Descriptors for 
Crocus 
(*Crocus spp.*)
### List of Descriptors

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allium (E, S)</td>
<td>2000</td>
<td>Papaya (E)</td>
</tr>
<tr>
<td>Almond (Revised)* (E)</td>
<td>1985</td>
<td>Peach* (E)</td>
</tr>
<tr>
<td>Apple* (E)</td>
<td>1982</td>
<td>Pear* (E)</td>
</tr>
<tr>
<td>Apricot* (E)</td>
<td>1984</td>
<td>Pearl millet (E/F)</td>
</tr>
<tr>
<td>Avocado (E, S)</td>
<td>1995</td>
<td>Pepino (E)</td>
</tr>
<tr>
<td>Bambara groundnut (E, F)</td>
<td>2000</td>
<td>Phaseolus acutifolius (E)</td>
</tr>
<tr>
<td>Banana (E, S, F)</td>
<td>1996</td>
<td>Phaseolus coccineus* (E)</td>
</tr>
<tr>
<td>Barley (E)</td>
<td>1994</td>
<td>Phaseolus lunatus (E/P)</td>
</tr>
<tr>
<td>Beta (E)</td>
<td>1991</td>
<td>Phaseolus vulgaris* (E/P)</td>
</tr>
<tr>
<td>Black pepper (E, S)</td>
<td>1995</td>
<td>Pigeonpea (E)</td>
</tr>
<tr>
<td>Brassica and Raphanus (E)</td>
<td>1990</td>
<td>Pineapple (E)</td>
</tr>
<tr>
<td>Brassica campestris L. (E)</td>
<td>1987</td>
<td>Pistacia (excluding P. vera) (E)</td>
</tr>
<tr>
<td>Buckwheat (E)</td>
<td>1994</td>
<td>Pistachio (E/F/A/R)</td>
</tr>
<tr>
<td>Cardamom (E)</td>
<td>1994</td>
<td>Potato varieties* (E)</td>
</tr>
<tr>
<td>Carrot (E/S/F)</td>
<td>1999</td>
<td>Quinoa (E/F/S)</td>
</tr>
<tr>
<td>Cashew* (E)</td>
<td>1986</td>
<td>Rambutan (E)</td>
</tr>
<tr>
<td>Chenopodium pallidicaule (S)</td>
<td>2005</td>
<td>Rice* (E/P)</td>
</tr>
<tr>
<td>Cherimoya (E/S)</td>
<td>2008</td>
<td>Rocket (E/I)</td>
</tr>
<tr>
<td>Cherry* (E)</td>
<td>1985</td>
<td>Rye and Triticale* (E)</td>
</tr>
<tr>
<td>Chickpea (E)</td>
<td>1993</td>
<td>Safflower* (E)</td>
</tr>
<tr>
<td>Citrus (E/F/S)</td>
<td>1999</td>
<td>Sesame* (E)</td>
</tr>
<tr>
<td>Coconut (E)</td>
<td>1992</td>
<td>Setaria italica and S. pumila (E)</td>
</tr>
<tr>
<td>Coffee (E/S/F)</td>
<td>1996</td>
<td>Shea tree (E)</td>
</tr>
<tr>
<td>Cotton (Revised)* (E)</td>
<td>1985</td>
<td>Sorghum (E/F)</td>
</tr>
<tr>
<td>Cowpea* (E)</td>
<td>1983</td>
<td>Soyabean* (E/C)</td>
</tr>
<tr>
<td>Cultivated potato* (E)</td>
<td>1977</td>
<td>Strawberry (E)</td>
</tr>
<tr>
<td>Date palm (F)</td>
<td>2005</td>
<td>Sunflower* (E)</td>
</tr>
<tr>
<td>Durian (E)</td>
<td>2007</td>
<td>Sweet potato (E/S/F)</td>
</tr>
<tr>
<td>Echinochloa millet* (E)</td>
<td>1983</td>
<td>Taro (E/F/S)</td>
</tr>
<tr>
<td>Eggplant (E/F)</td>
<td>1990</td>
<td>Tea (E/S/F)</td>
</tr>
<tr>
<td>Faba bean* (E)</td>
<td>1985</td>
<td>Tomato (E/S/F)</td>
</tr>
<tr>
<td>Fig (E)</td>
<td>2003</td>
<td>Tree tomato (E)</td>
</tr>
<tr>
<td>Finger millet* (E)</td>
<td>1985</td>
<td>Tropical fruit* (E)</td>
</tr>
<tr>
<td>Forage grass* (E)</td>
<td>1985</td>
<td>Ulluco (S)</td>
</tr>
<tr>
<td>Forage legumes* (E)</td>
<td>1984</td>
<td>Vigna aconitifolia and V. trilobata (E)</td>
</tr>
<tr>
<td>Grapevine (E/S/F)</td>
<td>1997</td>
<td>Vigna mungo and V. radiata (Rev.)* (E)</td>
</tr>
<tr>
<td>Groundnut (E/S/F)</td>
<td>1992</td>
<td>Walnut (E)</td>
</tr>
<tr>
<td>Hazelnut (E)</td>
<td>2008</td>
<td>Wheat (Revised)* (E)</td>
</tr>
<tr>
<td>Jackfruit (E)</td>
<td>2000</td>
<td>Wheat and Aegilops* (E)</td>
</tr>
<tr>
<td>Kodo millet* (E)</td>
<td>1983</td>
<td>White clover (E)</td>
</tr>
<tr>
<td>Lathyrus spp. (E)</td>
<td>2000</td>
<td>Winged bean* (E)</td>
</tr>
<tr>
<td>Lentil* (E)</td>
<td>1985</td>
<td>Xanthosoma* (E)</td>
</tr>
<tr>
<td>Litchi (E)</td>
<td>2002</td>
<td>Yam (E/S/F)</td>
</tr>
<tr>
<td>Lupin* (E/S)</td>
<td>1981</td>
<td></td>
</tr>
<tr>
<td>Maize (E/S/F/P)</td>
<td>1991</td>
<td></td>
</tr>
<tr>
<td>Mango (Revised) (E)</td>
<td>2006</td>
<td></td>
</tr>
<tr>
<td>Mangosteen (E)</td>
<td>2003</td>
<td></td>
</tr>
<tr>
<td>Medicago (Annual)* (E/F)</td>
<td>1991</td>
<td></td>
</tr>
<tr>
<td>Melon (E)</td>
<td>2003</td>
<td></td>
</tr>
<tr>
<td>Mung bean* (E)</td>
<td>1980</td>
<td></td>
</tr>
<tr>
<td>Oat* (E)</td>
<td>1985</td>
<td></td>
</tr>
<tr>
<td>Oca* (S)</td>
<td>2001</td>
<td></td>
</tr>
<tr>
<td>Oil palm (E)</td>
<td>1989</td>
<td></td>
</tr>
<tr>
<td>Panicum miliaceum and P. sumatrense (E)</td>
<td>1985</td>
<td></td>
</tr>
</tbody>
</table>

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Descriptors for

*Crocus*

*(Crocus spp.)*
Bioversity International is a global research-for-development organization. We have a vision – that agricultural biodiversity nourishes people and sustains the planet.

We deliver scientific evidence, management practices and policy options to use and safeguard agricultural biodiversity to attain sustainable global food and nutrition security. We work with partners in low-income countries in different regions where agricultural biodiversity can contribute to improved nutrition, resilience, productivity and climate change adaptation.

Bioversity International is a member of the CGIAR Consortium – a global research partnership for a food secure future.

www.bioversityinternational.org

The Plant Physiology Research Group is a structure belonging to the Plant Production Department at the Universitat Politècnica de València (Spain), which undertakes educational and research work at the High Technical School of Agricultural Engineering and Environment (ETSIAMN). This group brings together researchers in diverse fields of Plant Physiology, including photosynthesis and carbohydrate metabolism, abiotic stresses, as well as the developmental process. Over the last 14 years, this group has been working on different research activities related to Crocus genus in order to improve and modernise production systems.

The Genetics and Biotechnology Group of the Universidad de Castilla-La Mancha (Spain), carries out its research effort at the Institute for Regional Development (IDR) and its educational tasks at the High Technical School of Agricultural Engineering and Forestry (ETSIAM) in Albacete, Spain. Its research has been focused on saffron biotechnology and therapeutic properties of saffron apocarotenoids, as well as on the genetic variability in Crocus genus.

The Bank of Plant Germplasm of Cuenca (BGVCU) is placed in the facilities of the Agricultural Centre of Albaladejito, Spain, belonging to the Department of Agriculture of the Government of Castilla – La Mancha (Junta de Comunidades de Castilla-La Mancha). The activities related to the conservation and management of plant genetic resources were initiated nearly 30 years ago and have been focused on several crops of interest for rain-fed semiarid conditions, mainly grain-legumes and aromatic and medicinal plants. The BGVCU belongs to the Spanish Network of Genebanks for plant genetic resources (code FAO ESP124). Currently the BGVCU preserves and manages the World Saffron and Crocus Collections.
Crocus spp.
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PREFACE

The list of Descriptors for Crocus (Crocus spp.) has been developed within the framework of the EU funded Programme AGRI GEN RES, (Action 018, www.crocusbank.org), coordinated by the Universidad de Castilla-La Mancha (Spain). One of the main achievements of this Programme has been the creation of the World Saffron and Crocus Collection (WSCC), maintained by the Bank of Plant Germplasm of Cuenca (BGVCU), which belongs to the Junta de Comunidades de Castilla – La Mancha (JCCM, Spain). The overall coordination of the development of the list of Descriptors for Crocus has been carried out by Prof. Rosa V. Molina and her Plant Physiology Research Group at the Universitat Politècnica de València (Spain). They have developed a preliminary list of descriptors based on evaluation studies carried out on saffron and Crocus accessions and taking into account taxonomic criteria for the genus Crocus. Other organizations such as the Aristotle University of Thessaloniki and the Agricultural University of Athens (Greece), the University of Leicester (United Kingdom) and the University of Catania (Italy) have also provided valuable scientific contributions to the elaboration of this document.

The scientific overview of this document was provided by Stefano Padulosi and the technical advice by Adriana Alercia, both from Bioversity International, who prepared a draft using the international accepted format for descriptor lists. This was then circulated among international experts for further review and consolidation. A full list of the names and addresses of those involved in the production of this publication is given in the Contributors section.

Bioversity International (formerly known as IPGRI) encourages the collecting of data for all five types of descriptors (see Definitions and Use of the Descriptors), whereby data from the first four categories—Passport, Management, Environment and Site, and Characterization—should be made available for any accession. The number of descriptors selected in each of the categories will depend on the crop and its importance to the crop’s description. Descriptors listed under Evaluation allow for a more extensive description of the accession, but generally require repeated trials over a period of time.

Although the suggested coding should not be regarded as the definitive scheme, this format represents an important tool for a standardized characterization system and it is being promoted by Bioversity throughout the world.

