

**Collaborative action for updating, documenting and  
communicating the cherry patrimonial richness in EU**

**(EU.CHERRY)**

**March 2016 – February 2017**

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## **INTRODUCTION**

Providing easy access to data on *Prunus* Genetic Resources (GR) has been a priority goal of the ECPGR *Prunus* Working Group (WG) since its establishment (Benediková and Giovannini 2013). To facilitate access to information on accessions of interest for users, the WG developed a tool, the European *Prunus* Database (EPDB), listing over 13 000 accessions (<http://www.bordeaux.inra.fr/euprunusdb/index.html>). However, despite the recent inclusion of hundreds of new accessions and improvements in EPDB's functionalities (Balsemin 2012), several critical issues remain to be addressed:

- Most accessions in the EPDB are described only with Passport Data; consensus descriptors are needed to harmonize characterization and evaluation (C&E) data across collections, as they are deemed highly useful for users.
- Lack of harmonized morphological and genetic characterization hampers the implementation of the AEGIS *Prunus* Collection; harmonized genotyping (using a common set of effective markers) is needed to detect homonyms and synonyms within and across collections.
- The EPDB is not fully synchronized with the European Search Catalogue for Plant Genetic Resources (EURISCO), and inconsistencies among the accessions listed in the two databases (DBs) are frequent; since the evolution of EURISCO implies integration of C&E data, the future of the EPDB should be planned in coordination with EURISCO.

The main aims of the EU.CHERRY project were to: i) Increase the quantity and quality of data on sweet cherry accessions (mainly traditional cultivars) in the EPDB and in EURISCO, and ii) Contribute to the establishment of an AEGIS *Prunus* collection. Moreover, the data collected during the EU.CHERRY project (C&E data and genotyping data) will be analysed in order to prepare a scientific publication about European cherry diversity.

The EU.CHERRY project was conducted in collaboration with the COST ACTION FA1104 'Sustainable production of high-quality cherries for the European market' (<https://www.bordeaux.inra.fr/cherry/>), aimed to develop innovative strategies to safeguard European cherry production through active networking. This added further value to the ECPGR-funded activity and will align the ECPGR efforts within the research and breeding community.

The Activity Proposal, including the list of partners is available from the [EU.CHERRY webpage](#).

## **APPROACH USED IN THE EU.CHERRY PROJECT**

EU.CHERRY aimed to develop the following actions:

- **Action 1. Provide harmonized characterization data of European sweet cherry accessions to be included in EURISCO**
- **Action 2. Prepare transfer of *Prunus* passport data and *Prunus* C&E data experience from the EPDB to EURISCO**
- **Action 3. Contribute to the establishment of an AEGIS *Prunus* collection**

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The Activity included the following steps:

**1. Kick-off meeting** (actions 1, 2, 3)

The COST Action FA1104 supported in full the cost of the EU.CHERRY kick-off meeting, which was organized in concomitance with the COST Action General Meeting already scheduled for April 2016 in Naoussa (Greece). EU.CHERRY had a dedicated session; however, opportunities for interactions among scientists participating to the two networks were highly valorized throughout. An oral presentation of EU.CHERRY was offered to the COST Executive Committee and a poster about EURISCO and EPDB was presented. Both documents are available from the [EU.CHERRY webpage](#). During the kick-off meeting, EU.CHERRY partners discussed on criteria for selecting the accessions, descriptors, data collection and compilation. Minutes of the meeting are available from the [EU.CHERRY webpage](#).

**2. Selection of accessions** (action 1)

EU.CHERRY aimed to describe 350 sweet cherry accessions (150 from EU.CHERRY partners, with passport, C&E and molecular data and 200 from COST partners with at least passport and molecular data).

Criteria for selecting accessions were:

- Originating from the country
- Preference for landraces
- No patents or equivalent protection
- Possessing at least one trait of interest.

**3. Collection of C&E data** (action 1)

Aiming to harmonize the C&E data of the selected accessions, during the kick-off meeting the EU.CHERRY partners consulted the most important reference documents available in the literature (listed at page 12 in *Reference documents for descriptors selection*) and selected the C&E descriptors considered most useful to describe the EU.CHERRY accessions. Based on their importance and effectiveness in describing the sweet cherry varieties, the descriptors selected were ranked FPD (First Priority Descriptors, the most important) or SPD (Second Priority Descriptors, useful to supplement FPDs).

**4. Genotyping** (action 1)

To optimize the genotyping of the EU.CHERRY accessions, a questionnaire was prepared and sent to EU.CHERRY and COST partners in order to survey the efficiency of the ECPGR marker set proposed for cherry by Clarke and Tobutt (2009) based on the results of genotyping studies where this ECPGR SSR set had been used.

**5. Preparation of data for uploading into the EPDB and EURISCO databases** (actions 1, 2 and 3)

Pre-formatted template datasheets were prepared and sent to partners for passport and C&E data entry on their accessions and future uploading of the entire set of EU.CHERRY data into the EPDB. Moreover, the EPDB manager participated to the [EURISCO Training Workshop \(2016\)](#), in order to learn how to prepare templates for uploading the C&E data into the EURISCO database as well. Each of the ECPGR partners involved in the EU.CHERRY project is committed to transmitting to her/his National Focal Point the dataset of the sweet cherry accessions offered in the format compatible with EURISCO, with the final objective of uploading passport and C&E data in the EURISCO catalogue. Furthermore, each partner will verify if the phytosanitary status of the EU.CHERRY accessions of their collection is known and, if it is so, compatible with the AEGIS requirements.

