Key access and utilization descriptors for bean genetic resources

This list consists of an initial set of characterization and evaluation descriptors for bean 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. It will facilitate access to and utilization of bean accessions held in genebanks and does not preclude the addition of further descriptors, should data subsequently become available.

Based on the comprehensive list of '*Phaseolus vulgaris* Descriptors' published by IBPGR (now Bioversity International) in 1982, the list was subsequently compared and harmonized, wherever possible, with minimum descriptors listed in 'Descriptors for *Phaseolus*' (USDA, ARS, GRIN), UPOV technical guidelines (2005), 'Handbook on evaluation of *Phaseolus* Germplasm' (PHASELIEU, 2001) and 'Standard System for the Evaluation of Bean Germplasm' (CIAT, 1987) under the scientific guidance of Dr Daniel Debouck (CIAT).

This minimal set defines a first priority set of descriptors to describe, to access and to utilize bean genetic resources. A worldwide distribution of experts involved in an online survey was assured and the list was afterwards validated by a Core Advisory Group (see 'Contributors') led by Dr Daniel Debouck.

Biotic and abiotic stresses included in the list were chosen because of their cosmopolitan nature, 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 1982 publication. Descriptors with numbers ending in 'letters' are new descriptors that were added during the development of the list below.

PLANT DATA

Use category (4.1.X)

1 Dry beans
2 Snap beans
3 Green shelled beans
4 Popping beans

Plant growth habit (4.1.2)

1 Determinate bush
2 Indeterminate bush
3 Indeterminate prostrate or vining but not climbing
4 Indeterminate climbing
5 Determinate climbing
6 Mixture

Days from sowing to 50% flowering (4.2.2)

Number of days from sowing to a stage where 50% of plants have set flowers

Colour of flower standard (banner) (4.2.4)

In freshly opened flowers. The colours of freshly opened flowers are highly changeable after opening

1 White
2 Green
3 Lilac
4 White with lilac edge
5 White with red stripes
6 Dark lilac with purple outer edge
7 Dark lilac with purplish spots
8 Carmine red
9 Purple
99 Other (specify in descriptor **Notes**)

Colour of flower wings (4.2.5)

In freshly opened flowers

1 White
2 Green
3 Lilac
4 White with carmine stripes
5 Strongly veined in red to dark lilac
6 Plain red to dark lilac
7 Lilac with dark lilac veins
8 Purple
99 Other (specify in descriptor **Notes**)

Pod colour (4.2.6)

From fully expanded immature pod

1 Dark purple
2 Carmine red
3 Purple stripe on green
4 Carmine stripe on green
5 Pale red stripe on green
6 Dark pink (rose)
7 Normal green
8 Shiny green
9 Dull green to silver grey
10 Golden or deep yellow
11 Pale yellow to white
99 Other (specify in descriptor **Notes**)

Days to 90% pod maturity (6.1.7)

Number of days from emergence until 90% of pods are mature

SEED COLOUR

Seed coat pattern (4.3.1)

0 Absent
1 Mottled
2 Striped
3 Speckled
4 Spotted
5 Blotched
99 Other (specify in descriptor **Notes**)

Seed coat colour[1] (4.3.2)

The main colours are listed below. If the seed has more than one colour the secondary and tertiary colours are also recorded using the same colour codes as for the primary colour

1 White
2 Cream
3 Yellow
4 Brown
5 Pink
6 Red
7 Purple
8 Black
99 Other (specify in descriptor **Notes**)

Brilliance of seed (4.3.4)

3 Dull
5 Medium
7 Shiny

Seed shape (4.3.5)

Taken from middle of pod

1 Round
2 Oval
3 Cuboid
4 Kidney shaped
5 Markedly truncate

100-seed weight [g] (6.3.3)

Weight of 100 seeds to the first decimal place at a moisture content of 12-14%

1 For mixed material separate the variants and name them accordingly by a letter after the accession number

Phaseolin type[2] (6.3.X)

