

# Characterization and Preliminary Evaluation

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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 75 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 groundnut

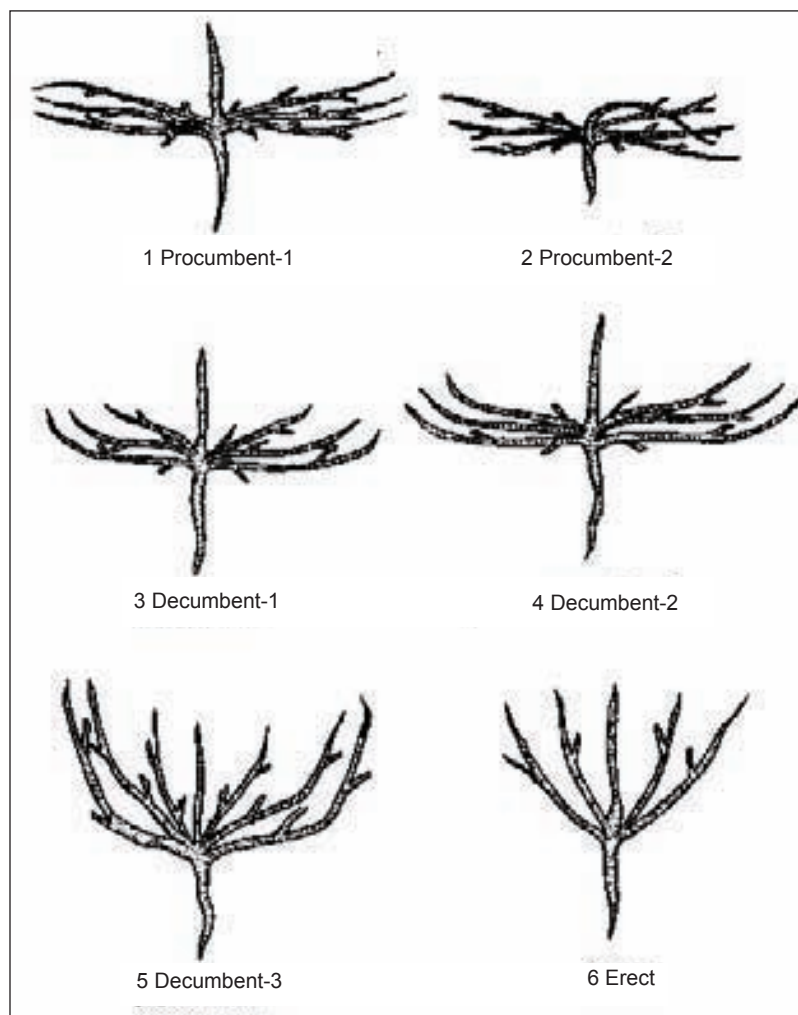
### Vegetative Phase

Days to emergence: Number of days to 75% seedling emergence from the day of sowing or first irrigation.

Growth habit: Recorded at podding stage for plants at 10–15 cm interplant spacing (Fig. 1).

- 1 Procumbent-1
- 2 Procumbent-2
- 3 Decumbent-1
- 4 Decumbent-2
- 5 Decumbent-3
- 6 Erect
- 7 Others

Plant height (cm): Height of main axis, measured from cotyledonary axil up to terminal bud, mean of 5 plants recorded 60–85 days after emergence.



*Figure 1. Growth habit in groundnut.*

Plant pigmentation: Presence of anthocyanin pigmentation in mature plants.