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## **RESULTS**

### **Action 1. Provide harmonized characterization data of European sweet cherry accessions to be included in EURISCO**

#### **COST partners recruitment**

COST partners recruitment, aiming to enlarge the number and the geographic origin of the European sweet cherry landraces studied in the EU.CHERRY project, was mainly carried out during the COST Action General Meeting in April 2016 in Naoussa. Nine partners from the countries listed below accepted to send samples from their cherry collections:

- Austria
- Croatia
- Hungary
- Morocco
- Norway
- Portugal
- Romania
- Slovakia
- Sweden

#### **Selection of accessions**

In total, 324 accessions from 23 countries were selected for genotyping (Table 1), 187 of which proposed by EU.CHERRY partners. Since it was not possible to recruit partners from all European countries, some EU.CHERRY partners offered for genotyping accessions of their collection originating from six additional countries: Belarus, Lithuania, Russian Federation, Spain, Switzerland and Ukraine (Figure 1).

#### **Selection of descriptors**

18 (7 mandatory and 11 recommended) passport and 33 C&E descriptors (16 FPD and 17 SPD) were selected, together with 6 descriptors related to the experiment (see Annex A). The guideline 'Passport and Priority Descriptors for EU.CHERRY', including the selected descriptors and protocols for their assessment (including pictures and drawings) is available from the [EU.CHERRY webpage](#).

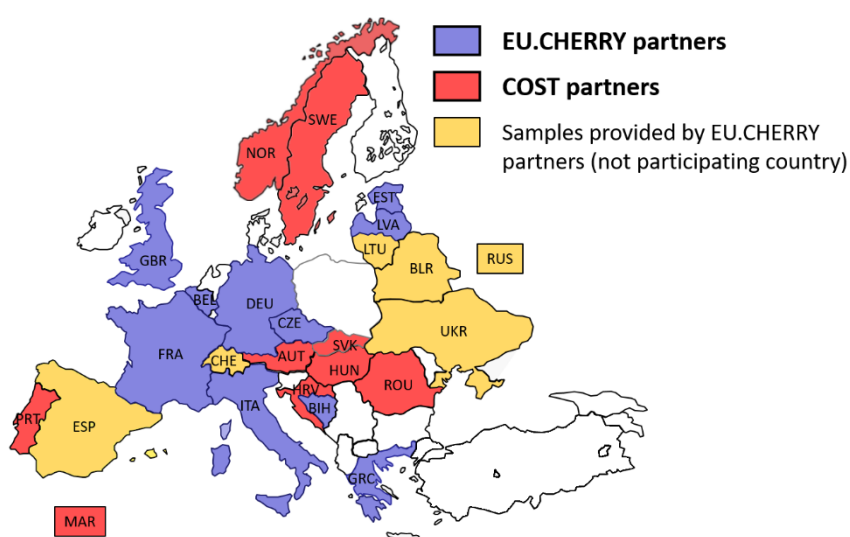
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**Table 1. Number of accessions provided by each partner**

	<b>Country</b>	<b>Number of accessions for genotyping</b>	<b>Number of accessions for phenotyping</b>
<b>EU.CHERRY partners</b>	Belgium	16	16
	Bosnia and Herzegovina	20	20
	Czech Republic	15	15
	Estonia	24	18
	France	43	43
	Germany	18	18
	Greece	12	12
	Italy	15	15
	Latvia	32	15
	United Kingdom	17	15
	<b>Sub-total</b>	<b>212</b>	<b>187</b>
<b>Other partners (COST)</b>	Austria	8	
	Croatia	1	
	Hungary	21	
	Morocco	19	
	Norway	28	
	Portugal	8	
	Romania	9	
	Slovakia	10	
	Sweden	8	
	<b>Sub-total</b>	<b>112</b>	<b>0</b>
<b>Total (All partners)</b>	<b>324</b>	<b>187</b>	



**Figure 1. Origin of the 324 genotyped samples.**

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## **Data collected**

### **EU.CHERRY partners collected passport and C&E descriptors for each of the accessions they offered to the project**

100% of mandatory passport data, 25% of recommended passport data and 75% of the experiment data were provided. Country of origin was completed for all accessions. 169 accessions were native from the country providing the data. Of the recommended descriptors, the following are potentially useful for screening the accessions for the AEGIS European Collection:

- **Status of sample** was filled for 74% of accessions (of which, 73% Landraces, 21% Improved cultivar and 4% Research material)
- **Type of germplasm storage**: all germplasm is stored in the field (data were filled for 75% of accessions)
- **Health status** was filled for 75% of accessions. For those accessions, 27% were not tested. Others were free from quarantine pest and disease (tested by ELISA or PCR, more than 2 years ago for 33% and more recently for 40%)
- **Identification of material using a standard method**: less than 50% of accessions documented for this descriptor with 15% of accessions not verified; 24% verified using molecular markers and phenotypic data; 61% with only phenotypic data
- **Protection status** was compiled for only 12% of accessions. Only one accession was mentioned as protected.

