16.4 | 80-81 |
| 12267 | 57 | 34 | P | LA | 24.0 | 25.3 | SE | 117 | 29 | 1.0 | 530 | 12.2 | B | ANG | R | 19.9 | 81-82 |
| 12268 | 60 | 34 | P | LA | 38.8 | 45.[illegible] | SS | 110 | 60 | 1.2 | 960 | 14.2 | LB | ANG | R | 25.7 | 82-83 |
| 12269 | 46 | 31 | P | LA | 25.0 | 28.3 | SE | 115 | 13 | 1.3 | 700 | 16.9 | YB | ANG | T | 22.1 | 81-82 |
| 12270 | 61 | 37 | P | LA | 19.0 | 26.0 | SS | 124 | 43 | 1.1 | 630 | 11.9 | YB | ANG | R | 24.9 | 81-82 |
| 12271 | 60 | 34 | P | LA | 37.6 | 43.4 | SS | 111 | 44 | 1.5 | 1380 | 10.9 | YB | ANG | R | 23.3 | 82-83 |
| 12273 | 44 | 41 | P | LA | 39.8 | 40.6 | SE | 102 | 95 | 1.1 | - | 14.0 | YB | ANG | R | 21.2 | 82-83 |
| 12275 | 80 | 23 | P | LA | 38.7 | 39.0 | SE | 121 | 38 | 1.3 | 1170 | 11.0 | YB | ANG | R | 18.9 | 81-82 |
| 12428 | 60 | 34 | W | NA | 33.8 | 34.6 | SE | 106 | 26 | 1.1 | 880 | 12.1 | BE | OWL | S | 24.1 | 82-83 |
| 12429 | 58 | 36 | W | NA | 40.4 | 35.0 | SS | 106 | 88 | 1.2 | 1710 | 13.2 | BB | ANG | R | 22.6 | 82-83 |
| 12430 | 78 | 22 | W | NA | 41.0 | 49.4 | SS | 118 | 52 | 1.4 | 500 | 7.7 | BE | OWL | S | 26.9 | 82-83 |
| 12432 | 46 | 40 | W | NA | 45.6 | 45.8 | SE | 102 | 90 | 1.5 | 1290 | 11.9 | BE | OWL | S | 23.6 | 82-83 |
| 12433 | 42 | 41 | W | NA | 42.0 | 40.0 | SE | 104 | 82 | 1.6 | - | 11.7 | BE | OWL | S | 22.6 | 82-83 |
| 12434 | 44 | 42 | W | NA | 44.8 | 52.0 | SE | 102 | 70 | 1.7 | 1880 | 11.6 | BE | OWL | S | 22.3 | 82-83 |
| 12435 | 51 | 43 | W | NA | 38.8 | 37.6 | SS | 111 | 92 | 1.4 | 1630 | 11.2 | BE | OWL | S | 21.8 | 82-83 |

## II. Accessions with absolute resistance to dry root rot[1].

| ICC No. | Pedigree/Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 11315 | ICC 1443 WR | Uttar Pradesh | IND | Pathology Sel. |
| 12237 | ICC 554 WR | New Delhi | IND | P 436-2 WR |
| 12241 | ICC 2086 WR | - | MEX | P 1683 WR |
| 12257 | ICC 7681 WR | Uttar Pradesh | IND | P 1179 WR |
| 12268 | ICC 1910 WR | - | IND | P 1542 |
| 12269 | ICC 1913 WR | - | IND | P 1546 |
| 12270 | ICC 2461 WR | - | IRN | P 2249 WR |
| 12271 | ICC 6366 WR | - | IRN | NEC 312 WR |
| 12273 | ICC 6926 WR | - | IRN | NEC 1166 WR |
| 12428 | ICC 537 WR | New Delhi | IND | P 422 WR |
| 12435 | ICC 10466 WR | Orissa | IND | ANM 570 WR |
| 12436 | ICC 435 DRR | Bihar | IND | P 319-1 DRR |
| 12437 | ICC 444 DRR | Bihar | IND | P 332 DRR |
| 12438 | ICC 999 DRR | - | MEX | P 812M DRR |
| 12439 | ICC 1918 DRR | - | IND | P 1549-1 DRR |
| 12440 | ICC 2450 DRR | - | IRN | P 2230 DRR |
| 12441 | ICC 2874 DRR | - | IRN | P 3230 DRR |
| 12442 | ICC 3181 DRR | - | IRN | P 3730-1 DRR |
| 12443 | ICC 3392 DRR | - | IRN | P 4079 DRR |
| 12444 | ICC 3428 DRR | - | TUR | P 4102 DRR |
| 12445 | ICC 4716 DRR | Uttar Pradesh | IND | P 6308 DRR |
| 12446 | ICC 4902 DRR | Antakya | TUR | P 9789 DRR |
| 12447 | ICC 4948 DRR | Punjab | IND | G 130 DRR |
| 12448 | ICC 4954 DRR | Punjab | IND | H 208 DRR |
| 12449 | ICC 4994 DRR | Uttar Pradesh | IND | Radhey DRR |
| 12450 | ICC 5901 DRR | Uttar Pradesh | IND | T 32 DRR |
| 12451 | ICC 6081 DRR | Madhya Pradesh | IND | JG 57 DRR |
| 12452 | ICC 6411 DRR | - | IRN | NEC 384 DRR |

1. Dry root rot is a disease caused by *Rhyzoctonia bataticola*

*Continued.*

II. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11315 | 59 | 31 | P | LA | 24.0 | 27.3 | SE | 110 | 19 | 1.3 | 370 | 14.0 | YB | ANG | R | - | 79-80 |
| 12237 | 44 | 44 | P | LA | 45.6 | 39.2 | SE | 104 | 74 | 1.1 | 2250 | 18.6 | YB | ANG | R | 20.8 | 82-83 |
| 12241 | 58 | 36 | P | LA | 33.4 | 51.4 | SE | 108 | 120 | 1.1 | 1880 | 13.6 | YB | ANG | R | 23.8 | 82-83 |
| 12257 | 44 | 45 | P | LA | 32.7 | 37.3 | SE | 128 | 33 | 1.2 | 1570 | 15.9 | YB | ANG | T | 16.0 | 80-81 |
| 12268 | 60 | 34 | P | LA | 38.8 | 45.8 | SS | 110 | 60 | 1.2 | 960 | 14.2 | LB | ANG | R | 25.7 | 82-83 |
| 12269 | 46 | 31 | P | LA | 25.0 | 28.3 | SE | 115 | 13 | 1.3 | 700 | 16.9 | YB | ANG | T | 22.1 | 81-82 |
| 12270 | 61 | 37 | P | LA | 19.0 | 26.0 | SS | 124 | 43 | 1.1 | 630 | 11.9 | YB | ANG | R | 24.9 | 81-82 |
| 12271 | 60 | 34 | P | LA | 37.6 | 43.4 | SS | 111 | 44 | 1.5 | 1380 | 10.9 | YB | ANG | R | 23.3 | 82-83 |
| 12273 | 44 | 41 | P | LA | 39.8 | 40.6 | SE | 102 | 95 | 1.1 | 2000 | 14.0 | YB | ANG | R | 21.2 | 82-83 |
| 12428 | 60 | 34 | W | NA | 33.8 | 34.6 | SE | 106 | 26 | 1.1 | 880 | 12.1 | BE | OWL | S | 24.1 | 82-83 |
| 12435 | 51 | 43 | W | NA | 38.8 | 37.6 | SS | 111 | 92 | 1.4 | 1630 | 11.2 | BE | OWL | S | 21.8 | 82-83 |
| 12436 | 78 | 23 | P | LA | 45.8 | 47.6 | SE | 122 | 21 | 1.2 | 790 | 20.2 | YB | ANG | R | 23.9 | 82-83 |
| 12437 | 42 | 45 | P | LA | 32.6 | 38.8 | SS | 104 | 112 | 1.2 | 1580 | 14.5 | YB | ANG | R | 23.3 | 82-83 |
| 12438 | 51 | 42 | P | LA | 36.4 | 33.0 | SE | 106 | 88 | 1.4 | 1420 | 13.2 | LB | ANG | R | 22.8 | 82-83 |
| 12439 | 57 | 37 | P | LA | 36.8 | 51.2 | SS | 113 | 66 | 1.8 | 2040 | 13.5 | YB | ANG | R | 25.7 | 82-83 |
| 12440 | 42 | 41 | P | LA | 33.8 | 40.0 | SS | 108 | 124 | 1.1 | 2710 | 12.5 | YB | ANG | R | 22.3 | 82-83 |
| 12441 | 58 | 36 | P | LA | 38.8 | 40.4 | SS | 99 | 60 | 1.3 | 2130 | 16.4 | LB | ANG | R | 22.4 | 82-83 |
| 12442 | 67 | 31 | LP | NA | 41.0 | 42.6 | SE | 118 | 55 | 1.5 | 1210 | 9.8 | BB | ANG | R | 24.4 | 82-83 |
| 12443 | 49 | 37 | P | LA | 36.8 | 34.2 | SS | 108 | 80 | 1.4 | 1750 | 9.3 | YB | ANG | R | 25.3 | 82-83 |
| 12444 | 84 | 21 | P | LA | 48.8 | 40.2 | SE | 121 | 18 | 1.3 | 750 | 18.9 | LB | ANG | R | 26.2 | 82-83 |
| 12445 | 57 | 35 | P | LA | 28.4 | 35.0 | SE | 107 | 73 | 1.4 | 1460 | 13.1 | YB | ANG | R | 22.6 | 82-83 |
| 12446 | 56 | 38 | P | LA | 37.8 | 37.8 | SS | 108 | 44 | 1.5 | 1420 | 12.6 | LB | ANG | R | 20.2 | 82-83 |
| 12447 | 71 | 31 | P | LA | 49.2 | 51.2 | SE | 118 | 44 | 1.4 | 1130 | 13.0 | YB | ANG | R | 23.7 | 82-83 |
| 12448 | 63 | 31 | P | LA | 38.2 | 34.4 | SE | 116 | 50 | 1.4 | 1420 | 13.5 | YB | ANG | R | 23.3 | 82-83 |
| 12449 | 49 | 45 | P | LA | 36.8 | 38.7 | SE | 109 | 45 | 1.2 | 1750 | 23.4 | YB | ANG | R | 21.9 | 82-83 |
| 12450 | 51 | 36 | B | LA | 29.4 | 34.2 | SS | 106 | 32 | 1.0 | 880 | 14.4 | LB | PEA | S | 24.2 | 82-83 |
| 12451 | 56 | 38 | P | LA | 46.0 | 46.0 | SE | 107 | 42 | 1.4 | 2040 | 23.4 | LB | ANG | R | 19.7 | 82-83 |
| 12452 | 60 | 32 | P | LA | 35.8 | 35.8 | SS | 110 | 84 | 1.3 | 1960 | 12.8 | YB | ANG | R | 19.8 | 82-83 |

*Continued.*

II. *Continued.*

| ICC No. | Pedigree/Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 12454 | ICC 6501 DRR | - | IRN | NEC 539 DRR |
| 12455 | ICC 6570 DRR | - | IRN | NEC 646 DRR |
| 12456 | ICC 6608 DRR | - | IRN | NEC 691 DRR |
| 12457 | ICC 6668 DRR | - | IRN | NEC 774 DRR |
| 12458 | ICC 6687 DRR | - | IRN | NEC 815 DRR |
| 12459 | ICC 6772 DRR | - | IRN | NEC 934 DRR |
| 12460 | ICC 6816 DRR | - | IRN | NEC 986 DRR |
| 12461 | ICC 6840 DRR | - | IRN | NEC 1026 DRR |
| 12462 | ICC 6939 DRR | - | IRN | NEC 1179 DRR |
| 12463 | ICC 7777 DRR | - | PAK | NEC 1639 DRR |
| 12464 | ICC 8970 DRR | - | IRN | NEC 318 DRR |
| 12465 | ICC 8971 DRR | - | IRN | NEC 319 DRR |
| 12466 | ICC 9018 DRR | - | IRN | NEC 480 DRR |
| 12467 | ICC 9023 DRR | - | IRN | NEC 497 DRR |
| 12468 | ICC 9042 DRR | - | IRN | NEC 540 DRR |
| 12469 | ICC 10500 DRR | Punjab | IND | RPSP 231 DRR |
| 12470 | ICC 10539 DRR | Rajasthan | IND | RPSP 270 DRR |
| 12471 | ICC 10630 DRR | Haryana | IND | H 362 DRR |
| 12472 | ICC 11550 DRR | Uttar Pradesh | IND | DA 1 DRR |

II. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12454 | 51 | 35 | P | LA | 39.8 | 42.4 | SF | 101 | 106 | 1.6 | 1880 | 11.7 | LB | ANG | R | 23.0 | 82-83 |
| 12455 | 57 | 37 | P | LA | 45.0 | 46.4 | SS | 110 | 99 | 1.1 | 1790 | 14.6 | YB | ANG | R | 20.8 | 82-83 |
| 12456 | 67 | 28 | P | LA | 39.0 | 46.4 | SF | 110 | 68 | 1.1 | 1040 | 13.4 | YB | ANG | R | 26.4 | 82-83 |
| 12457 | 43 | 41 | P | LA | 39.2 | 41.8 | SF | 104 | 89 | 1.1 | 1960 | 17.6 | YB | ANG | T | 22.2 | 82-83 |
| 12458 | 51 | 35 | P | LA | 42.8 | 37.8 | SF | 105 | 90 | 1.0 | 1670 | 14.1 | YB | ANG | R | 21.6 | 82-83 |
| 12459 | 57 | 35 | P | LA | 34.6 | 41.4 | SS | 107 | 61 | 1.4 | 1750 | 16.1 | YB | ANG | R | 22.6 | 82-83 |
| 12460 | 56 | 38 | P | LA | 47.0 | 54.2 | SF | 108 | 69 | 1.4 | 2040 | 14.1 | YB | ANG | R | 24.6 | 82-83 |
| 12461 | 50 | 40 | W | NA | 50.2 | 47.6 | SF | 106 | 60 | 1.3 | 1750 | 20.0 | BF | OWL | S | 20.5 | 82-83 |
| 12462 | 64 | 34 | P | LA | 43.0 | 40.4 | SF | 113 | 48 | 1.7 | 670 | 9.8 | DB | ANG | R | 23.4 | 82-83 |
| 12463 | 84 | 21 | P | LA | 48.2 | 45.0 | SF | 122 | 14 | 1.4 | 380 | 13.4 | YB | ANG | R | 26.7 | 82-83 |
| 12464 | 80 | 22 | P | NA | 46.0 | 40.6 | SF | 118 | 20 | 1.1 | 580 | 13.4 | YB | ANG | R | - | 82-83 |
| 12465 | - | 33 | P | LA | 42.6 | 46.0 | SS | 106 | 52 | 1.2 | 1710 | 16.9 | YB | ANG | R | 24.7 | 82-83 |
| 12466 | 57 | 33 | P | LA | 38.2 | 41.4 | SS | 107 | 111 | 1.1 | 1920 | 18.3 | YB | ANG | R | 25.4 | 82-83 |
| 12467 | 51 | 41 | P | LA | 36.6 | 51.6 | SS | 104 | 64 | 1.3 | 1880 | 13.1 | YB | ANG | R | 21.7 | 82-83 |
| 12468 | 46 | 48 | P | LA | 46.2 | 52.0 | SF | 107 | 81 | 1.2 | 1540 | 14.7 | YB | ANG | R | 21.8 | 82-83 |
| 12469 | 73 | 24 | P | LA | 46.4 | 44.8 | SF | 118 | 40 | 1.2 | 920 | 15.9 | YB | ANG | R | 25.3 | 82-83 |
| 12470 | 57 | 35 | P | LA | 30.6 | 39.0 | SS | 109 | 63 | 1.0 | 2330 | 13.5 | DB | ANG | R | 22.5 | 82-83 |
| 12471 | 63 | 35 | P | LA | 39.2 | 44.2 | SF | 110 | 70 | 1.5 | 1040 | 12.2 | YB | ANG | R | 23.2 | 82-83 |
| 12472 | 64 | 31 | P | LA | 34.4 | 43.4 | SF | 110 | 37 | 1.3 | 1040 | 13.9 | YB | ANG | R | 24.2 | 82-83 |

## III(a). Accessions resistant to ascochyta blight in isolation plant propagator screening at ICRISAT Center.

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 120 | P 97 | Uttar Pradesh | IND | - |
| 468 | P 351 | Bihar | IND | - |
| 2600 | P 2614 | Neyshabur | IRN | 0777 0787 |
| 3259 | F 3840-1 | Jiroft | IRN | - |
| 3277 | P 3871 | - | IRN | 1999 2044 |
| 3531 | P 4232-2 | Kerman | IRN | - |
| 4826 | P 6594 | Karaj | IRN | 1730 1773 |
| 4827 | P 6595 | Karaj | IRN | 1738 1779 |
| 4855 | P 9624 | - | USA | MEXICAN SEL 4 |
| 4856 | P 9625 | - | USA | MEXICAN SEL 1 |
| 4857 | P 9630 | - | USA | MEXICAN SEL 6 |
| 4861 | P 9648 | - | YUG | - |
| 4864 | P 9651 | - | ETH | - |
| 5124 | EC 26446 | - | ISR | - |
| 6045 | JG 12 | Madhya Pradesh | IND | - |
| 6314 | NEC 216 | - | ESP | PI 254689 |
| 6354 | NEC 280 | - | TUR | PI 339144 |
| 6840 | NEC 1026 | - | IRN | PI 360219, P2156 |
| 6843 | NEC 1029 | - | IRN | PI 360222, P2203 |
| 6847 | NEC 1033 | - | IRN | PI 360226, P2266 |
| 6887 | NEC 1108 | - | IRN | PI 360302, P3567 |
| 6888 | NEC 1109 | - | IRN | PI 360303, P3575 |
| 7559 | P 9625 | - | USA | - |
| 7562 | P 9628 | - | USA | - |
| 7567 | P 9657 | - | SUN | - |
| 7592 | P 9720 | - | ETH | P 40, AWASA SMALL |
| 7609 | P 9742 | - | TUR | VAR. 25 6-5 |
| 7676 | P 9875 | - | PRT | - |
| 7773 | NEC 1566 Giza | - | EGY | GIZA 1 BIG SEED |