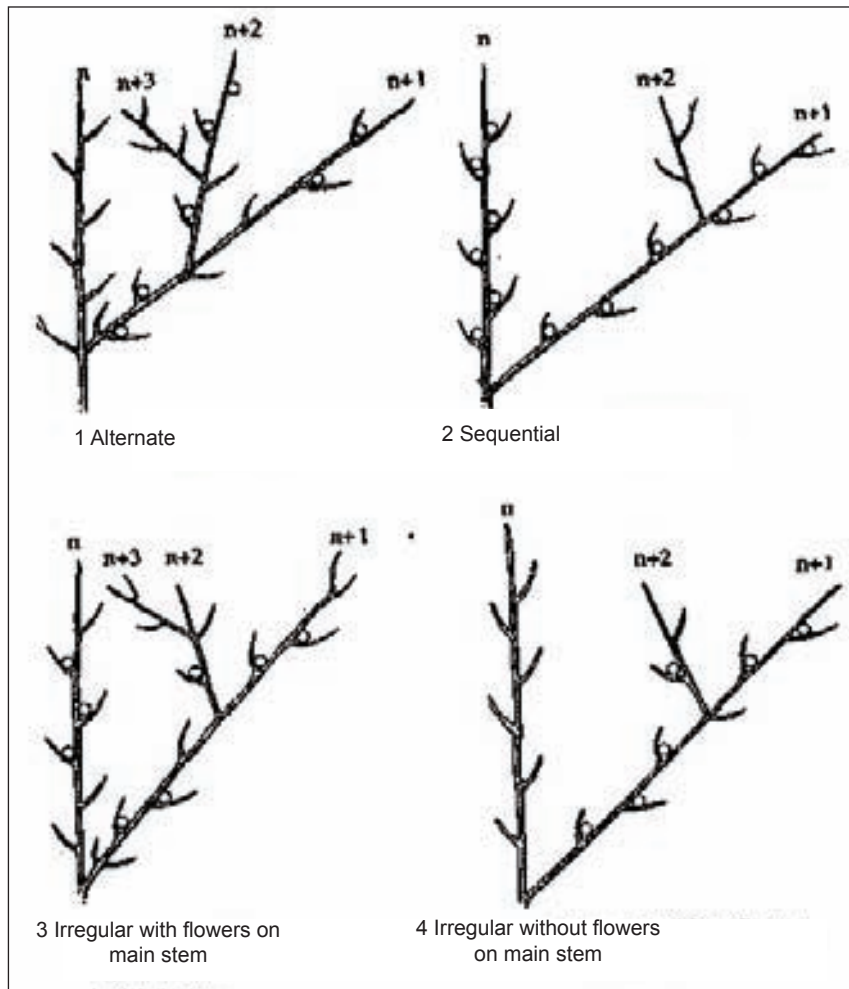
- 0 Absent
- + Present

Stem hairiness: Hairiness, observed on main axis.

- 1 Glabrous
- 3 Sub-glabrous, hairs in one or two rows along main stem
- 5 Moderately hairy, three or four rows along the main axis
- 7 Very hairy, most of the stem surface covered with hairs
- 9 Woolly, most of the stem surface covered with long hairs

Branching pattern: Pattern of cotyledonary branching (Fig. 2).

- 1 Alternate
- 2 Sequential
- 3 Irregular with flowers on main stem
- 4 Irregular without flowers on main stem
- 5 Others



*Figure 2. Branching pattern in groundnut.*

Primary branches number: Number of primary branches.

Leaflet color: Color of fully expanded leaf.

- 1 Yellow or yellow-green
- 2 Light green
- 3 Green
- 4 Dark green
- 5 Bluish green
- 6 Other

Leaflet length (mm): Length of apical leaflet of the fully expanded third leaf on the main stem. Mean of 5 leaflets recorded from different plants.

Leaflet width (mm): Width of fully expanded apical leaflet of the third leaf on the main stem, measured at its widest portion. Mean of 5 leaflets recorded from different plants.

Leaflet shape: Shape of fully expanded apical leaflet of the third leaf on the main stem (Fig. 3).

1	Cuneate	9	Ovate
2	Obcuneate	10	Obovate
3	Elliptic	11	Oblong
4	Oblong-elliptic	12	Oblong-lanceolate
5	Narrow-elliptic	13	Lanceolate
6	Wide-elliptic	14	Linear-lanceolate
7	Suborbicular	15	Others
8	Orbicular		

Leaflet hairiness: Hairiness on both surfaces, recorded from leaflets at the third node of the main stem.