This descriptors list provides an international format and thereby produces a universally understood ‘language’ for plant genetic resources data. The adoption of this scheme for data encoding, or at least the production of a transformation method to convert other schemes into the Bioversity format, will produce a rapid, reliable, and efficient means of information storage, retrieval and communication, and will assist with the use of germplasm. It is recommended, therefore, that information should be produced by closely following the descriptor list with regard to ordering and numbering descriptors, using the specified descriptors and recommended descriptor states.

This descriptors list is intended to be comprehensive for the descriptors it contains. Bioversity does not, however, assume that curators will characterize accessions of their collections using all descriptors given. Descriptors should be used when they are useful to users, either collections’ curators for the management and maintenance of their germplasm material or to all other users of plant genetic resources for promoting their sustainable use. To
this end, highly discriminating descriptors are listed at the beginning of the Characterization section (highlighted text) to facilitate selection of descriptors.

The ‘List of Multi-crop Passport Descriptors’ (Alercia et al., 2012) was developed to provide consistent coding schemes for common passport descriptors among crops. They are marked in the text as [MCPD]. Owing to the generic nature of the multicrop passport descriptors, not all descriptor states for a particular descriptor will be relevant to a specific crop.

In Annex I the reader will find a ‘Collecting form for Crocus spp.’ that will facilitate data collection.

Any suggestions for improvement of the ‘Descriptors for Crocus (Crocus spp.)’ will be highly appreciated by Bioversity¹, Universitat Politècnica de València, Universidad de Castilla-La Mancha and Junta de Comunidades de Castilla-La Mancha.

¹ Contact: a.alercia@cgiar.org
INTRODUCTION

Common names of saffron according to literature

<table>
<thead>
<tr>
<th>Language</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabic</td>
<td>safran, zafaran</td>
</tr>
<tr>
<td>English</td>
<td>saffron</td>
</tr>
<tr>
<td>French</td>
<td>safran</td>
</tr>
<tr>
<td>Dutch</td>
<td>saffraan</td>
</tr>
<tr>
<td>German</td>
<td>safran</td>
</tr>
<tr>
<td>Greek</td>
<td>krokos, zafora, safrani</td>
</tr>
<tr>
<td>Italian</td>
<td>zafferano</td>
</tr>
<tr>
<td>Portuguese</td>
<td>açafrao</td>
</tr>
<tr>
<td>Russian</td>
<td>shafran</td>
</tr>
<tr>
<td>Spanish</td>
<td>azafrán</td>
</tr>
<tr>
<td>Turkish</td>
<td>zaferen, safran</td>
</tr>
</tbody>
</table>

The Crocus genus is part of the Iridaceae family and consists of more than 88 corm-bearing perennial species distributed from Central and Southern Europe, to North Africa, Southwest Asia and Western China, with the centre of species diversity located in Asia Minor and the Balkan Peninsula (Mathew 1982; Goldblatt et al., 2008; Petersen et al., 2008; Harpke et al., 2013). Many Crocus species are highly appreciated as garden plants for their colourful flowers, but the genus is mainly known for the species C. sativus, commercially cultivated for the production of saffron, the world’s most expensive spice (Fernández 2004).

Saffron has been widely known since the pre-Hellenic and Hellenic periods. On the wall of the Palace of Minos in Knossos (Crete, Greece), dating 1700–1600 BC, frescoes depicting crocus-gatherers can be observed. Other important records are found in the palace of Akrotiri in Thera (now Santorini, Greece, 1700-1450 BC) where frescoes represent young women collecting crocuses and offering them to a divinity. Unfortunately, it is not possible to determine with certainty which Crocus species (C. sativus or C. cartwrightianus) had inspired these paintings. The Mediterranean region is one of the most probable sites of origin of saffron; another possible site is located in the Turkey–Iran–India area, where saffron cultivation is reported to be thousands of years old (Grilli-Caiola and Canini, 2010). According to some authors (Alberini 1990; Winterhalter and Straubinger, 2000) saffron originated first in Iran and Kashmir, from where the Phoenicians introduced it to the Greek and Romans. Later on, it was brought by the Arabs to Spain. The term used in ancient Greek for Crocus is ‘koricos’, whereas the Romans used the term ‘crocum’. By contrast, ‘saffron’ probably originates from the Arabic word ‘zafaran’ or ‘zaafaran’. The Arabic ‘safran’ is quite similar in various other languages as listed below.

Ancient civilizations used saffron to dye clothes, as a food additive and even as a medical remedy (Basker and Negbi, 1983). There is a long history of the use of saffron in traditional medicines of many cultures. Its applications in the medical field have been extensively tested as well and it is worth noting its reported tumoricidal and anti-carcinogenic properties (Abdullaev, 2003, Chryssanthi et al., 2007).

Although concern in the Crocus genus is mainly related to C. sativus, there is also growing interest in other ornamental and wild related species. Many Crocus species could be used as a
source of food colorants and nutraceuticals, and are also rich in high added value compounds possessing biological activity (fungicidal, antioxidant or insecticidal) that can be extracted from corms, tepals and leaves. Furthermore, the recorded tolerance to summer drought and winter cold, together with their showy flowers, makes wild species interesting as ornamental in areas with severe climatic conditions. Wild species can also be used as sources of useful genes in improvement programmes of the cultivated species.

Conservation of saffron and allies is particularly concerning because of the shrinking of their populations both in the wild and in cultivated areas. In this regard, the descriptors developed for these species represent a valuable instrument for a better comprehension of these dwindling resources in support of their enhanced conservation and use and following an international agreed protocol (Bioversity International, 2007).
DEFINITIONS AND USE OF THE DESCRIPTORS

Bioversity uses the following definitions in genetic resources documentation:

**Passport descriptors:** These provide the basic information used for the general management of the accession (including registration at the genebank and other identification information) and describe parameters that should be observed when the accession is originally collected.

**Management descriptors:** These provide the basis for the management of accessions in the genebank and assist with their multiplication and regeneration.

**Environment and site descriptors:** These describe the environmental and site-specific parameters that are important when characterization and evaluation trials are held. They can be important for the interpretation of the results of those trials. Site descriptors for germplasm collecting are also included here.

**Characterization descriptors:** These enable an easy and quick discrimination between phenotypes. They are generally highly heritable, can be easily seen by the eye and are equally expressed in all environments. Furthermore, these may include a limited number of additional traits thought desirable by a consensus of users of the particular crop.

**Evaluation descriptors:** The expression of many of the descriptors in this category will depend on the environment and, consequently, special experimental designs and techniques are needed to assess them. Their assessment may also require complex biochemical or molecular characterization methods. These types of descriptors include characters such as yield, agronomic performance, stress susceptibilities and biochemical and cytological traits. They are generally the most interesting traits in crop improvement.

Characterization will normally be the responsibility of genebank curators, while evaluation will typically be carried out elsewhere (possibly by a multidisciplinary team of scientists). The evaluation data should be fed back to the genebank, which will maintain a data file.

Highly discriminating descriptors are highlighted in the text and are listed at the beginning of the *Characterization* section.

The following internationally accepted norms for the scoring, coding and recording of descriptor states should be followed:

(a) the Système International d’Unités (SI);

(b) the units to be applied are given in square brackets following the descriptor name;

(c) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, or Munsell Color Chart for Plant Tissues, are strongly recommended for all ungraded colour characters (the precise chart chosen should be specified in the section where it is used);
(d) the three-letter abbreviations from the *International Standard (ISO) Codes for the representation of names of countries are used* (http://unstats.un.org/unsd/methods/m49/m49alpha.htm)

(e) quantitative characters, i.e. those that are continuously variable, should preferably be measured quantitatively. Alternatively, in cases where it is difficult to measure in this way, it is acceptable to score instead on a 1–9 scale, where:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very low</td>
</tr>
<tr>
<td>2</td>
<td>Very low to low</td>
</tr>
<tr>
<td>3</td>
<td>Low</td>
</tr>
<tr>
<td>4</td>
<td>Low to intermediate</td>
</tr>
<tr>
<td>5</td>
<td>Intermediate</td>
</tr>
<tr>
<td>6</td>
<td>Intermediate to high</td>
</tr>
<tr>
<td>7</td>
<td>High</td>
</tr>
<tr>
<td>8</td>
<td>High to very high</td>
</tr>
<tr>
<td>9</td>
<td>Very high</td>
</tr>
</tbody>
</table>

is the expression of a character. The authors of this list have sometimes described only a selection of the states, e.g. 3, 5 and 7 for such descriptors. Where this has occurred, the full range of codes is available for use by extension of the codes given or by interpolation between them, e.g. in Section 10 (*Biotic stress susceptibility*), 1 = very low susceptibility and 9 = very high susceptibility;

(f) when a descriptor is scored using a scale, such as in (e), ‘0’ would be scored when (i) the character is not expressed; (ii) a descriptor is inapplicable. In the following example, ‘0’ will be recorded if an accession does not have leaf hairs:

**Leaf hairiness**

Observed on abaxial side

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Absent (glabrous)</td>
</tr>
<tr>
<td>1</td>
<td>Puberulent</td>
</tr>
<tr>
<td>2</td>
<td>Pubescent</td>
</tr>
<tr>
<td>3</td>
<td>Pilose</td>
</tr>
<tr>
<td>4</td>
<td>Tomentose</td>
</tr>
</tbody>
</table>

(g) absence/presence of characters is scored as in the following example:

**Presence of stone cell aggregates in mesocarp**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Absent</td>
</tr>
<tr>
<td>1</td>
<td>Present</td>
</tr>
</tbody>
</table>

(h) blanks are used for information not yet available;
(i) for accessions which are not generally uniform for a descriptor (e.g. mixed collection, genetic segregation), the mean and standard deviation could be reported where the descriptor is continuous. Where the descriptor is discontinuous, several codes in the order of frequency could be recorded; or other publicized methods can be utilized, such as Rana et al. (1991) or van Hintum (1993), that clearly state a method for scoring heterogeneous accessions;

(j) Dates should be recorded numerically as YYYYMMDD, where

- **YYYY** - 4 digits to represent the year
- **MM** - 2 digits to represent the month
- **DD** - 2 digits to represent the day

If the month or days are missing, this should be indicated with hyphens or ‘00’ [double zero] (e.g. 1975----, 19750000; 197506--, 19750600).
PASSPORT

All descriptors listed under Passport, belonging to the multicrop passport descriptors category, are indicated in the text as [MCPD].

1. Accession descriptors

1.1 Institute code

FAO WIEWS code of the institute where the accession is maintained. The codes consist of the 3-letter ISO 3166 country code of the country where the institute is located, plus a number. The current set of institute codes is available from http://apps3.fao.org/wiews/wiews.jsp.

