Key access and utilization descriptors for chickpea genetic resources

This list consists of an initial set of characterization and evaluation descriptors for chickpea (*Cicer arietinum* L.) genetic resources utilization. This strategic set of descriptors, together with passport data, will become the basis for the global accession level information portal being developed by Bioversity International with the financial support of the Global Crop Diversity Trust (GCDT). It will facilitate access to and utilization of chickpea accessions held in genebanks and does not preclude the addition of further descriptors, should data subsequently become available.

Based on the comprehensive list 'Descriptors for Chickpea (*Cicer arietinum* L.)' published by ICRISAT, ICARDA and IBPGR (now Bioversity International) in 1993, the list builds on the results of the Global Public Goods Activity 4.2.1.1, particularly with regards to those descriptors highlighted as the most important diagnostic and breeding traits. It was subsequently compared and harmonized with a number of sources such as UPOV technical guidelines for Chick-Pea (2005), 'Descriptors for CHICKPEA' (USDA, ARS, GRIN), 'Core Collection of Chickpea as a Means to Enhance Utilization of Genetic Resources in Crop Improvement' (ICRISAT-website), 'Global Strategy for the *Ex situ* Conservation of Chickpea (*Cicer* L.)' (GCDT, 2008), as well as with those descriptors that were awarded funds for further research by the GCDT in 2008 Evaluation Awards Scheme (EAS). This list was further refined during a meeting held at the National Bureau of Plant Genetic Resources (NBPGR, India) in June 2009. Several scientists from NBPGR and the Indian Agricultural Research Institute (IARI) participated.

A worldwide distribution of experts was involved in an online survey to define a first priority set of descriptors to describe, to access and to utilize chickpea genetic resources. This key set was afterwards validated by a Core Advisory Group (see 'Contributors') led by Dr M. Imtiaz of the International Center for Agricultural Research in the Dry Areas (ICARDA), Dr M.C. Kharkwal (IARI) and Dr Hari D. Upadhyaya of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

Biotic and abiotic stresses included in the list were chosen because of their wide geographic occurrence and significant economic impact at a global level.

Numbers in parentheses on the right-hand side are the corresponding descriptor numbers listed in the 1993 publication. Descriptors with numbers ending in 'letters' are either modified or are new descriptors that were added during the development of the list below.

PLANT DATA

Stem/foliage pigmentation (4.1.1)

Observed before flowering. Indicate whether the pigmentation is on stems or leaves in the descriptor **Notes**

1 No anthocyanin (light green)
3 No anthocyanin (green)
5 Low anthocyanin (partly light purple)
7 High anthocyanin (predominantly purple)
9 Highly purple

Days to 50% flowering (4.2.1)

Number of days from sowing (or first rain sufficient for germination under rainfed conditions) until 50% of the plants have started to flower

Days to maturity (4.2.2)

Number of days from sowing (or first rain sufficient for germination under rainfed conditions) until 90% of the pods have matured and turned yellow

Number of seeds per pod (4.2.3)

Average number of 10 pods each from five representative plants. At maturity

Flower colour (4.2.4)

In most cases pink and blue flowers have veins of a darker shade in the flag, while the tip of the keel is also darker. The classes are ranges rather than only the shades of the reference colours. Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states

1 Blue (violet-blue group 97B)
2 Light blue (violet-blue group 97C)
3 Dark pink (red-purple group 64D)
4 Pink (red-purple group 63D)
5 Light pink (red-purple group 69C)
6 White (white group 155D)
7 White-pink striped (white group 155D, red-purple group 63D)

Number of pods per plant (4.2.8)

Average number of pods taken from five representative plants. At maturity

Seed shape (4.3.1)

1 Angular, ram's head (most desi cultivars)
2 Irregular rounded, owl's head (most kabuli cultivars)
3 Pea-shaped, smooth round (intermediate types)

Seed testa texture (4.3.2)

1 Rough (pea-shaped)
2 Smooth
3 Tuberculated (sticky surface)

Seed colour (4.3.3)

Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states

1 Black (black group 202A, 202B; brown group 200A)
2 Brown (greyed-orange group 177B)
3 Light brown (greyed-orange group 177C)
4 Dark brown (greyed-orange group 177A)
5 Reddish brown (greyed-orange group 166C)
6 Greyish brown (brown group 200D)
7 Salmon brown (greyed-orange group 165C)
8 Grey (greyed-green group 196A)
9 Brown beige (greyed-orange group 173D)
10 Beige (greyed-orange group 165D)
11 Yellow (greyed-orange group 164B)
12 Light yellow (greyed-orange group 164C)
13 Yellow brown (greyed-orange group 165C)
14 Orange yellow (greyed-orange group 168D)
15 Orange (greyed-orange group 168C)
16 Yellow beige (orange-white group 159C)
17 Ivory white (orange-white group 159C)
18 Green (greyed-green group 191A; grey group 201A; greyed-orange group 166B)
19 Light green (greyed-green group 193B)
20 Variegated
21 Black brown mosaic (black group 202A; greyed-orange group 177E)

100-seed weight [g] (4.3.5)

Measured at 10% (air-dry) moisture content

Growth habit (6.1.1)

The angle of the branches from the vertical axis at the pod filling stage

1 Prostrate (branches flat on the ground, >80°)
2 Spreading (61-80° from vertical)
3 Semi-spreading (26-60° from vertical)
4 Semi-erect (16-25° from vertical)
5 Erect (0-15° from vertical)

Number of primary branches (6.1.4.1)

Average number of basal primary branches per plant taken from five representative plants

Plant canopy height [cm] (6.1.5)

Average canopy height of five representative plants. Recorded at maturity

Seed yield per plant [kg ha^{-1}] (6.2.2.2)

Seed protein content [% DW] (6.3.1.1)

Whole seed crude protein using the dye-binding method or automatic protein analyzer

ABIOTIC STRESSES

Reaction to drought (7.5)

Reaction to salinity (7.X)

BIOTIC STRESSES

Ascochyta blight *(Ascochyta rabiei)* (8.1.2)

Grey mould *(Botrytis cinerea)* (8.1.3)

Fusarium wilt *(Fusarium oxysporum* f. sp. *ciceri)* (8.1.4)

Pod borer (*Helicoverpa armigera*) (8.6.1)

NOTES

Any additional information may be specified here, particularly that referring to the category '99=Other' present in some of the descriptors above.

CONTRIBUTORS

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