Characterization and Preliminary Evaluation

Characterization and preliminary evaluation of germplasm are the prerequisites for utilization in crop improvement.

Phenotypic characterization and evaluation

- Characterization involves recording characters, which are
  - highly heritable,
  - easily seen by the eye, and
  - are expressed in all environments.
- Preliminary evaluation consists of recording a limited number of additional agronomic traits considered to be desirable by users of the crop.

Follow the same sowing and cultural practices for the field grow-out. Grow the accessions in 1-3 rows of 4 m each. Maintain the row to row distance at 60 cm and plant-to-plant distance at 10 cm. Evaluate the accessions in an augmented block design. Plant standard check cultivars at every 10 or 20 accessions. Use the descriptors developed by ICRISAT and IBPGR (now Bioversity International) for characterization and preliminary evaluation (ICRISAT/IBPGR 1992a,b and 1993a,b; ICRISAT/IBPGR/ICARDA 1993).

Descriptors for characterization of chickpea

Vegetative phase

Growth habit: Angle of primary branches, recorded at mid-pod filling stage (Fig. 1).

E Erect; 0–15° from vertical

SE Semi-erect; 16–25° from vertical

SS Semi-spreading; 26–60° from vertical

S Spreading; 61–80° from vertical

P Prostrate, branches flat on the ground

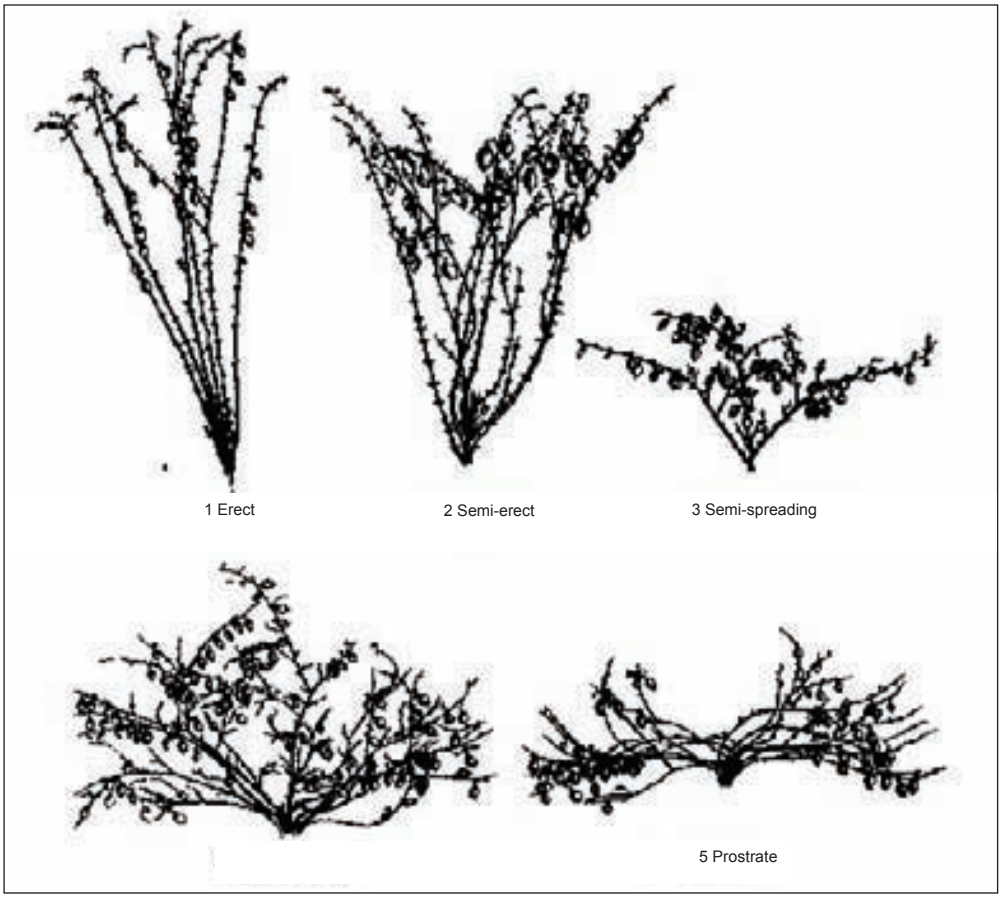

Figure 1. Growth habit in chickpea.

Plant height (cm): Mean canopy height of five representative plants, measured from soil surface at the end of flowering.

Plant width (cm): Mean canopy spread of five representative plants, measured at the time of flower ending.

Plant pigmentation: Presence of anthocyanin pigment in plant parts.

NA No anthocyanin

LA Low anthocyanin

HA High anthocyanin

Basal primary branches number: Branches emerging from the axils on the lower half of the main stem, average of five representative plants from each accession at the time of harvest.

Apical primary branches number: Number of branches emerging from the leaf axils on the upper half of the main stem, average of 5 representative plants from each accession at the time of harvest.

Basal secondary branches number: Number of branches emerging from the leaf axils of basal primary branches, average of 5 representative plants from each accession at the time of harvest.

Apical secondary branches number: Number of branches emerging from the leaf axils of apical primary branches, average of 5 representative plants from each accession at the time of harvest.

Tertiary branches number: Number of branches emerging from the leaf axils of basal and apical secondary branches, average of 3–5 representative plants from each accession at the time of harvest.

Reproductive phase

Days to 50% flowering: Number of days from sowing (first irrigation) to the stage when 50% of plants have begun to flower in an accession.

Flowering duration: Number of days from 50% flowering to the date when 50% of the plants of an accession stops flowering.

Flower color: Color of standard petal.