**III(a).** *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120 | 67 | - | P | LA | 28.0 | 37.7 | SE | 106 | 36 | 1.1 | 1020 | 15.3 | Y | ANG | R | 19.4 | 75-76 |
| 468 | 55 | - | P | - | 37.3 | 56.7 | SS | 115 | 105 | 1.2 | 3070 | 10.7 | B | ANG | R | - | 74-75 |
| 2600 | 73 | - | W | - | 40.0 | 45.7 | SI | 116 | 12 | 1.2 | 420 | 17.0 | BF | OWL | S | - | 74-75 |
| 3259 | 45 | - | P | - | 31.0 | 35.0 | SS | 100 | 51 | 1.2 | 1270 | 12.1 | B | ANG | R | 18.3 | 74-75 |
| 3277 | 48 | - | P | - | 35.0 | 33.7 | SS | 100 | 40 | 1.1 | 1400 | 12.8 | B | ANG | I | - | 74-75 |
| 3531 | 53 | - | P | LA | 36.7 | 51.3 | SE | 103 | 51 | 1.3 | 2040 | 15.4 | Y | ANG | I | 17.9 | 75-76 |
| 4826 | 59 | - | W | - | 40.3 | 44.0 | SS | 118 | 16 | 1.3 | 760 | 14.5 | BF | OWL | S | - | 74-75 |
| 4827 | 83 | 38 | W | NA | 49.0 | 38.7 | SE | 159 | 36 | 1.5 | 1600 | 17.5 | BF | OWL | S | 19.5 | 78-79 |
| 4855 | 40 | 41 | W | NA | 33.3 | 33.3 | SS | 123 | 11 | 1.1 | 700 | 42.3 | BF | OWL | S | 15.0 | 80-81 |
| 4856 | 65 | 39 | W | NA | 36.7 | 28.3 | SE | 132 | 25 | 1.0 | 430 | 27.2 | BF | OWL | S | - | 79-80 |
| 4857 | 84 | 39 | W | NA | 46.0 | 35.7 | SE | 148 | 36 | 1.5 | 1170 | 16.7 | BF | OWL | S | 17.2 | 80-81 |
| 4861 | 84 | 34 | W | NA | 57.3 | 40.3 | SE | 134 | 33 | 1.1 | 970 | 15.3 | BF | OWL | S | 16.9 | 80-81 |
| 4864 | 43 | 21 | W | NA | 21.3 | 28.7 | SE | 93 | 33 | 1.2 | 600 | 9.4 | BF | OWL | S | - | 79-80 |
| 5124 | 74 | 30 | W | NA | 53.6 | 43.0 | SE | 122 | 5 | 1.4 | 256 | 16.4 | BF | PEA | S | 23.6 | 82-83 |
| 6045 | 62 | 51 | W | NA | 37.7 | 25.0 | SE | 137 | 20 | 1.2 | 690 | 20.5 | BF | OWL | S | 24.5 | 77-78 |
| 6314 | 67 | 56 | W | NA | 58.3 | 38.0 | SE | 140 | 28 | 1.0 | 1100 | 27.5 | BF | OWL | S | 16.5 | 80-81 |
| 6354 | 74 | 34 | W | NA | 31.7 | 28.0 | SE | 127 | 16 | 1.2 | 1090 | 35.0 | BF | OWL | S | 19.9 | 77-78 |
| 6840 | 46 | 46 | W | NA | 43.6 | 46.0 | SE | 105 | 38 | 1.0 | 1540 | 20.5 | BF | OWL | S | 18.2 | 82-83 |
| 6843 | 61 | 28 | W | NA | 30.7 | 21.7 | SE | 111 | 51 | 1.0 | 1110 | 14.0 | BF | OWL | S | 21.7 | 77-78 |
| 6847 | 53 | - | W | - | 28.3 | 31.0 | SS | 100 | 25 | 1.2 | 840 | 14.7 | BF | PEA | S | - | 74-75 |
| 6887 | 57 | 38 | W | NA | 40.3 | 31.0 | SE | 129 | 16 | 1.4 | 330 | 26.5 | BF | OWL | R | - | 79-80 |
| 6888 | 67 | 43 | W | NA | 49.0 | 40.7 | SE | 131 | 36 | 1.3 | 1230 | 14.6 | BF | OWL | S | 16.9 | 80-81 |
| 7559 | 81 | 37 | W | NA | 45.0 | 37.0 | SE | 144 | 31 | 1.0 | 1300 | - | BF | OWL | S | - | 80-81 |
| 7562 | 84 | 36 | W | NA | 44.0 | 39.7 | SE | 144 | 22 | 1.1 | 1170 | 22.2 | BF | OWL | S | 17.3 | 80-81 |
| 7567 | 84 | 36 | W | NA | 53.3 | 38.0 | SE | 134 | 55 | 1.0 | 600 | 14.9 | BB | OWL | S | 17.3 | 80-81 |
| 7592 | 42 | 44 | W | NA | 34.3 | 30.0 | SE | 133 | 21 | 1.2 | 400 | 9.8 | BF | PEA | S | 17.9 | 78-79 |
| 7609 | 67 | 31 | W | NA | 43.3 | 39.7 | SE | 142 | 24 | 1.3 | 1230 | 27.0 | BF | OWL | S | 15.9 | 80-81 |
| 7676 | 60 | 46 | W | NA | 46.7 | 35.7 | SE | 142 | 40 | 1.0 | 1730 | 31.1 | BF | OWL | S | 15.0 | 80-81 |
| 7773 | 50 | 38 | W | NA | 37.7 | 33.0 | SE | 112 | 21 | 1.0 | 870 | 33.7 | BF | OWL | S | - | 79-80 |

## III(b). Accessions resistant to ascochyta blight screened at ICARDA

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 76 | P 60-1 | Uttar Pradesh | IND | - |
| 187 | P 152-1 | Uttar Pradesh | IND | - |
| 607 | P 479 | New Delhi | IND | NP 15 |
| 1069 | P 919 | - | SUN | IP 251784 |
| 1121 | P 1004 | Rezaiyeh | IRN | 3141 |
| 1136 | P 1034 | Uttar Pradesh | IND | 306 |
| 1305 | P 1193 | Uttar Pradesh | IND | 6248 |
| 1416 | P 1252-1 | Uttar Pradesh | IND | - |
| 1467 | P 1279-1 | Uttar Pradesh | IND | - |
| 1468 | P 1279-2 | Uttar Pradesh | IND | - |
| 1754 | P 1441 | Uttar Pradesh | IND | 129 2 |
| 1762 | P 1443-3 | Uttar Pradesh | IND | - |
| 1781 | P 1453-1 | Uttar Pradesh | IND | - |
| 1903 | P 1528-1 | - | MAR | - |
| 2160 | P 1741-1 | - | MEX | - |
| 2162 | P 1742-1 | - | IRN | - |
| 2165 | P 1747-1 | - | MEX | - |
| 2270 | P 1872 | - | IRN | 0044 0045 |
| 2342 | P 2031-1 | - | IRN | - |
| 2441 | P 2221-1 | Ghochan | IRN | - |
| 2506 | P 2383 | Ghochan | IRN | 0559 0556 |
| 3440 | P 4117 | Ghazvin | IRN | 2290 |
| 3597 | P 4267 | Kermanshah | IRN | 0275 0033 |
| 3598 | P 4268 | Estahan | IRN | 0276 0034 |
| 3634 | P 4289 | Estahan | IRN | 0297 0055 |
| 3843 | P 4491 | Estahan | IRN | 2269 0257 |
| 3916 | P 4603 | Ardebil | IRN | 2370 0369 |
| 3918 | P 4605 | Ardebil | IRN | 2371 0371 |
| 3919 | P 4607 | Ardebil | IRN | 2373 0373 |
| 3921 | P 4610 | Ardebil | IRN | 2376 0376 |

*Continued.*

III(b). *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 76 | 69 | - | P | LA | 46.0 | 48.0 | SS | 107 | 39 | 1.1 | 1130 | 11.1 | BI | ANG | R | 22.9 | 75-76 |
| 187 | 57 | - | P | - | 42.7 | 82.3 | SE | 110 | 121 | 1.0 | 3090 | 13.9 | DB | ANG | R | 21.3 | 74-75 |
| 607 | 73 | 44 | P | LA | 32.0 | 27.3 | SE | 160 | 51 | 1.4 | 700 | 10.1 | BI | ANG | R | 17.9 | 78-79 |
| 1069 | 78 | 43 | P | LA | 50.3 | 17.0 | SE | 155 | 10 | 1.3 | 550 | 29.3 | BI | ANG | R | 21.2 | 78-79 |
| 1121 | 66 | - | P | - | 43.0 | 58.7 | SS | 113 | 58 | 1.2 | 1710 | 9.6 | BI | ANG | R | - | 74-75 |
| 1136 | 66 | - | P | - | 43.7 | 59.7 | SE | 113 | 117 | 1.2 | 3840 | 11.3 | YB | ANG | R | - | 74-75 |
| 1305 | 50 | - | P | - | 33.0 | 44.0 | SS | 112 | 64 | 1.2 | 2000 | 15.3 | B | ANG | I | - | 74-75 |
| 1416 | 66 | - | P | - | 45.3 | 43.0 | SE | 112 | 17 | 1.5 | 1490 | 20.8 | LB | ANG | R | - | 74-75 |
| 1467 | 73 | - | P | - | 39.7 | 42.3 | SS | 114 | 33 | 1.5 | 780 | 9.2 | BI | ANG | R | - | 74-75 |
| 1468 | 77 | 36 | P | LA | 31.0 | 36.7 | SE | 132 | 44 | 1.3 | 1070 | 14.1 | BI | ANG | R | 23.3 | 77-78 |
| 1754 | 66 | - | P | - | 46.3 | 53.3 | SE | 111 | 42 | 1.2 | 2310 | 11.5 | B | ANG | R | - | 74-75 |
| 1762 | 66 | - | P | - | 45.7 | 52.7 | SE | 111 | 52 | 1.4 | 1960 | 11.3 | B | ANG | R | - | 74-75 |
| 1781 | 73 | - | P | - | 52.7 | 52.3 | SE | 112 | 49 | 1.3 | 2090 | 12.3 | B | ANG | R | - | 74-75 |
| 1903 | 91 | - | P | - | 62.3 | 53.0 | E | 128 | 18 | 1.5 | 580 | 11.3 | BI | ANG | R | - | 74-75 |
| 2160 | 57 | 36 | P | LA | 30.3 | 27.7 | SE | 116 | 20 | 1.4 | 600 | 12.0 | BI | ANG | R | - | 79-80 |
| 2162 | 71 | 40 | P | LA | 34.0 | 26.7 | SE | 157 | 37 | 1.4 | 770 | 9.6 | BI | ANG | R | 18.7 | 78-79 |
| 2165 | 60 | 32 | P | LA | 33.7 | 36.0 | SE | 122 | 23 | 1.5 | 630 | 11.0 | BI | ANG | R | - | 79-80 |
| 2270 | 87 | - | P | - | 61.7 | 88.3 | SS | 120 | 21 | 1.6 | 1230 | 10.1 | BI | ANG | R | - | 74-75 |
| 2342 | 75 | 38 | P | LA | 34.0 | 28.7 | SE | 159 | 31 | 1.5 | 1000 | 9.1 | BL | ANG | R | 18.0 | 78-79 |
| 2441 | 62 | 40 | W | NA | 32.3 | 35.0 | SS | 116 | 57 | 1.6 | 1560 | 18.5 | BF | OWL | S | 21.2 | 77-78 |
| 2506 | 73 | - | LP | - | 49.0 | 51.7 | SE | 118 | 17 | 1.0 | 650 | 15.2 | LY | ANG | R | - | 74-75 |
| 3440 | 76 | 31 | P | LA | 24.7 | 28.3 | SS | 135 | 25 | 1.2 | 670 | 16.2 | B | ANG | R | 17.6 | 78-79 |
| 3597 | 61 | - | P | LA | 46.0 | 48.7 | SS | 116 | 30 | 1.1 | 1040 | 10.9 | BI | ANG | R | 20.1 | 75-76 |
| 3598 | 76 | - | P | LA | 48.7 | 51.0 | SS | 118 | 33 | 1.1 | 1000 | 10.0 | BI | ANG | R | 20.6 | 75-76 |
| 3634 | 69 | - | P | LA | 36.7 | 40.3 | SS | 115 | 32 | 1.8 | 840 | 8.8 | BI | ANG | R | 17.9 | 75-76 |
| 3843 | 62 | - | P | LA | 54.3 | 59.0 | SS | 113 | 36 | 1.1 | 1360 | 9.9 | BI | ANG | R | 21.8 | 75-76 |
| 3916 | 67 | - | P | - | 31.3 | 32.0 | SS | 117 | 15 | 1.1 | 380 | 9.1 | BI | ANG | R | - | 74-75 |
| 3918 | 80 | - | P | - | 34.0 | 44.0 | SS | 116 | 13 | 1.2 | 430 | 9.3 | BI | ANG | R | - | 74-75 |
| 3919 | 85 | 44 | P | LA | 32.0 | 34.0 | SS | 160 | 64 | 1.5 | 1070 | 8.5 | BI | ANG | R | 18.1 | 78-79 |
| 3921 | 80 | - | P | - | 28.0 | 37.0 | SS | 116 | 13 | 1.1 | 360 | 16.3 | BI | ANG | R | - | 74-75 |

*Continued.*

**III(b).** *Continued.*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 3932 | P 4630 | Ardebil | IRN | 2394 0396 |
| 3969 | P 4671 | Ardebil | IRN | 2431 0437 |
| 4018 | P 4722 | Ardebil | IRN | 2477 0488 |
| 4020 | P 4724-2 | - | IRN | - |
| 4030 | P 4739 | Ardebil | IRN | 2492 0505 |
| 4045 | P 4758 | Ardebil | IRN | 2509 0524 |
| 4083 | P 4821 | Ardebil | IRN | 2566 0587 |
| 4093 | P 4848 | Ardebil | IRN | 2590 0614 |
| 4174 | P 5002 | Gharye-Gole | IRN | 2729 0768 |
| 4181 | P 5009 | Gharye-Gole | IRN | 2735 0775 |
| 4187 | P 5016 | Gharye-Gole | IRN | 2741 0782 |
| 4188 | P 5017 | Gharye-Gole | IRN | 2742 0783 |
| 4192 | P 5023 | Gharye-Gole | IRN | 2748 0789 |
| 4472 | P 5491 | Ardebil | IRN | 2436 0445 |
| 4475 | P 5496 | Ardebil | IRN | 2441 0448 |
| 4616 | P 6207 | - | IND | - |
| 5035 | C 8 | Punjab | IND | - |
| 5313 | LG 2526 | Punjab | IND | - |
| 5566 | V 136 | - | MEX | - |
| 6103 | JG 87 | Madhya Pradesh | IND | - |
| 6250 | NEC 123 | - | MAR | - |
| 6304 | NEC 206 | - | SUN | PI 251781 |
| 6306 | NEC 208 | - | SUN | PI 251784 |
| 6336 | NEC 252 | - | IND | PI 315796 |
| 6781 | NEC 945 | - | IRN | PI 359813, P 1452 |
| 6813 | NEC 983 | - | IRN | PI 359856, P 1528 |
| 6988 | NEC 1243 | - | IRN | PI 360437, P 4722 |
| 6989 | NEC 1244 | - | IRN | PI 360438, P 4729 |
| 6999 | NEC 1254 | - | IRN | PI 360448, P 4830 |
| 7000 | NEC 1255 | - | IRN | PI 360449, P 4841 |

III(b). *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3932 | 76 | 45 | P | LA | 35.3 | 31.7 | SI | 157 | 44 | 1.3 | 1130 | 9.9 | BL | ANG | R | 19.2 | 78-79 |
| 3969 | 66 | - | P | LA | 48.0 | 50.0 | SI | 110 | 28 | 1.2 | 1070 | 10.9 | BL | ANG | R | 23.0 | 75-76 |
| 4018 | 80 | - | P | - | 41.7 | 50.3 | SS | 117 | 11 | 1.4 | 440 | 8.2 | BL | ANG | R | - | 74-75 |
| 4020 | 74 | 34 | P | LA | 32.7 | 19.7 | SS | 140 | 32 | 1.4 | 670 | 10.7 | BI | ANG | R | 23.0 | 77-78 |
| 4030 | 80 | - | P | - | 40.0 | 56.7 | SS | 116 | 19 | 1.1 | 600 | 10.0 | BL | ANG | R | - | 74-75 |
| 4045 | 73 | - | P | - | 43.7 | 43.7 | SS | 114 | 17 | 1.3 | 690 | 9.3 | BI | ANG | R | - | 74-75 |
| 4083 | 67 | - | P | - | 36.3 | 32.7 | SS | 117 | 17 | 1.6 | 300 | 9.5 | BL | ANG | R | - | 74-75 |
| 4093 | 71 | 33 | P | LA | 43.0 | 42.7 | SF | 123 | 23 | 1.4 | 1640 | 11.2 | B | ANG | R | 23.7 | 77-78 |
| 4174 | 67 | - | P | - | 38.7 | 43.0 | SF | 116 | 17 | 1.3 | 440 | 10.0 | BI | ANG | R | - | 74-75 |
| 4181 | 81 | 30 | P | LA | 41.3 | 39.0 | SE | 137 | 43 | 1.2 | 1360 | 10.7 | BI | ANG | R | 21.0 | 77-78 |
| 4187 | 67 | - | P | - | 33.0 | 32.3 | SS | 112 | 8 | 1.6 | 330 | 9.0 | BI | ANG | R | - | 74-75 |
| 4188 | 80 | - | P | - | 34.0 | 32.7 | SS | 122 | 8 | 1.0 | 610 | 10.5 | BL | ANG | R | - | 74-75 |
| 4192 | 59 | - | P | - | 48.0 | 48.0 | SE | 114 | 26 | 1.5 | 450 | 10.4 | DB | ANG | R | - | 74-75 |
| 4472 | 67 | - | P | - | 41.3 | 44.3 | SS | 117 | 24 | 1.0 | 820 | 8.9 | BL | ANG | R | 17.0 | 74-75 |
| 4475 | 80 | - | P | - | 47.3 | 47.7 | SS | 122 | 18 | 1.3 | 680 | 9.7 | BL | ANG | R | 17.5 | 74-75 |
| 4616 | 70 | - | P | LA | 41.7 | 46.0 | SS | 112 | 50 | 1.3 | 1040 | 10.1 | BL | ANG | R | 19.9 | 75-76 |
| 5035 | 91 | 48 | DP | LA | 52.3 | 35.7 | E | 160 | 25 | 1.8 | 800 | 24.9 | F | ANG | R | 18.5 | 78-79 |
| 5313 | 59 | - | P | - | 42.0 | 45.0 | SS | 111 | 13 | 1.4 | 600 | 10.7 | BL | ANG | R | - | 74-75 |
| 5566 | 85 | 39 | P | LA | 54.7 | 38.3 | SE | 140 | 44 | 1.5 | 1000 | 15.7 | YB | ANG | R | 17.5 | 80-81 |
| 6103 | 90 | - | P | - | 53.0 | 26.7 | F | 120 | 7 | 1.4 | 510 | 25.4 | BL | ANG | R | - | 74-75 |
| 6250 | 86 | 39 | DP | LA | 67.7 | 37.7 | E | 144 | 21 | 1.1 | 1000 | 24.5 | BL | ANG | R | 17.5 | 80-81 |
| 6304 | 89 | 33 | DP | LA | 59.7 | 51.7 | SE | 144 | 21 | 1.3 | 500 | 24.1 | BL | ANG | R | 16.8 | 80-81 |
| 6306 | 86 | 32 | DP | LA | 66.3 | 46.0 | SE | 138 | 29 | 1.3 | 600 | 24.9 | BL | ANG | R | 16.9 | 80-81 |
| 6336 | 91 | 38 | DP | LA | 52.7 | 35.7 | E | 161 | 13 | 1.1 | 700 | 26.4 | BL | ANG | R | 19.6 | 78-79 |
| 6781 | 89 | 34 | P | LA | 43.3 | 35.0 | SE | 138 | 17 | 1.2 | 640 | 18.4 | LB | ANG | R | 22.0 | 77-78 |
| 6813 | 76 | - | P | LA | 67.0 | 66.0 | SE | 121 | 58 | 1.1 | 1040 | 25.1 | BL | ANG | R | 22.0 | 75-76 |
| 6988 | 50 | 38 | P | LA | 28.7 | 31.3 | SS | 111 | 27 | 1.2 | 800 | 11.6 | BL | ANG | R | - | 79-80 |
| 6989 | 85 | 33 | P | LA | 40.3 | 37.0 | SE | 138 | 60 | 1.4 | 760 | 10.0 | BL | ANG | R | 23.7 | 77-78 |
| 6999 | 64 | - | P | LA | 50.3 | 63.0 | SS | 111 | 63 | 1.0 | 1020 | 10.3 | BL | ANG | R | 22.6 | 75-76 |
| 7000 | 70 | - | P | LA | 47.7 | 63.7 | SS | 112 | 22 | 1.3 | 890 | 9.9 | BL | ANG | R | 22.2 | 75-76 |