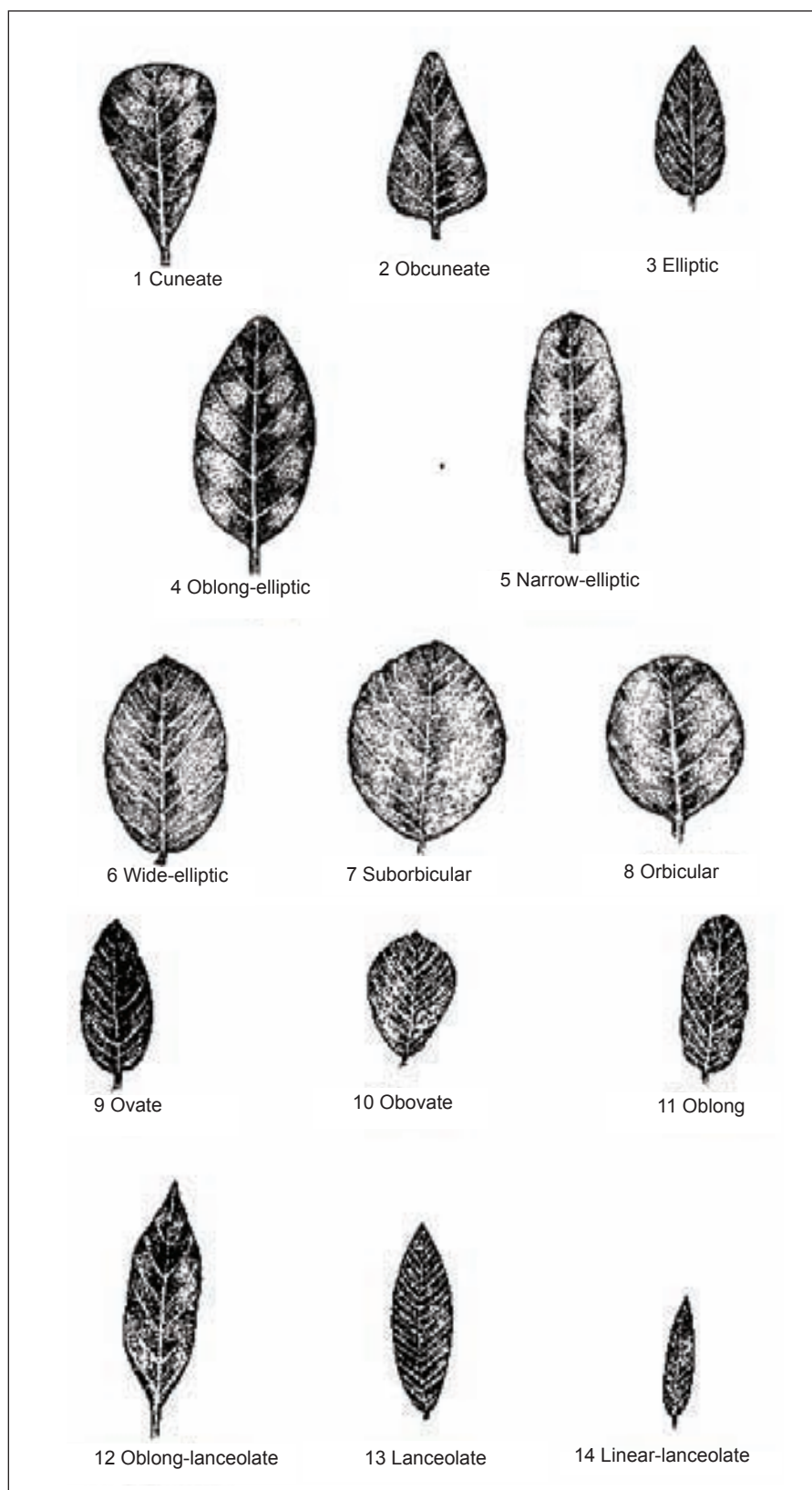
- 1 Almost glabrous on both surfaces
- 2 Almost glabrous above, hairs below
- 3 Almost glabrous above, hairs and/or bristles below
- 4 Almost glabrous below, hairs above
- 5 Almost glabrous below, hairs and bristles above
- 6 Hairs on both surfaces, without bristles
- 7 Hairs on both surfaces, with bristles at least on one surface
- 8 Woolly without bristles
- 9 Woolly with bristles on one surface
- 10 Others

### Reproductive Phase

Days to 50% flowering: Number of days from emergence to the day on which 50% plants of an accession have flowered.