1.2 Accession number

This number serves as a unique identifier for accessions within a genebank, and is assigned when a sample is entered into the genebank collection. Once assigned, this number should never be reassigned to another accession in the collection. Even if an accession is lost, its assigned number should never be reused. Letters should be used before the number to identify the genebank or national system (e.g. CGN indicates an accession from the genebank in Wageningen, the Netherlands; PI indicates an accession within the USA system).

1.3 Donor institute code

FAO WIEWS code of the donor institute. (See instructions under Institute code, 1.1).

1.3.1 Donor institute name

Name of the donor institute (or person). This descriptor should be used only if DONORCODE cannot be filled because the FAO WIEWS code for this institute is not available.

1.4 Donor accession number

Identifier assigned to an accession by the donor. (See instructions under Accession number, 1.2).

1.5 Other identifiers associated with the accession

Any other identifiers known to exist in other collections for this accession. Use the following format: INSTCODE:ACCENUMB;INSTCODE:identifier;… INSTCODE and identifier are separated by a colon without space. Pairs of INSTCODE and identifier are separated by a semicolon without space. When the institute is not known, the identifier should be preceded by a colon.

1.6 Genus

Genus name for taxon. Initial uppercase letter required.
1.7 Species
Specific epithet portion of the scientific name in lowercase letters. Only the following abbreviation is allowed: ‘sp.’.

1.7.1 Species authority
Provide the authority for the species name.

1.8 Subtaxon
Subtaxon can be used to store any additional taxonomic identifier. The following abbreviations are allowed: ‘subsp.’ (for subspecies); ‘convar.’ (for convariety); ‘var.’ (for variety); ‘f.’ (for form); ‘Group’ (for ‘cultivar group’).

1.8.1 Subtaxon authority
Provide the subtaxon authority at the most detailed taxonomic level.

1.9 Ancestral data
Information about either pedigree or other description of ancestral information (i.e. parent variety in the case of mutant or selection).

1.10 Accession

1.10.1 Accession name
Either a registered or other designation given to the material received other than the Donor accession number, 1.4 or Collecting number, 2.2. First letter uppercase. Multiple names are separated by a semicolon without space. Example: Accession name: Bogatyr;Symphony;Emma.

1.10.2 Synonyms
Include here any names other than the current one. Newly assigned station names are frequently used as synonyms.

1.10.3 Common crop name

1.11 Acquisition date [YYYYMMDD]
Date on which the accession entered the collection where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens or double zero.

1.12 Remarks
The Remarks field is used to add notes or to elaborate on descriptors with value ‘99’ or ‘999’ (= Other).
2. Collecting descriptors

2.1 Collecting institute code

FAO WIEWS code of the institute(s) collecting the sample. If the holding institute has collected the material, the collecting institute code should be the same as the holding institute code. Multiple values are separated by a semicolon without space. (See instructions under Institute code, 1.1).

2.1.1 Collecting institute name

Name of the institute collecting the sample. This descriptor should be used only if the Collecting institute code cannot be filled because the FAO WIEWS code for this institute is not available. Multiple values are separated by a semicolon without space.

2.1.1.1 Collecting institute address

Address of the institute collecting the sample. This descriptor should be used only if Collecting institute code cannot be filled since the FAO WIEWS code for this institute is not available. Multiple values are separated by a semicolon without space.

2.2 Collecting number

Original identifier assigned by the collector(s) of the sample, normally composed of the name or initials of the collector(s) followed by a number (e.g. ‘FM9909’). This identifier is essential for identifying duplicates held in different collections. It should be unique and always accompany subsamples wherever they are sent.

2.3 Collecting date of sample [YYYYMMDD]

Collecting date of the sample where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens or double zero [00].

2.4 Collecting mission identifier

Identifier of the collecting mission used by the Collecting institute 2.1 or 2.1.1 (e.g. ‘CIATFOR-052’, ‘CN426’).

2.5 Country of origin

Three-letter ISO 3166-1 code of the country in which the sample was originally collected (landrace, crop wild relative, farmers’ variety), bred or selected (breeding lines, GMOs, segregating populations, hybrids, modern cultivars, etc.).
2.6  Breeding institute code  [MCPD]
FAO WIEWS code of the institute that has bred the material. If the holding institute has
bred the material, the breeding institute code should be the same as the holding institute
code. Follow the Institute code 1.1 standard. Multiple values are separated by a semicolon
without space.

2.6.1 Breeding institute name  [MCPD]
Name of the institute (or person) that bred the material. This descriptor should be
used only if BREDCODE cannot be filled because the FAO WIEWS code for this
institute is not available. Multiple names are separated by a semicolon without
space.

2.7 Location of collecting site  [MCPD]
Location information below the country level that describes where the accession was
collected, preferably in English. This might include the distance in kilometres and direction
from the nearest town, village or map grid reference point (e.g. 7 km south of Curitiba in
the state of Parana).

Geographical coordinates

- For latitude and longitude descriptors, two alternative formats are proposed, but the
  one reported by the collecting mission should be used.

- Latitude and longitude in decimal degree format with a precision of four decimal
  places corresponds to approximately 10 m at the Equator and describes the point-radius
  representation of the location, along with geodetic datum and coordinate uncertainty in
  metres.

The following two mutually exclusive formats can be used for latitude and longitude:

2.8  Latitude of collecting site [DDMSSH]  [MCPD]
Degrees (2 digits), minutes (2 digits) and seconds (2 digits) followed by N (North) or S
(South) (e.g. 103020S). Every missing digit (minutes or seconds) should be indicated with
a hyphen. Leading zeros are required (e.g. 10----S; 011530N; 4531--S).

2.8a Latitude of collecting site [-/+DD.DDDD]  [MCPD]
Latitude expressed in decimal degrees. Positive values are North of the Equator; negative
values are South of the Equator (e.g. -44.6975).

2.9  Longitude of collecting site [DDDMSSH]  [MCPD]
Degrees (3 digits), minutes (2 digits) and seconds (2 digits) followed by E (East) or W
(West) (e.g. 0762510W). Every missing digit (minutes or seconds) should be indicated with
a hyphen. Leading zeros are required (e.g. 076 ----W).
2.9a **Longitude of collecting site** [-/+DD.DDDD] [MCPD]
Longitude expressed in decimal degrees. Positive values are East of the Greenwich Meridian; negative values are West of the Greenwich Meridian (e.g. +120.9123).

2.10 **Coordinate uncertainty** [m] [MCPD]
Uncertainty associated with the coordinates in metres. Leave the value empty if the uncertainty is unknown.

2.11 **Coordinate datum** [MCPD]
The geodetic datum or spatial reference system upon which the coordinates given in decimal latitude and decimal longitude are based (e.g. WGS84, ETRS89, NAD83). The GPS uses the WGS84 datum.

2.12 **Georeferencing method** [MCPD]
The georeferencing method used (GPS, determined from map, gazetteer, or estimated using software). Leave the value empty if georeferencing method is not known.

2.13 **Elevation of collecting site** [m asl] [MCPD]
Elevation of collecting site expressed in metres above sea level. Negative values are allowed.

2.14 **Collecting /acquisition source** [MCPD]
The coding scheme proposed can be used at 2 different levels of detail: either by using the general codes (in **boldface**) such as 10, 20, 30, 40, etc., or by using the more specific codes, such as 11, 12, etc.

10 **Wild habitat**
11 Forest or woodland
12 Shrubland
13 Grassland
14 Desert or tundra
15 Aquatic habitat
20 **Farm or cultivated habitat**
21 Field
22 Orchard
23 Backyard, kitchen or home garden (urban, periurban or rural)
24 Fallow land
25 Pasture
26 Farm store
27 Threshing floor
28 Park
2.15 **Biological status of accession**

The coding scheme proposed can be used at 3 different levels of detail: either by using the general codes (in **boldface**) such as 100, 200, 300, 400, or by using the more specific codes such as 110, 120, etc.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Wild</td>
</tr>
<tr>
<td>110</td>
<td>Natural</td>
</tr>
<tr>
<td>120</td>
<td>Semi-natural/wild</td>
</tr>
<tr>
<td>130</td>
<td>Semi-natural/sown</td>
</tr>
<tr>
<td>200</td>
<td>Weedy</td>
</tr>
<tr>
<td>300</td>
<td>Traditional cultivar/landrace</td>
</tr>
<tr>
<td>400</td>
<td>Breeding/research material</td>
</tr>
<tr>
<td>410</td>
<td>Breeder’s line</td>
</tr>
<tr>
<td>411</td>
<td>Synthetic population</td>
</tr>
<tr>
<td>412</td>
<td>Hybrid</td>
</tr>
<tr>
<td>413</td>
<td>Founder stock/base population</td>
</tr>
<tr>
<td>414</td>
<td>Inbred line (parent of hybrid cultivar)</td>
</tr>
<tr>
<td>415</td>
<td>Segregating population</td>
</tr>
<tr>
<td>416</td>
<td>Clonal selection</td>
</tr>
<tr>
<td>420</td>
<td>Genetic stock</td>
</tr>
<tr>
<td>421</td>
<td>Mutant (e.g. induced/insertion mutants, tilling populations)</td>
</tr>
<tr>
<td>422</td>
<td>Cytogenetic stocks (e.g. chromosome addition/substitution, aneuploids, amphiploids)</td>
</tr>
<tr>
<td>423</td>
<td>Other genetic stocks (e.g. mapping populations)</td>
</tr>
<tr>
<td>500</td>
<td>Advanced/improved cultivar (conventional breeding methods)</td>
</tr>
<tr>
<td>600</td>
<td>GMO (by genetic engineering)</td>
</tr>
<tr>
<td>999</td>
<td>Other (elaborate in descriptor 2.25 Remarks)</td>
</tr>
</tbody>
</table>

2.16 **Collecting source environment**

Use descriptors 6.1 to 6.2 in section 6.
2.17  **Type of sample**  
Type of material collected. If different types of material have been collected from the same source, each sample (type) should be designated with a unique collecting number and a corresponding unique accession number.  
1  Vegetative  
2  Seed  
99  Other (specify which part of the plant is used in descriptor 2.25 Remarks)

2.18  **Number of plants sampled**  
Appropriate number of plants collected in the field to produce this accession.

2.19  **Number of seeds collected**

2.20  **General appearance of population**  
Provide a subjective assessment of the general appearance of the population:  
3  Poor  
5  Medium  
7  Good

2.21  **Population isolation [km]**  
Straight line distance between two adjacent collecting sites.

2.22  **Ethnobotanical data**  
Information on traditional attributes of the sample in place for collecting runs (community): uses, methods of preparation, native names, healing properties, cultural beliefs and other characteristics.

2.22.1  **Ethnic group**  
Name of the ethnic group of the donor of the sample or of the people living in the collecting area.

2.22.2  **Local vernacular name**  
Name given by farmer to crop and cultivar/landrace/clone/wild form. State local language or dialect if the ethnic group is not provided.