## III(c). Accessions tolerant to ascochyta blight in isolation plant propagator screening at ICRISAT Center.

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 130 | P 104-1 | Uttar Pradesh | IND | - |
| 204 | P 167 | Uttar Pradesh | IND | - |
| 229 | P 180-1 | Uttar Pradesh | IND | - |
| 377 | P 280 | Bihar | IND | - |
| 462 | P 347 | Bihar | IND | - |
| 539 | P 424 | New Delhi | IND | NP 41 |
| 559 | P 440-1 | New Delhi | IND | - |
| 567 | P 449 | New Delhi | IND | NP 68 |
| 595 | P 471 | Uttar Pradesh | IND | T 87 |
| 599 | P 474 | Rajasthan | IND | 53-86 |
| 600 | P 474-1 | Rajasthan | IND | - |
| 693 | P 542 | Punjab | IND | A 269 |
| 703 | P 553-1 | Punjab | IND | - |
| 704 | P 554 | Punjab | IND | A 287 |
| 724 | P 570 | Punjab | IND | G 83 |
| 781 | P 620 | Punjab | IND | G 298 |
| 816 | P 642-1 | New Delhi | IND | - |
| 838 | P 661 | New Delhi | IND | BT 31 |
| 931 | P 737 | Madhya Pradesh | IND | GRAM INDORE |
| 1009 | P 840 | - | MAR | NO.58A |
| 1465 | P 1278-2 | Uttar Pradesh | IND | - |
| 1911 | P 1542-i | - | IND | - |
| 1915 | P 1548 | - | IND | EC 27657 |
| 2153 | P 1728 | - | MEX | V 16 |
| 2156 | P 1732 | - | MEX | V 11 |
| 2160 | P 1741-1 | - | MEX | - |
| 2237 | P 1810 | - | USA | USA 609 |
| 3252 | P 3829 | - | IRN | 1956 2002 |
| 3287 | P 3910 | - | IRN | 2041 2083 |
| 3330 | P 3975 | - | CYP | 2103 2148 |

*Continued.*

**III(c).** *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 130 | 64 | 31 | W | NA | 40.0 | 26.0 | SE | 129 | 20 | 1.0 | 670 | 24.3 | BE | OWL | S | - | 79-80 |
| 204 | 50 | - | P | - | 42.0 | 63.0 | SS | 115 | 65 | 1.2 | 3180 | 14.3 | DB | ANG | R | - | 74-75 |
| 229 | 54 | - | P | LA | 25.0 | 27.7 | SE | 109 | 30 | 1.0 | 1330 | 14.1 | B | ANG | R | 20.1 | 75-76 |
| 377 | 66 | - | W | - | 45.0 | 93.0 | SS | 115 | 62 | 1.4 | 2210 | 17.5 | BE | OWL | S | - | 74-75 |
| 462 | 69 | 30 | P | LA | 33.3 | 30.3 | SE | 114 | 43 | 1.1 | 1760 | 14.5 | B | ANG | R | 20.2 | 77-78 |
| 539 | 66 | - | P | - | 49.3 | 71.0 | SS | 112 | 72 | 1.3 | 2780 | 11.1 | B | ANG | R | - | 74-75 |
| 559 | 66 | - | P | - | 45.3 | 67.0 | SS | 117 | 100 | 1.2 | 2490 | 19.9 | OB | PEA | R | - | 74-75 |
| 567 | 50 | - | P | LA | 19.3 | 30.7 | SS | 100 | 40 | 1.1 | 1000 | 11.8 | Y | ANG | T | 22.2 | 75-76 |
| 595 | 48 | - | P | - | 35.0 | 80.7 | SS | 112 | 62 | 1.1 | 2950 | 16.7 | B | ANG | T | - | 74-75 |
| 599 | 70 | - | P | - | 41.3 | 82.0 | SS | 113 | 51 | 1.4 | 2980 | 12.3 | LB | ANG | R | - | 74-75 |
| 600 | 50 | - | P | - | 27.0 | 71.7 | SS | 117 | 55 | 1.1 | 2270 | 13.1 | BI | ANG | T | - | 74-75 |
| 693 | 66 | - | P | - | 46.7 | 71.7 | SS | 113 | 103 | 1.1 | 2800 | 11.9 | LB | ANG | R | 19.3 | 74-75 |
| 703 | 57 | 31 | W | NA | 35.3 | 38.0 | SE | 132 | 11 | 1.2 | 270 | 19.5 | BE | OWL | S | - | 79-80 |
| 704 | 55 | - | P | - | 47.0 | 105.0 | SS | 112 | 72 | 1.1 | 3560 | 20.4 | LB | PEA | R | 18.8 | 74-75 |
| 724 | 66 | - | P | - | 45.0 | 95.3 | SS | 116 | 103 | 1.3 | 3780 | 12.8 | LB | ANG | R | - | 74-75 |
| 781 | 63 | - | P | LA | 37.7 | 48.0 | SS | 108 | 23 | 1.3 | 1560 | 10.9 | Y | ANG | R | 21.8 | 75-76 |
| 816 | 53 | - | P | LA | 30.7 | 38.3 | SS | 110 | 50 | 1.1 | 1220 | 14.8 | YB | ANG | R | 20.4 | 75-76 |
| 838 | 69 | - | P | LA | 33.3 | 37.0 | SE | 111 | 50 | 1.1 | 1000 | 11.1 | Y | ANG | R | 20.4 | 75-76 |
| 931 | 50 | - | P | - | 36.0 | 52.0 | SS | 110 | 80 | 1.1 | 3020 | 15.8 | B | ANG | T | 21.5 | 74-75 |
| 1009 | 66 | - | P | - | 45.3 | 49.3 | SE | 114 | 23 | 1.2 | 1490 | 11.7 | B | ANG | R | - | 74-75 |
| 1465 | 66 | - | P | - | 36.0 | 51.0 | SE | 111 | 26 | 1.2 | 1890 | 17.8 | O | PEA | R | - | 74-75 |
| 1911 | 74 | 31 | P | LA | 36.7 | 24.3 | SE | 123 | 15 | 1.7 | 530 | 24.7 | BL | ANG | R | 18.7 | 77-78 |
| 1915 | 85 | 39 | DP | LA | 51.7 | 37.3 | SE | 142 | 25 | 1.3 | 1130 | 24.4 | BL | ANG | R | 18.6 | 80-81 |
| 2153 | 78 | 32 | P | LA | 42.7 | 31.7 | SE | 128 | 32 | 1.3 | 1630 | 19.7 | YB | ANG | R | 16.7 | 80-81 |
| 2156 | 67 | 35 | P | LA | 39.3 | 27.0 | SE | 131 | 30 | 1.2 | 1400 | 23.4 | LB | ANG | R | 16.1 | 80-81 |
| 2160 | 57 | 36 | P | LA | 30.3 | 27.7 | SE | 116 | 20 | 1.4 | 600 | 12.0 | BI | ANG | R | - | 79-80 |
| 2237 | 57 | - | P | - | 35.0 | 31.0 | SE | 118 | 11 | 1.3 | 540 | 10.4 | BI | ANG | R | - | 74-75 |
| 3252 | 67 | - | LP | - | 44.0 | 36.7 | SE | 109 | 15 | 1.3 | 680 | 13.1 | BB | ANG | R | - | 74-75 |
| 3287 | 51 | - | P | - | 30.7 | 53.0 | SS | 107 | 35 | 1.3 | 1510 | 19.6 | DB | ANG | R | 15.6 | 74-75 |
| 3330 | 43 | 26 | P | LA | 16.7 | 19.3 | SE | 93 | 15 | 1.1 | 530 | 16.6 | YB | ANG | R | - | 79-80 |
| 3346 | 54 | 54 | W | NA | 30.7 | 32.7 | SE | 147 | 12 | 1.7 | 430 | 21.4 | BE | OWL | S | 16.2 | 78-79 |
| 4784 | 80 | - | W | - | 53.7 | 53.0 | SS | 124 | 28 | 1.3 | 1240 | 15.5 | BE | PEA | S | - | 74-75 |
| 4785 | 73 | - | W | - | 44.3 | 57.0 | SS | 125 | 43 | 1.2 | 1090 | 19.2 | BE | PEA | S | - | 74-75 |
| 4787 | 80 | - | W | - | 48.3 | 65.3 | SS | 124 | 14 | 1.2 | 1090 | 14.9 | BE | PEA | S | - | 74-75 |
| 4882 | 77 | 46 | W | NA | 58.3 | 38.0 | SE | 134 | 16 | 1.2 | 770 | 20.5 | BE | OWL | S | 17.6 | 80-81 |

*Continued*

III(c). *Continued.*

| ICC No. | Pedigree/Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 3346 | P 4022 | - | IRN | 2146 2195 |
| 4784 | P 6450 | - | IRN | 1588 5151 |
| 4785 | P 6453 | - | IRN | 0086 5154 |
| 4787 | P 6456-1 | - | IRN | - |
| 4882 | P 9693 | - | MAR | - |
| 4899 | P 9763 | Eskisehir | TUR | VAR 43/1-1 |
| 5046 | C 161 | Punjab | IND | - |
| 5106 | EC 26421 | - | ISR | - |
| 5119 | EC 26439 | - | ISR | - |
| 5122 | EC 26443 | - | ISR | - |
| 5123 | EC 26445 | - | ISR | - |
| 6235 | NEC 108 | - | GRC | - |
| 6293 | NEC 190 | - | ITA | PI 239859 |
| 6312 | NEC 214 | - | IRN | PI 254549 |
| 6345 | NEC 266 | - | IND | PI 315818, NP 27 |
| 6837 | NEC 1022 | - | IRN | PI 360315, P 2141 |
| 6838 | NEC 1023 | - | IRN | PI 360216, P 2145 |
| 7198 | NEC 1571 | - | EGY | F 36 SMALL SEED |
| 7212 | NEC 1585 | - | EGY | F 79 SMALL SEED |
| 7243 | NEC 1616 | - | LBN | - |
| 7246 | NEC 1619 | - | LBN | - |
| 7249 | NEC 1622 | - | IND | EGYPT ACC NO.9 |
| 7251 | NEC 1624 | - | IND | EGYPT ACC NO.12 |
| 7287 | NEC 1660 | - | TUN | SN.15 |
| 7359 | 2098 | - | IND | - |
| 7633 | P 9778 | - | TUR | VAR. 55/1-2 |
| 7638 | P 9793 | - | TUR | VAR. 83/2-3 |
| 7653 | P 9813 | - | TUR | VAR. 115/1-2 |
| 7668 | P 9845 | - | SUN | GS 1931 |
| 7718 | NEC 131 | - | SUN | DNEPROVSVJI 1 |
| 8920 | K 1170 | - | SUN | GIBRIDNYJ 180 |
| 10136 | PANT 114 | Uttar Pradesh | IND | G130X1540 |

III(c). *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4899 | 60 | 34 | W | NA | 51.0 | 49.8 | SE | 118 | 12 | 1.0 | 1040 | 49.8 | BE | OWL | S | 21.8 | 82-83 |
| 5046 | 57 | 31 | W | NA | 41.0 | 37.0 | SS | 113 | 5 | 2.4 | 330 | 16.6 | BE | OWL | S | - | 79-80 |
| 5106 | 75 | 44 | W | NA | 43.0 | 34.3 | SE | 157 | 22 | 1.0 | 530 | 25.7 | BE | OWL | S | 16.8 | 78-79 |
| 5119 | 74 | 34 | W | NA | 55.3 | 36.7 | SE | 142 | 11 | 1.1 | 1400 | 29.6 | BE | OWL | S | 21.1 | 77-78 |
| 5122 | 76 | 29 | P | LA | 49.0 | 37.3 | SE | 145 | 22 | 1.0 | 120[illegible] | 28.8 | BE | OWL | S | 18.9 | 77-78 |
| 5123 | 67 | 31 | W | NA | 54.2 | 53.6 | SE | 120 | 44 | 1.0 | 880 | 33.5 | BE | OWL | S | 22.1 | 82-83 |
| 6235 | 86 | 41 | W | NA | 60.0 | 38.7 | E | 146 | 22 | 1.0 | 600 | 22.8 | LY | PEA | S | 19.4 | 80-81 |
| 6293 | 68 | - | P | - | 52.0 | 82.3 | SS | 114 | 117 | 1.5 | 1060 | 10.4 | BL | ANG | R | - | 74-75 |
| 6312 | 43 | 49 | W | NA | 31.7 | 31.3 | SE | 115 | 13 | 1.1 | 200 | 27.8 | BE | OWL | S | - | 79-80 |
| 6345 | 57 | 35 | W | NA | 37.0 | 32.0 | SE | 129 | 13 | 1.1 | 470 | 31.8 | BE | OWL | S | - | 79-80 |
| 6837 | 43 | 45 | W | NA | 32.0 | 25.0 | SE | 125 | 9 | 1.3 | 370 | 32.9 | BE | OWL | S | - | 79-80 |
| 6838 | 83 | 40 | W | NA | 39.0 | 35.3 | SE | 136 | 27 | 1.1 | 1130 | 16.0 | PE | OWL | R | 17.7 | 80-81 |
| 7198 | 53 | - | W | - | 48.0 | 34.7 | SE | 100 | 47 | 1.0 | 980 | 11.3 | BE | PEA | S | - | 74-75 |
| 7212 | 49 | - | W | - | 51.7 | 75.7 | SE | 100 | 66 | 1.5 | 1200 | 8.6 | BE | PEA | S | - | 74-75 |
| 7243 | 50 | 54 | W | NA | 32.7 | 32.3 | SS | 128 | 28 | 1.1 | 1630 | 32.7 | BE | OWL | S | 15.1 | 80-81 |
| 7246 | 47 | 33 | W | NA | 32.7 | 38.7 | SS | 110 | 18 | 1.0 | 800 | 46.0 | BE | OWL | S | - | 79-80 |
| 7249 | 64 | 42 | W | NA | 43.3 | 35.7 | SE | 149 | 16 | 1.2 | 830 | 31.3 | BE | PEA | S | 19.2 | 78-79 |
| 7251 | 69 | 38 | W | NA | 40.3 | 47.0 | SE | 128 | 20 | 1.1 | 960 | 22.4 | BE | OWL | S | 23.8 | 77-78 |
| 7287 | 77 | 39 | W | NA | 49.7 | 33.3 | SE | 142 | 16 | 1.1 | 1300 | 34.4 | BE | OWL | S | 16.4 | 80-81 |
| 7359 | 52 | 36 | W | NA | 43.7 | 46.7 | SE | 122 | 16 | 1.0 | 730 | 28.5 | BE | OWL | S | - | 79-80 |
| 7633 | 73 | 35 | W | NA | 37.0 | 30.0 | SE | 129 | 27 | 1.0 | 1560 | 43.2 | BE | OWL | S | 19.5 | 77-78 |
| 7638 | 50 | 31 | W | NA | 30.3 | 24.3 | SE | 118 | 11 | 1.1 | 500 | 37.7 | BE | OWL | S | - | 79-80 |
| 7653 | 74 | 31 | W | NA | 38.7 | 36.0 | SE | 142 | 32 | 1.1 | 1700 | 37.7 | BE | OWL | S | 16.7 | 80-81 |
| 7668 | 73 | 33 | W | NA | 29.0 | 18.7 | SE | 127 | 27 | 1.[illegible] | 670 | 29.4 | BE | OWL | S | 20.0 | 78-79 |
| 7718 | 84 | 40 | W | NA | 56.3 | 37.0 | SE | 140 | 40 | 1.0 | 930 | 23.1 | BE | OWL | S | 16.9 | 80-81 |
| 8920 | 83 | 59 | W | NA | 78.3 | 32.7 | E | 162 | 45 | 1.4 | 670 | 19.4 | LO | PEA | S | 18.1 | 78-79 |
| 10136 | 59 | 33 | P | LA | 37.0 | 31.3 | SS | 114 | 80 | 1.3 | 620 | 13.1 | Y | ANG | P. | 20.2 | 76-77 |