Flower color: Color of front face of the standard petal excluding the crescent portion of fresh and fully opened flowers.

- 1 White
- 2 Lemon
- 3 Yellow
- 4 Orange-yellow
- 5 Orange



*Figure 3. Leaflet shape in groundnut.*

- 6 Dark orange
- 7 Garnet/brick red
- 8 Others

Streak color: Color of the markings (crescent) on the front face of the standard petal.

- 1 White
- 2 Lemon
- 3 Yellow
- 4 Orange-yellow
- 5 Orange
- 6 Dark orange
- 7 Garnet or brick red
- 8 Others

Peg color: Pigmentation on peg.

- 0 Absent
- + Present

Days to maturity: Number of days from emergence to maturity.

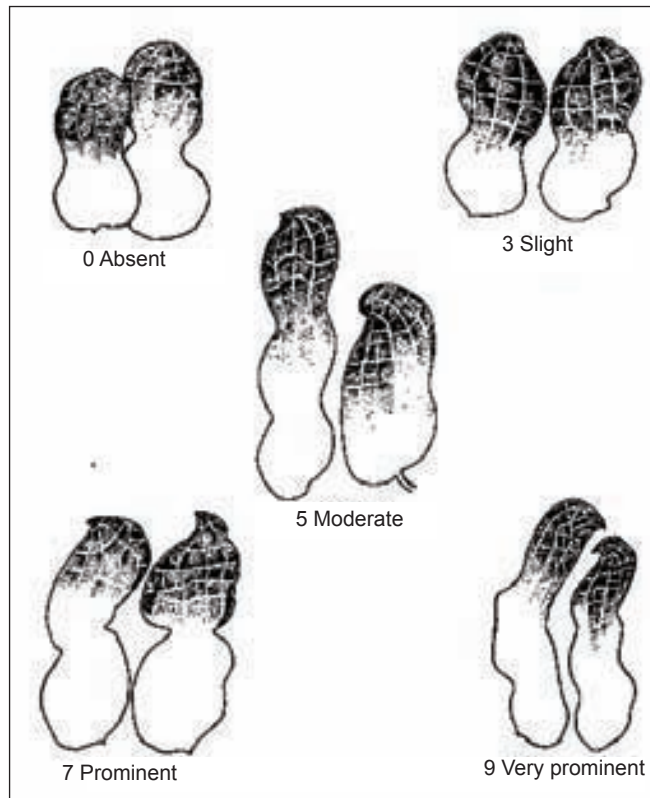
- 1 <90
- 2 91-100
- 3 101-110
- 4 111-120
- 5 121-130
- 6 131-140
- 7 141-150
- 8 151-160
- 9 >160

Pod beak: Tip of the indehiscent fruit (Fig.4).