2.22.2.1  **Translation**  
Provide translation of the local name into English, if possible.

2.22.3  **History of plant use**  
1  Ancestral/indigenous (always associated with the place and community)  
2  Introduced (but in unknown distant past)  
3  Introduced (time of introduction known)
2.22.4 Parts of the plant used
If more than one part is used, multiple values are allowed, separated by a semicolon (;).
1 Entire plant
2 Flower/inflorescence (calyx, corolla, style)
3 Root or corm
99 Other (specify in descriptor 2.25 Remarks)

2.22.5 Plant use
1 Spices, aromatic
2 Medicinal
3 Industrial
4 Ornamental
99 Other (specify in descriptor 2.25 Remarks)

2.22.6 Cultural characteristics
Is there any folklore associated with the collected Crocus species (e.g. taboos, stories and/or superstitions)? If so, describe it briefly in descriptor 2.25 Remarks.
0 No
1 Yes

2.22.7 Prevailing stresses
Information on main associated biotic (pests and diseases) and abiotic (drought, salinity, temperature) stresses.

2.22.8 Cultural practices

2.22.8.1 Sowing date [YYYYMMDD]

2.22.8.2 First harvest date [YYYYMMDD]

2.22.8.3 Last harvest date [YYYYMMDD]

2.22.9 Cropping system
1 Monoculture
2 Intercropped (specify other crops in descriptor 2.25 Remarks)

2.22.10 Mode of reproduction
1 Vegetative
2 Seed
3 Both
2.22.11 Associated flora
Other dominant crop/or wild plant species, including other *Crocus* species, found in and around the collecting site.

2.22.12 Seasonality
1. Available only in season/at particular period
2. Available throughout the year

2.23 Photograph
Was/were (a) photograph(s) taken of the sample or habitat at the time of collecting? If so, provide (an) identification number(s).

0. No
1. Yes

2.23.1 Photograph identification number

2.24 Herbarium specimen
Was a herbarium specimen collected? If so, provide an identification number and indicate in which place (herbarium) the *Crocus* specimen was deposited.

2.24.1 Specimen identification number

2.24.2 Herbarium name

2.25 Remarks
Specify here any additional information recorded by the collector or any specific information on descriptors with value “99” or “999” (=Other).
3. Management descriptors

3.1 Accession number  
(Passport 1.2)

3.2 Population identification  
(Passport 2.2)
Collecting number, pedigree, cultivar name, etc., depending on the population type.

3.3 Storage address
Building, room, shelf number/location in medium-term and/or long-term storage.

3.4 Type of germplasm storage  
[MCPD]
If germplasm is maintained under different types of storage, multiple choices are allowed, separated by a semicolon (e.g. 20;30). [Refer to FAO Genebank Standards for Plant Genetic Resources for Food and Agriculture (2014) for details on storage type].

10 Seed collection
11 Short term
12 Medium term
13 Long term
20 Field collection
30 In vitro collection
40 Cryopreserved collection
50 DNA collection
99 Other (elaborate in 3.18 Remarks)

3.5 Accession size
Approximate number or weight of seeds, cuttings, or plants of an accession in the genebank.

3.6 Acquisition date [YYYYMMDD]  
[MCPD]
Date on which the accession entered the collection where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens or 00 [double zero].

3.7 Location of safety duplicates  
[MCPD]
FAO WIEWS code of the institute(s) where a safety duplicate of the accession is maintained. Multiple values are separated by a semicolon without space. It follows 1.1 Institute code.
3.7a Institute maintaining safety duplicates [MCPD]
Name of the institute where a safety duplicate of the accession is maintained. This descriptor should be used only if INSTCODE cannot be filled because the FAO WIEWS code for this institute is not available. Multiple values are separated by a semicolon without space.

3.8 MLS status of the accession [MCPD]
The status of an accession with regard to the Multilateral System (MLS) of the International Treaty on Plant Genetic Resources for Food and Agriculture. Leave the value empty if the status is not known.

0   No (not included)
1   Yes (included)
99  Other (elaborate in Remarks field, e.g. ‘under development’)

3.9 Storage date [YYYYMMDD]

3.10 Seed germination at storage [%]

3.11 Date of last seed germination test [YYYYMMDD]

3.12 Seed germination at the last test [%]

3.13 Date of last regeneration [YYYYMMDD]

3.14 Date of next seed germination test [YYYYMMDD]
(Estimate)

3.15 Date of next regeneration [YYYYMMDD]
(Estimate)

3.16 Seed moisture content at harvest [%]

3.17 Seed moisture content at storage (initial) [%]

3.18 Remarks
Any additional information may be specified here.
4. Multiplication/regeneration descriptors

4.1 Accession number

4.2 Population identification
Collecting numbers, pedigree, cultivar name, etc., depending on the population type.

4.3 Field plot number

4.4 Collaborator(s) name
Name(s) and address(es) of the person(s) in charge of the multiplication/regeneration.

4.5 Propagation
1 Seed
2 Vegetative (cuttings)
3 Vegetative (in vitro culture)

4.6 Substrate/medium for propagation
Indicate the substrate or in vitro growing medium used for propagation.

4.7 Percentage of seed germination [%]

4.8 Percentage of cuttings/explants rooting and giving plantlets [%]
For vegetatively reproduced accessions.

4.9 Number of plants used as seed/cuttings/explants source for each regeneration

4.10 Cultural practices

4.10.1 Sowing or vegetative propagation date [YYYYMMDD]

4.10.2 Transplanting date [YYYYMMDD]

4.10.3 Harvest date [YYYYMMDD]

4.10.4 Irrigation
Specify frequency.

4.10.5 Pruning date [YYYYMMDD]

4.10.5.1 Pruning frequency
Specify frequency.
4.10.6 Field spacing

4.10.6.1 Distance between plants in a row [cm]

4.10.6.2 Distance between rows [cm]

4.10.7 Fertilizer application [g/m²]
Indicate the type of fertilizer used and the number of applications made.

4.11 Type of pollination
1 Artificial
2 Natural
3 Both

4.12 Pollination method
1 Self-pollinated
2 Mixed
3 Cross-pollinated

4.13 Previous multiplication and/or regeneration

4.13.1 Location

4.13.2 Transplanting/in vitro culture date [YYYYMMDD]

4.14 Date of last regeneration or multiplication [YYYYMMDD]

4.15 Number of times accession regenerated
Since the date of acquisition.

4.16 Remarks
Any additional information may be specified here.
ENVIRONMENT AND SITE

5. Characterization and/or evaluation site descriptors

5.1 Country of characterization and/or evaluation
(See instructions in descriptor 2.5 Country of origin).

5.2 Site (research institute)

5.2.1 Latitude
(See format under 2.8/2.8a).

5.2.2 Longitude
(See format under 2.9/2.9a).

5.2.3 Elevation [m asl]

5.2.4 Name of farm or institute

5.2.5 Planting site in the field
Give block, strip and/or row/plot numbers as applicable, plants/plot, replication.

5.3 Evaluator's name and address

5.4 Sowing date [YYYYMMDD]

5.5 Transplanting date [YYYYMMDD]

5.6 Harvest date [YYYYMMDD]

5.7 Evaluation environment
Environment in which characterization/evaluation was carried out:

1. Field
2. Screenhouse
3. Greenhouse
4. Laboratory
99 Other (specify in descriptor 5.9 Remarks)

5.8 Environmental characteristics of site
Use descriptors 6.1.1 to 6.2 in section 6.
5.9 Remarks
Any other site-specific information.

6. Collecting and/or characterization/evaluation site environment descriptors

6.1 Site environment

6.1.1 Topography
This refers to the profile in elevation of the land surface on a broad scale. (From FAO 1990).

<table>
<thead>
<tr>
<th></th>
<th>Topography</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flat</td>
<td>0 - 0.5%</td>
</tr>
<tr>
<td>2</td>
<td>Almost flat</td>
<td>0.6 - 2.9%</td>
</tr>
<tr>
<td>3</td>
<td>Gently undulating</td>
<td>3 - 5.9%</td>
</tr>
<tr>
<td>4</td>
<td>Undulating</td>
<td>6 - 10.9%</td>
</tr>
<tr>
<td>5</td>
<td>Rolling</td>
<td>11 - 15.9%</td>
</tr>
<tr>
<td>6</td>
<td>Hilly</td>
<td>16 - 30%</td>
</tr>
<tr>
<td>7</td>
<td>Steeply dissected</td>
<td>&gt;30%, moderate elevation range</td>
</tr>
<tr>
<td>8</td>
<td>Mountainous</td>
<td>&gt;30%, great elevation range (&gt;300m)</td>
</tr>
<tr>
<td>99</td>
<td>Other (elaborate in descriptor 6.2 Remarks)</td>
<td></td>
</tr>
</tbody>
</table>

6.1.2 Higher level landform (general physiographic features)
The landform refers to the shape of the land surface in the area in which the site is located (adapted from FAO, 1990).

<table>
<thead>
<tr>
<th></th>
<th>Landform</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plain</td>
</tr>
<tr>
<td>2</td>
<td>Basin</td>
</tr>
<tr>
<td>3</td>
<td>Valley</td>
</tr>
<tr>
<td>4</td>
<td>Plateau</td>
</tr>
<tr>
<td>5</td>
<td>Upland</td>
</tr>
<tr>
<td>6</td>
<td>Hill</td>
</tr>
<tr>
<td>7</td>
<td>Mountain</td>
</tr>
</tbody>
</table>
6.1.3 **Land element and position**

Description of the geomorphology of the immediate surroundings of the site (adapted from FAO 1990). See Fig. 1.

1. Plain level  
2. Escarpment  
3. Interfluve  
4. Valley  
5. Valley floor  
6. Channel  
7. Levee  
8. Terrace  
9. Floodplain  
10. Lagoon  
11. Pan  
12. Caldera  
13. Open depression  
14. Closed depression  
15. Dune  
16. Longitudinal dune  
17. Interdunal depression  
18. Mangrove  
19. Upper slope  
20. Midslope  
21. Lower slope  
22. Ridge  
23. Beach  
24. Beachridge  
25. Rounded summit  
26. Summit  
27. Coral atoll  
28. Drainage line (bottom position in flat or almost-flat terrain)  
29. Coral reef  
30. Other (specify in appropriate section’s Notes)

---

**Fig. 1. Land element and position**
6.1.4 **Slope[^°]**
Estimated slope of the site.

6.1.5 **Slope aspect**
The direction the slope faces on which the accession was collected. Describe the direction with symbols N, S, E, W (e.g., a slope that faces a south-western direction has an aspect of SW).