## IV. Accessions resistant to botrytis gray mold.

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 1069 | P 919 | - | SUN | PI 251784 |
| 1084 | P 947-1 | - | IRN | - |
| 1093 | P 960 | - | IRN | KARAJ 152-2 |
| 1102 | P 975-2 | - | IRN | - |
| 3540 | P 4237-1 | - | IND | - |
| 4014 | P 4718 | - | IRN | 2473 0484 |
| 4018 | P 4722 | - | IRN | 2477 0488 |
| 4055 | P 4766 | - | IRN | 2516 0532 |
| 4063 | P 4775-1 | - | IRN | - |
| 4065 | P 4778 | - | IRN | 2527 0564 |
| 4074 | P 4797-2 | - | IRN | - |
| 4075 | P 4798 | - | IRN | 2545 0564 |
| 6671 | NEC 790 | - | IRN | PI 359631, P1206 |
| 8383 | PATNE RAM SUBUR | Maharashtra | IND | - |
| 11321 | ICC 6671 WR | - | IND | PATHOLOGY SEL |

IV. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1069 | 78 | 43 | P | LA | 50.3 | 17.0 | SE | 155 | 10 | 1.3 | 550 | 29.3 | BL | ANG | R | 21.2 | 78-79 |
| 1084 | 66 | - | P | - | 43.0 | 69.3 | SS | 116 | 65 | 1.1 | 1580 | 9.7 | BL | ANG | R | - | 74-75 |
| 1093 | 73 | - | P | - | 63.7 | 81.3 | SE | 118 | 51 | 1.1 | 1110 | 9.2 | BL | ANG | R | - | 74-75 |
| 1102 | 66 | - | P | - | 53.0 | 66.3 | SE | 120 | 68 | 1.2 | 1560 | 9.8 | BL | ANG | R | - | 74-75 |
| 3540 | 62 | 47 | P | LA | 42.3 | 56.7 | SE | 126 | 33 | 1.3 | 1580 | 12.2 | BL | ANG | R | 22.1 | 77-78 |
| 4014 | 67 | - | P | - | 48.0 | 55.0 | SS | 117 | 12 | 2.8 | 520 | 8.3 | BL | ANG | R | - | 74-75 |
| 4018 | 80 | - | P | - | 41.7 | 50.3 | SS | 117 | 11 | 1.4 | 440 | 8.2 | BL | ANG | R | - | 74-75 |
| 4055 | 59 | - | P | - | 44.0 | 46.3 | SS | 113 | 26 | 1.6 | 880 | 9.7 | BL | ANG | R | - | 74-75 |
| 4063 | 75 | 36 | P | LA | 40.3 | 36.0 | SE | 130 | 62 | 1.4 | 1110 | 11.8 | BL | ANG | R | 24.5 | 77-78 |
| 4065 | 80 | - | P | - | 37.7 | 45.7 | SS | 115 | 33 | 1.2 | 580 | 10.0 | BL | ANG | R | - | 74-75 |
| 4074 | 69 | 39 | P | LA | 38.7 | 29.7 | SS | 123 | 165 | 1.1 | 1820 | 11.6 | B | ANG | R | 22.9 | 77-78 |
| 4075 | 59 | - | P | - | 35.3 | 35.7 | SS | 112 | 18 | 1.4 | 660 | 7.7 | DB | ANG | R | - | 74-75 |
| 6671 | 55 | - | P | LA | 31.0 | 35.0 | SE | 104 | 27 | 1.0 | 1600 | 19.7 | LB | ANG | R | 16.8 | 75-76 |
| 8383 | 61 | - | P | LA | 23.3 | 30.3 | SS | 103 | 33 | 1.2 | 1160 | 12.9 | Y | ANG | R | 19.5 | 75-76 |
| 11321 | 45 | 36 | P | LA | 42.6 | 44.6 | SS | 106 | 39 | 1.2 | 1880 | 22.9 | LB | ANG | R | 20.1 | 82-83 |

## V. Accessions promising against stunt[1] under natural epiphytotic conditions at Hisar, India.

| ICC No. | Pedigree/Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 403 | P 298-1 | Bihar | IND | - |
| 591 | P 466 | New Delhi | IND | IC 5926 |
| 685 | P 537 | Punjab | IND | A 258 |
| 693 | P 542 | Punjab | IND | A 269 |
| 2385 | P 2151-1 | - | IRN | - |
| 2546 | P 2512 | - | IRN | 0677 0685 |
| 3718 | P 4341-2 | - | IRN | - |
| 4949 | G 24 | Punjab | IND | - |
| 6433 | NEC 417 | - | IRN | PI 359100, P 142 |
| 6934 | NEC 1174 | - | IRN | PI 360368, P 4250 |
| 10495 | RPSP 226 | Rajasthan | IND | - |
| 10596 | RPSP 327 | Rajasthan | IND | - |

1. Chickpea stunt is a foliar disease caused by 'pea leaf roll virus' transmitted through aphids (*Aphis craccivora* Koch).

V. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 403 | 57 | - | P | - | 42.0 | 55.3 | SS | 113 | 49 | 1.4 | 2530 | 9.4 | B | ANG | R | 22.2 | 74-75 |
| 591 | 66 | - | P | - | 33.7 | 71.7 | SE | 113 | 57 | 1.3 | 258[illegible] | 10.8 | LB | ANG | R | - | 74-75 |
| 685 | 55 | - | P | - | 44.3 | 46.3 | SS | 108 | 107 | 1.0 | 2580 | 10.5 | DB | ANG | R | 18.8 | 74-75 |
| 693 | 66 | - | P | - | 46.7 | 71.7 | SS | 113 | 103 | 1.1 | 2800 | 11.9 | LB | ANG | R | 19.3 | 74-75 |
| 2385 | 69 | - | P | LA | 32.3 | 36.3 | SE | 106 | 37 | 1.1 | 1240 | 11.4 | Y | ANG | R | 18.7 | 75-76 |
| 2546 | 78 | - | P | - | 32.7 | 38.7 | SE | 114 | 8 | 1.8 | 680 | 11.6 | B | ANG | R | - | 74-75 |
| 3718 | 69 | - | P | LA | 38.7 | 38.0 | SS | 114 | 16 | 1.0 | 1420 | 22.8 | YB | ANG | R | - | 75-76 |
| 4949 | 70 | - | P | - | 25.3 | 30.7 | SE | 118 | 26 | 1.2 | 960 | 10.4 | DB | ANG | R | - | 74-75 |
| 6433 | 70 | - | P | LA | 33.7 | 40.0 | SE | 111 | 23 | 1.2 | 1200 | 9.2 | B | ANG | R | 18.1 | 75-76 |
| 6934 | 70 | - | P | LA | 31.3 | 35.0 | SE | 111 | 43 | 1.2 | 1440 | 11.4 | B | ANG | R | 20.4 | 75-76 |
| 10495 | 68 | 38 | P | LA | 41.3 | 39.3 | SS | 126 | 50 | 1.4 | 1560 | 14.1 | Y | ANG | R | 19.2 | 76-77 |
| 10596 | 64 | 35 | P | LA | 36.0 | 31.7 | SE | 112 | 38 | 1.1 | 1360 | 12.1 | Y | ANG | R | 22.9 | 76-77 |

## VI. Accessions less susceptible to pod borer (*Heliothis armigera* Hubn.).

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 12475 | ICC 506 HR | Andhra Pradesh | IND | P 386 HR |
| 12476 | ICC 6663 HR | - | IRN | P 1165 HR |
| 12477 | ICC 10460 HR | Karnataka | IND | RPSP 194 HR |
| 12478 | ICC 10667 HR | Tamil Nadu | IND | 62-10-3 HR |
| 12479 | ICC 10619 HR | Punjab | IND | RPSP 583 HR |
| 12480 | ICC 1381 HR | Uttar Pradesh | IND | P 1234-1 HR |
| 12481 | ICC 9526 HR | Uttar Pradesh | IND | P 52 HR |
| 12482 | (K 850 X CHAFA) HR | - | IND | - |
| 12483 | (H 208 X BEG 482) HR | - | IND | - |
| 12484 | (K 850 X N 59) HR | - | IND | - |
| 12485 | (H 208 X N 59) HR | - | IND | - |
| 12486 | (GW 5 7 X H 223) HR | - | IND | - |
| 12487 | (H 208 X N 59) HR | - | IND | - |
| 12488 | (H 208 X KS 11) HR | - | IND | - |
| 12489 | (H 208 X RS 11) HR | - | IND | - |
| 12490 | ICC 4935 HR | Punjab | IND | C 235 HR |
| 12491 | ICC 10870 HR | Ghor | AFG | JM 2575 HR |
| 12492 | ICC 5264 HR | Punjab | IND | GL 645 HR |
| 12493 | ICC 5264 HR | Punjab | IND | GL 645 HR |
| 12494 | ICC 7966 HR | - | IRN | NEC 2059 HR |
| 12495 | ICC 7559 HR | - | USA | P 9625 HR |
| 12496 | ICC 2696 HR | - | IRN | P 2774 HR |

VI. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12475 | 45 | 28 | P | LA | 28.6 | 45.8 | SS | 101 | 48 | 1.0 | 1080 | 14.8 | YB | ANG | R | - | 83-84 |
| 12476 | 56 | 23 | P | LA | 33.0 | 47.8 | SE | 101 | 39 | 1.3 | 1460 | 14.8 | LB | ANG | R | - | 83-84 |
| 12477 | 51 | 25 | P | LA | 26.4 | 36.0 | SS | 95 | 34 | 1.2 | 1250 | 11.0 | YB | ANG | R | - | 83-84 |
| 12478 | 53 | 19 | P | LA | 25.8 | 47.8 | SS | 96 | 36 | 1.0 | 1170 | 12.1 | YB | ANG | R | - | 83-84 |
| 12479 | 47 | 28 | P | LA | 25.8 | 36.0 | SS | 98 | 33 | 1.2 | 750 | 14.3 | LB | ANG | R | - | 84-85 |
| 12480 | 51 | 26 | P | LA | 24.8 | 37.8 | SS | 102 | 42 | 1.0 | 960 | 14.2 | LY | ANG | R | - | 83-84 |
| 12481 | 56 | 23 | P | LA | 39.0 | 49.4 | SS | 99 | 28 | 1.2 | 790 | 15.3 | B | ANG | R | - | 84-85 |
| 12482 | 44 | 33 | P | LA | 25.8 | 48.0 | SS | 100 | 42 | 1.1 | 1460 | 15.1 | LB | ANG | R | - | 83-84 |
| 12483 | 51 | 25 | P | LA | 27.0 | 44.8 | SS | 100 | 42 | 1.0 | 1000 | 11.7 | YB | ANG | R | - | 83-84 |
| 12484 | 51 | 26 | P | NA | 27.6 | 45.8 | SS | 100 | 61 | 1.0 | 1580 | 15.7 | YB | ANG | R | - | 83-84 |
| 12485 | 51 | 25 | P | NA | 27.4 | 41.8 | SS | 96 | 40 | 1.0 | 1250 | 14.1 | YB | ANG | R | - | 83-84 |
| 12486 | 54 | 25 | P | LA | 34.0 | 46.2 | SE | 101 | 28 | 1.1 | 1290 | 13.1 | YB | ANG | R | - | 83-84 |
| 12487 | 55 | 22 | P | NA | 25.6 | 42.8 | SE | 101 | 37 | 1.0 | 1040 | 13.7 | LB | ANG | R | - | 83-84 |
| 12488 | 63 | 27 | W | NA | 31.2 | 48.2 | SE | 102 | 39 | 1.4 | 920 | 10.3 | YB | ANG | R | - | 83-84 |
| 12489 | 60 | 21 | W | NA | 28.4 | 41.0 | SE | 100 | 43 | 1.5 | 830 | 9.6 | YB | ANG | R | - | 83-84 |
| 12490 | 58 | 28 | P | LA | 36.2 | 42.8 | SE | 112 | 27 | 1.3 | 880 | 12.7 | YB | ANG | R | - | 84-85 |
| 12491 | 52 | 24 | W | NA | 32.8 | 45.6 | SE | 94 | 40 | 1.0 | 960 | 16.4 | BE | OWL | S | - | 83-84 |
| 12492 | 58 | 22 | W | NA | 30.4 | 41.0 | SE | 103 | 18 | 1.1 | 880 | 16.5 | BE | OWL | S | - | 83-84 |
| 12493 | 53 | 26 | W | NA | 29.8 | 44.2 | SE | 100 | 35 | 1.1 | 1420 | 14.3 | BE | OWL | S | - | 83-84 |
| 12494 | 60 | 34 | W | NA | 39.4 | 41.4 | SE | 108 | 16 | 1.6 | 960 | 13.5 | BE | OWL | S | - | 83-84 |
| 12495 | 58 | 33 | W | NA | 37.0 | 58.6 | SS | 101 | 32 | 1.0 | 1380 | 20.9 | BE | OWL | S | - | 83-84 |
| 12496 | 51 | 25 | W | NA | 28.6 | 45.8 | SE | 101 | 35 | 1.4 | 1170 | 15.9 | BE | OWL | S | - | 83-84 |

## VII. Accessions with erect growth habit.

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 1500 | P 1293 | Uttar Pradesh | IND | 730-2 |
| 1903 | P 1528-1 | - | MAR | - |
| 2019 | P 1628-1 | - | IND | - |
| 2256 | P 1848-1 | - | IRN | - |
| 2469 | P 2263 | - | IRN | 0450 0436 |
| 2722 | P 2828-1 | - | IRN | - |
| 2891 | P 3264 | - | IRN | 1411 1437 |
| 2894 | P 3269 | - | IRN | 1415 1442 |
| 2896 | P 3274 | - | IRN | 1420 1447 |
| 4676 | P 6264-1 | Uttar Pradesh | IND | - |
| 4686 | P 6274 | Uttar Pradesh | IND | - |
| 4844 | P 6625 | - | ISR | 113 |
| 4936 | E 100 | - | GRC | - |
| 5035 | C 8 | Punjab | IND | - |
| 5101 | EC 26415-1 | - | ISR | - |
| 5108 | EC 26423 | - | ISR | - |
| 5115 | EC 26432 | - | ISR | - |
| 5151 | F 396-2 | Punjab | IND | - |
| 5152 | F 408 | Punjab | IND | - |
| 5155 | F 502 | Punjab | IND | - |
| 5156 | F 506 | Punjab | IND | - |
| 5157 | F 507 | Punjab | IND | - |
| 5173 | G 13-1 | Punjab | IND | - |
| 5719 | C 1 | Punjab | IND | - |
| 5726 | C 16 | Punjab | IND | - |
| 5758 | DHARWAR 18-12 | Karnataka | IND | - |
| 5766 | EARLY GULAB 1 | Maharashtra | IND | - |
| 5774 | PARNER 4-14-1XBRONZE LEAF 31-1 | Maharashtra | IND | - |
| 5775 | PARNER 4-14-1XBRONZE LEAF 33-3 | Maharashtra | IND | - |
| 5776 | PARNER 4-14-1XBRONZE LEAF 48-2 | Maharashtra | IND | - |

*Continued.*

VII. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1500 | 57 | - | P | - | 47.3 | 42.3 | E | 110 | 40 | 1.1 | 1920 | 17.4 | B | ANG | R | - | 74-75 |
| 1903 | 91 | - | P | - | 62.3 | 53.0 | E | 128 | 18 | 1.5 | 580 | 11.3 | BL | ANG | R | - | 74-75 |
| 2019 | 80 | 37 | W | NA | 56.3 | 43.3 | E | 129 | 28 | 1.0 | 730 | 23.7 | BF | OWL | R | 18.8 | 81-82 |
| 2256 | 86 | 41 | DP | LA | 57.7 | 36.3 | E | 143 | 24 | 1.3 | 700 | 23.7 | BL | ANG | R | 20.0 | 80-81 |
| 2469 | 73 | - | LP | - | 45.7 | 42.0 | E | 121 | 11 | 1.0 | 250 | 23.5 | BB | ANG | R | - | 74-75 |
| 2722 | 80 | - | LP | - | 42.7 | 44.7 | E | 120 | 6 | 1.0 | 310 | - | | - | - | - | 74-75 |
| 2891 | 57 | - | P | LA | 43.0 | 42.7 | E | 110 | 17 | 1.3 | 1420 | 12.5 | BL | ANG | R | 21.4 | 75-76 |
| 2894 | 65 | - | P | LA | 38.0 | 34.3 | E | 107 | 27 | 1.1 | 1490 | 12.3 | Y | ANG | R | 21.4 | 75-76 |
| 2896 | 58 | - | P | LA | 29.0 | 29.7 | E | 104 | | - | 1440 | 11.3 | Y | ANG | R | 21.6 | 75-76 |
| 4676 | 70 | - | W | - | 39.0 | 33.7 | E | 116 | 16 | 1.2 | 950 | 22.2 | BF | OWL | S | - | 74-75 |
| 4686 | 80 | - | P | - | 38.7 | 33.0 | E | 124 | 5 | 1.2 | 480 | 16.0 | OB | PEA | R | - | 74-75 |
| 4844 | 90 | 44 | P | LA | 47.3 | 37.0 | E | 157 | 18 | 1.2 | 700 | 23.5 | BL | ANG | R | 17.6 | 78-79 |
| 4936 | 67 | 54 | P | LA | 53.3 | 35.7 | E | 143 | 30 | 1.0 | 930 | 27.1 | B | ANG | R | 17.7 | 80-81 |
| 5035 | 91 | 48 | DP | LA | 52.3 | 35.7 | E | 160 | 25 | 1.8 | 800 | 24.9 | BL | ANG | R | 18.5 | 78-79 |
| 5101 | 90 | - | P | - | 40.3 | 50.3 | E | 106 | 18 | 1.2 | 380 | 14.2 | LB | ANG | R | - | 74-75 |
| 5108 | 85 | 38 | P | LA | 50.0 | 34.3 | E | 143 | 14 | 1.0 | 790 | 31.9 | BM | PEA | R | - | 77-78 |
| 5115 | 69 | - | W | NA | 35.3 | 41.3 | E | 114 | 27 | 1.0 | 940 | 18.9 | BF | OWL | S | 21.8 | 75-76 |
| 5151 | 63 | - | P | LA | 36.3 | 24.7 | E | 109 | 35 | 1.0 | 910 | 12.4 | G | ANG | R | 19.3 | 75-76 |
| 5152 | 67 | - | P | LA | 38.7 | 29.7 | E | 109 | 51 | 1.1 | 1580 | 13.6 | YB | ANG | R | 20.1 | 75-76 |
| 5155 | 69 | - | P | LA | 40.3 | 32.3 | E | 110 | 47 | 1.1 | 1380 | 17.5 | YB | ANG | R | 23.3 | 75-76 |
| 5156 | 63 | - | P | LA | 44.0 | 43.0 | E | 109 | 30 | 1.0 | 1730 | 19.8 | Y | ANG | R | 21.4 | 75-76 |
| 5157 | 68 | - | P | LA | 47.7 | 33.7 | E | 110 | 43 | 1.0 | 1360 | 17.0 | YB | ANG | R | 24.7 | 75-76 |
| 5173 | 91 | 52 | DP | LA | 50.0 | 33.0 | E | 161 | 27 | 1.1 | 970 | 24.4 | BL | ANG | R | 19.2 | 78-79 |
| 5719 | 80 | - | P | - | 45.0 | 48.0 | E | 120 | 12 | 1.1 | 760 | 19.1 | YB | ANG | R | - | 74-75 |
| 5726 | 73 | - | P | - | 39.3 | 46.0 | E | 115 | 33 | 1.1 | 1160 | 12.3 | Y | ANG | R | - | 74-75 |
| 5758 | 46 | - | P | - | 32.0 | 36.3 | E | 92 | 28 | 1.2 | 1420 | 13.6 | RB | ANG | R | - | 74-75 |
| 5766 | 59 | - | P | - | 44.0 | 52.3 | E | 116 | 27 | 1.2 | 980 | 10.5 | BL | ANG | R | - | 74-75 |
| 5774 | 46 | - | B | - | 26.0 | 42.3 | E | 94 | 75 | 1.0 | 1760 | 12.6 | DB | ANG | R | - | 74-75 |
| 5775 | 46 | - | B | - | 25.7 | 33.0 | E | 93 | 60 | 1.2 | 1640 | 10.9 | B | ANG | R | - | 74-75 |
| 5776 | 46 | - | B | - | 28.7 | 26.7 | E | 93 | 39 | 1.1 | 1490 | 12.0 | B | ANG | R | - | 74-75 |