FPD data were collected for 84% of accessions (100% when considering only the accessions native to the countries providing the data); SPD data were collected for 30% of accessions.

## **Data curation**

The DB manager checked carefully the quality of data provided by the partners and, when errors were detected, corrections were requested.

## **Genotyping**

Based on the results of the survey among EU.CHERRY and COST partners, 18 SSR markers for *Prunus* were chosen for optimization in multiplexes (Table 2). These included 11 of the markers from the ECPGR recommended genotyping set (Clarke and Tobutt 2009), and 7 new markers: 2 linked to fruit size (Rosyara et al. 2013), 1 to flesh colour (Sandefur et al. 2016) and 4 successfully used by other groups in previous genotyping studies (Vilanova et al. 2003).

All partners sent leaf samples to East Malling Research (UK), where the SSR analysis was performed.

Of the 324 samples screened, 311 presented allelic patterns corresponding to diploid (2n) genotypes (i.e. one or two alleles per marker) whereas 13 presented additional alleles in various markers suggesting they might be triploid (3n) or, more likely in cherry, tetraploid (4n).

Of the samples analysed, 192 (179 diploids and all the putative polyploids) appeared to be unique whilst for 132 of the diploid samples their genotype matched the alleles of at least one other sample at all loci. These 132 samples could be grouped as 39 unique genotypes. Eighteen of these groups were pairs whilst the largest comprised 12 samples. Given the surprisingly high number of samples with identical profiles, there are a number of possible explanations. Firstly, it is possible that some samples are maintained under the wrong name in the country that provided the sample; secondly, errors could have been made during the collecting/processing of some of these samples; thirdly, the number of previously unreported synonyms in cherry germplasm collections across Europe could be much higher than anticipated. The answer is likely to include examples of all three. For example, it would be perfectly

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plausible (subject to phenotypic verification) for an old cultivar such as 'Emperor Francis' to be known by a range of names in different European countries whilst other groups contain accessions of well-known cultivars known to be different (e.g. 'Van' and 'Ferrovia').

While some cases correspond to evident duplicates (e.g. it is no surprise that two samples of 'Early Rivers' – from the UK and Norway – in Group 11 have turned out to be identical), for the majority of samples further investigation using the phenotypic information provided by the countries of origin of these samples would be the next step to clarify putative identities. Additional genotyping might be needed to fully clarify some cases.

Combining the phenotype and genotype information will also allow us to verify the predictive value of the markers linked to fruit size and flesh colour and determine their usefulness for marker-assisted breeding in this wide germplasm pool.

**Table 2. SSR markers used during the optimization process; classified by original multiplex (MP), fluorescent label (Dye), linkage group (LG), expected allele range, observed heterozygosity (Ho), number of alleles expected and assessment on ease of scoring**

MP	Dye	Marker name	LG	Allele range	Ho	Number of alleles	Amplification signal	Ease of scoring	Reference <sup>3</sup>
A	FAM	EMPa002	1	100-132	0.653	7	very good	easy	1
A	FAM	<u>CPSCT038</u> <sup>1</sup>	2	185-205	N/A	N/A	N/A	N/A	2
A	FAM	CPPCT022	7	204-228	0.544	6.5	good	moderately easy	1
A	NED	EMPaS10	4	134-190	0.556	9	very good	easy	1
A	NED	<u>BPPCT034</u> <sup>1</sup>	2	210-255	N/A	N/A	N/A	N/A	2
A	HEX	CPPCT006	8	173-202	0.556	8	very good	easy	1
A	HEX	EMPa015	4	215-240	0.773	7	very good	easy	1
A	HEX	<u>PAV-Rf-SSR</u> <sup>2</sup>	3	351-361	N/A	N/A	N/A	N/A	3
A	PET	EMPaS02	3	124-156	0.737	6	very good	easy	1
B	FAM	BPPCT037	5	117-170	0.748	11.5	very good	easy	1
B	FAM	EMPaS06	4	226-278	0.811	7	very good	easy	1
B	NED	EMPaS01	6	220-244	0.688	7	very good	easy	1
B	NED	UDP96-005	1	96-135	0.55	5	good	moderately easy	4
B	PET	EMPa004	6	178-206	0.772	6	very good	easy	1
B	PET	EMPa017	2	227-250	0.507	6.5	very good	easy	1
B	PET	EMPa018	8	95-106	0.687	8	very good	easy	1
B	HEX	EMPaS12	3	100-149	0.728	6	very good	easy	1
B	HEX	EMPaS14	5	170-216	0.654	5.5	very good	easy	1

<sup>1</sup> Markers linked to fruit size

<sup>2</sup> Marker linked to flesh colour

<sup>3</sup> 1 = Clark and Tobutt 2009; 2 = Rosyara et al. 2013; 3 = Sandefur et al. 2016; 4 = Vilanova et al. 2003 (see Bibliography below)



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## **Action 2. Prepare transfer of *Prunus* passport data and *Prunus* C&E data from the EPDB to EURISCO**

### **Comparison of EU.CHERRY dataset and EURISCO dataset**

Passport data for cherry stored in EURISCO (*Prunus avium* and *Prunus cerasus*, July 2018) were compared to our EU.CHERRY dataset.

