Key access and utilization descriptors for lentil genetic resources

This list consists of an initial set of characterization and evaluation descriptors for lentil 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 lentil accessions held in genebanks and does not preclude the addition of further descriptors, should data subsequently become available.

Based on the comprehensive list 'Lentil Descriptors' published by ICARDA and IBPGR (now Bioversity International) in 1985, the list was subsequently compared with a number of sources such as 'UPOV technical guidelines for Lentil' (2003); 'Descriptors for LENTIL' (USDA, ARS, GRIN); 'Methodology to establish a composite collection: case study in lentil'[1] (ICARDA, 2005); 'Global Strategy for the *Ex Situ* Conservation of Lentil (*Lens* Miller)' (GCDT, 2008); as well as with those descriptors that were awarded funds for further research by the GCDT in 2008 Evaluation Awards Scheme (EAS). The initial list was further refined during a crop-specific consultation meeting held at the National Bureau of Plant Genetic Resources (NBPGR, India) in June 2009. It involved several scientists from NBPGR and the Indian Agricultural Research Institute (IARI).

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 lentil genetic resources. This key set was afterwards validated by a Core Advisory Group (see 'Contributors') led by Dr Ashutosh Sarker (ICARDA) and Dr Shashi K. Mishra (NBPGR).

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 1985 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

Plant height [cm] (4.1.4)

Height of plant measured from the ground to the tip of the extended foliage, at maturity. Average height of 10 plants

Plant growth habit (4.1.X)

Observed after flowering

1 Prostrate
2 Semi-prostrate
3 Intermediate
4 Upright
5 Erect
99 Other (i.e. 'mixed', specify in the descriptor **Notes**)

1 Bonnie J. Furman, Plant Genetic Resources, Vol. 4, Issue 1, pp. 2-12, NIAB, 2006

Days to 50% flowering [d] (4.2.1)
Number of days from sowing until 50% of the plants are in flower. However, in dry land areas when planting in dry soils, it is counted from the first day of rainfall or irrigation, which is sufficient for germination

Days to physiological maturity [d] (4.2.2)
Number of days from sowing until 90% of the pods are golden brown. See 4.2.1 for planting in dry soils

Number of seeds per pod (4.3.1)
Average number of seeds of 10 dry pods

100-seed weight [g] (4.3.2)
Average weight of two samples of 100 randomly chosen seeds

Ground colour of seed testa (4.3.3)
To be observed on seeds less than three months old

1 Green
2 Grey
3 Brown
4 Black
5 Pink

Pattern of seed testa (4.3.4)

0 Absent
1 Dotted
2 Spotted
3 Marbled
4 Complex (any combination of 1, 2 and 3)

Cotyledon colour (4.3.6)
To be observed on seeds less than three months old

1 Yellow
2 Orange-red
3 Olive-green

Lodging susceptibility (6.1.1)
Scored at maturity (see 4.2.2) on a scale 1-9

0 None (all plants standing)
3 Low
5 Medium
7 High

Biological yield per plant [g] (6.1.2)
Yield of dried mature plants after pulling

Harvest index [%] (6.1.X)

Number of pods per peduncle (6.2.1)
Maximum number of pods per peduncle on 10 representative plants

Height of lowest pod [cm] (6.2.2)
Estimate of the average height above ground of the lowest pod on unlodged plants at harvest

Pod shedding (6.2.3)
Scored after or during harvesting one week after maturity (see 4.2.2) on a scale 1-9

0 None
3 Low
5 Medium
7 High

Pod dehiscence (6.2.4)
Scored one week after maturity on a scale 1-9

0 None
3 Low
5 Medium
7 High

Number of pods per plant (6.2.X)
Average number of pods. Recorded from randomly selected plants at physiological maturity

Seed yield per plant [g/plant] (6.3.1)
Yield of seed after drying

ABIOTIC STRESSES

Frost (7.1.2)

Drought (7.3)

BIOTIC STRESSES

Rust (*Uromyces fabae*) (8.2.1)

Blight (*Ascochyta* spp., *Stemphylium* spp.) (8.2.2)

Vascular wilts (*Fusarium oxysporum* f. sp. *lentis*) (8.2.3)

NOTES

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

CONTRIBUTORS

Bioversity is grateful to all the scientists and researchers who have contributed to the development of this strategic set of 'Key access and utilization descriptors for lentil genetic resources', and in particular to Dr A. Sarker of the International Center for Agricultural Research in the Dry Areas (ICARDA) and Dr S. K. Mishra of the National Bureau of Plant Genetic Resources (NBPGR) for providing valuable scientific direction. Adriana Alercia provided technical expertise and guided the entire production process.

CORE ADVISORY GROUP

A. Sarker, International Center for Agricultural Research in the Dry Areas (ICARDA), India
S. K. Mishra, National Bureau of Plant Genetic Resources (NBPGR), India
Kumar Shiv Agrawal, International Center for Agricultural Research in the Dry Areas (ICARDA), Syria
Lucía De la Rosa, Centro de Recursos Fitogenéticos, Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA), Spain
Ulrike Lohwasser, Leibniz Institute of Plant Genetics and Crop Plant Research, Germany
J. C. Rana, National Bureau of Plant Genetic Resources (NBPGR), India

REVIEWERS

Australia
Maqbool Ahmad, South Australian Research and Development Institute (SARDI)
Bob Redden, Department of Primary Industries Victoria

China
Zong Xuxiao, Institute of Crop Sciences, Chinese Academy of Agricultural Sciences

France
François Boulineau, Groupe d'Etude et de contrôle des Variétés et des Semences (GEVES)

Hungary
Laszlo Holly, Agriculture Research Centre for Agrobotany, Central Agriculture Office (RCA, CAO)

India
R. P. Dua, National Bureau of Plant Genetic Resources (NBPGR)
R. K. Solanki, Indian Institute of Pulses Research, Kanpur

Italy
Gaetano Laghetti, National Research Council

Pakistan
Zahoor Ahmad, National Agricultural Research Centre (NARC)

Slovak Republic
Michaela Benkova, Plant Production Research Centre Piešťany

Spain
Constantino Caminero Saldaña, Instituto Tecnológico Agrario de Castilla y León
María José Suso, Instituto de Agricultura Sostenible, Consejo Superior de Investigaciones Científicas (CSIC)

Syria
Kenneth Street, International Center for Agricultural Research in the Dry Areas (ICARDA)

Turkey
Nuket Atikyilmaz, Aegean Agricultural Research Institute

USA
Bonnie J. Furman, United States Department of Agriculture, Agricultural Research Service (USDA-ARS)