*Continued.*

VII. *Continued.*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 5802 | GRAM 87 | Madhya Pradesh | IND | - |
| 5818 | KANPUR T.6 | Uttar Pradesh | IND | - |
| 6038 | JG 3 | Madhya Pradesh | IND | - |
| 6103 | JG 87 | Madhya Pradesh | IND | - |
| 6112 | JG 100 | Madhya Pradesh | IND | - |
| 6235 | NEC 108 | - | GRC | - |
| 6250 | NEC 123 | - | MAR | - |
| 6336 | NEC 252 | - | IND | PI 315796 |
| 7192 | NEC 1563 | - | HUN | - |
| 7193 | NEC 1564 | - | HUN | - |
| 7322 | PI 251783 | - | SUN | - |
| 7669 | P 9849 | - | GRC | GS 1937 |
| 7711 | NEC 42 | - | ESP | - |
| 7722 | NEC 140 | - | SUN | - |
| 7772 | NEC 1454 | - | IRN | PI 360649, P6592 |
| 7961 | NEC 2053 | - | IRN | P 3944 |
| 8203 | NEC 2357 | - | SUN | PI 2517783 |
| 8476 | JM 506 | - | MAR | RABAT 15 |
| 8507 | JM 536 | - | SUN | - |
| 8508 | JM 537 | - | SUN | - |
| 8520 | JM 550 | - | GRC | - |
| 8521 | JM 551 | - | ITA | - |
| 8523 | JM 553 | - | ITA | ITALIAN 40/64 |
| 8536 | JM 577 | - | NOI | - |
| 8539 | JM 580 | - | NOI | - |
| 8540 | JM 581 | - | NOI | - |
| 8560 | JM 989 | - | NOI | - |
| 8564 | JM 993 | - | NOI | - |
| 8565 | JM 995 | - | NOI | - |
| 8566 | JM 996 | - | NOI | - |

*Continued.*

VII. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5802 | 67 | - | P | - | 37.3 | 55.3 | E | 112 | 34 | 1.2 | 1270 | 11.1 | YB | ANG | R | - | 74-75 |
| 5818 | 70 | - | W | - | 33.7 | 35.7 | E | 116 | 24 | 1.1 | 560 | 13.7 | LY | ANG | R | - | 74-75 |
| 6038 | 47 | - | P | - | 35.0 | 42.7 | E | 116 | 29 | 1.0 | 780 | 11.4 | G | ANG | R | - | 74-75 |
| 6103 | 90 | - | P | - | 53.0 | 26.7 | E | 120 | 7 | 1.4 | 510 | 25.4 | BL | ANG | R | - | 74-75 |
| 6112 | 73 | - | LP | - | 41.0 | 43.0 | E | 117 | 12 | 1.1 | 560 | 14.2 | B | ANG | R | - | 74-75 |
| 6235 | 86 | 41 | W | NA | 60.0 | 38.7 | E | 146 | 22 | 1.0 | 600 | 22.8 | LY | PEA | S | 19.4 | 80-81 |
| 6250 | 86 | 39 | DP | LA | 67.7 | 37.7 | E | 144 | 21 | 1.1 | 1000 | 24.5 | BL | ANG | R | 17.5 | 80-81 |
| 6336 | 91 | 38 | DP | LA | 52.7 | 35.7 | E | 161 | 13 | 1.1 | 700 | 26.4 | BL | ANG | R | 19.6 | 78-79 |
| 7192 | 79 | 44 | DP | LA | 61.0 | 33.3 | E | 140 | 30 | 1.3 | 730 | 16.6 | BL | ANG | R | 19.1 | 80-81 |
| 7193 | 94 | 47 | DP | LA | 46.7 | 36.3 | E | 162 | 29 | 1.1 | 630 | 22.3 | BL | ANG | R | 18.9 | 78-79 |
| 7323 | 71 | 55 | W | NA | 81.0 | 38.7 | E | 144 | 35 | 1.5 | 600 | 17.9 | LO | PEA | S | 16.9 | 80-81 |
| 7669 | 84 | 42 | DP | LA | 59.0 | 40.0 | E | 142 | 26 | 1.0 | 1070 | 24.9 | BL | ANG | R | 18.1 | 80-81 |
| 7711 | 70 | - | W | - | 82.0 | 36.7 | E | 131 | 5 | 1.0 | 840 | 41.5 | BE | OWL | S | - | 74-75 |
| 7722 | 91 | 48 | W | NA | 56.3 | 18.3 | E | 159 | 15 | 1.3 | 500 | 25.7 | BE | OWL | S | 18.9 | 78-79 |
| 7772 | 73 | - | W | - | 48.0 | 57.7 | E | 119 | 16 | 1.4 | 1290 | 15.8 | BE | OWL | S | - | 74-75 |
| 7961 | 73 | - | W | - | 52.0 | 49.3 | E | 132 | 12 | 1.2 | 1020 | 21.4 | BE | OWL | S | - | 74-75 |
| 8203 | 67 | 31 | W | NA | 80.0 | 47.0 | E | 122 | 25 | 1.1 | 290 | 23.5 | LO | PEA | S | 19.4 | 82-83 |
| 8476 | 94 | 40 | DP | LA | 47.7 | 24.0 | E | 159 | 12 | 1.3 | 500 | 26.2 | BL | ANG | R | 21.1 | 78-79 |
| 8507 | 90 | 49 | W | NA | 42.7 | 23.3 | E | 159 | 21 | 1.2 | 500 | 17.2 | BE | OWL | S | 21.0 | 78-79 |
| 8508 | 96 | 43 | DP | LA | 46.7 | 35.0 | E | 155 | 10 | 1.1 | 830 | 27.0 | BL | ANG | R | 20.4 | 78-79 |
| 8520 | 84 | 42 | DP | LA | 56.0 | 37.0 | E | 142 | 17 | 1.3 | 600 | 16.5 | BL | ANG | R | 21.6 | 80-81 |
| 8521 | 84 | 39 | P | NA | 61.3 | 41.7 | E | 142 | 38 | 1.2 | 830 | 21.5 | BB | ANG | R | 19.2 | 80-81 |
| 8523 | 75 | 48 | DP | LA | 66.7 | 36.0 | E | 142 | 28 | 1.2 | 1130 | 17.8 | BL | ANG | R | 20.5 | 80-81 |
| 8536 | 92 | 51 | P | LA | 55.7 | 40.7 | E | 164 | 16 | 1.3 | 730 | 19.7 | BL | ANG | R | 21.8 | 78-79 |
| 8539 | 91 | 42 | DP | LA | 45.0 | 30.7 | E | 153 | 19 | 1.3 | 830 | 25.0 | LB | ANG | R | 18.5 | 78-79 |
| 8540 | 91 | 52 | DP | LA | 54.0 | 38.3 | E | 164 | 14 | 1.3 | 670 | 27.7 | BL | ANG | R | 19.1 | 78-79 |
| 8560 | 85 | 33 | DP | LA | 63.3 | 43.7 | E | 146 | 29 | 1.2 | 670 | 17.3 | BL | ANG | R | 17.6 | 80-81 |
| 8564 | 92 | 47 | P | LA | 51.0 | 36.7 | E | 153 | 22 | 1.2 | 600 | 18.2 | BL | ANG | R | 19.7 | 78-79 |
| 8565 | 92 | 35 | P | LA | 60.0 | 42.0 | E | 153 | 34 | 1.2 | 550 | 21.4 | BL | ANG | R | 23.0 | 78-79 |
| 8566 | 86 | 42 | DP | LA | 65.7 | 42.0 | E | 148 | 32 | 1.2 | 670 | 16.8 | BL | ANG | R | 18.0 | 80-81 |

*Continued.*

VII. *Continued.*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 8920 | K 1170 | - | SUN | GIBRIDNYJ 180 |
| 8921 | K 1174 | - | SUN | GIBRIDNYJ 620/10 |
| 8923 | K 1189 | - | SUN | SKOROSPELXA |
| 8924 | K 1258 | - | SUN | JUBILEJNYJ |
| 8925 | K 1286 | - | SUN | VYZOKOROSLYJ 30 |
| 8926 | K 1480 | - | SUN | - |
| 8927 | K 1481 | - | SUN | - |
| 8928 | 56566 | - | SUN | L 1243 |
| 8929 | 56567 | - | SUN | L 1286 |
| 8953 | NEC 270 | - | IND | PB 12 |
| 8954 | NEC 274 | - | IND | T 2 |
| 9206 | NEC 1418 | - | IRN | PI 360613, P 6440 |
| 9242 | NEC 1565 | - | HUN | F 28 |
| 9494 | NEC 2358 | - | SUN | PI 251784 |
| 9514 | NEC 2447 | - | SUN | PI 251781 |
| 10881 | K 1190 | - | SUN | - |
| 11142 | P 9847 | New Delhi | IND | - |
| 11263 | B 235/75 | - | CZK | - |
| 11264 | B 236/75 | - | CZK | - |
| 11266 | B 238/75 | - | CZK | - |
| 11267 | B 251/75 | - | CZK | - |
| 11269 | B 260/76 | - | CZK | - |
| 11846 | TAY 27-78 | Maule | CHL | - |
| 11909 | ILC 3248 | New Delhi | IND | P 9847 |
| 12320 | P 10165 | - | NOI | - |
| 12326 | P 10188 | - | NOI | - |

VII. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8920 | 83 | 59 | W | NA | 78.3 | 32.7 | E | 162 | 45 | 1.4 | 670 | 19.4 | LO | PEA | S | 18.1 | 78-79 |
| 8921 | 60 | 42 | W | NA | 76.6 | 46.4 | F | 118 | 21 | 1.3 | 580 | 21.1 | LO | PEA | S | 21.1 | 82-83 |
| 8923 | 52 | 38 | W | NA | 43.0 | 29.0 | E | 123 | 10 | 1.2 | 270 | 18.7 | BE | PEA | S | - | 79-80 |
| 8924 | 66 | 36 | W | NA | 54.3 | 30.3 | E | 126 | 94 | 1.0 | 1030 | 20.2 | BF | PEA | S | 15.0 | 80-81 |
| 8925 | 82 | 37 | W | NA | 68.7 | 43.0 | E | 146 | 32 | 1.0 | 500 | 23.4 | BF | OWL | S | 16.5 | 80-81 |
| 8926 | 82 | 37 | W | NA | 96.3 | 37.3 | E | 146 | 22 | 1.1 | 570 | 24.0 | BF | OWL | S | 16.8 | 80-81 |
| 8927 | 77 | - | W | NA | 88.0 | 37.0 | E | 121 | 15 | 1.0 | 490 | 26.3 | BI | OWL | S | 20.8 | 75-76 |
| 8928 | 86 | - | DP | LA | 66.0 | 41.0 | E | 122 | 37 | 1.0 | 626 | 25.3 | B | ANG | R | 20.8 | 75-76 |
| 8929 | 75 | - | W | NA | 93.3 | 46.0 | E | 121 | 15 | 1.0 | 350 | 26.5 | BE | OWL | S | 20.4 | 75-76 |
| 8953 | 75 | - | P | LA | 42.0 | 37.3 | F | 111 | 40 | 1.5 | 1020 | 12.4 | Y | ANG | R | 22.6 | 75-76 |
| 8954 | 50 | - | W | NA | 37.3 | 35.0 | E | 103 | 39 | 1.1 | 1690 | 11.9 | BF | OWL | S | 20.8 | 75-76 |
| 9206 | 93 | 36 | W | NA | 64.0 | 27.7 | E | 144 | 25 | 1.0 | 500 | 15.3 | I | OWL | R | 19.6 | 80-81 |
| 9242 | 91 | 48 | P | LA | 51.3 | 42.0 | E | 157 | 13 | 1.4 | 570 | 20.2 | BI | ANG | R | 20.8 | 78-79 |
| 9494 | 94 | 45 | DP | LA | 50.7 | 21.3 | E | 159 | 27 | 1.5 | 670 | 26.7 | BI | ANG | R | 19.7 | 78-79 |
| 9514 | 94 | 45 | DP | LA | 49.3 | 18.0 | E | 159 | 33 | 1.3 | 330 | 27.0 | BI | ANG | R | 18.9 | 78-79 |
| 10881 | 89 | 50 | W | NA | 51.3 | 22.3 | E | 159 | 13 | 1.0 | 520 | 23.7 | BE | PEA | S | 19.5 | 78-79 |
| 11142 | 81 | 30 | W | NA | 66.0 | 40.3 | E | 132 | 14 | 1.1 | 620 | 21.4 | BF | PEA | S | 24.2 | 77-78 |
| 11263 | 73 | 30 | W | NA | 68.0 | 43.2 | E | 122 | 88 | 1.0 | 380 | 31.2 | BF | OWL | S | 23.0 | 82-83 |
| 11264 | 81 | 42 | W | NA | 60.7 | 34.7 | E | 140 | 34 | 1.0 | 1270 | 22.2 | BE | OWL | S | 18.4 | 80-81 |
| 11266 | 79 | 44 | W | NA | 64.3 | 38.0 | E | 140 | 29 | 1.0 | 1400 | 21.9 | BF | OWL | S | 18.6 | 80-81 |
| 11267 | 80 | 35 | W | NA | 52.0 | 38.0 | E | 136 | 18 | 1.0 | 670 | 23.9 | BF | OWL | S | 18.3 | 81-82 |
| 11269 | 84 | 21 | W | NA | 65.8 | 43.4 | E | 122 | 3 | 1.1 | 170 | 30.5 | BE | OWL | S | 21.5 | 82-83 |
| 11846 | 84 | 29 | W | NA | 59.3 | 40.3 | E | 136 | 3 | 1.0 | 870 | 37.8 | BE | OWL | S | 18.6 | 81-82 |
| 11909 | 49 | 37 | W | NA | 73.0 | 43.2 | F | 110 | 8 | 1.3 | 630 | 18.2 | BE | PEA | S | 20.2 | 82-83 |
| 12320 | 70 | 31 | LP | NA | 52.0 | 45.0 | E | 116 | 37 | 1.1 | 960 | 18.7 | BB | ANG | R | 26.2 | 82-83 |
| 12326 | 70 | 28 | W | NA | 91.0 | 42.2 | E | 120 | 17 | 1.0 | 380 | 43.1 | BE | OWL | S | 21.0 | 82-83 |

## VIII. Accessions with two pods per node (twin-podded).

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 364 | P 271 | Uttar Pradesh | IND | - |
| 365 | P 272 | Uttar Pradesh | IND | - |
| 495 | P 375 | Andhra Pradesh | IND | BEG 64 |
| 552 | P 436 | New Delhi | IND | NP 55 |
| 583 | P 458 | New Delhi | IND | NP 77 |
| 640 | P 502 | New Delhi | IND | NP 55 |
| 645 | P 505 | New Delhi | IND | NP 58 |
| 759 | P 601-1 | Punjab | IND | - |
| 988 | P 799 | - | MEX | EC 26945 |
| 1056 | P 894 | - | PAK | PI 219730-2 |
| 1237 | P 1140 | Uttar Pradesh | IND | 188 |
| 1750 | P 1439 | Uttar Pradesh | IND | 462-2 |
| 1827 | P 1481-2 | - | IND | - |
| 1828 | P 1482 | - | IND | 6251 |
| 1829 | P 1482-1 | - | IND | - |
| 1935 | P 1560-1 | - | IND | - |
| 1993 | P 1611 | - | IND | G 5 |
| 2069 | P 1666-1 | - | IND | - |
| 2401 | P 2173-2 | - | IRN | - |
| 2462 | P 2252 | - | IRN | 0440 0425 |
| 2522 | P 2414-1 | - | IRN | - |
| 2687 | P 2740 | - | IRN | 0909 0913 |
| 2796 | P 2994 | - | IRN | 1146 1167 |
| 2826 | P 3083 | - | IRN | 1227 125 |
| 2836 | P 3111 | - | IRN | 1258 1284 |
| 2955 | P 3387 | - | IRN | - |
| 2956 | P 3387-1 | - | IRN | - |
| 3081 | P 3595-1 | - | IRN | - |
| 3175 | P 3720 | - | IRN | 1850 1893 |
| 3301 | P 3934 | - | IRN | 2063 2107 |