#### **List of accessions by countries (Table 3)**

By July 2018, some countries had not yet supplied cherry data to EURISCO:

- **2 EU.CHERRY countries:** Bosnia and Herzegovina and France
- **7 COST countries:** Hungary, Morocco, Norway, Portugal, Romania, Slovakia and Sweden.

For other countries, 92 accessions out of 187 in EU.CHERRY dataset and 2 out of COST accessions were found in EURISCO. For Croatia (HRV), Belgium (BEL) and Greece (GRC), none of the accessions selected for EU.CHERRY project were found. One reason could be that **the numbering of accessions used in EURISCO and the numbering used in EU.CHERRY was different.**

*For example, the accession called 'Abbesse de Moulard' bears the accession numbers '15' and '16' in EURISCO, and it bears the number 'CRA-W-CER-0058' in EU.CHERRY dataset.*

For Italy (ITA) only 11 out of 15 of the EU.CHERRY accessions are also in EURISCO. For Czech Republic (CZE), Estonia (EST), Germany (DEU), Latvia (LVA) and United Kingdom (GBR), all the accessions provided in EU.CHERRY are also in EURISCO.

**Table 3. Comparison of lists of accessions between EURISCO and EU.CHERRY (*Prunus avium* and *Prunus cerasus*)**

<b>Countries</b>	<b>National Inventory code in EURISCO</b>	<b>Number of accessions in EURISCO</b>	<b>Number of accessions shared between EURISCO and EU.CHERRY (with same ACCESSION NUMBER)</b>
<b>EU.CHERRY countries</b>	BEL	304	0
	CZE	439	15
	DEU	604	18
	EST	46	18
	GBR	347	15
	GRC	57	0
	ITA	922	11
	LVA	81	15
	BIH	0	0
	FRA	0	0
	<b>TOTAL</b>	<b>2800</b>	<b>92</b>

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**Table 3 (continued). Comparison of lists of accessions between EURISCO and EU.CHERRY (*Prunus avium* and *Prunus cerasus*)**

Countries	National Inventory code in EURISCO	Number of accessions in EURISCO	Number of accessions shared between EURISCO and EU.CHERRY (with same ACCESSION NUMBER)
<b>COST countries</b> (supplying samples)	AUT	337	2
	HRV	27	0
	HUN	0	0
	MAR	0	0
	NOR	0	0
	PRT	0	0
	ROM	0	0
	SVK	0	0
	SWE	0	0
	<b>TOTAL</b>	<b>364</b>	<b>2</b>
<b>Other countries</b>	ALB	67	
	CHE	2347	
	ESP	298	
	MDA	14	
	MKD	55	
	NGB	1	
	UKR	744	
	<b>TOTAL</b>	<b>3526</b>	
<b>GRAND TOTAL</b>		<b>6690</b>	

## Descriptors

### Passport descriptors

As the ECPGR *Prunus* Working Group used the MCPD (Multi-Crop Passport Descriptors), which are also used by EURISCO, transfer of EPDB dataset to EURISCO dataset should be quite easy. Annex B shows a brief comparison between both datasets for passport descriptors.

### Common descriptors

23 descriptors are expected in both DBs.

- Both datasets are complete for 6 out of the 7 EU.CHERRY mandatory descriptors : NICODE, INSTCODE, ACCENUMB, GENUS, SPECIES, ACCENAME.
- For some descriptors, there is more data in EU.CHERRY, and for others, in EURISCO.
- 4 descriptors were never used in both DB (DONORNUMB, SUBTAXA, SUBAUTHOR, COLLNUMB).

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For some common descriptors, there are some differences between EURISCO and EU.CHERRY data. In most cases, there are only minor syntax differences (ex: "IfO Dresden-Pillnitz" vs "IfO, Dresden-Pillnitz" for DONORNAME descriptor). Only for SAMPSTAT descriptor, there are true differences; for example, some accessions are noted '300' (= traditional cultivar) in EU.CHERRY dataset and '500' (= improved cultivar) in EURISCO dataset. Partners will be asked about this.

***Descriptors expected only in EURISCO***

20 descriptors were not chosen for EU.CHERRY, but only 9 were really used in EURISCO: COLLSITE, COLLINSTADDRESS, DUPLSITE, DUPLINSTNAME, REMARKS, ACCEURL, MLSSTAT, AEGISSTAT, HISTORIC.

HISTORIC is not used in EURISCO template, so except for this descriptor, as they are used by some partners, and as they should be useful in detecting synonyms or duplications, and in AEGIS procedure, we can propose to use them in future ECPGR *Prunus* WG datasets.

***Descriptors expected only in EU.CHERRY***

13 descriptors were chosen for EU.CHERRY while they are not expected in EURISCO.