6.1.6 **Crop agriculture**
(From FAO, 2006)
1. Annual field cropping
2. Perennial field cropping
3. Tree and shrub cropping

6.1.7 **Overall vegetation surrounding and at the site**
(Adapted from FAO, 2006).
10. Herbaceous
11. Grassland
12. Forbland
20. Closed forest (continuous tree layer, crowns overlapping, large number of tree and shrub species in distinct layers)
30. Woodland (continuous tree layer, crowns usually not touching, understory may be present)
40. Scrubland
50. Dwarf shrubs
99. Other (specify in descriptor 6.2 **Remarks**)

6.1.8 **Soil drainage**
(Adapted from FAO, 2006).
3. Poorly drained
5. Moderately drained
7. Well drained
6.1.9 Soil matrix colour
(Adapted from FAO, 2006).
The colour of the soil matrix material in the root zone around the accession is recorded in moist condition (or both dry and moist condition, if possible) using the notation for hue, value and chroma as given in the Munsell Soil Color Charts (Munsell, 1975). If there is no dominant soil matrix colour, the horizon is described as mottled and two or more colours are given and should be registered under uniform conditions. Early morning and late evening readings are not accurate. Provide depth of measurement (cm). If colour chart is not available, the following states may be used:

1  White  7  Reddish brown  13  Greyish
2  Red    8  Yellowish brown 14  Blue
3  Reddish 9  Yellow          15  Bluish-black
4  Yellowish red 10  Reddish yellow 16  Black
5  Brown  11  Greenish, green
6  Brownish 12  Grey

6.1.10 Soil texture classes
(Adapted from FAO, 2006). For convenience in determining the texture classes of the following list, particle size classes are given for each of the fine earth fractions listed below. See Fig. 2.

1  Clay
2  Loam
3  Clay loam
4  Silt
5  Silt clay
6  Silt clay loam
7  Silt loam
8  Sandy clay
9  Sandy clay loam
10 Sandy loam
   10.1 Fine sandy loam
   10.2 Coarse sandy loam
11 Loamy sand
   11.1 Loamy very fine sand
   11.2 Loamy fine sand
   11.3 Loamy coarse sand
12 Sand (unspecified)
   12.1 Very fine sand
   12.2 Fine sand
   12.3 Medium sand
   12.4 Coarse sand
6.1.11 Soil organic matter content
1 Nil (as in arid zones)
2 Low (as in long-term cultivation in a tropical setting)
3 Medium (as in recently cultivated but not yet much depleted)
4 High (as in never cultivated, and in recently cleared forest)
5 Peaty

6.1.12 Water availability
1 Rain-fed
2 Irrigated
3 Flooded
4 River banks
5 Sea coast
99 Other (specify in appropriate descriptor 6.2 Remarks)

6.1.13 Soil fertility
General assessment of the soil fertility based on existing vegetation.
3 Low
5 Moderate
7 High

Fig. 2. Soil texture classes (adapted from FAO, 2006)
6.1.14 Climate of the site
It should be assessed as close to the site as possible.

6.1.14.1 Temperature [°C]
Provide either the monthly or the annual mean.

6.1.14.1.1 Number of recorded years

6.1.14.2 Duration of the dry season [d]

6.1.14.3 Rainfall [mm]
Provide either the monthly or the annual mean (state number of recorded years).

6.1.14.3.1 Number of recorded years

6.2 Remarks
Provide here any additional information related to the site (i.e. if data collected refers to collecting or to characterization/evaluation sites).
CHARACTERIZATION

7. **Plant descriptors**
Corms of uniform size and able to flower must be used and the initial corm size (length and width) should be recorded. For all colour descriptors the use of the Royal Horticultural Society (RHS) Colour Chart codes is recommended. If these are not available, the colour codes as suggested throughout the text can be used.

**List of minimum highly discriminating descriptors**

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1.1</td>
<td>Corm tunic (coat) texture and aspect</td>
</tr>
<tr>
<td>7.2.1</td>
<td>Presence of leaves at flowering</td>
</tr>
<tr>
<td>7.2.6</td>
<td>Leaf cross-sectional shape</td>
</tr>
<tr>
<td>7.4.2</td>
<td>Comparison of size between the inner and outer tepals whorls</td>
</tr>
<tr>
<td>7.4.3</td>
<td>Tepal shape (Inner and outer tepals)</td>
</tr>
<tr>
<td>7.4.7/8</td>
<td>Background colour of inner/outer tepals (Inner and outer surface)</td>
</tr>
<tr>
<td>7.4.11/12</td>
<td>Mottled pattern in inner and outer tepals (outer surface)</td>
</tr>
<tr>
<td>7.4.13/14</td>
<td>Veining pattern of inner/outer tepals</td>
</tr>
<tr>
<td>7.4.15</td>
<td>Stripes or veins aspect of the inner and outer tepals</td>
</tr>
<tr>
<td>7.4.19/20</td>
<td>Presence of blotches different from the rest of flower on inner/outer tepals</td>
</tr>
<tr>
<td>7.4.21/22</td>
<td>Colour of the blotches of the inner/outer tepals</td>
</tr>
<tr>
<td>7.4.24</td>
<td>Outer tepals length [mm]</td>
</tr>
<tr>
<td>7.4.29</td>
<td>Colour of the floral tube throat</td>
</tr>
<tr>
<td>7.4.36</td>
<td>Anther colour before dehiscence</td>
</tr>
<tr>
<td>7.4.37</td>
<td>Style branching</td>
</tr>
<tr>
<td>7.4.38</td>
<td>Style colour</td>
</tr>
<tr>
<td>7.4.40</td>
<td>Style dry weight [mg DW]</td>
</tr>
<tr>
<td>7.5.7</td>
<td>Seed shape</td>
</tr>
<tr>
<td>7.5.14</td>
<td>Seed surface colour</td>
</tr>
<tr>
<td>7.5.15</td>
<td>Development of caruncle</td>
</tr>
</tbody>
</table>

---

Minimum key descriptors are highlighted.
7.1 Corms and roots

7.1.1 Corm tunic (coat) texture and aspect
Observed after corm harvest. See Fig.3.

1 Smooth and splitting into acute teeth at base
2 Membranous or papery thin
3 Papery or tough and smooth splitting at the base and forming basal rings
4 Wholly parallel-fibrous
5 Membranous with parallel fibres those sometimes are less conspicuous towards the apex
6 Finely reticulate (like a fish net) fibres
7 Coarsely reticulate (netted) fibres
8 Interwoven fibres
9 Tunic fibrous with parallel fibres but slightly reticulated at the apex of the corm
10 Papery and splitting into longitudinally parallel strips
99 Other (specify in descriptor 7.6 Remarks)

7.1.2 Corm tunic colour
Observed on the external coat of tunics of less than one-year-old. If possible, use the RHS Colour Chart codes. If these are not available, use the following colour codes:

1 Yellow
2 Tan
3 Brown
4 Dark brown
99 Other (specify in descriptor 7.6 Remarks)
30 Crocus spp.

7.1.3 Corm tunic persistence
0 No [outermost tunics rapidly rot away (common in species from damp habitats)]
1 Yes [great build-up of old tunics (common in species from dry regions)]

7.1.4 Shape of naked corms
Recorded on corms able to flower, without the old corm tunics. See Fig. 4
1 Flattened
2 Subglobose
3 Ovoid
4 Flattened-globose
5 Elongated-ovoid
99 Other (specify in descriptor 7.6 Remarks)

Fig. 3. Corm tunic (coat) texture and aspect
7.1.5 **Corm length** [cm]
Recorded from the corm base up to the apex.

7.1.6 **Corm width** [cm]
Recorded at the widest point.

7.1.7 **Presence of stolon forming corms**
0 Absent
1 Present

7.1.8 **Root branching**
0 Absent (unbranched)
1 Present (branched)

7.2 **Leaves**

7.2.1 **Presence of leaves at flowering**
0 Absent
1 Present

7.2.2 **Leaf length** [cm]
(Young and adult). Measured from the soil level up to the apex at flowering. Average of 10 longest leaves taken from different plants.

7.2.3 **Adult leaf length** [cm]
Measured from the soil level up to the apex when flowering has finished. Average of 10 longest leaves taken from different plants.

7.2.4 **Leaf lamina thickness** [mm]
Measured at the middle of the leaf. Average of 20 fully developed leaves taken from 10 different plants.
**7.2.5 Foliage colour**

1. Light green
2. Green
3. Dark-green
4. Grey-green
5. Bluish-green
99. Other (specify in descriptor 7.6 Remarks)

**7.2.6 Leaf cross-sectional shape**

See Fig. 5.

1. T-shaped
2. Semi-cylindrical
3. Squared outline

![Fig. 5. Leaf cross-sectional shape](image)

**7.2.7 Ratio of leaf keel/lamina width**

See Fig. 6.

1. Same size
2. Lamina wider than the leaf keel but less than twice
3. Lamina at least two times wider than leaf keel

![Fig. 6. Ratio of leaf keel/lamina width](image)
7.2.8 Number of ridges or ribs in the grooves of leaf abaxial side
See Fig. 7.

Fig. 7. Number of ridges or ribs in the grooves of leaf abaxial side

7.2.9 Location of the hairs on the leaf
0 Absent
1 Adaxial
2 Abaxial
3 Both sides

7.2.10 Presence of a white or pale stripe in the leaf centre
0 Absent
1 Present

7.2.11 Ratio of white stripe (a) to total leaf lamina width (b): a/b

7.3 Flowering sprouts

7.3.1 Number of cataphylls
(Sheathing leaves)

7.3.2 Cataphylls colour
1 White
2 Greenish
3 Brownish
99 Other (specify in descriptor 7.6 Remarks)

7.3.3 Presence of a prophyl subtending the scape
0 No
1 Yes

7.3.4 Bract visibility
0 No (not clearly visible)
1 Yes (clearly visible above ground)
7.3.5 **Bract texture**
1 Tender
2 Rigid

7.3.6 **Bract colour**
1 White
2 Greenish
3 Brownish
99 Other (specify in descriptor 7.6 Remarks)

7.3.7 **Bracteole texture**
1 Tender
2 Rigid

7.3.8 **Bracteole colour**
1 White
2 Greenish
3 Brownish
99 Other (specify in descriptor 7.6 Remarks)

7.3.9 **Size of the bracteole relative to the bract**
1 Same size
2 Smaller

7.4 **Flower**

7.4.1 **Perianth tube length** [mm]
Measured from the base of tepals to the top of ovary.