The phaseolin types should be indicated by a letter, e.g. T, C, S, as it has been indicated in specialized publications such as Toro O, CH Ocampo & DG Debouck, 2007. 'Phaseolin: variability and reference materials in wild and cultivated common bean'. Annual Rept. *Bean Improvement Cooperative* (USA) 50: 69-70. Once the phaseolin type has been indicated by a conventional letter, then a digital image of the gel with the particular accession under study can be added

ABIOTIC STRESSES

Drought (7.3)

BIOTIC STRESSES

Bruchid (*Acanthoscelides obtectus*) (8.1.1)

Bruchid (*Zabrotes subfasciatus*) (8.1.11)

Anthracnose (*Colletotrichum lindemuthianum*) (8.2.5)

Halo blight (*Pseudomonas syringae* pv. *phaseolicola*) (8.3.2)

Bacterial blight (*Xanthomonas campestris* pv. *phaseoli*) (8.3.5)

Bean common mosaic virus (BCMV) (8.4.3)

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 bean genetic resources', and in particular to Dr Daniel Debouck who provided valuable scientific direction. Adriana Alercia provided technical expertise and guided the entire production process.

2 Brown JWS, Y Ma, FA Bliss & TC Hall. 1981. Genetic variation in the subunits of globulin-1 storage protein in French bean. *Theor. Appl. Genet.* 59: 83-88

CORE ADVISORY GROUP

Daniel Debouck, Centro Internacional de Agricultura Tropical (CIAT), Colombia
Antonio M. De Ron, Misión Biológica de Galicia, Consejo Superior de Investigaciones Científicas (MBG-CSIC), Spain
Marta Santalla Ferradas, Consejo Superior de Investigaciones Científicas, Spain
Oswaldo Voysest Voysest, Centro Internacional de Agricultura Tropical (retired), USA
Molly Welsh, United States Department of Agriculture, Agricultural Research Service, (USDA/ARS/WRPIS), USA

REVIEWERS

Argentina
O. Mario Aguilar, Instituto de Biotecnología y Biología Molecular (IBBM), Facultad Ciencias Exactas, Universidad Nacional de La Plata

Australia
Sally Dillon, Primary Industries and Fisheries

Austria
Wolfgang Kainz, Austrian Agency for Health and Food Safety (AGES)
Doris Lengauer, Versuchsstation für Spezialkulturen
Birgit Vorderwülbecke, Arche Noah

Belgium
Thierry Vanderborght, National Botanic Garden of Belgium

China
Zong Xuxiao, Institute of Crop Science, Chinese Academy of Agricultural Sciences (CAAS)

Colombia
Stephen Beebe, Centro Internacional de Agricultura Tropical (CIAT)

Germany
Baerbel Schmidt, Genebank Department, Leibniz Institute of Plant Genetics and Crop Plant Research (IPK)

India
J. C. Rana, National Bureau of Plant Genetic Resources (NBPGR)

Italy
Eliseu Bettencourt
Francesca Sparvoli, Istituto di Biologia e Biotecnologia Agraria, Consiglio Nazionale delle Ricerche (IBBA-CNR)

Mexico
Alejandra A. Covarrubias, Instituto de Biotecnología, Universidad Nacional Autónoma de México (UNAM)

Portugal
Maria Manuela Veloso, Instituto Nacional de Recursos Biológicos, Instituto Nacional de Investigação Agrária (INRB/INIA)

Slovak Republic
Daniela Benedikova, Plant Production Research Centre – Piestany

Sweden
Fredrik Ottosson, Nordic Genetic Resource Center

USA
James Beaver, University of Puerto Rico
James D. Kelly, Michigan State University
Juan M. Osorno, North Dakota State University
Marcial A. Pastor-Corrales (Talo), United States Department of Agriculture, Agricultural Research Service, (USDA-ARS, SGIL)
Carlos A. Urrea, University of Nebraska – Lincoln