- 2 descriptors about the holding institute (INSTACRONYM and INSTDESCR) are not needed in EURISCO. Currently, these descriptors are imported in EURISCO from the [FAO-WIEWS](#) database.
- 4 EU.CHERRY descriptors could be replaced by existing EURISCO descriptors: FEMALE PARENT, MALE PARENT and HYBRID could be concatenated into ANCESTR descriptor (Ancestral data = Information about either pedigree or other description of ancestral information, i.e. parent variety in case of mutant or selection); CROPTYPE could be used as CROPNAME because they are very similar.
- 5 descriptors seem to be important but they cannot be included clearly in EURISCO. For now, they can easily be concatenated in REMARKS descriptor.
  - SYNONYMS and EUONYM (a "Consensus" name for a group of synonyms which should be convenient for cross-referencing) could be very important for interpreting diversity analysis.
  - PLANTUSE and FRUITUSE could be useful for users, and so could make the dataset more user-friendly.
  - PROTECT brings useful information for AEGIS selection and for distribution of the accession.
- For 2 descriptors, we might ask if they are really passport descriptors. In fact, HEALTHSTATUS and IDENTIF can be considered as C&E descriptors.

**C&E descriptors**

EURISCO contains C&E data only for *Prunus avium* from the Czech Republic.

**Upload of the data**

In order to ensure full correspondence between the two DBs, at least for EU.CHERRY accessions, a datasheet template compatible with EURISCO was prepared. Curated data were sent into EURISCO templates to all partners. Partners will follow all the steps needed to make these data uploaded onto EURISCO.

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Since reception of the abovesaid template, each partner must undertake to ensure that their EU.CHERRY accessions are included into EURISCO catalogue, involving the institutional figures responsible for this task.

**Future of EPDB: Import of EPDB data into another information system (interoperable with EURISCO)**

The European *Prunus* Database is the Central Crop Database of the ECPGR Working Group on *Prunus*. It is under the responsibility of the *Prunus* BRC, UEA, INRA Bordeaux. It is hosted on a computer at INRA Bordeaux. Unfortunately, INRA Bordeaux cannot guarantee the security of this computer. A solution is to transfer the data to another Information System maintained by INRA: GnpIS.

[GnpIS](#) is a multispecies integrative information system dedicated to plant and fungi pests. It bridges genetic and genomic data, allowing researchers' access to both genetic information (e.g. genetic maps, quantitative trait loci, association genetics, markers, polymorphisms, germplasms, phenotypes and genotypes) and genomic data (e.g. genomic sequences, physical maps, genome annotation and expression data) for species of agronomical interest. GnpIS is used by both large international projects and plant science departments at the French National Institute for Agricultural Research. It is regularly improved and released several times per year.

GnpIS is interoperable with EURISCO, and can provide some functionalities **which are lacking in EURISCO**:

- Ability to search for an accession using several characters (for example searching all cherry accessions with red colour and big fruit) (currently not possible with EURISCO)
- Ability to host SSR data (currently not possible with EURISCO)
- Easy import of data.

The transfer will be achieved by the end of 2019.

**Action 3. Contribute to the establishment of an AEGIS *Prunus* collection**

Among the goals of the EU.CHERRY project was the inclusion of sweet cherry accessions into the European collection under the AEGIS system. Accessions entering the European Collection must meet the general selection requirements agreed by the ECPGR Steering Committee: material needs to be a PGRFA under the management and control of the member countries' governments and in the public domain. Moreover, this material should be genetically unique within AEGIS, to the best available knowledge, and should be of European origin or introduced germplasm that is of actual or potential importance to Europe.

In order to comply as much as possible with AEGIS requirements, EU.CHERRY participants were requested to select for the Project sweet cherry landraces:

- original of their country (hence under the management and control of their government and in the public domain),
- possessing agronomic traits of interest (in order to guarantee their interest for breeding or cultivation purposes).

During the Project, EU.CHERRY accessions were analysed with the same set of 18 SSR markers, selected for their good discrimination efficiency and described with (at least) 7 Passport and 16 First Priority Descriptors (FPDs).

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Of the 324 accessions analysed with SSRs, 192 showed distinct allelic profiles. Further 39 allelic profiles resulted common among 2 or more accessions.

114 accessions from those 192 accessions are part of the EU.CHERRY dataset, and the following criteria were checked for each one:

- Diploid accession (as sweet cherry)
- Country of origin = Country where the accession is maintained
- Accession known as a landrace
- Accession not protected

56 sweet cherry accessions (listed in Annex C) comply with these requirements and should be considered most appropriate accessions (MAAs), hence eligible for inclusion in AEGIS. The 132 accessions grouped into 39 unique profiles will be the subject of further study within the WG, in order to identify those that are most worthy of being considered MAAs.

Moreover 4 accessions, presumed to be triploid, and 2 *Prunus cerasus*, tetraploid, could also be MAAs.

As the inclusion in the EURISCO catalogue is a necessary step for the candidacy of an accession in AEGIS, the *Prunus* DB manager filled the templates for EURISCO with EU.CHERRY Passport and C&E data. While sending the templates to each partner, the DB manager provided the list of their MAAs, and asked them if they could flag them for AEGIS, i.e. whether the following conditions were met:

- **Their country is part of AEGIS**
- **They are able to send plant material under existing regulation about circulation of plants**
- **The accession is free of quarantine disease.**

Material offered to the European Collection needs to be confirmed by the respective National Coordinator and registered as "part of AEGIS" into EURISCO (<http://eurisco.ecpgr.org>) by the National Inventory Focal Point (NFP).

Concerning the EU.CHERRY accessions whose sanitary status is unknown, they might still be included in the AEGIS system with the understanding that problematic material from the phytosanitary point of view should be given priority to be made quarantine disease-free before it can be distributed.