7.4.2 **Comparison of size between the inner and outer tepal whorls**
1 Similar
2 Different

7.4.3 **Tepal shape**
Specify if inner or outer tepal shape. See Fig. 8.
1 Linear
2 Elliptic
3 Oblanceolate
4 Obovate
99 Other (specify in descriptor 7.6 Remarks)
7.4.4 Tepal apex shape
Specify if inner or outer tepal. See Fig. 9.
1  Acute
2  Acuminate
3  Obtuse
4  Rounded
5  Mucronate
6  Emarginate
99  Other (specify in descriptor 7.6 Remarks)
7.4.5  **Uniformity of colour pattern of tepals** (inner surface)
Discarding the presence of veins, tiny dots or blotches. Specify if inner or outer tepals
   0  No
   1  Yes

7.4.6  **Uniformity of colour pattern of tepals** (outer surface)
Discarding the presence of veins, tiny dots or blotches. Specify if inner or outer tepals.
   0  No
   1  Yes

7.4.7  **Background colour of inner tepals**
If coloured pattern is uniform. Specify if inner or outer surface.
   1  White
   2  Cream
   3  Yellow
   4  Light violet
   5  Violet
   6  Dark violet
   7  Purplish
   99  Other (specify in descriptor 7.6 Remarks)

7.4.8  **Background colour of outer tepals**
If coloured pattern is uniform. Specify if inner or outer surface.
   1  White
   2  Cream
   3  Yellow
   4  Light violet
   5  Violet
   6  Dark violet
   7  Purplish
   99  Other (specify in descriptor 7.6 Remarks)

7.4.9  **Colour gradation of inner tepals**
Observe the apical to basal part along the segment. Specify if inner or outer surface.
   0  Absent
   1  Violet-cream
   2  Violet-white
   3  Purple-violet
   4  Dark purple-light purple
   99  Other (e.g. ‘Blackish’ specify in descriptor 7.6 Remarks)
7.4.10  **Colour gradation of outer tepals**
Observe the apical to basal part along the segment. Specify if inner or outer surface.

0  Absent
1  Violet-cream
2  Violet-white
3  Purple-violet
4  Dark purple-light purple
99  Other (specify in descriptor 7.6 Remarks)

7.4.11  **Mottled pattern of inner tepals** (outer surface)

0  Absent
1  Uniformly mottled
2  No uniformly mottled

7.4.12  **Mottled pattern of outer tepals** (outer surface)

0  Absent
1  Uniformly mottled
2  No uniformly mottled

7.4.13  **Veining pattern of inner tepals**
Specify if inner or outer surface.

0  Absent
1  Uniformly veined
2  Only the main veins are marked
3  More marked at the base of the segments
4  Discontinuous veining
99  Other (specify in descriptor 7.6 Remarks)

7.4.14  **Veining pattern of outer tepals**
Specify if inner or outer surface.

0  Absent
1  Uniformly veined
2  Only the main veins are marked
3  More marked at the base of the segments
4  Discontinuous veining
99  Other (specify in descriptor 7.6 Remarks)
### 7.4.15 Stripes or veins aspect of the inner and outer tepals

Specify if inner or outer tepals.

1. Slightly defined
2. Clearly defined
3. “Feathering” (Similar to a feather aspect)
4. “Feathering” and the colour of the main veins merges to give a large blotch of different colour
99. Other (specify in descriptor 7.6 Remarks)

### 7.4.16 Colour of stripes or veins of the inner tepals

Specify if inner or outer surface.

1. Violet
2. Purplish
3. Green
4. Blue
99. Other (specify in descriptor 7.6 Remarks)

### 7.4.17 Colour of stripes or veins of the outer tepals

Specify if inner or outer surface.

1. Violet
2. Purplish
3. Green
4. Blue
99. Other (specify in descriptor 7.6 Remarks)

### 7.4.18 Stripes of external tepals along the perianth tube

0. Absent
1. Present

### 7.4.19 Presence of blotches different from the rest of the flower on the inner tepals

Specify if inner or outer surface.

0. Without blotches
1. Blotches at the base of the segment
2. Blotches at the base of the segment continues down to the throat
3. Irregular pattern of blotches
99. Other (specify in descriptor 7.6 Remarks)
### 7.4.20 Presence of blotches different from the rest of the flower on the outer tepals
Specify if inner or outer surface.
- 0 Without blotches
- 1 Blotches at the base of the segment
- 2 Blotches at the base of the segment continues down to the throat
- 3 Irregular pattern of blotches
- 99 Other (specify in descriptor 7.6 Remarks)

### 7.4.21 Colour of the blotches of the inner tepals
Specify if inner or outer surface.
- 0 Without patches
- 1 White
- 2 Cream
- 3 Yellow
- 4 Violet
- 5 Dark violet
- 6 Purplish
- 7 Bronze
- 8 Orange
- 99 Other (specify in descriptor 7.6 Remarks)

### 7.4.22 Colour of the blotches of the outer tepals
Specify if inner or outer surface.
- 0 Without patches
- 1 White
- 2 Cream
- 3 Yellow
- 4 Violet
- 5 Dark violet
- 6 Purplish
- 7 Bronze
- 8 Orange
- 99 Other (specify in descriptor 7.6 Remarks)

### 7.4.23 Blotches of outer tepals along the perianth tube
- 0 Absent
- 1 Present
7.4.24 **Outer tepals length** [mm]
Average length of 10 tepals taken from 10 flowers.

7.4.25 **Outer tepals width** [mm]
Average width of 10 tepals taken from 10 flowers.

7.4.26 **Inner tepals length** [mm]
Average length of 10 tepals taken from 10 flowers.

7.4.27 **Inner tepals width** [mm]
Average width of 10 tepals taken from 10 flowers.

7.4.28 **Colour of the floral tube apex**
1. White-cream
2. Violet-purplish
3. Mottled with violet tiny dots
4. Mottled with purplish tiny dots
5. Yellow
6. Blue
99. Other (specify in descriptor 7.6 Remarks)

7.4.29 **Colour of the floral tube throat**
1. White-cream
2. Yellow
3. With a ring of yellow blotches
4. With a purple ring
5. Orange
6. Violet
99. Other (specify in descriptor 7.6 Remarks)

7.4.30 **Pubescence of the floral tube throat**
1. Glabrous
2. Pubescent (with a ring of hairs at about the point of attachment of the filaments)
### 7.4.31 Stamen filament colour
1. White
2. Light yellow
3. Orange yellow
4. Orange
5. Violet
6. Purplish
7. With black stain at the base
8. White or cream with dark tiny dots near of the anther
9. Other (specify in descriptor 7.6 Remarks)

### 7.4.32 Stamen filament surface
1. Glabrous
2. Pubescent
3. Strongly pubescent
4. Papillose

### 7.4.33 Stamen filament length [mm]
Average length of 10 filaments from 10 flowers.

### 7.4.34 Anther length [mm]
Average length of 10 anthers from 10 flowers before dehiscence.

### 7.4.35 Form of anther tip
1. Separated
2. Continuous

### 7.4.36 Anther colour before dehiscence
1. Yellow
2. White
3. Blackish-maroon
9. Other (specify in descriptor 7.6 Remarks)

### 7.4.37 Style branching
0. Non visible branching
1. Three-branches
2. Four branches
3. Six-branches
4. > 6 branches (multifid)
9. Other (specify in descriptor 7.6 Remarks)
7.4.38 **Style colour**

<table>
<thead>
<tr>
<th>No.</th>
<th>Colour Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Whitish</td>
</tr>
<tr>
<td>2</td>
<td>Yellow</td>
</tr>
<tr>
<td>3</td>
<td>Orange</td>
</tr>
<tr>
<td>4</td>
<td>Red</td>
</tr>
<tr>
<td>5</td>
<td>White with tiny purplish dots</td>
</tr>
<tr>
<td>6</td>
<td>Orange with darker tiny dots</td>
</tr>
<tr>
<td>7</td>
<td>Red with darker tiny dots</td>
</tr>
<tr>
<td>99</td>
<td>Other (specify in descriptor 7.6 Remarks)</td>
</tr>
</tbody>
</table>

7.4.39 **Style length [mm]**

Average style length observed at 1 cm from the throat of 10 flowers.

7.4.40 **Style dry weight [mg DW]**

Average weight of styles from 10 flowers.

7.5 **Capsules and seeds**

7.5.1 **Seed fertility**

<table>
<thead>
<tr>
<th>No.</th>
<th>Seed Fertility</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

7.5.2 **Capsules elevation above ground [cm]**

After fruit development, observe 10 capsules from 10 plants.

<table>
<thead>
<tr>
<th>No.</th>
<th>Capsule Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>At ground level</td>
</tr>
<tr>
<td>2</td>
<td>&lt;2cm elevation</td>
</tr>
<tr>
<td>3</td>
<td>&gt;2cm elevation</td>
</tr>
</tbody>
</table>

7.5.3 **Capsule shape**

See Fig. 10.

<table>
<thead>
<tr>
<th>No.</th>
<th>Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oblong</td>
</tr>
<tr>
<td>2</td>
<td>Ellipsoid</td>
</tr>
<tr>
<td>3</td>
<td>Fusiform</td>
</tr>
</tbody>
</table>

Fig. 10. Capsule shape
7.5.4 Capsule length [mm]  
Average length of 10 capsules from 10 plants.

7.5.5 Capsule width [mm]  
Average width of 10 capsules from 10 plants at the widest point.

7.5.6 Capsule colour  
1  Green  
2  Green with purplish stripes  
3  Green with greenish stripes  
4  Purple with purplish stripes  
99  Other (specify in descriptor 7.6 Remarks)

7.5.7 Seed shape  
See Fig. 11.  
1  Globose  
2  Subglobose  
3  Ellipsoid  
99  Other (specify in descriptor 7.6 Remarks)

Fig. 11. Seed shape

7.5.8 Seed length [mm]  
Average length of 50 seeds taken from 10 plants.

7.5.9 Seed width [mm]  
Measured at the widest part. Average width of 50 seeds taken from 10 plants.

7.5.10 50-seed weight [mg]  
Average seed weight taken from 10 different plants.

7.5.11 Number of seeds per fruit  
Average number of 10 capsules from 10 plants.
### Crocus spp.

<table>
<thead>
<tr>
<th>7.5.12</th>
<th>Seed surface aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Glossy</td>
</tr>
<tr>
<td>2</td>
<td>Dull</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.5.13</th>
<th>Seed surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Smooth</td>
</tr>
<tr>
<td>2</td>
<td>Slightly wrinkled</td>
</tr>
<tr>
<td>3</td>
<td>Wrinkled</td>
</tr>
<tr>
<td>4</td>
<td>Sharply wrinkled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.5.14</th>
<th>Seed surface colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reddish-brown</td>
</tr>
<tr>
<td>2</td>
<td>Deep red-brown</td>
</tr>
<tr>
<td>3</td>
<td>Pale brown</td>
</tr>
<tr>
<td>4</td>
<td>Brown</td>
</tr>
<tr>
<td>5</td>
<td>Deep brown</td>
</tr>
<tr>
<td>99</td>
<td>Other (specify in descriptor 7.6 Remarks)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.5.15</th>
<th>Development of caruncle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indistinct</td>
</tr>
<tr>
<td>2</td>
<td>Poorly developed</td>
</tr>
<tr>
<td>3</td>
<td>Prominent</td>
</tr>
<tr>
<td>4</td>
<td>Very prominent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.5.16</th>
<th>Degree of development of raphe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indistinct</td>
</tr>
<tr>
<td>2</td>
<td>Poorly developed</td>
</tr>
<tr>
<td>3</td>
<td>Prominent</td>
</tr>
<tr>
<td>4</td>
<td>Wing-like</td>
</tr>
</tbody>
</table>

### Remarks

Specify here any additional information.
EVALUATION

Corms of uniform size, free from pest and diseases and planted 10-15 cm deep in the soil must be used. The initial corm size and weight has to be recorded.

