

Research Reports

Genetic Resources

Chickpea Genetic Resources at ICRISAT

The chickpea germplasm activity of ICRISAT started in the postrainy season of 1973. Existing germplasm from several research stations and institutes in and outside India have been assembled. The cooperation we received in this endeavour is appreciated. New expeditions were undertaken and local cultivars have been collected from areas hitherto poorly represented. In India, collections are due from Punjab, Rajasthan, M.P., and Gujarat states. Other countries like Ethiopia, Iran, Afghanistan, Turkey, and Burma still remain to be explored fully. To date chickpea accessions total 11483, representing 36 different countries.

The accessions are being grown and evaluated every year at two locations in India, Patancheru (Hyderabad) and Hissar. The germplasm evaluation is undertaken on several agronomic features including: days to flowering, flower color, flowering duration, stem color, growth habit, plant height, plant spread, plant stand, branches (basal primary, basal secondary, apical primary, apical secondary and tertiary), maturity, number of pods, number of seeds, harvest index, 100 seed weight, seed yield, seed shape, seed surface, seed color, presence of dots, reactions against diseases, insect pests, and quality traits. All the passport information and evaluation data have been entered into our computer, and a catalog has been prepared but will not be distributed because of its bulk, and the need to update it every year with new information. However, researchers are welcome to ask for any chickpea seed material with specific characters, and we will be able to retrieve these accessions and supply the seed.

Besides cultivated chickpea (*Cicer arietinum* L.), special efforts are constantly made to collect, maintain, and make use of wild *Cicer* species. All the eight wild annual species, namely, *C. reticulatum*, *C. echinospermum*, *C. bijugum*, *C. judaicum*, *C. pinnatifidum*, *C. cuneatum*, *C. yamashitae* and *C. chorassanicum*, and seven of the perennials, namely, *C. montbretii*, *C. micro-*

phyllum, *C. rechingeri*, *C. anatolicum*, *C. floribundum*, *C. pungens*, and *C. graecum* have been collected and maintained at ICRISAT Center. Perennials are difficult to grow and maintain in Patancheru conditions, but all the annual species grow well and seed is available for interested workers.

- L.J.G. van der Maesen (ICRISAT).

Breeding

The ICRISAT-ICARDA Program

Both ICRISAT and ICARDA have chickpeas as a mandate crop. To strengthen the research work and to avoid unnecessary duplication of effort, the chickpea programs at these two centers were integrated in 1978. Agroecological considerations largely determined the division of responsibilities. ICRISAT is located in a winter-season desi-chickpea-producing area, and ICARDA in a traditional summer-season kabuli-chickpea-producing area. Therefore, ICRISAT has the main responsibility for improvement of desis, including all international trials and nurseries, and ICARDA has a similar responsibility for the kabulis.

Both Centers use outlying locations to provide additional selection pressure for adaptation in other environments. Results of international trials, provided by cooperators, further strengthen the data base for international improvement programs. Both Centers freely provide genetic material to national programs, conduct training programs, sponsor workshops, and publish and distribute reports of research results.

The services of both Centers are available to all chickpea workers; inquiries will be welcome.

- J.M. Green (ICRISAT) and G.C. Hawtin (ICARDA).

International Yield Trials and Nurseries Coordinated by ICRISAT

ICRISAT has been coordinating International Chickpea Trials and Nurseries since 1975-76 with the following objectives:

- a. To strengthen national and regional programs
- b. To supply cultivars, segregating populations, and advanced breeding lines

having specific characteristics to cooperators for evaluation, use in breeding and, if promising, finishing for release.

- c. To identify differences in adaptation among lines regionally and internationally through multilocation testing, and to characterize environments in which chickpeas are grown.
- d. To promote international cooperation through personal visits and exchange of information

We offer the following nurseries and trials for 1979-80:

a. International Chickpea Cooperative Trial: Desi - Short duration (ICCT-DS)

b. International Chickpea Cooperative Trial: Desi - Long duration (ICCT-DL)

The entries included in these trials are superior cultivars and lines developed by national programs and ICRISAT scientists. Each of these trials includes 16 entries in four replications. The plot size is six rows, each 4 m long.

c. International Chickpea Screening Nursery Desi - Short duration (ICSN-DS)

d. International Chickpea Screening Nursery Desi - Long duration (ICSN-DL)

ICSN-DS has 60 and ICSN-DL has 80 test entries that are advanced breeding lines developed at ICRISAT. The nurseries are unreplicated, planted in an augmented design, with three checks in each at the beginning and end, and after every 10 entries. The plot size is two rows, each 4 m long.

e. Early Generation Segregating Bulk Trials

These include F₂ trial with 50 entries (46 populations and four checks) and F₃ trial with 16 entries (12 populations and four checks) in three replications each.

In addition to these tests, we supply on request any parental and/or segregating material to interested individuals or organizations for research work anywhere.

- Jagdish Kumar (ICRISAT).

International Yield Trials and Nurseries Coordinated by ICARDA

ICARDA started systematic international trials in 1977-78 with generally the same objectives as those listed for ICRISAT. From two types of nurseries sent to 21 cooperators in 13 countries the first year, the program has grown to five types of trials/nurseries sent to 51 cooperators in 28 countries. The present trials are:

	Trial/Nursery	Locations	Countries
CAT	Chickpea Adaptation Trial	40	21
CIYT	Chickpea International Yield Trial	43	21
CIYT-W	Chickpea International Yield Trial - Winter Planting	15	9
CISN	Chickpea International Screening Nursery	40	23
CIF4T	Chickpea International F ₄ Trial	25	13

- K.B. Singh (ICARDA).

Rapid Generation Turnover

To speed up the breeding program we are investigating conditions necessary for shortening generation time in chickpea. Work elsewhere has shown that chickpea is a quantitative longday plant, and that earlier flowering can be induced by increasing daylength.

With an early cultivar, CPS-1, planted at ICRISAT Center in mid-December, time to flowering was reduced by 10 days when daylength was increased to 24 hours by use of artificial lights. A further gain of 3 days was achieved with foliar nutrient (N+P) sprays. A second experiment was planted in mid-January with 18 cultivars that would take from 32 to 74 days to flower in a normal rabi season. All 18 cultivars, at 24-hour daylength, flowered in 32 to 34 days, and produced mature seed. Under normal daylength, (12 hours) only the early cultivars flowered and matured; midlate and late cultivars were killed by high temperatures before they could flower. The average germination of seeds harvested 62 days after planting from all the cultivars subjected to 24-hour days was 94.7 percent. Earlier harvests did not give satisfactory germination. There appeared to be no advantage of continuing 24-hour days beyond flowering.

Thus the life cycle of chickpeas can be substantially shortened by exposure to 24-hour days up to flowering. Further investigations on the optimum time for starting longer days and minimum number of inductive