## **BIBLIOGRAPHY**

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*Reference documents for descriptors selection:*

- [\*AEGIS selection of Most Appropriate Accessions : List of minimum passport descriptors for all Prunus species \(ECPGR Prunus Working Group, 2010\)\*](#)
- [\*BBCH scale \(Growth stages of mono-and dicotyledonous plants. BBCH Monograph \(Meier 2001\)\*](#)
- [\*Cherry Descriptors \(IBPGR/CEC, 1985\)\*](#)
- [\*Data exchange standard for uploading characterisation and evaluation data from National Inventories to EURISCO v1.0 \(2015\)\*](#)
- [\*ECPGR-Prunus Database Descriptors \(ECPGR, 2011\)\*](#)
- [\*Multi-crop passport descriptors \(MCPD\) v2.1 \(FAO/Bioversity 2015\)\*](#)
- [\*NAP Descriptors \(Obst-Descriptoren NAP / Descripteurs de fruits PAN\) \(Szalatnay and Bauermeister, 2006\)\*](#)
- [\*Passport and Priority Descriptors for Cherry – Version 1 \(Eu.Cherry Version\) – Revised August 2018\*](#)
- [\*The list of minimum passport descriptors proposed by the PRUNDOC project \(Annex I in the PRUNDOC Activity report, Hjeltnes et al. 2016\)\*](#)
- [\*UPOV/DUS Descriptors for cherry TG/35/7 \(UPOV, 2006\)\*](#)

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## Annex A. Descriptor lists

### Mandatory passport descriptors

- **ACCENUMB:** Accession number = the unique identifier for accessions within a genebank, assigned when a sample is entered into the genebank collection
- **ACCENAME:** Accession name (if existing); First letter uppercase. Multiple names are separated by a semicolon without space. Example: Accession name: Bogatyr;Symphony;Emma
- **INSTCODE:** Holding Institute FAO WIEWS code (3-letter ISO 3166 country code)
- **GENUS :** *Prunus*
- **SPECIES :** *avium*
- **ORIGCTY:** Country of origin of the variety = 3-letter ISO 3166-1 code of the country in which the sample was originally collected (e.g. landrace, crop wild relative, farmers' variety), bred or selected (breeding lines, GMOs, segregating populations, hybrids, modern cultivars, etc.). (not to be confused with the country of the donor!)
- **NICODE:** National Inventory code (new – mandatory by EURISCO) Code identifying the National Inventory; the code of the country preparing the National Inventory - Example: NLD

### Recommended passport descriptors

- **DONORCODE** (FAO-WIEWS code of the institute which provided material of that accession, if any)
- **DONORNAME** (i.e. name of that institute) which will be particularly useful to trace duplicates in the European Collection. Everyone can add other field(s) (e.g.: subspecies)
- **ACQDATE:** Acquisition date (i.e. date on which the accession entered the collection) [YYYYMMDD]  
Missing data (MM or DD) should be indicated with hyphens or '00' [double zero]
- **OTHERNUMB:** Other identification (numbers) associated with the accession
- **BREDCODE & BREDESCR:** Information about the breeding institute (i.e. FAO code and/or name of the breeding institute)
- **SAMPSTAT:** Biological status of accession
- **STORAGE:** Type of germplasm storage
- **HEALTHSTATUS:** Pest and disease status
- **IDENTIF:** Identification of material
- **FEMALE PARENT** of the accession
- **MALE PARENT** of the accession



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### **Experiment data**

This kind of data aims to help to contextualize the C&E data.

- **EXPERIMENT\_DESCRIPTION:** Brief English description of the experiment. Information relevant for the interpretation of the scores in the experiment, such as experimental design, experimenter, weather, etc. (max. 2000 alphanumeric characters).
- **EXPERIMENT\_START\_YEAR:** The year the experiment was performed (started) (4 numeric characters).
- **EXPERIMENT\_END\_YEAR:** The year in which the experiment ended (4 numeric characters).
- **EXPERIMENT\_LONGITUDE:** The longitude of the experimental site, provided it was an experiment in the open field (decimal number).
- **EXPERIMENT\_LATITUDE:** The latitude of the experimental site, provided it was an experiment in the open field (decimal number).
- **ROOTSTOCK:** On which rootstock(s) is the accession maintained? This information describes the individual representing the accession in the collection.

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**C&E descriptors**

**First priority descriptors (FPD)**

<b>Name</b>	<b>Reference</b>	<b>Description</b>	<b>Mandatory/optional</b>	<b>Scale</b>
Phenology: Time of beginning of flowering	UPOV descriptor	Time of beginning of flowering (BBCH code 61)	MANDATORY	1 very early 3 early 5 medium 7 late 9 very late
Phenology: Time of beginning harvesting	ECPGR descriptor	Season of maturity (BBCH code 89)	MANDATORY	1 extremely early 3 early 5 mid-season 7 late 8 very late 9 extremely late
Tree: vigour	UPOV descriptor	Visual assessment	MANDATORY	1 very weak 3 weak 5 medium 7 strong 9 very strong
Tree: habit	ECPGR descriptor	Visual assessment	MANDATORY	1 upright 3 semi-upright 5 spreading 7 drooping 9 weeping
Fruit: size (class)	UPOV descriptor	Quantitative measurement recorded on a 1-9 scale	MANDATORY	1 very small 3 small 5 medium 7 large 9 very large
Fruit: size (g)	UPOV descriptor	Average weight	Optional	in grams rounded to 1 decimal place
Fruit: shape (lateral view)	UPOV descriptor	Visual assessment	MANDATORY	1 cordate 2 reniform 3 oblate 4 circular 5 elliptic
Fruit: length of stalk (class)	UPOV descriptor	Measurement or Visual assessment of a quantitative trait recorded on a 1-9 scale	MANDATORY	1 very short 3 short 5 medium 7 long 9 very long
Fruit: length of stalk (mm)	UPOV descriptor	Average length	Optional	in mm rounded to 1 decimal place

