General protocols for using the
ECPGR descriptors for *Prunus* spp.

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Introduction

During the 8th meeting of the ECPGR *Prunus* Working Group (September 2010, Forlí, Italy), the need of harmonizing the descriptors and protocols in order to characterize and evaluate the accessions in the European *Prunus* collections was stressed. The Working Group recognized the importance of using standardized protocols and consensus descriptors to describe or measure each trait with a view of allowing an easier comparison of data from different collections.

A task force of *Prunus* experts was formed at the Forlì meeting with the mandate to develop a list of descriptors particularly useful for the evaluation and the characterization of *Prunus* collections and to develop species-specific protocols. It was decided to use, as far as possible, already published descriptors instead of developing new ones and, to do so, to refer to the most updated guidelines on descriptors adopted by the European *Prunus* Database (EPDB)[1], the International Union for the Protection of New Varieties of Plants (UPOV)[2] and the European Union Community Plant Variety Office (CPVO)[3] as the basis for the development of species-specific documents.

In the frame of plant genetic resources characterization and evaluation (C&E), encompassing a wide diversity of traits, it was considered strategic to establish wide and open assessment scales allowing a detailed description of traits. As a general rule, the group decided to establish, whenever applicable, 1-9 scales inclusive of intermediate classes (referenced in the descriptor tables as "X") and classes in which the trait is in its "extreme" expression, e.g. "Extremely early" or "Extremely late", meaning earlier or later than currently known.

According to a priority scale established by the *Prunus* WG for each species, the *First Priority characterization and evaluation Descriptors* (hereafter FPD) are those considered as the

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[1]   http://www.bordeaux.inra.fr/euprunusdb/index.html
[2]   http://www.upov.int/test_guidelines/en/
[3]   http://www.cpvo.europa.eu/main/en/home/technical-examinations/technical-protocols/tp-fruit-species

most useful, hence to be prioritized in the process of characterization of the accessions to be included in the EPDB.

In the second priority level, the identification of a second set of descriptors, named *Second Priority Descriptors*, was also deemed useful to supplement the FPD set with the aim of increasing completeness of the evaluation and/or characterization work. Whenever possible, it was decided to adopt the same FPDs across the different *Prunus* species.

The general guidelines endorsed by the *Prunus* WG are presented below.

General guidelines for phenotyping *Prunus* species

For the comparison of data throughout different collections and countries to be as reliable as possible, it is <u>recommended</u> to provide the most relevant information on the climate and soil characteristics at the genebank site (e.g. latitude and longitude; minimum, maximum and average monthly temperatures; total rainfall amount and distribution in the year; soil texture; pH; active limestone percentage, etc.).

Collection design

It is also recommended to describe briefly the collection design and routine management. Particularly useful would be information on:
- ✓ tree spacing and training system;
- ✓ number of trees/accessions evaluated;
- ✓ age of the trees evaluated;
- ✓ rootstock used;
- ✓ standard management practices as related to tree (e.g. pruning, thinning, phytosanitary treatments), soil (e.g. weeding, cultivation or permanent sod between rows) and water management.

Reference cultivars

Ideally, several reference cultivars, well known worldwide and especially by the evaluator, should be included in the collection and in the evaluation work, so as to help classifying each accession for as many descriptors as possible.

Phenology of flowering and harvesting

The monitoring of the flowering phenology should take into account the flower buds inserted on the most representative type of fertile wood of each *Prunus* species. In order to monitor accurately enough the timing of flowering, it is recommended to repeat the survey two to three times a week (e.g. Monday, Wednesday, Friday) from the flower bud swelling stage till the petal fall, to assign the correct stage.

- **Phenology of flowering**

Ideally, three dates should be recorded:
1. beginning of flowering (about 10% of the flowers have reached the open stage; BBCH 61[1]);
2. full flowering (about 50% of the flowers have reached the open stage; BBCH 65);
3. end of flowering (end of petal fall; BBCH 69).

It is important to record <u>at least</u> the date of beginning of flowering, as it is easier to detect and less susceptible to the evaluator's subjectivity.

- **Phenology of harvesting**

As in many *Prunus* species fruit ripening on the tree is scalar, it is recommended to record the harvest maturity date when some of the hanging fruits have first attained the eating maturity (BBCH 87 or 89, according to the species).

Practically,
- before encoding the phenological data in a database, all recorded dates should be converted in number of days from January 1st (e.g. in a non-leap year, March 15 = 74 days);
- the easiest way to classify the accessions into their relative group of flowering and/or harvesting time is to calculate the average flowering and harvesting times and to express them as "+ X" or "- X" where X = number of days departing from the value of the reference cultivar(s).

Fruit description

Heterogeneity is commonly observed among fruits of the same tree, at different sites and over the years even for traits such as shape, size, skin colour, soluble solids content, etc. It is therefore important to record data for a long enough period of time to capture the variability and calculate the average value for each trait. As a general rule, the assessment of the main morphological and qualitative traits should be carried out on samples of an adequate number of representative fruits, harvested as close as possible to their ready-to-eat stage. This is indeed the stage where fruit quality and organoleptic traits are expressed at their best.

Due to many variability factors, the evaluation/characterization of an accession can be considered as complete after a number of representative years of records. Three to six representative years are requested in order to classify the flowering and harvesting periods and the quality of the fruit of each genotype compared to the reference cultivars.

Years with severe spring frost or hail episodes significantly reducing flower and/or fruit load should not be considered as representative.

Assessment of fruit internal quality traits

Instrumental analyses are very helpful to measure the internal quality of a fruit. As the ripening stage of the fruit sample strongly affects the results, it is very important to define a consensus stage at which measurements will be made. As the fruit quality of stone fruits is generally fully expressed at the ready-to-eat stage, it is recommended to carry out qualitative analyses on fruit samples at this stage. It is also recommended to prioritize the following measures, as they are well correlated with the quality perceived by the consumer at tasting:

- **Sugar content**

The soluble solids content (SSC) is measured on the juice expressed by the fruit sample using a refractometer (manual or automatic), and is referred to as the degrees Brix.

- **Acidity content**

The titratable acidity (TA) is measured on the juice obtained by squeezing the fruit sample, using a titrator (manual or automatized). Is it expressed in meq/l and is measured by using NaOH 0.1 N to neutralize the acids contained in a given amount of juice. A volume of 10 ml of juice is sufficient to perform the analysis.

- **Flesh firmness**

Use manual or automatic fruit texture analysers. Penetrometers are the most common instruments used for this purpose. If a penetrometer is used, firmness should be measured on the peeled fruit cheeks and expressed in Newton (N), i.e. the force needed to penetrate the fruit flesh to a given depth. Both the plunger size and the depth vary according to the fruit.

Species-specific protocols detailing sampling and analytical methods to measure the internal quality of fruits are being developed for Peach, Sweet Cherry, Sour Cherry and Plum.

Reference

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