*Continued.*

VIII. *Continued*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 364 | 48 | - | P | - | 32.7 | 55.3 | SS | 112 | 91 | 1.1 | 2910 | 14.9 | B | ANG | R | - | 74-75 |
| 365 | 48 | - | P | - | 35.0 | 55.0 | SS | 112 | 65 | 1.1 | 2680 | 16.0 | B | ANG | R | - | 74-75 |
| 495 | 48 | - | P | - | 35.3 | 55.0 | SS | 113 | 83 | 1.2 | 2510 | 13.1 | B | ANG | R | - | 74-75 |
| 552 | 48 | - | P | - | 33.0 | 54.0 | SS | 110 | 116 | 1.1 | 3040 | 14.5 | B | ANG | R | - | 74-75 |
| 583 | 48 | - | P | - | 31.7 | 62.3 | SS | 112 | 83 | 1.6 | 2850 | 15.5 | B | ANG | R | - | 74-75 |
| 640 | 48 | - | P | - | 31.3 | 47.0 | SS | 111 | 112 | 1.1 | 3020 | 14.8 | B | ANG | R | - | 74-75 |
| 645 | 66 | - | P | - | 51.3 | 81.0 | SS | 111 | 64 | 1.1 | 2840 | 12.3 | LB | ANG | R | - | 74-75 |
| 759 | 70 | - | P | - | 30.3 | 71.7 | SS | 113 | 69 | 1.1 | 1690 | 11.1 | LB | ANG | R | - | 74-75 |
| 988 | 65 | 39 | P | LA | 36.0 | 27.7 | SE | 131 | 19 | 1.4 | 400 | 12.0 | BL | ANG | R | - | 79-80 |
| 1056 | 48 | - | P | - | 37.0 | 38.0 | SS | 112 | 83 | 1.1 | 2090 | 14.5 | B | ANG | R | - | 74-75 |
| 1237 | 73 | - | P | - | 46.0 | 62.7 | SS | 118 | 33 | 1.8 | 2000 | 13.5 | LB | ANG | R | - | 74-75 |
| 1750 | 72 | - | P | LA | 34.3 | 35.0 | SS | 111 | 27 | 1.2 | 1130 | 11.8 | Y | ANG | R | 22.2 | 75-76 |
| 1827 | 73 | - | P | - | 45.0 | 50.0 | SE | 112 | 54 | 1.4 | 1620 | 12.2 | B | ANG | R | - | 74-75 |
| 1828 | 73 | - | P | LA | 30.7 | 28.7 | SS | 111 | 17 | 1.1 | 960 | 11.3 | Y | ANG | R | 21.0 | 75-76 |
| 1829 | 73 | - | P | - | 41.3 | 54.0 | SE | 111 | 37 | 1.1 | 1470 | 11.8 | B | ANG | R | - | 74-75 |
| 1935 | 68 | - | P | LA | 42.3 | 38.0 | SE | 114 | 14 | 1.2 | 800 | 15.5 | YB | ANG | R | 19.5 | 75-76 |
| 1993 | 78 | - | P | - | 39.7 | 46.0 | SE | 118 | 23 | 1.2 | 730 | 11.1 | B | ANG | R | - | 74-75 |
| 2069 | 73 | - | P | - | 30.7 | 32.0 | SE | 118 | 18 | 1.1 | 560 | 16.2 | B | ANG | R | - | 74-75 |
| 2401 | 72 | 34 | P | LA | 42.7 | 37.0 | SE | 122 | 29 | 1.3 | 1240 | 13.1 | Y | ANG | R | 18.6 | 76-77 |
| 2462 | 58 | 32 | P | LA | 31.0 | 35.3 | SE | 109 | 50 | 1.1 | 1620 | 16.7 | B | ANG | R | 21.2 | 77-78 |
| 2522 | 55 | - | P | - | 33.0 | 44.0 | SS | 108 | 71 | 1.1 | 1300 | 11.3 | B | ANG | R | - | 74-75 |
| 2687 | 56 | 36 | P | NA | 37.7 | 37.3 | SS | 109 | 77 | 1.1 | 2730 | 16.5 | LB | ANG | R | 19.7 | 77-78 |
| 2796 | 66 | - | P | - | 43.0 | 34.3 | SE | 118 | 17 | 1.0 | 490 | 12.0 | BI | ANG | R | - | 74-75 |
| 2826 | 51 | - | P | - | 35.0 | 30.3 | SE | 100 | 22 | 1.0 | 500 | 10.6 | B | ANG | R | - | 74-75 |
| 2836 | 49 | 38 | P | LA | 33.0 | 37.6 | SS | 102 | 64 | 1.1 | 2080 | 15.9 | YB | ANG | R | 20.4 | 82-83 |
| 2955 | 73 | - | W | - | 46.3 | 57.0 | SS | 120 | 19 | 1.1 | 490 | 17.0 | BE | OWL | S | - | 74-75 |
| 2956 | 57 | 33 | P | LA | 24.0 | 25.0 | SS | 113 | 27 | 1.0 | 530 | 15.8 | B | ANG | R | 17.6 | 78-79 |
| 3081 | 48 | - | P | - | 27.3 | 29.7 | SS | 92 | 28 | 1.1 | 880 | 12.5 | B | ANG | R | - | 74-75 |
| 3175 | 44 | 41 | P | LA | 35.6 | 41.6 | SS | 102 | 92 | 1.1 | 1790 | 16.2 | YB | ANG | R | 21.0 | 82-83 |
| 3301 | 51 | - | P | - | 20.0 | 29.7 | SS | 96 | 33 | 1.1 | 930 | 13.8 | B | ANG | R | - | 74-75 |

*Continued*

VIII. *Continued.*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 3302 | P 3934-1 | - | IRN | - |
| 3309 | P 3941 | - | IRN | 2069 2114 |
| 3351 | P 4027 | - | IRN | - |
| 3497 | P 4197-2 | - | IRN | - |
| 3500 | P 4203 | - | TUR | 2376 |
| 3507 | P 4206-2 | - | TUR | - |
| 3946 | P 4641 | - | IRN | 2404 0407 |
| 4229 | P 5104 | - | IRN | - |
| 4479 | P 5507-1 | - | TUR | - |
| 4540 | P 6088 | New Delhi | IND | PLGR NO.49 |
| 4649 | P 6240-1 | - | IND | - |
| 4929 | C 156 | Punjab | IND | - |
| 4945 | F 404 | Punjab | IND | - |
| 4951 | JG 62 | Madhya Pradesh | IND | G 62-404 |
| 4996 | SEL 544 | Uttar Pradesh | IND | - |
| 5020 | BR 65 | Bihar | IND | - |
| 5050 | C 169 | Punjab | IND | - |
| 5322 | M 4 | - | IND | - |
| 5402 | NP 81 | Bihar | IND | - |
| 5593 | WFWGIIIX816-140-14T | Punjab | IND | - |
| 5594 | WFWGX810-140-15T | Punjab | IND | - |
| 6478 | NEC 494 | - | IRN | PI 359191, P 271 |
| 6479 | NEC 495 | - | IRN | PI 359192, P 272 |
| 6919 | NEC 1153 | - | IRN | PI 360347, P 4203 |
| 7274 | NEC 1647 | - | IND | - |
| 7302 | PI 193481 | - | ETH | - |
| 7743 | NEC 422 | - | IRN | PI 359105, P 148 |
| 7746 | NEC 495 | - | IRN | PI 359192, P 272 |
| 7861 | NEC 1849 | - | IRN | P 3681 |
| 7871 | NEC 1861 | - | IRN | P 3698 |

*Continued.*

VIII. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3302 | 51 | - | P | - | 21.0 | 23.0 | SS | 96 | 41 | 1.0 | 880 | 13.9 | B | ANG | R | - | 74-75 |
| 3309 | 51 | - | P | - | 27.0 | 31.7 | SS | 96 | 34 | 1.0 | 930 | 12.4 | B | ANG | R | - | 74-75 |
| 3351 | 55 | 34 | P | LA | 37.3 | 43.0 | SE | 107 | 18 | 1.3 | 2600 | 16.5 | B | ANG | R | 21.0 | 77-78 |
| 3497 | 55 | - | P | - | 29.0 | 33.7 | SS | 100 | 53 | 1.2 | 1530 | 12.8 | B | ANG | R | - | 74-75 |
| 3500 | 44 | 47 | P | LA | 32.7 | 32.3 | SS | 109 | 58 | 1.0 | 1500 | 16.1 | YB | ANG | R | 15.6 | 80-81 |
| 3507 | 63 | 33 | P | LA | 30.0 | 35.0 | SE | 123 | 57 | 1.2 | 1690 | 17.2 | B | ANG | R | 18.8 | 77-78 |
| 3946 | 67 | - | P | - | 44.3 | 55.3 | SS | 118 | 25 | 1.4 | 440 | 9.4 | BL | ANG | R | - | 74-75 |
| 4229 | 67 | - | P | - | 50.0 | 47.3 | SE | 121 | 20 | 1.2 | 1050 | 10.7 | BL | ANG | R | - | 74-75 |
| 4479 | 46 | 47 | P | LA | 36.7 | 33.3 | SE | 121 | 34 | 1.0 | 1330 | 24.7 | LB | ANG | R | 14.2 | 80-81 |
| 4540 | 51 | - | P | - | 28.7 | 41.0 | SS | 112 | 48 | 1.1 | 1490 | 15.2 | B | ANG | R | - | 74-75 |
| 4649 | 53 | - | P | LA | 25.3 | 27.0 | SS | 104 | 50 | 1.3 | 1070 | 14.2 | Y | ANG | R | 17.0 | 75-76 |
| 4929 | 74 | 28 | WP | NA | 42.0 | 58.7 | SS | 118 | 54 | 1.1 | 1670 | 12.7 | Y | ANG | R | 18.8 | 76-77 |
| 4945 | 84 | 22 | P | LA | 37.7 | 33.3 | SE | 136 | 52 | 1.2 | 930 | 12.9 | B | ANG | R | 25.4 | 77-78 |
| 4951 | 44 | 29 | P | LA | 20.7 | 25.7 | SS | 107 | 27 | 1.2 | 1470 | 17.1 | YB | ANG | R | - | 79-80 |
| 4996 | 53 | - | P | - | 23.3 | 34.7 | SS | 96 | 52 | 1.0 | 960 | 13.2 | B | ANG | R | - | 74-75 |
| 5020 | 59 | - | P | - | 29.3 | 37.0 | SS | 102 | 61 | 1.5 | 1400 | 11.8 | B | ANG | R | - | 74-75 |
| 5050 | 73 | - | P | - | 36.3 | 37.7 | SE | 124 | 18 | 1.3 | 730 | 18.2 | B | ANG | R | - | 74-75 |
| 5322 | 86 | 30 | P | LA | 38.7 | 39.0 | SE | 134 | 12 | 1.2 | 380 | 14.4 | Y | ANG | R | 21.8 | 76-77 |
| 5402 | 79 | 38 | P | LA | 33.0 | 23.0 | SE | 132 | 34 | 1.1 | 1070 | 14.1 | LB | ANG | R | 21.1 | 77-78 |
| 5593 | 45 | - | P | - | 28.3 | 42.3 | SE | 94 | 31 | 1.1 | 1510 | 16.1 | B | ANG | R | - | 74-75 |
| 5594 | 45 | - | P | - | 22.0 | 38.0 | SS | 94 | 36 | 1.1 | 1240 | 16.4 | B | PEA | R | - | 74-75 |
| 6478 | 43 | 38 | P | LA | 16.0 | 15.0 | SE | 86 | 16 | 1.0 | 270 | 15.4 | Y | ANG | R | - | 79-80 |
| 6479 | 46 | 41 | P | LA | 38.0 | 46.2 | SS | 101 | 55 | 1.5 | 1170 | 15.2 | YB | ANG | R | 22.7 | 82-83 |
| 6919 | 42 | 23 | P | LA | 27.0 | 33.3 | SS | 85 | 28 | 1.5 | 1230 | 17.3 | Y | ANG | R | - | 79-80 |
| 7274 | 46 | 41 | P | LA | 30.8 | 36.6 | SS | 102 | 94 | 1.0 | 2170 | 16.6 | YB | ANG | R | 21.0 | 82-83 |
| 7302 | 51 | 45 | P | LA | 33.0 | 30.0 | SE | 120 | 57 | 1.6 | 830 | 11.3 | B | ANG | R | 15.6 | 80-81 |
| 7743 | 50 | - | P | - | 28.0 | 28.7 | SS | 92 | 60 | 1.0 | 1380 | 12.8 | B | ANG | R | - | 74-75 |
| 7746 | 53 | - | P | - | 31.3 | 24.7 | SE | 92 | 47 | 1.1 | 1240 | 12.7 | B | ANG | R | - | 74-75 |
| 7861 | 59 | 40 | W | NA | 35.0 | 27.0 | SE | 127 | 14 | 1.0 | 200 | 25.9 | BE | OWL | R | - | 79-80 |
| 7871 | 61 | 38 | W | FA | 44.7 | 28.7 | SE | 129 | 9 | 1.0 | 200 | 24.4 | BE | OWL | S | - | 79-80 |

*Continued.*

VIII. *Continued*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 7883 | NEC 1904 | - | IRN | P 3752 |
| 8077 | NEC 2208 | - | IRN | P 6936 |
| 8152 | NEC 2299 | - | USA | 69 D.P. |
| 8153 | NEC 2300 | - | USA | G 152 |
| 8157 | NEC 2304 | - | USA | 74 D.P. |
| 8158 | NEC 2305 | - | USA | G 151 |
| 8277 | BR 78 | Bihar | IND | - |
| 8284 | HYB 16-3 | Uttar Pradesh | IND | K 16-3 |
| 8285 | JG-GULAB | Madhya Pradesh | IND | - |
| 8741 | JM 489 | - | PAK | LYALLPUR 382 |
| 8619 | WP 2654 | Sidamo | ETH | - |
| 8621 | WP 2793 C | Sidamo | ETH | - |
| 9070 | NEC 607 | - | IRN | PI 359324, P 463 |
| 9208 | NEC 1421 | - | IRN | PI 360616, P 6446 |
| 9644 | NEC 2565-1 | Kandahar | AFG | 373C-1 |
| 10034 | JG 62 M | Andhra Pradesh | IND | JG 62 N L MUTANT |
| 10138 | PANT 116 | Uttar Pradesh | IND | G130X1540 |
| 10379 | RS 11XGNR 114 | Rajasthan | IND | - |
| 10381 | S 26XGNR 114 | Rajasthan | IND | - |
| 10909 | RS 11XGNR 114-1 | Rajasthan | IND | ICC 10379 D.P. |
| 10919 | RPSP 322-1 | Rajasthan | IND | D.P. |
| 11101 | PANT G 121 | Uttar Pradesh | IND | JG 62 X 106 |
| 11102 | PANT G 122 | Uttar Pradesh | IND | JG 62 X 106 |
| 11130 | ANM 759 | Uttar Pradesh | IND | - |
| 11150 | JG 1257 | Madhya Pradesh | IND | - |
| 11337 | PR 4312 | Madhya Pradesh | IND | - |
| 11343 | PR 4318 | Madhya Pradesh | IND | - |
| 11510 | GNG 88 | Rajasthan | IND | G 24XGNR 114 |
| 11865 | CPI 53008 | - | IND | GC 62-404 |
| 11869 | PARA 109 | New Delhi | IND | MUTANT JG 62 |

*Continued.*

VIII. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7883 | 81 | 30 | W | NA | 43.0 | 30.7 | SE | 140 | 26 | 1.1 | 1000 | 21.0 | BE | OWL | S | 18.1 | 77-78 |
| 8077 | 62 | 37 | W | NA | 37.0 | 25.7 | SE | 129 | 11 | 1.2 | 130 | 26.5 | BE | OWL | S | - | 79-80 |
| 8152 | 89 | 34 | P | LA | 45.3 | 33.3 | SE | 137 | 37 | 1.4 | 1490 | 18.8 | B | ANG | R | 17.9 | 77-78 |
| 8153 | 79 | 39 | P | LA | 38.3 | 37.0 | SE | 130 | 57 | 1.3 | 1670 | 16.9 | B | ANG | R | 13.7 | 80-81 |
| 8157 | 80 | 22 | P | LA | 49.2 | 46.0 | SE | 118 | 38 | 1.1 | 500 | 18.7 | YB | ANG | R | 25.2 | 82-83 |
| 8158 | 84 | 39 | P | LA | 42.7 | 30.0 | SE | 138 | 32 | 1.2 | 1290 | 17.1 | B | ANG | R | 17.7 | 77-78 |
| 8277 | 58 | - | P | LA | 26.7 | 32.7 | SE | 105 | 17 | 1.1 | 1400 | 16.7 | G | ANG | R | 17.9 | 75-76 |
| 8284 | 63 | 31 | W | NA | 36.7 | 38.0 | SE | 132 | 8 | 1.6 | 430 | 25.0 | BE | OWL | S | - | 79-80 |
| 8285 | 54 | 39 | W | NA | 36.0 | 35.4 | SS | 105 | 60 | 1.7 | 1880 | 16.7 | O | ANG | R | 21.9 | 82-83 |
| 8471 | 84 | 22 | W | NA | 49.6 | 41.4 | SE | 122 | 34 | 1.3 | 1170 | 11.8 | LO | PEA | S | 23.5 | 82-83 |
| 8619 | 44 | 29 | P | LA | 21.0 | 25.3 | SS | 88 | 36 | 1.1 | 700 | 14.8 | YB | ANG | R | - | 79-80 |
| 8621 | 61 | 27 | P | LA | 35.3 | 32.0 | SE | 108 | 80 | 1.1 | 2000 | 16.2 | B | ANG | R | 18.4 | 77-78 |
| 9070 | 70 | - | P | LA | 44.7 | 45.3 | SS | 109 | 64 | 1.4 | 2020 | 12.0 | Y | ANG | R | 22.4 | 75-76 |
| 9206 | 54 | - | P | LA | 28.3 | 34.3 | SE | 107 | 54 | 1.1 | 2400 | 14.9 | Y | ANG | R | 20.1 | 75-76 |
| 9644 | 82 | 29 | LP | NA | 32.3 | 30.3 | SE | 145 | 14 | 1.6 | 270 | 13.7 | BB | ANG | R | 21.9 | 78-79 |
| 10034 | 47 | 28 | P | LA | 22.0 | 31.0 | SS | 92 | 18 | 1.2 | 470 | 17.8 | YB | ANG | R | - | 79-80 |
| 10138 | 44 | 42 | P | LA | 40.8 | 45.2 | SS | 104 | 67 | 1.2 | 1380 | 16.5 | YB | ANG | R | 22.1 | 82-83 |
| 10379 | 79 | 31 | W | NA | 37.3 | 38.3 | SE | 131 | 55 | 1.4 | 1400 | 13.1 | B | ANG | R | 16.0 | 80-81 |
| 10381 | 75 | 32 | P | LA | 28.0 | 20.0 | SE | 131 | 25 | 1.3 | 870 | 14.2 | B | ANG | R | 17.0 | 78-79 |
| 10909 | 85 | 34 | P | LA | 30.3 | 30.0 | SE | 146 | 20 | 1.3 | 770 | 15.6 | YB | ANG | R | 16.4 | 78-79 |
| 10919 | 82 | 29 | P | LA | 30.0 | 29.3 | SE | 157 | 24 | 1.5 | 1200 | 14.6 | B | ANG | R | 16.0 | 78-79 |
| 11101 | 51 | 40 | P | LA | 25.3 | 28.3 | SE | 119 | 29 | 1.0 | 570 | 13.2 | YB | ANG | R | 19.6 | 81-82 |
| 11102 | 52 | 35 | P | LA | 26.0 | 28.3 | SS | 109 | 36 | 1.6 | 1100 | 17.2 | YB | ANG | R | - | 79-80 |
| 11130 | 50 | 36 | P | LA | 22.0 | 28.7 | SE | 109 | 38 | 1.2 | 1070 | 14.6 | YB | ANG | R | - | 79-00 |
| 11150 | 35 | 32 | P | LA | 26.7 | 31.7 | SE | 88 | 35 | 1.1 | 1600 | 29.4 | YB | ANG | R | - | 79-80 |
| 11337 | 43 | 29 | P | LA | 22.0 | 22.0 | SE | 90 | 26 | 1.1 | 530 | 13.5 | YB | ANG | R | - | 79-80 |
| 11343 | 44 | 43 | P | LA | 32.2 | 37.0 | SS | 105 | 85 | 1.0 | 2000 | 16.1 | YB | ANG | R | 21.7 | 82-83 |
| 11510 | 81 | 28 | - | LA | 39.0 | 34.0 | SE | 125 | 45 | 1.5 | 1470 | 13.6 | YB | ANG | R | 14.8 | 80-81 |
| 11865 | 60 | 42 | P | LA | 29.7 | 42.3 | SE | 133 | 35 | 1.2 | 1230 | 14.6 | YB | ANG | R | 16.4 | 80-81 |
| 11889 | 44 | 42 | P | LA | 34.8 | 36.4 | SS | 192 | 66 | 1.3 | 1790 | 16.5 | YB | ANG | R | 21.6 | 82-83 |