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<b>Name</b>	<b>Reference</b>	<b>Description</b>	<b>Mandatory/optional</b>	<b>Scale</b>
Fruit: skin colour	ECPGR descriptor	Visual assessment	MANDATORY	1 yellow 3 vermilion on yellow ground 4 light red 5 red 7 dark red 9 black
Fruit: colour of flesh	UPOV descriptor	Visual assessment	MANDATORY	1 cream 2 yellow 3 pink 4 medium red 5 dark red
Fruit: colour of juice	UPOV descriptor	Visual assessment	MANDATORY	1 colourless 3 pink 5 red 7 purple 8 brown red 9 black red
Fruit: flesh firmness	ECPGR descriptor	Sensorial assessment (or measurement)	MANDATORY	1 very soft 3 soft 5 medium 7 firm 9 very firm
Fruit: soluble sugar content (SSC)	UPOV descriptor		MANDATORY	in degrees Brix rounded to 1 decimal place
Fruit: titratable acidity (TA)	UPOV descriptor		MANDATORY	in meq 100/ml rounded to 1 decimal place
Fruit: ratio fruit/stone	NAP descriptor		MANDATORY	3 small 5 medium 7 large
Stone: shape (in ventral view)	UPOV descriptor	Visual assessment	MANDATORY	1 medium elliptic 2 broad elliptic 3 circular
Fruit: flesh juiciness	UPOV descriptor	Sensorial assessment	MANDATORY	3 weak 5 medium 7 strong

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**Second priority descriptors (SPD)**

<b>Name</b>	<b>Reference</b>	<b>Description</b>	<b>Mandatory/optional</b>	<b>Scale</b>
Flower: diameter (class)	UPOV descriptor	Measurement or visual assessment of a quantitative trait	Optional	3 small 5 medium 7 large
Flower: diameter (mm)	UPOV descriptor	Average diameter of 10 flowers	Optional	in mm rounded to 1 decimal place
Flower: shape of petals	UPOV descriptor	Visual assessment	Optional	1 circular 2 medium obovate 3 broad obovate
Flower: arrangement of petals	UPOV descriptor	Visual assessment	Optional	1 free 2 intermediate 3 overlapping
Flower: self-fertility of flowers	IBPGR descriptor		Optional	0 Self-incompatible 1 Self-compatible
Fruit: pistil end	UPOV descriptor	Visual assessment	Optional	1 pointed 2 flat 3 depressed
Fruit: suture	UPOV descriptor	Visual assessment	Optional	1 absent or very weakly conspicuous 2 weakly conspicuous 3 strongly conspicuous
Fruit: width of stalk	UPOV descriptor	Visual assessment	Optional	1 thin 2 medium 3 thick
Fruit: skin cracking susceptibility	ECPGR descriptor		Optional	1 none 2 very low 3 low 5 intermediate 7 high 9 extremely high
Fruit: depth of stalk cavity	NAP descriptor		Optional	1 none 3 small 5 medium 7 large
Fruit: Fruit removal force from the tree		Sensorial assessment	Optional	3 weak 5 medium 7 wide
Fruit: Stalk removal force from the fruit		Sensorial assessment	Optional	3 weak 5 medium 7 wide

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<b>Name</b>	<b>Reference</b>	<b>Description</b>	<b>Mandatory/optional</b>	<b>Scale</b>
Fruit: abscission layer between stalk and fruit	UPOV descriptor		Optional	1 absent 9 present
Fruit: sensorial analysis of sugar/acid ratio	IBPGR descriptor	Sensorial assessment	Optional	1 extremely acid 3 acid 5 good balance 7 sweet 9 extremely sweet
Fruit: sensorial analysis of global taste	IBPGR descriptor	Sensorial assessment	Optional	1 extremely poor 3 poor 5 fair 7 good 9 extremely good
Stone: size (weight - class)	UPOV descriptor	Average weight of at least 10 stones	Optional	3 small 5 medium 7 large 9 very large
Stone: size (weight - g)	UPOV descriptor	Average weight of at least 10 stones	Optional	in grams rounded to 1 decimal place
Stone: detachment of the flesh from the stone	NAP descriptor	Sensorial assessment	Optional	1 easy 2 medium 3 difficult
Susceptibility: monilia disease	ECPGR descriptor		Optional	1 none 2 very low 3 low 5 intermediate 7 high 9 extremely high

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**Annex B. Comparison of passport descriptors**

Comparison of passport descriptors for 92 cherry accessions described in both EURISCO and EU.CHERRY datasets.