For some characters, a comparison with a control cultivar or commercial variety should be done. The control genotype and test accession should be sown at the same time and if possible, should have the same corm size. For the evaluation of wild *Crocus*, autumn and spring flowering commercial varieties could be used. For the evaluation of saffron, because there are not commercial varieties, the BCU001584 accession from the CROCUSBANK collection could be used.

8. Plant descriptors

8.1 Number of days to 50% of seed germination [d]
Relative to a control genotype. This depends on temperature and light and postharvest time and conditions should be recorded during the trials. The control genotype and test accession should be sown at the same time. The commencement of germination should be recorded for the test relative to the standard. The data to be presented as (-3), i.e. three days earlier or (+2), two days later than the control.

8.2 Requirements for breaking of dormancy
0 No requirements (seeds do not require cold stratification or after-ripening treatments to germinate)
1 Seeds require a period of moist cold (cold stratification) before they germinate
2 Seeds require a period of dry storage at room temperature (after-ripening) before they germinate

8.3 Optimum temperature for seed germination
1 <10°C
2 10-15°C
3 15-20°C
4 >20°C

8.4 Requirements of light for seed germination
0 No (seeds do not require light to germinate)
1 Yes (seeds require light to germinate)

8.5 Weight of corms [g FW]
Average weight of 10 corms formed from a seedling.
8.6 Minimum weight of corms [g FW]
Minimum average weight of 10 corms able to flower.

8.7 Number of days from sprouting to leaf senescence [d]
Average number of days observed on 10 plants.

8.8 Season of sprouting

1  Spring  
2  Summer  
3  Autumn  
4  Winter  

Descriptors 8.9 and 8.10 are relative to a control cultivar. The control cultivar and test accession should be sown at the same time. The commencement of sprouting/flowering should be recorded for the test relative to the standard. The data to be presented as (-3), i.e. three days earlier or (+2), two days later than the control.

8.9 Number of days from sowing to 50% sprouting [d]

8.10 Number of days from sowing to 50% flowering [d]

8.11 Season of flowering

1  Spring  
2  Summer  
3  Autumn  
4  Winter  

8.12 Number of days from flowering until flower senescence [d]
(Only for ornamental species). Average number of days observed on 10 flowers of 10 plants.

8.13 Number of days from flowering until capsule emergence [d]
Average number of days observed on 10 flowers of 10 plants.

8.14 Number of days from capsule emergence until fruit ripening [d]
Average number of days from capsule appearance until the opening of the valves. Observed on 10 capsules of 10 plants.
Corm, flower and leaf production
Corms of uniform size, able to flower and coming from the main sprouts of corms flowered in previous year must be used. A control genotype and the test accession should be planted at the same time. All the material should be cultivated in uniform conditions the year before testing. Traits for the test and the standard should be recorded.

8.15 **Number of buds per corm**
Average number of 10 corms.

8.16 **Number of sprouted buds per corm**
Average number of 10 corms.

8.17 **Number of leaves per corm**
Average number of 10 corms.

8.18 **Number of leaves in the main sprout**
Average number of 10 corms. (If there are more than one sprout, record the one with the highest number of leaves).

8.19 **Diameter of the replacement corms [mm]**
Average diameter of replacement corms of 10 initial mother corms after one crop cycle.

8.20 **Length of the replacement corms [mm]**
Average length of replacement corms of 10 initial mother corms after one crop cycle.

8.21 **Number of replacement corms per mother corm**
Average number of replacement corms from 10 initial mother corms after one crop cycle.

8.22 **Weight of the replacement corms [g]**
Average weight of replacement corms of 10 initial mother corms after one crop cycle.

8.23 **Number of flowering buds per corm**
Average number of 10 corms.

8.24 **Number of flowers per corm**
Average number of 10 corms.
8.25 Biochemical characteristics

8.25.1 Colouring strength of stigmas [DW]

\[ \text{E}_{1\%_{1cm}} \text{ at } 440 \text{ nm on dry basis, according to ISO 3632-2}. \] Fresh stigmata should be dried at 35°C during 24h

\[ \text{E}_{1\%_{1cm}} = \frac{D \times 10000}{m} \left[ 100 - H \right] \]

\( D: \) the absorbance value

\( m: \) the mass of the test portion [g]

\( H: \) the moisture and volatile content of the sample [% w/w]

8.25.2 Apocarotenoid analysis by HPLC-DAD

- **Plant Material:** Fresh stigmata dried at 35°C for 24h
- **Extraction of apocarotenoids:** Methanol-water (50:50, v/v) mixture instead of water should be used as the extraction solvent prior to HPLC-DAD analysis according to Kyriakoudi et al. (2012)
- **Chromatographic examination:** Analysis of crocins, picrocrocin and safranal in the methanol-water extracts of *C. sativus* L. and other *Crocus* species should be carried out using the protocol of Tarantilis et al. (1995) with slight modifications: test metabolites were separated on a LiChroCART Superspher 100 RP-18 (125 x 4 mm i.d, 4 μm) end-capped column (Merck, KGaA, Darmstadt, Germany) after injection of a 20 μL aliquot and gradient elution with a mixture of water-acetic acid 1%, v/v, (A) -acetonitrile (B) (20 to 100% B in 20 min) at a flow rate of 0.5 mL/min.

8.25.2.1 Trans-4-GG-crocetin ester content [% DW]

By RP-HPLC-DAD, monitor at 440 nm (crocins). Quantification of the percentage of trans-4-GG crocetin ester content should be made using the equation described by Sanchez et al. (2008):

\[ A \times \left( \frac{E_{1\%_{440}}}{\varepsilon_{t,c}} \right) \times \frac{\text{MW}}{10} \]

Where:

\( A: \) the percentage peak area of the trans-4-GG-crocetin ester at 440 nm

\( E_{1\%_{440}}: \) colouring strength value

\( \varepsilon_{t,c}: \) molar coefficient absorbance value (89000 for trans crocins)

\( \text{MW:} \) molecular weight of the trans-4GG-crocetin ester (976.96 g mol-1)

8.25.2.2 Picrocrocin content [% DW]

Estimated using a five-point calibration curve of isolated picrocrocin in water at 250 nm (RP-HPLC-DAD at 250 nm). Isolation of picrocrocin can be made according to the protocol of Sanchez et al. (2008).

8.26 Inflorescence fragrance in the morning

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Absent</td>
</tr>
<tr>
<td>1</td>
<td>Light</td>
</tr>
<tr>
<td>2</td>
<td>Medium</td>
</tr>
<tr>
<td>3</td>
<td>Strong</td>
</tr>
</tbody>
</table>
8.27 Inflorescence fragrance in the evening
   0 Absent
   1 Light
   2 Medium
   3 Strong

8.28 Remarks
Specify here any additional information.

9. Abiotic stress susceptibility
Scored under artificial and/or natural conditions, which should be clearly specified. These are coded on a susceptibility scale from 1 to 9, viz.:
   1 Very low or no visible sign of susceptibility
   3 Low
   5 Intermediate
   7 High
   9 Very high

9.1 Reaction to low temperature

9.2 Reaction to high temperature

9.3 Reaction to drought

9.4 Reaction to high soil moisture

9.5 Reaction to soil salinity
Specify water conductivity (dS·m⁻¹) and main salt involved (NaCl, Na₂CO₃, CaCl₂, etc.).

9.6 Reaction to soil acidity
Specify soil pH.

9.7 Reaction to soil alkalinity
Specify soil pH.

9.8 Remarks
Specify any additional information here.
10. **Biotic stress susceptibility**
In each case, it is important to state the origin of the infestation or infection, i.e. natural, field inoculation, laboratory. Record such information in descriptor **10.6 Remarks**. These are coded on a susceptibility scale from 1 to 9, viz:

1. Very low or no visible signs of susceptibility
2. Low
3. Intermediate
4. High
5. Very high

The organisms considered most important by breeders and pathologists are indicated by asterisks (*) and **boldface**.

### 10.1 Arthropods

<table>
<thead>
<tr>
<th>Causal Organism</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1.1 <em>Rhizoglyphus robini</em></td>
<td>Saffron bulb mite</td>
</tr>
<tr>
<td>10.1.2 <em>Thrips tabaci</em></td>
<td>Corm thrips</td>
</tr>
<tr>
<td>10.1.3 <em>Mylabris macilenta</em></td>
<td>Blister beetle</td>
</tr>
</tbody>
</table>

### 10.2 Nematodes

<table>
<thead>
<tr>
<th>Causal Organism</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.2.1 <em>Ditylenchus dipsaci</em></td>
<td>Stem and bulb nematode</td>
</tr>
</tbody>
</table>

### 10.3 Fungi

<table>
<thead>
<tr>
<th>Causal Organism</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.3.1 <strong>Fusarium oxysporum f.sp gladioli</strong></td>
<td>Basal rot</td>
</tr>
<tr>
<td>10.3.2 <em>Fusarium verticillioides</em></td>
<td>Corm rot</td>
</tr>
<tr>
<td>(=<em>Fusarium moniliforme</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Fusarium solani</em></td>
<td></td>
</tr>
<tr>
<td>10.3.3 <em>Rhizoctonia violacea</em></td>
<td>Violet root rot</td>
</tr>
<tr>
<td>10.3.4 <em>Penicillium cyclopium</em></td>
<td></td>
</tr>
<tr>
<td><em>Penicillium gladioli</em></td>
<td></td>
</tr>
<tr>
<td><em>Penicillium hirsutum</em></td>
<td></td>
</tr>
<tr>
<td>(=<em>Penicillium corymbiferum</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Penicillium crocicola</em></td>
<td></td>
</tr>
<tr>
<td>10.3.5 <em>Phoma crocophyla</em></td>
<td></td>
</tr>
<tr>
<td>10.3.6 <em>Macrophomina phaseolina</em></td>
<td></td>
</tr>
<tr>
<td>10.3.7 <em>Sclerotinia bulborum</em></td>
<td></td>
</tr>
<tr>
<td>10.3.8 <em>Pythium sp.</em></td>
<td></td>
</tr>
</tbody>
</table>
10.4 Bacteria
10.4.1 *Erwinia carotovora*
10.4.2 *Burkholderia gladioli*

10.5 Virus
10.5.1 Bean yellow mosaic virus (BYMV)
10.5.2 Narcissus mosaic virus (NMV)
10.5.3 Cucumber mosaic cucumovirus (CMV)
10.5.4 Turnip mosaic virus (TuMV)
10.5.5 Narcissus mosaic virus (NMV)
10.5.6 Iris mild mosaic virus (IMMV)
10.5.7 Iris severe mosaic virus (ISMV)
10.5.8 Tobacco necrosis virus (TNV)
10.5.9 Tobacco rattle virus (TRV)
10.5.10 Arabis mosaic virus (ArMV)

10.6 Remarks
Specify any additional information here.

11. Metabolic based markers

11.1 **Anthocyanin content of perianth segments** [relative %]
Content on the malonated anthocyanins. Identification of anthocyanins and data processing should be carried out according to Norbaek et al. (2002). The descriptor should indicate the relative percentages of each anthocyanin as +++ correspond to >55%; ++ correspond to >30%; + correspond to >10% and ± correspond to <5%.