B	Blue	VLP	Very light pink
LB	Light blue	W	White
DP	Dark pink	WBS	White with blue streaks
P	Pink	WPS	White with pink streaks
LP	Light pink		

Days to maturity: Number of days from sowing (first irrigation) to the stage when 90% of pods have matured and turned yellow in an accession.

Pods per plant: Average number of fully formed pods per plant from 5 representative plants at maturity.

Seeds per pod: Number of seeds per pod estimated by dividing the total number of seeds by the total number of pods harvested from 5 representative plants.

Seed color: Color of mature seeds stored not longer than 5 months.

BL	Black	YB	Yellow brown
B	Brown	OY	Orange yellow
LB	Light brown	O	Orange
DB	Dark brown	YE	Yellow beige
RB	Reddish brown	I	Ivory
GB	Greyish brown	G	Green
SB	Salmon brown	LG	Light green
OB	Orange brown	BR	Brown reddish
GR	Grey	M	Variegated
BB	Brown beige	BM	Black brown mosaic
Y	Yellow	LO	Light orange
LY	Light yellow		

Dots on seed coat: Presence or absence of minute black dots on the seed coat.

A Absent

P Present

Seed shape: Shape of mature seeds (Fig. 2).

ANG Angular, ram's head

OWL Irregular round, owl's head

PEA Pea-shaped, smooth round

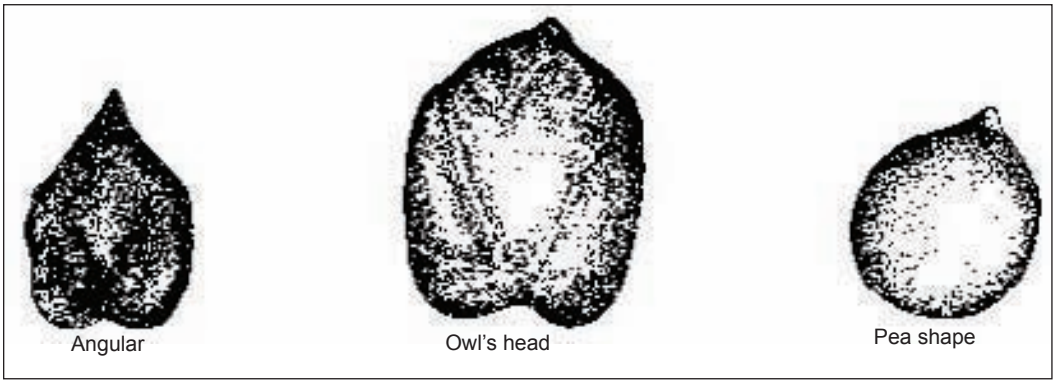

Figure 2. Seed shape in chickpea.

Seed surface: Seed surface observed from dry mature seed (Fig. 3).

R Rough — wrinkled with uneven surface.

T Tuberculated — sticky because of tiny projections.

S Smooth.

Seed weight (g): Weight of 100 seeds at 10% moisture content.

Seed yield (kg ha^{-1}): Seed yield from all the plants of the plot. Plant stand is also counted. If the plant stand is at least 60% of the optimum number, then plot yield is converted to seed yield in kg ha^{-1}.

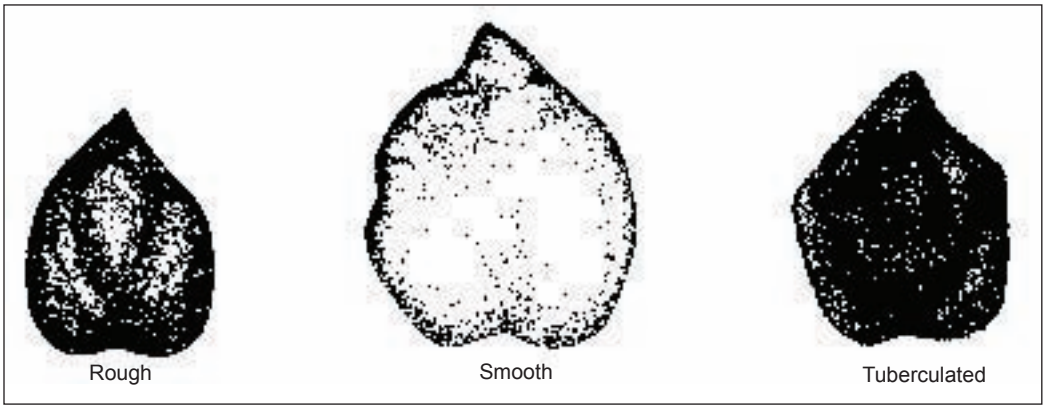

Figure 3. Testa texture in chickpea.

Protein content (%): The percentage of crude protein in the freshly harvested seeds, estimated using dye-binding method or automatic protein analyzer.

Diseases

Wilt: Scoring for fusarium wilt (causal organism: *Fusarium oxysporum*) resistance. Accessions sown in wilt-sick plots, plant mortality counted at the end of the season and converted into percentage.

R Resistant: <10% mortality

M Moderately resistant: 10-20% mortality

S Susceptible: >20% mortality

Ascochyta blight: Scoring for ascochyta blight (causal organism: *Ascochyta rabiei*) resistance. Ten day-old seedlings are inoculated in a plant propagator and disease severity scored after 15-day incubation on a 1–9 scale.

1 No damage

9 Severe damage

Colletotrichum blight: Scored for colletotrichum blight, caused by *Colletotrichum dematium*. Screening done by artificial inoculation with the pathogen twice and scored on a 1–9 scale.

1 No damage

9 Severe damage

Botrytis grey mold: Screening done using isolation plant propagator. Ten-day old seedlings inoculated and disease severity scored 15 days after inoculation on a 1–9 scale.

1 No damage

9 Severe damage