**In bold:** Dataset is complete for this descriptor

**In green:** Dataset is more complete for this descriptor

**In red:** No data for this descriptor

**Descriptors expected in both DBs**

Name of the descriptor	Number of accessions with data for the descriptor		
	EURISCO	EU.CHERRY	
NICODE	92	92	<i>Both datasets are complete</i>
INSTCODE	92	92	
ACCENUMB	92	92	
GENUS	92	92	
SPECIES	92	92	
ACCENAME	92	92	
SPAUTHOR	92	77	<i>Both datasets are not complete</i>
CROPNAME	81	77	
ACQDATE	57	18	
ORIGCTY	73	92	
BREDCODE	2	16	
SAMPSTAT	59	66	
ANCEST	28	0	
COLLSRC	11	51	
DONORCODE	0	12	
DONORDESCR	25	31	
OTHERNUMB	2	0	
STORAGE	92	66	
BREDDSCR	12	5	
COLLNUMB	0	0	<i>No data for both datasets</i>
SUBTAXA	0	0	
SUBTAUTHOR	0	0	
DONORNUMB	0	0	

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Descriptors expected only for EURISCO

Name of the descriptor	Number of accessions with data for the descriptor		
	EURISCO	EU.CHERRY	
COLLSITE	9		<i>EURISCO dataset is not complete</i>
DUPLSITE	10		
REMARKS	24		
ACCEURL	59		
MLSSTAT	48		
AEGISSTAT	47		
COLLINSTADDRESS	9		
DUPLINSTNAME	10		
HISTORIC	15		
COLLCODE	0		<i>No data in EURISCO</i>
LATITUDE	0		
LONGITUDE	0		
ELEVATION	0		
COLLDATE	0		
COLLMISSID	0		
COLLNAME	0		
COORDDATUM	0		
COORDUNCERT	0		
DECLATITUDE	0		
DECLONGITUDE	0		
GEOREFMETH	0		

Descriptors expected only for EU.CHERRY

Name of the descriptor	Number of accessions with data for the descriptor		
	EURISCO	EU.CHERRY	
HEALTHSTATUS		66	<i>EU.CHERRY dataset is not complete</i>
IDENTIF2		48	
FEMALEPARENT		17	
MALEPARENT		14	
INSTACRONYM		36	
INSTDESCR		36	
CROPTYPE		77	
HYBRID		33	
PROTECT		48	
SYNONYMS		31	
FRUITUSE		66	
EUONYM		0	<i>No data in EUCHERRY</i>
PLANTUSE		0	

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## **Annex C. List of EU.CHERRY Most Appropriate Accessions**

### **Diploid accessions**

<b>Accession name</b>	<b>Partner</b>
Bigarreau Ghijssens	Belgium
Cerise de Lignette	Belgium
Guigne Presgaux 2	Belgium
Helshoven	Belgium
Pirette de Biercée	Belgium
Rouge Dorée	Belgium
Alica	Bosnia and Herzegovina
Banjalučka Crnica	Bosnia and Herzegovina
Bijela Hašlama	Bosnia and Herzegovina
Bijeli Triješanj	Bosnia and Herzegovina
Cipov	Bosnia and Herzegovina
Divlja Crna	Bosnia and Herzegovina
Hašlama	Bosnia and Herzegovina
Černá Špička	Czech Republic
Chlumecká černá Chrupka	Czech Republic
Granát	Czech Republic
Karešova Raná	Czech Republic
Libědjovická raná	Czech Republic
Pivka	Czech Republic
Pivovka	Czech Republic
Švestičková	Czech Republic
Těchlovická	Czech Republic
Žalanka	Czech Republic
Maardu Maguskirss	Estonia
Madissoni Roosa	Estonia
Maia	Estonia
Bigarreau Camus de Venasque	France
Bigarreau Cœur de Pigeon Tardif	France
Bigarreau Grand	France
Bigarreau Maria Gaucher	France
Bigarreau Noir d'Ecully	France
Bigarreau Saint Bruno	France
Bruelles	France
Durette	France



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<b>Accession name</b>	<b>Partner</b>
Etienne Thuilleaux	France
Guigne Douce du Champ de l'air	France
Merveille de Saint Genis-Laval	France
Jerusalem	France
Olivette	France
Saint Georges	France
Versaillaise	France
Xapata	France
Dolleseppler	Germany
Große Prinzessin	Germany
Hedelfinger	Germany
Kassins Frühe	Germany
Knauffs Schwarze	Germany
Kronprinz von Hannover	Germany
Cornetta;Cornina;Corniola;Cornuzza;Barzizza	Italy
Durona di S. Giovanni	Italy
Durone Tardivo di Valstaffora	Italy
Morandina	Italy
Morena	Italy
Strazdes Agrais	Latvia
Talsu 1	Latvia
Vidzemes Sārtvaidzis	Latvia

**Polyploid accessions**

<b>Accession name</b>	<b>Partner</b>
Griotte de Schaerbeek (4n)	Belgium
Griotte de Schaerbeek AR1 (4n)	Belgium
Divlja bijela (3n)	Bosnia and Herzegovina
Bigarreau Coeur (3n)	France
Blancale precoce (3n)	France
Blancale tardive (3n)	France