*Continued.*

VIII. *Continued.*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 11892 | PARA 119 | New Delhi | IND | MUTANT JG 62 |
| 11893 | PARA 123 | New Delhi | IND | MUTANT JG 62 |
| 11899 | ILC 1281 | - | IRN | NEC 2380 |
| 11969 | NEC 2820 | - | NOI | - |
| 12029 | L 1467 | - | MEX | - |
| 12030 | L 1776 | - | MEX | - |
| 12031 | L 1852 | - | MEX | - |
| 12032 | L 1869 | - | MEX | - |
| 12314 | GNG 16 | Rajasthan | IND | - |
| 12366 | RSG 44 | Rajasthan | IND | JG 62 X F 496 |

VIII. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11892 | 46 | 46 | P | LA | 47.8 | 53.2 | SE | 109 | 44 | 1.1 | 1670 | 12.5 | YB | ANG | R | 24.2 | 82-83 |
| 11893 | 44 | 43 | P | LA | 34.0 | 40.8 | SS | 102 | 88 | 1.1 | 1880 | 16.7 | YB | ANG | R | 22.4 | 82-83 |
| 11899 | 49 | 41 | P | LA | 39.6 | 49.2 | SE | 106 | 80 | 1.4 | 2040 | 15.8 | YB | ANG | R | 22.9 | 82-83 |
| 11969 | 62 | 31 | P | LA | 27.0 | 40.3 | SS | 118 | 31 | 1.1 | 1630 | 15.8 | YB | ANG | R | 16.7 | 80-81 |
| 12029 | 81 | 39 | P | LA | 45.0 | 37.0 | SE | 137 | 40 | 1.2 | 1800 | 16.3 | YB | ANG | R | 14.6 | 80-81 |
| 12030 | 79 | 31 | P | LA | 39.7 | 37.3 | SE | 137 | 42 | 1.1 | 1230 | 11.6 | YB | ANG | R | 15.4 | 80-81 |
| 12031 | 75 | 48 | W | NA | 50.7 | 36.7 | SE | 138 | 29 | 1.4 | 1170 | 11.9 | LO | PEA | R | 16.1 | 80-81 |
| 12032 | 71 | 39 | P | NA | 44.3 | 37.0 | SE | 134 | 49 | 1.1 | 1500 | 12.3 | YB | ANG | R | 15.4 | 80-81 |
| 12314 | 74 | 32 | P | LA | 41.8 | 38.2 | SS | 118 | 64 | 1.5 | 1250 | 14.9 | LB | ANG | R | - | 82-83 |
| 12366 | 56 | 38 | P | LA | 42.8 | 40.2 | SS | 109 | 75 | 1.3 | 1790 | 13.9 | Y | ANG | R | 21.6 | 82-83 |

## IX. Multiseeded accessions.

| ICC N. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 9 | P 6 | Uttar Pradesh | IND | - |
| 98 | P 76 | Uttar Pradesh | IND | - |
| 112 | P 88-1 | Uttar Pradesh | IND | - |
| 295 | P 229-2 | Uttar Pradesh | IND | - |
| 613 | P 482 | New Delhi | IND | NP 19 |
| 841 | P 663 | New Delhi | IND | BT 34 |
| 1052 | P 886 | - | PAK | PI 217520-2 |
| 1315 | P 1198-1 | Uttar Pradesh | IND | - |
| 1401 | P 1245-2 | Uttar Pradesh | IND | - |
| 1630 | P 1360-1 | Uttar Pradesh | IND | - |
| 1813 | P 1474 | Uttar Pradesh | IND | 832-4 |
| 1901 | P 1522 | - | IND | EC-26432 |
| 2210 | P 1781 | - | DZA | ALGERIA 444 |
| 2259 | P 1854 | - | IRN | 0028 0027 |
| 2400 | P 2173-1 | - | IRN | - |
| 2496 | P 2365 | - | IRN | 0452 0438 |
| 2500 | P 2376 | - | IRN | 0553 0549 |
| 2593 | P 2602 | - | IRN | 0765 0775 |
| 2671 | P 2697-2 | - | IRN | - |
| 3279 | P 3876 | - | IRN | 2004 2049 |
| 3370 | P 4058 | - | IRN | 2179 2231 |
| 3616 | P 4278-2 | - | IRN | - |
| 3832 | P 4459 | - | IRN | 2240 0225 |
| 3850 | P 4500 | - | IRN | 2277 0266 |
| 3859 | P 4515 | - | IRN | 2290 0281 |
| 3912 | P 4593 | - | IRN | 2361 0359 |
| 4014 | P 4718 | - | IRN | 2473 0484 |
| 4201 | P 5044-2 | - | IRN | - |
| 4410 | P 5394 | - | IRN | - |
| 5046 | C 161 | Punjab | IND | - |
| 5172 | G 13 | Punjab | IND | - |

*Continued.*

IX. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 60 | - | P | LA | 29.0 | 35.7 | SE | 105 | 13 | 2.5 | 1622 | 15.4 | B | ANG | R | 17.6 | 75-76 |
| 98 | 60 | - | P | LA | 30.0 | 31.7 | SE | 103 | 14 | 2.3 | 1340 | 12.1 | Y | ANG | R | 17.4 | 75-76 |
| 112 | 60 | - | P | LA | 32.0 | 41.0 | SS | 105 | 35 | 2.1 | 1360 | 13.2 | Y | ANG | R | 18.9 | 75-76 |
| 295 | 58 | - | P | LA | 32.7 | 31.0 | SE | 105 | 13 | 2.4 | 1310 | 14.0 | Y | ANG | R | 18.0 | 75-76 |
| 613 | 73 | - | P | - | 51.3 | 86.7 | SS | 115 | 44 | 2.3 | 2220 | 11.5 | B | ANG | R | 19.3 | 74-75 |
| 877 | 55 | - | LP | - | 40.3 | 69.0 | SS | 110 | 60 | 2.1 | 1980 | 11.2 | BB | ANG | R | - | 74-75 |
| 1052 | 66 | - | P | - | 50.0 | 43.3 | SE | 116 | 12 | 3.0 | 1020 | 9.8 | BL | ANG | R | - | 74-75 |
| 1315 | 53 | - | P | LA | 31.7 | 38.0 | SE | 100 | 11 | 2.9 | 1530 | 13.5 | YB | ANG | T | 20.1 | 75-76 |
| 1401 | 50 | 40 | P | LA | 32.0 | 35.3 | SS | 103 | 50 | 2.2 | 1960 | 16.1 | LB | ANG | R | 20.2 | 77-78 |
| 1630 | 66 | - | P | - | 42.7 | 53.3 | SS | 114 | 27 | 2.2 | 2800 | 17.7 | B | ANG | R | - | 74-75 |
| 1813 | 66 | - | P | - | 51.0 | 62.7 | SS | 112 | 70 | 2.7 | 2800 | 11.7 | B | ANG | R | - | 74-75 |
| 1901 | 66 | - | P | - | 39.0 | 38.0 | SS | 111 | 36 | 2.5 | 1580 | 10.3 | B | ANG | R | - | 74-75 |
| 2210 | 81 | 35 | P | LA | 36.3 | 34.3 | SE | 134 | 35 | 2.1 | 1400 | 12.4 | YB | ANG | R | 16.7 | 80-81 |
| 2259 | 57 | - | P | - | 44.0 | 58.3 | SS | 121 | 43 | 2.4 | 1660 | 11.3 | B | ANG | R | - | 74-75 |
| 2400 | 50 | - | W | NA | 36.0 | 70.0 | SS | 106 | 43 | 2.1 | 1560 | 11.8 | BE | PEA | S | 22.0 | 75-76 |
| 2496 | 67 | 32 | W | N | 37.3 | 24.7 | SE | 127 | 12 | 2.1 | 200 | 29.8 | BE | OWL | S | - | 79-80 |
| 2500 | 74 | 35 | P | LA | 34.3 | 40.0 | SE | 126 | 40 | 2.4 | 1000 | 13.4 | BL | ANG | R | 23.0 | 77-78 |
| 2593 | 78 | - | W | - | 37.0 | 37.7 | SE | 121 | 8 | 2.9 | 400 | 17.2 | BE | OWL | S | - | 74-75 |
| 2671 | 76 | 29 | W | NA | 40.7 | 37.7 | SE | 133 | 18 | 2.1 | 1220 | 20.4 | BE | OWL | S | 19.5 | 77-78 |
| 3279 | 61 | - | P | - | 28.3 | 35.0 | SS | 106 | 11 | 2.5 | 1050 | 10.4 | B | ANG | R | - | 74-75 |
| 3370 | 76 | - | P | LA | 37.0 | 43.0 | SE | 118 | 29 | 2.1 | 1470 | 11.9 | Y | ANG | R | 20.1 | 75-76 |
| 3616 | 61 | - | P | - | 52.3 | 35.3 | SE | 110 | 15 | 2.1 | 380 | 9.6 | BL | ANG | R | - | 74-75 |
| 3832 | 61 | - | P | - | 39.7 | 45.7 | SE | 118 | 17 | 2.8 | 230 | 8.8 | BL | ANG | R | - | 74-75 |
| 3850 | 61 | - | P | - | 41.0 | 55.0 | SE | 101 | 14 | 2.8 | 460 | 10.7 | BL | ANG | R | - | 74-75 |
| 3859 | 59 | - | P | - | 34.0 | 42.0 | SS | 117 | 7 | 2.2 | 510 | 9.4 | BL | ANG | R | - | 74-75 |
| 3912 | 70 | - | P | - | 36.0 | 34.0 | SS | 118 | 10 | 2.1 | 370 | 10.1 | BL | ANG | R | - | 74-75 |
| 4014 | 67 | - | P | - | 48.0 | 55.0 | SS | 117 | 12 | 2.8 | 520 | 8.3 | BL | ANG | R | - | 74-75 |
| 4201 | 59 | - | P | - | 37.7 | 36.0 | SE | 111 | 16 | 2.2 | 990 | 16.9 | B | ANG | R | - | 74-75 |
| 4410 | 59 | - | P | - | 32.0 | 36.3 | SE | 120 | 8 | 2.2 | 160 | 8.9 | BL | ANG | R | - | 74-75 |
| 5046 | 57 | 31 | W | NA | 41.0 | 37.0 | SS | 113 | 8 | 2.4 | 330 | 16.6 | BE | OWL | S | - | 79-80 |
| 5172 | 67 | - | P | - | 27.3 | 38.0 | SE | 113 | 11 | 2.3 | 470 | 11.8 | B | ANG | R | - | 74-75 |

*Continued.*

IX. *Continued.*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 5254 | GL 634 | Punjab | IND | - |
| 5499 | V 41 | - | MEX | - |
| 5605 | 7 237 | Punjab | IND | - |
| 5643 | LUDHIANA 12 | Punjab | IND | - |
| 5659 | LUDHIANA 28 | Punjab | IND | - |
| 5680 | ALTERNIFOLIA | Karnataka | IND | - |
| 5857 | SIMBALPUR 1 | Maharashtra | IND | |
| 7156 | NEC 1519 | - | TUR | - |
| 7201 | NEC 1574 | - | EGY | F 43 SMALL SEED |
| 7225 | NEC 1598 | - | EGY | F 117 SMALL SEED |
| 7369 | 4844 | - | IND | - |
| 7405 | T 44A-1 | Uttar Pradesh | IND | - |
| 7491 | GC 82 | W. Bengal | IND | S 43 |
| 7495 | GC 91 | W. Bengal | IND | S 95 |
| 7513 | 12-071-05132 | - | IRN | - |
| 7907 | NEC 1979 | - | IRN | P 3845 |
| 7983 | NEC 2079 | - | IRN | P 3981 |
| 8040 | NEC 2171 | - | IRN | P 6898 |
| 8594 | SL 1044 B | Wollo | ETH | - |
| 8757 | NEC 2603 | Badghis | AFG | 504C |
| 9557 | P 302 | - | MEX | EC 26949 |
| 9614 | NEC 2499-1 | Kunduz | AFG | 87C 1 |
| 9636 | NEC 2555-1 | Ghanzi | AFG | 324C 1 |
| 10174 | H 531 | Haryana | IND | - |
| 11216 | M 16-1 | - | ETH | - |
| 11568 | SAR 2357 | Uttar Pradesh | IND | MARKET SAMPLE |
| 11596 | RPSP 558 | Punjab | IND | - |
| 11901 | WHITE NO.2 | - | SDN | - |
| 12050 | VALLE DE SANTIAGO 28 | - | MEX | - |
| 12113 | YURIRIA 134 | - | MEX | - |
| 12118 | YURIRIA 145 | - | MEX | - |

IX. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5254 | 67 | - | W | - | 39.7 | 44.0 | SE | 112 | 26 | 2.3 | 1290 | 23.9 | BE | PEA | S | - | 74-75 |
| 5499 | 53 | - | P | - | 29.0 | 33.7 | SS | 98 | 33 | 2.2 | 980 | 10.4 | BL | ANG | R | - | 74-75 |
| 5605 | 80 | - | P | - | 33.7 | 52.0 | SE | 116 | 27 | 2.4 | 870 | 10.9 | LB | ANG | R | - | 74-75 |
| 5643 | 67 | - | P | - | 32.0 | 32.0 | SE | 110 | 13 | 2.3 | 710 | 12.2 | LB | ANG | R | - | 74-75 |
| 5659 | 59 | - | P | - | 32.7 | 40.7 | SE | 106 | 17 | 2.1 | 1020 | 12.8 | DB | ANG | R | - | 74-75 |
| 5680 | 53 | - | P | - | 42.0 | 41.7 | SE | 104 | 20 | 2.5 | 1160 | 9.5 | LB | ANG | R | - | 74-75 |
| 5857 | 49 | - | P | - | 34.3 | 50.0 | SE | 100 | 51 | 2.7 | 1020 | 10.2 | BL | ANG | R | - | 74-75 |
| 7156 | 81 | 39 | W | NA | 46.3 | 38.0 | SE | 136 | 40 | 2.2 | 1000 | 37.4 | BE | OWL | S | 16.8 | 80-81 |
| 7201 | 53 | - | W | - | 46.0 | 67.7 | SE | 100 | 39 | 2.2 | 580 | 11.0 | BE | PEA | S | - | 74-75 |
| 7225 | 46 | - | W | - | 43.7 | 68.0 | SE | 98 | 30 | 2.6 | 1360 | 10.4 | BE | PEA | S | - | 74-75 |
| 7369 | 73 | - | P | - | 50.7 | 44.0 | SE | 115 | 10 | 2.5 | 270 | 11.2 | BL | ANG | R | - | 74-75 |
| 7405 | 56 | - | B | 30.7 | | 38.0 | SE | 104 | 20 | 2.5 | 870 | 16.4 | Y | ANG | R | - | 74-75 |
| 7491 | 68 | - | P | - | 40.3 | 42.0 | SS | 110 | 17 | 2.1 | 1310 | 12.1 | B | ANG | R | - | 74-75 |
| 7495 | 59 | - | P | - | 33.0 | 38.0 | SS | 103 | 25 | 2.1 | 1090 | 12.1 | B | ANG | R | - | 74-75 |
| 7513 | 70 | - | P | - | 53.3 | 45.0 | SE | 116 | 8 | 2.1 | 730 | 12.4 | BL | ANG | R | - | 74-75 |
| 7907 | 82 | - | W | - | 44.0 | 47.0 | SE | 124 | 9 | 2.1 | 620 | 18.5 | BE | OWL | S | - | 74-75 |
| 7983 | 83 | 29 | W | NA | 45.0 | 32.7 | SE | 146 | 18 | 2.2 | 840 | 24.0 | BE | OWL | S | 21.1 | 77-78 |
| 8040 | 73 | 30 | W | NA | 50.6 | 45.4 | SE | 120 | 13 | 2.1 | 540 | 21.3 | BE | OWL | S | 23.1 | 82-83 |
| 8594 | 42 | 44 | P | LA | 22.7 | 31.7 | SE | 127 | 16 | 2.1 | 500 | 9.0 | BL | ANG | R | 16.9 | 78-79 |
| 8757 | 75 | - | W | NA | 53.3 | 54.0 | SS | 118 | 10 | 2.1 | 560 | 30.2 | BE | OWL | S | 20.1 | 75-76 |
| 9557 | 63 | - | P | LA | 31.0 | 30.7 | SE | 111 | 13 | 2.2 | 1440 | 17.4 | YB | ANG | R | 18.3 | 75-76 |
| 9614 | 50 | 35 | LP | NA | 38.0 | 32.7 | SE | 112 | 21 | 2.2 | 1370 | 16.5 | BB | ANG | R | - | 79-80 |
| 9636 | 72 | 34 | LP | NA | 36.7 | 32.3 | SE | 136 | 21 | 3.0 | 1000 | 16.4 | BB | ANG | R | - | 77-78 |
| 10174 | 58 | - | P | LA | 33.3 | 33.0 | SE | 106 | 28 | 2.3 | 1690 | 13.6 | LB | ANG | R | 20.1 | 75-76 |
| 11216 | 46 | 40 | W | NA | 39.0 | 37.4 | SE | 103 | 40 | 2.3 | 960 | 9.1 | BB | ANG | R | 20.9 | 82-83 |
| 11568 | 67 | 35 | W | NA | 34.0 | 31.0 | SE | 131 | 47 | 2.1 | 1430 | 11.4 | LY | ANG | R | 15.6 | 80-81 |
| 11596 | 84 | 21 | W | NA | 59.4 | 54.8 | SE | 124 | 8 | 2.5 | 1130 | 20.9 | BE | OWL | S | 22.7 | 82-83 |
| 11901 | 46 | 40 | W | NA | 47.6 | 45.2 | SE | 109 | 45 | 2.2 | 1630 | 12.5 | BE | OWL | S | 20.0 | 82-83 |
| 12050 | 81 | 42 | DP | LA | 47.7 | 38.3 | SE | 138 | 37 | 2.1 | 1130 | 14.1 | YB | ANG | R | 15.9 | 80-81 |
| 12113 | 82 | 44 | W | NA | 53.7 | 37.3 | SE | 142 | 28 | 2.2 | 1170 | 18.0 | BE | OWL | S | 16.9 | 80-81 |
| 12118 | 81 | 42 | P | LA | 49.0 | 35.0 | SE | 140 | 17 | 3.2 | 870 | 17.8 | SB | PEA | S | 17.3 | 80-81 |