11.1.1 A1 Delphinidin 3,7-di-O-β-glucoside
11.1.2 A2 Petunidin 3,7-di-O-β-glucoside
11.1.3 A3 Delphinidin 3,5-di-O-β-glucoside
11.1.4 A4 Petunidin 3,5-di-O-β-glucoside
11.1.5 A5 Delphinidin 3-O-β-rutinoside
11.1.6 A6 Petunidin 3-O-β-rutinoside
11.1.7 A7 Delphinidin 3-O-β-glucoside-5-O-β-(6-O-malonyl) glucoside
11.1.8 A8 Petunidin 3,7-di-O-β-(6-O-malonyl) glucoside
11.1.9 A9 Malvidin 3,7-di-O-β-(6-O-malonyl) glucoside
11.2  **Flavonoid content of perianth segments** [relative %]
Identification of flavonoids and data processing should be carried out according to Norbaek et al. (2002). The descriptor should indicate the relative percentage of each flavonoid as +++ correspond to >55%; ++ correspond to >30%; + correspond to >10% and ± correspond to <5%.

11.2.1  F10  Dihydrokaempferol 7-0-β-glucoside
11.2.2  F11  Myricetin 3-O-α-(2-O-β-glucosyl)- rhamnoside-7-0-β-glucoside
11.2.3  F12  Quercetin 3-O- α-(2-O-β-glucosyl)- rhamnoside-7-0-β-glucoside
11.2.4  F13  Kaempferol 3-O- α-(2-O-β-glucosyl)- rhamnoside-7-0-β-glucoside
11.2.5  F14  Quercetin 3-O-β-sophoroside
11.2.6  F15  Quercetin 3,4′-di-O-β-glucoside
11.2.7  F16  Kaempferol 3,4′-di-O-β-glucoside
11.2.8  F17  Isorhamnetin 3,4′-di-O-β-glucoside
11.2.9  F18  Kaempferol 3-O-β-sophoroside
11.2.10 F19  Kaempferol 3-O-β-(2-O-α-rhamnosyl)- glucoside
11.2.11 F20  Isorhamnetin 3-O-β-(2-O-α-rhamnosyl)- glucoside
11.2.12 F21  Kaempferol 3-O- α-(2-O-β-glucosyl)- rhamnoside-7-0-β-(6-O-malonyl) glucoside
11.2.13 F22  Kaempferol 3-O- α-(2,3-di-O-β-glucosyl) rhamnoside
11.2.14 F23  Kaempferol 3-O- α-(2-O-β-glucosyl) rhamnoside-7-0-β-(6-O-acetyl) glucoside
11.2.15 F24  Apigenin 7-O-β-glucoside
11.2.16 F25  Kaempferol 3-O- α-(2-O-β-glucosyl)- rhamnoside
11.2.17 F26  Quercetin 3-O-β-glucosidea
11.2.18 F27  Kaempferol 3-O-β-glucoside

11.3  **Volatile compounds content of Crocus styles** [relative%]
Isolation of volatile compounds should be carried out according to Kanakis et al. (2004). Volatile constituents can be tentatively identified and quantified by comparing their elution order and mass spectra with data from the NBS75K mass spectral library and published data (Zarghami and Heinz, 1971; Rödel and Petrzika, 1991; Tarantilis and Polissiou, 1997; Adams, 2001; Kanakis et al., 2004). The descriptor should indicate the relative percentage of each volatile compound.

11.3.1  V1  Isophorone
11.3.2  V2  4- ketoisophorone
11.3.3  V3  2,2,6-trimethyl-1,4-cyclohexanedione
11.3.4  V4  Safranal
11.3.5  V5  Isomer of 4-hydroxy-3,5,5-trimethyl-2-cyclohexen-1-one
11.3.6  V6  4-hydroxy-2,6,6-trimethyl-3-oxocyclohexa- 1,4-diene-1-carboxaldehyde
11.3.7  V7  HTCC
11.4 FT-IR spectra profile of intact stigmas [cm$^{-1}$]
Or of an extract of pure crocins in the spectral region 2000-800. Samples preparation and measurements should be made according to Tarantilis et al. (1998)

- 0 Absence (band at 1708 cm$^{-1}$ and band at 1233 cm$^{-1}$)
- 1 Weak presence (band at 1708 cm$^{-1}$ and band at 1233 cm$^{-1}$)
- 2 Strong presence (band at 1708 cm$^{-1}$ and band at 1233 cm$^{-1}$)

11.5 RAMAN spectra profile of intact stigmas of C. sativus L. and allies
In the spectral region 1800-800 cm$^{-1}$. Samples preparation and measurements should be made according to Anastasaki et al. (2010).

- 0 No Raman spectrum
- 1 <6% crocetin esters
- 2 6 - 10 % crocetin esters
- 3 >10 % crocetin esters

12. Molecular markers

12.1 AFLP
Universal name: CsAFLP primer E-AAC/M-CTT
Canonical name: Xusca001
Marker of unknown function (X), developed by UCLM-Santaella (us), for Crocus (c), as AFLP marker (a).

13. Cytological markers

13.1 Chromosome number
13.2 Ploidy level
13.3 DNA content (C-value)
13.4 Meiosis chromosome associations
13.5 Number of satellite chromosomes
13.6 Number and position of 45S and 5S rDNA sites
13.7 Characterization of heterochromatin
13.8 Other cytological characters

14. Identified genes
Describe any known specific mutant present in the accession.
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Abdullaev, F I 2003. Saffron (Crocus sativus L.) and its possible role in the prevention of cancer. Recent Progress in Medicinal Plants 8:69-82.


Munsell Color 1975. Munsell Soil Color Chart. Munsell Color, Baltimore, MD, USA.


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Adriana Alercia supervised and coordinated the production and publication and provided scientific and technical expertise. Elena Fiorino contributed with the groundwork and formatting of the text. Pablo Gallo designed the cover and Ana Laura Cerutti prepared the layout. Scientific advice provided by Rosa V. Molina is gratefully acknowledged.

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Annex I. COLLECTING FORM for *Crocus* spp.

---

### SAMPLE IDENTIFICATION

**COLLECTING INSTITUTE CODE (2.1):**

**COLLECTING NUMBER (2.2):**

**PHOTOGRAPH No. (2.23):**

**HERBARIUM SPECIMEN (2.24):**

**COLLECTING DATE OF SAMPLE [YYYYMMDD] (2.3):**

**GENUS (1.6):**

**SPECIES (1.7):**

**SUBTAXON (1.8):**

**COMMON CROP NAME (1.10.3):**

---

### COLLECTING SITE LOCATION

**COUNTRY OF ORIGIN (2.5):**

**LOCATION (2.7):**

**km:**

**direction:**

**from:**

**LATITUDE (2.8/a):**

**LONGITUDE (2.9/a):**

**ELEVATION (2.13):**

**m asl**

---

**Additional notes:**

---

### COLLECTING SITE ENVIRONMENT

**COLLECTING/ACQUISITION SOURCE (2.14):**

10. Wild habitat
20. Farm or cultivated habitat
30. Market or shop
40. Institute, Experimental station, Research Org., Genebank
50. Seed company
60. Weedy, disturbed or ruderal habitat
99. Other (specify):

**HIGHER LEVEL LANDFORM (6.1.2):**

1. Plain
2. Basin
3. Valley
4. Plateau
5. Upland
6. Hill
7. Mountain:

**SLOPE [°] (6.1.4):**

**SLOPE ASPECT (6.1.5):**

(code N,S,E,W)

**SOIL TEXTURE CLASSES (6.1.16):**

Specify class (e.g. clay, silt, loamy sand)

**OVERALL VEGETATION SURROUNDING AND AT THE SITE (6.1.7):**

11. Grassland
12. Forbland
20. Closed forest
30. Woodland
40. Scrubland
50. Dwarf shrubs
99. Other (specify):

**SOIL DRAINAGE (6.1.8):**

3. Poorly drained
5. Moderately drained
7. Well drained

---

### SAMPLE

**BIOLOGICAL STATUS OF ACCESSION (2.15):**

100. Wild
200. Weedy
300. Traditional cultivar/landrace
400. Breeding/research material
500. Advanced/improved cultivar (conventional breeding)
600. GMO (by genetic engineering)
999. Other (specify):

**TYPE OF SAMPLE (2.17):**

1. Vegetative
2. Seed
99. Other (specify):

---

---
No. PLANTS SAMPLED (2.18):  No. SEEDS COLLECTED (2.19):

GENERAL APPEARANCE OF POPULATION (2.20):
3. Poor  5. Medium  7. Good

POPULATION ISOLATION (2.21) [km]

PREVAILING STRESSES (2.22.7):
Information on main associated biotic (pests and diseases) and abiotic (drought, salinity, temperature) stresses

ETHNOBOTANICAL DATA

LOCAL/VERNACULAR NAME (2.22.2):

ETHNIC GROUP (2.22.1):

HISTORY OF PLANT USE (2.22.3):
1. Ancestral/indigenous (always associated with the place and community)
2. Introduced (but in unknown distant past)  3. Introduced (time of introduction unknown)

PARTS OF THE PLANT USED (2.22.4):
1. Entire plant  3. Root or corm
2. Flower/inflorescence (calyx, corolla, style)  99. Other (specify):

PLANT USE (2.22.5):
99. Other (specify):

CULTURAL CHARACTERISTICS (2.22.6): Mention if there is any folklore (i.e., taboos, stories and/or superstitions)
0. No  1. Yes: specify in REMARKS (2.25)

CULTURAL PRACTICES (2.22.8):
Sowing date [YYYYMMDD] (2.22.8.1):

First harvest date [YYYYMMDD] (2.22.8.2):

Last harvest date [YYYYMMDD] (2.22.8.3):

MODE OF REPRODUCTION (2.22.10):

SEASONALITY (2.22.12):
1. Available only in season/at particular period  2. Available throughout the year

ASSOCIATED FLORA (2.22.11):
Other dominant crop/or allies species, including other Crocus species, found in and around the collecting site

REMARKS (2.25):