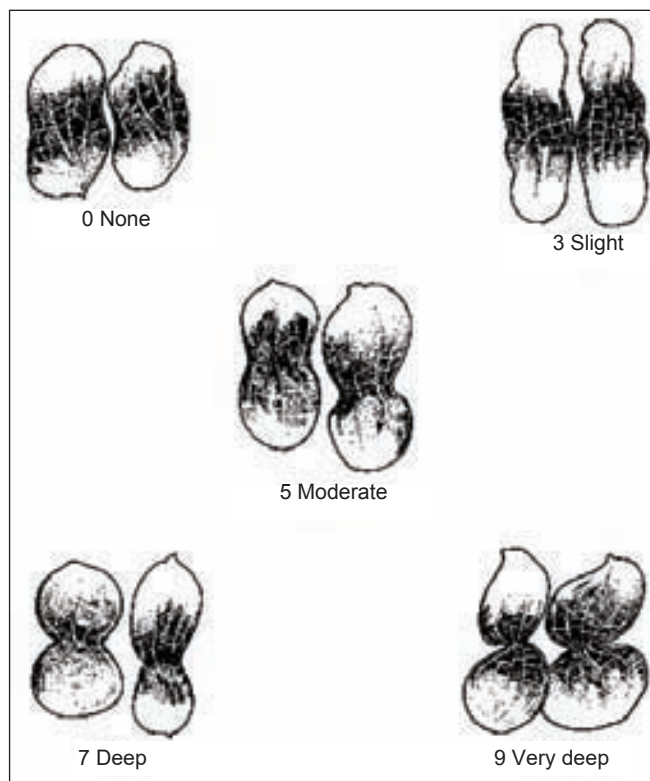
- 0 Absent
- 3 Slight
- 5 Moderate
- 7 Prominent
- 9 Very prominent

Pod constriction: Degree of pod constriction (Fig. 5).

- 0 None
- 3 Slight
- 5 Moderate



*Figure 4. Pod beak in groundnut.*



*Figure 5. Pod constriction in groundnut.*



- 7 Deep
- 9 Very deep

Pod reticulation: Reticulation (venation, ribbing, ridging) on the shell of the pod.

- 0 None
- 3 Slight
- 5 Moderate
- 7 Prominent
- 9 Very prominent

Pod length (mm): Mean length of the pod, recorded from 10 mature pods (Fig. 6).



*Figure 6. Diversity for pod and seed traits in groundnut.*

Pod width (mm): Mean width of pod at widest point, recorded from 10 mature pods.

Seeds per pod: Number of seeds per pod. First number indicating most frequent number of seeds per pod, second indicating second most frequent number and so on.

- 1 2-1
- 2 2-3-1/2-1-3
- 3 3-2-1/3-1-2
- 4 2-3-4-1/2-4-3-1/2-3-1-4/2-4-1-3/2-1-3-4/2/1/4/3
- 5 3-2-4-1/3-2-1-4
- 6 3-4-2-1/3-4-1-2
- 7 4-3-2-1/4-2-3-1



- 8 4-3-1-2/4-2-1-3
- 9 3 or 4 seeded with occasional 5 seeded pods

Seed color pattern: Pattern of seed color, recorded within a month of harvest after complete drying (Fig. 6)

- 1 One color
- 2 Variegated

Primary seed color: Major color of seeds recorded within one month of harvest after complete drying of mature, wrinkle free seeds (Fig.6)

- |                 |                                |
|-----------------|--------------------------------|
| 1 White         | 11 Salmon                      |
| 2 Off-white     | 12 Light red                   |
| 3 Yellow        | 13 Red                         |
| 4 Very pale tan | 14 Dark red                    |
| 5 Pale tan      | 15 Purplish red/reddish purple |
| 6 Light tan     | 16 Light purple                |
| 7 Tan           | 17 Purple                      |
| 8 Dark tan      | 18 Dark purple                 |
| 9 Greyed orange | 19 Very dark purple            |
| 10 Rose         | 20 Other                       |

Secondary seed color: Minor color of variegated seeds (Fig. 10A.5.6)

- 1 Blotched
- 2 Flecks of color
- 3 Striped
- 4 Tipped at the embryo end
- 5 Obscure or hazy
- 6 Others

Seed length (mm): Length of seed, recorded from an average of 10 mature seeds (Fig. 6).

Seed width (mm): Width of seeds measured at mid point.

Shelling percentage: Shelling percentage recorded with seeds at about 8% moisture as

$$(\text{Mass of mature seeds} \times 100) / (\text{Mass of mature pods}).$$

Fresh seed dormancy (%): Germination immediately after harvest and number of days to achieve 70% germination, eg, 65/12 indicates that 65% seed can germinate immediately after harvest, and seeds require 12 days to reach 70% germination.