## X. Accessions with heavy seeds.

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 4854 | P 9623 | - | USA | MEXICAN SEL 2 |
| 4855 | P 9624 | - | USA | MEXICAN SEL 4 |
| 4858 | P 9639 | - | USA | WHITE SPANISH 8 |
| 4878 | P 9675 | - | IND | S 279 |
| 4899 | P 9763 | Eskisehir | TUR | VAR 43 1-1 |
| 4905 | P 9792 | Gaziantep | TUR | VAR 82 2-1 |
| 6163 | NEC 28 | Masul | IRQ | - |
| 6171 | NEC 37 | - | IRQ | - |
| 6174 | NEC 40 | - | IRQ | - |
| 6182 | NEC 49 | - | ESP | - |
| 6185 | NEC 52 | - | ESP | - |
| 6209 | NEC 77 | - | ESP | - |
| 6233 | NEC 102 | - | ESP | - |
| 6238 | NEC 111 | - | TUN | - |
| 6241 | NEC 114 | - | TUN | - |
| 6242 | NEC 115 | - | TUN | - |
| 6243 | NEC 116 | - | TUN | - |
| 7147 | NEC 1509 | - | TUR | - |
| 7185 | NEC 1555 | - | TUR | - |
| 7246 | NEC 1619 | - | LBN | - |
| 7269 | NEC 1642 | - | DZA | - |
| 7344 | ANGOSTURA | - | MEX | - |
| 7345 | BREMIZADO | - | MEX | - |
| 7346 | CULIACANCITO (860) | - | MEX | - |
| 7358 | 2088 | - | IND | - |
| 7633 | P 9778 | - | TUR | VAR. 55/1-2 |
| 7675 | P 9873 | - | USA | - |
| 7712 | NEC 53 | - | ESP | - |
| 7715 | NEC 85 | - | ESP | - |
| 7859 | NEC 1847 | - | IRN | P 3679 |

*Continued.*

X. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4854 | 78 | 29 | W | NA | 35.3 | 28.0 | SE | 139 | 21 | 1.0 | 1360 | 45.9 | BE | OWL | S | 18.5 | 77-78 |
| 4855 | 40 | 41 | W | NA | 33.3 | 33.3 | SS | 123 | 11 | 1.1 | 700 | 42.3 | BE | OWL | S | 15.0 | 80-81 |
| 4858 | 84 | 40 | W | NA | 58.7 | 37.3 | SE | 148 | 13 | 1.0 | 600 | 42.6 | BE | OWL | S | 17.6 | 80-81 |
| 4878 | 70 | 31 | W | NA | 47.2 | 46.8 | SE | 117 | 20 | 1.0 | 580 | 48.2 | RB | PEA | S | 21.0 | 82-83 |
| 4899 | 60 | 34 | W | NA | 51.0 | 49.8 | SE | 118 | 12 | 1.0 | 1040 | 49.8 | BE | OWL | S | 21.8 | 82-83 |
| 4905 | 81 | 34 | W | NA | 37.0 | 28.0 | SE | 134 | 13 | 1.0 | 870 | 43.2 | BE | OWL | S | 20.0 | 77-78 |
| 6163 | 59 | 41 | W | NA | 36.0 | 31.3 | SS | 133 | 15 | 1.1 | 530 | 43.8 | BE | OWL | R | - | 79-80 |
| 6171 | 52 | 33 | W | NA | 36.3 | 38.0 | SS | 104 | 17 | 1.0 | 1070 | 45.3 | BE | OWL | S | - | 79-80 |
| 6174 | 82 | 26 | W | NA | 44.0 | 27.3 | SE | 133 | 6 | 1.0 | 1070 | 43.9 | BE | OWL | S | 19.5 | 77-78 |
| 6182 | 79 | 44 | W | NA | 55.7 | 31.7 | SE | 142 | 16 | 1.0 | 1200 | 44.1 | BE | OWL | S | 16.8 | 80-81 |
| 6185 | 86 | 37 | W | NA | 57.7 | 36.0 | SE | 143 | 14 | 1.0 | 970 | 42.2 | BE | OWL | S | 16.7 | 80-81 |
| 6209 | 70 | 51 | W | NA | 59.0 | 37.0 | SE | 142 | 17 | 1.0 | 1030 | 42.8 | BE | OWL | S | 16.0 | 80-81 |
| 6233 | 64 | 52 | W | NA | 55.3 | 38.3 | SE | 142 | 16 | 1.0 | 730 | 49.9 | BE | OWL | S | 16.9 | 80-81 |
| 6238 | 81 | 45 | W | NA | 47.0 | 34.7 | SE | 148 | 16 | 1.0 | 1170 | 42.3 | BE | OWL | S | 16.7 | 80-81 |
| 6241 | 85 | 38 | W | NA | 45.0 | 34.0 | SE | 143 | 42 | 1.1 | 820 | 45.4 | BE | OWL | S | 18.4 | 77-78 |
| 6242 | 81 | 29 | W | NA | 50.0 | 38.7 | SE | 130 | 22 | 1.0 | 1500 | 42.5 | BE | OWL | S | 18.2 | 80-81 |
| 6243 | 85 | 38 | W | NA | 50.0 | [illegible] | SE | 147 | 14 | 1.1 | 620 | 51.3 | BE | OWL | S | 19.2 | 77-78 |
| 7147 | 65 | 29 | W | NA | 41.3 | 31.3 | SE | 125 | 3 | 1.0 | - | 48.7 | BE | OWL | S | - | 79-80 |
| 7185 | 86 | 40 | W | NA | 47.0 | 36.0 | SE | 146 | 15 | 1.1 | 700 | 44.8 | BE | OWL | S | 18.9 | 80-81 |
| 7246 | 47 | 33 | W | NA | 32.7 | 38.7 | SS | 110 | 18 | 1.0 | 800 | 46.0 | BE | OWL | S | - | 79-80 |
| 7269 | 57 | 33 | W | NA | 35.3 | 30.0 | SE | 120 | 5 | 1.3 | 300 | 43.9 | BE | OWL | S | - | 79-80 |
| 7344 | 35 | 47 | W | NA | 37.4 | 43.6 | SS | 108 | 26 | 1.1 | 500 | 59.1 | BE | OWL | S | - | 82-83 |
| 7345 | 39 | 34 | W | NA | 30.3 | 30.7 | SE | 106 | 5 | 1.0 | 500 | 54.5 | BE | OWL | S | - | 79-80 |
| 7346 | 57 | 35 | W | NA | 50.4 | 51.4 | SE | 118 | 14 | 1.0 | 500 | 57.1 | BE | OWL | S | 18.4 | 82-83 |
| 7358 | 55 | 33 | W | NA | 35.3 | 37.3 | SE | 122 | 14 | 1.0 | 830 | 44.4 | BE | OWL | S | - | 79-80 |
| 7633 | 73 | 35 | W | NA | 37.0 | 30.0 | SE | 129 | 27 | 1.0 | 1560 | 43.2 | BE | OWL | S | 19.5 | 77-78 |
| 7675 | 57 | 32 | W | NA | 24.3 | 22.0 | SE | 116 | 22 | 1.1 | 430 | 52.5 | BE | OWL | S | - | 79-80 |
| 7712 | 59 | - | W | - | 54.0 | 54.3 | SS | 131 | 17 | 1.0 | 490 | 46.3 | BE | OWL | S | - | 74-75 |
| 7715 | 70 | - | W | - | 44.0 | 82.3 | SS | 131 | 7 | 1.1 | 440 | 46.3 | BE | OWL | S | - | 74-75 |
| 7859 | 73 | - | LP | - | 32.0 | 42.3 | SE | 130 | 13 | 1.0 | 360 | 51.2 | BE | OWL | R | - | 74-75 |

*Continued.*

X. *Continued.*

| ICC No. | Pedigree Identity | Origin | | Other number |
|---|---|---|---|---|
| | | Province | Country | |
| 8150 | NEC 2297 | - | USA | SIMPLE LEAF |
| 8151 | NEC 2298 | - | USA | 68 LARGE |
| 8957 | NEC 286 | - | TUR | PI 339185 |
| 9236 | NEC 1521 | - | TUR | - |
| 9476 | NEC 2241 | - | IRN | P 6969 |
| 9504 | NEC 2425 | - | TUR | PI 339162 |
| 10321 | ISPANYOL NOFUT C | - | TUR | REG.NO.12 |
| 10358 | YESIL NOHUT 35 1-62 | - | TUR | REG.NO.79 |
| 10688 | CRIC 34852 | Gaziantep | TUR | - |
| 10695 | CRIC 34861 | Kastamonu | TUR | - |
| 10712 | CRIC 34878 | Denizli | TUR | - |
| 10715 | CRIC 34881 | Amasya | TUR | - |
| 10722 | CRIC 34891 | Bursa | TUR | - |
| 10734 | CRIC 34904 | Denizli | TUR | - |
| 10735 | CRIC 34905 | Maras | TUR | - |
| 10749 | CRIC 34920 | Konya | TUR | - |
| 11285 | BULK | - | USA | - |
| 11286 | M 1 | - | USA | - |
| 11295 | 4 | - | USA | - |
| 11296 | 6 | - | USA | - |
| 11297 | 7 | - | USA | - |
| 11298 | 9 | - | USA | - |
| 11306 | 735104 | - | CHL | - |
| 11748 | INIA 28 | Colchagua | CHL | - |
| 11756 | INIA 36 | Colchagua | CHL | - |
| 11770 | INIA 51 | San Antonio | CHL | - |
| 11779 | INIA 60 | Colchagua | CHL | - |
| 11815 | INIA 103 | Colchagua | CHL | - |
| 11816 | INIA 104 | Colchagua | CHL | - |
| 11841 | TAY 22-78 | Maule | CHL | - |
| 12033 | F4LINE TRIPLE CROSS | - | MEX | - |
| 12326 | P 10188 | - | NOI | - |

X. *Continued.*

| ICC | DAF | FLD | FCOL | STCOL | PLHT | PLWTH | GRHB | MATR | PP | SP | SYD | 100M | SCOL | SSH | SSUR | PRT | EVS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8150 | 67 | 17 | W | NA | 35.0 | 28.0 | SE | 144 | 18 | 1.0 | 670 | 56.0 | BE | OWL | S | 16.1 | 80-81 |
| 8151 | 43 | 41 | W | NA | 32.3 | 29.0 | SE | 144 | 10 | 1.0 | 570 | 57.6 | BE | OWL | S | 15.6 | 80-81 |
| 8957 | 85 | 31 | W | NA | 44.3 | 42.7 | SE | 146 | 12 | 1.1 | 580 | 45.9 | BE | OWL | S | 20.3 | 77-78 |
| 9236 | 52 | 41 | W | NA | 36.0 | 31.3 | SE | 134 | 7 | 1.0 | 270 | 43.7 | BE | OWL | S | - | 79-80 |
| 9476 | 80 | 31 | W | NA | 44.7 | 32.3 | SE | 143 | 27 | 1.0 | 1110 | 43.1 | BE | OWL | S | 19.7 | 77-78 |
| 9504 | 80 | 36 | W | NA | 41.0 | 39.0 | SE | 143 | 10 | 1.0 | 670 | 42.9 | BE | OWL | S | 19.7 | 77-78 |
| 10321 | 81 | 29 | W | NA | 46.0 | 39.0 | SE | 144 | 7 | 1.0 | 770 | 42.5 | BE | OWL | S | 16.9 | 80-81 |
| 10358 | 72 | 33 | W | NA | 51.7 | 37.7 | SE | 130 | 21 | 1.0 | 1170 | 44.2 | BE | OWL | S | 18.6 | 80-81 |
| 10688 | 54 | 36 | W | NA | 32.0 | 29.7 | SS | 120 | 9 | 1.0 | 330 | 43.6 | BE | OWL | S | - | 79-80 |
| 10695 | 81 | 31 | W | NA | 50.0 | 39.3 | SE | 134 | 11 | 1.0 | 770 | 43.0 | BE | OWL | S | 17.5 | 80-81 |
| 10712 | 50 | 38 | W | NA | 35.0 | 34.3 | SE | 112 | 11 | 1.0 | 600 | 42.7 | BE | OWL | S | - | 79-80 |
| 10715 | 48 | 33 | W | NA | 35.7 | 36.7 | SE | 106 | 16 | 1.1 | 530 | 43.0 | BE | OWL | S | - | 79-80 |
| 10722 | 75 | 37 | W | NA | 49.0 | 37.7 | SE | 128 | 17 | 1.1 | 830 | 42.2 | BE | OWL | S | 17.6 | 80-81 |
| 10734 | 71 | 37 | W | NA | 41.3 | 32.7 | SE | 132 | 23 | 1.0 | 1130 | 44.2 | BE | OWL | S | 23.0 | 77-78 |
| 10735 | 54 | 40 | W | NA | 36.0 | 36.0 | SE | 123 | 17 | 1.1 | 500 | 43.6 | BE | OWL | S | - | 79-80 |
| 10749 | 47 | 35 | W | NA | 33.7 | 41.0 | SE | 112 | 14 | 1.1 | 600 | 49.5 | BE | OWL | S | - | 79-80 |
| 11285 | 75 | 37 | W | NA | 52.0 | 40.7 | SE | 128 | 35 | 1.0 | 1300 | 44.5 | BE | OWL | S | 16.4 | 80-81 |
| 11286 | 44 | 48 | W | NA | 42.6 | 37.8 | SE | 108 | 34 | 1.0 | 1000 | 43.3 | BE | OWL | S | 19.9 | 82-83 |
| 11295 | 67 | 31 | W | NA | 49.8 | 48.4 | SE | 120 | 20 | 1.1 | 630 | 51.8 | BE | OWL | S | 22.0 | 82-83 |
| 11296 | 66 | 32 | W | NA | 53.6 | 48.0 | SE | 122 | 7 | 1.0 | 330 | 48.0 | BE | OWL | S | 22.4 | 82-83 |
| 11297 | 67 | 31 | W | NA | 56.0 | 50.2 | SE | 123 | 17 | 1.0 | 630 | 46.5 | BE | OWL | S | 21.4 | 82-83 |
| 11298 | 51 | 41 | W | NA | 52.2 | 43.2 | SE | 123 | 25 | 1.1 | 750 | 46.7 | BE | OWL | S | 20.5 | 82-83 |
| 11306 | 77 | 35 | W | NA | 57.7 | 47.3 | SE | 136 | 12 | 1.0 | 500 | 42.3 | BE | OWL | S | 19.8 | 81-82 |
| 11748 | 77 | 29 | W | NA | 57.0 | 52.6 | SE | 123 | 6 | 1.0 | 210 | 42.3 | BE | OWL | S | 23.9 | 82-83 |
| 11756 | 73 | 32 | W | NA | 51.3 | 58.7 | SE | 131 | 9 | 1.0 | 370 | 42.3 | BE | OWL | S | 19.8 | 81-82 |
| 11770 | 73 | 29 | W | NA | 48.4 | 42.6 | SE | 121 | 17 | 1.1 | 330 | 49.8 | BE | OWL | S | - | 82-83 |
| 11779 | 84 | 39 | W | NA | 54.3 | 45.0 | SE | 149 | 16 | 1.0 | 530 | 43.3 | BE | OWL | S | 20.5 | 80-81 |
| 11815 | 60 | 36 | W | NA | 36.0 | 37.0 | SE | 123 | 10 | 1.0 | 290 | 58.1 | BE | OWL | S | - | 82-83 |
| 11816 | 67 | 42 | W | NA | 43.7 | 38.3 | SE | 134 | 22 | 1.0 | 470 | 50.6 | BE | OWL | S | 17.2 | 80-81 |
| 11841 | 80 | 30 | W | NA | 52.3 | 46.7 | SE | 136 | 4 | 1.1 | 330 | 45.9 | BE | OWL | S | 18.9 | 81-82 |
| 12033 | 46 | 29 | W | NA | 45.0 | 48.8 | SE | 103 | 16 | 1.0 | 710 | 50.5 | BE | OWL | S | 19.2 | 82-83 |
| 12326 | 70 | 28 | W | NA | 91.0 | 42.2 | E | 120 | 17 | 1.0 | 380 | 43.1 | BE | OWL | S | 21.0 | 82-83 |

## Format of A Seed Request Application

To
Botanist (Chickpea)
Genetic Resources Unit
ICRISAT
Patancheru P.O.
Andhra Pradesh 502 324
India

Subject: Indent for chickpea germplasm seeds from the ICRISAT gene bank.

1. Purpose : (e.g., to screen for drought resistance)

2. List of ICC nos. requested:

OR

If the accessions are to be selected by staff of the gene bank, provide the following information on the region of germplasm usage:

a. Preference for type : e.g., desi
b. Preference for seed mass : e.g., 20-25g(100 seeds)
c. Growth duration : e.g., short
d. Specific problems of the area : e.g., fusarium wilt, soil salinity
e. No. of accessions required : e.g., 20

3. Whether seed import permit needed : e.g., yes (attach the permit)

4. Any specific instruction:

**Address for seed dispatch** **Address of the indenter**