

**Identification of a representative set of
Prunus domestica accessions of European origin,
well documented and characterized,
to be included into the AEGIS system
(PRUNDOC)**

1 January 2015 – 31 December 2015

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Revised version, September 2016

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INTRODUCTION

Following the ECPR Call for Activity proposals in 2014, Daniela Giovannini, Chair of the *Prunus* WG, invited all members of the WG to present project ideas for the Call. Of the proposals presented, that of Stein Harald Hjeltnes to establish PRUNDOC was selected. The project content was mainly worked out by these two members, and an invitation to take part was sent out to the WG *Prunus* members. A total of nine partners signed an Expression of Interest. In addition, the Chair of the *Malus/Pyrus* WG, Marc Lateur, was included in the group as self-funded partner (see partners' details in [Activity Proposal](#)). This was highly appreciated in order to take advantage of possible synergic effects with the ECoHisPy project, led by Marc Lateur and presented by the *Malus/Pyrus* WG in the same Call. During the project, the Swedish University of Agricultural Sciences (SLU) Balsgård offered data as a self-funded partner.

PRUNDOC was accepted by the ECPGR Steering Committee in December 2015.

According to the AEGIS website, three of the nine original partner countries have not yet signed the AEGIS Memorandum of Understanding (MoU), namely France, Greece and Serbia. Consequently, the accessions from these countries cannot be flagged as part of the European Collection until the MoU has been signed.

MATERIAL AND METHODS

The PRUNDOC partners agreed that a meeting to specify the work and protocols was necessary, and all partners were asked to present their candidates for inclusion into the European Collection at this meeting, that was held 20-21 April 2015 in Leuven, Belgium. Services for arranging the meeting were provided by ECPGR Secretariat. All presentations, protocols, Excel sheets, etc. were uploaded to Dropbox, in order to obtain a common platform to find these key resources. In addition emails with revision of documents were sent to the partners whenever situations occurred that required action.

Accessions that were selected from the partners were *Prunus domestica* selections of domestic origin, with long growing history. A few *Prunus cerasifera* accessions were added by the Slovak partner, and two cultivars of Estonian origin were offered for phenological description by the Latvian partner. The partners offered from 3 to 16 accessions for full description, and a total of approximately 100 accessions were selected. Some of the cultivars selected are still being commercially propagated by nurseries; however they are included into the European *Prunus* database and the National Coordinators have to define if they meet the criteria for the European Collection.

For SSR analyses the laboratory at the Swedish University of Agricultural Sciences (SLU) Balsgård, was selected, as this laboratory and collaborators had recently published work on genotyping of *Prunus domestica* germplasm (Sehic et al. 2015a, 2015b). Leaf samples of an agreed number of accessions were sent to the laboratory in May-June 2015 according to specifications given by the lab. Due to the costs of running accurate analyses and evaluation of bands of the samples, the budget covered 36 accessions, and the decision regarding the number of accessions that could be analysed for each partner was made at the project meeting in Leuven.

The phenotyping was carried out according to the IBPGR/CEC descriptors (Cobianchi and Watkins 1984), Szalatnay and Bauermeister (2006) and UPOV (1977) as specified in Annex I (page 5). Photographs in the field were carried out following an agreed method where a piece of white paper was held below the fruits when taking the picture, and an example picture was distributed to illustrate how close one should take the picture. The pictures of fruits in the laboratory were taken according to specifications given by Szalatnay and Bauermeister (2006).

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RESULTS

The plans made at the meeting in Leuven had to be adapted during the course of the project. The Austrian partner could not participate and had to withdraw. Regarding phenological descriptor data, a few accessions could not be described due to lack of fruits. Regarding the SSR analysis, the number of accessions was increased from 3 to 4 for some partners to make full use of the original budget which covered samples from Austria.

The final numbers of accessions phenotyped and delivered for SSR are given in Table 1. More details on the phenotyped accessions are available in Annex II to this report, and in the Excel table available online ([here](#)).

Table 1. Number of plum accessions described in PRUNDOC according to standards

Country	Number of accessions		Comments
	Phenotyped	Delivered for SSR	
France	18	4	Two of the four accessions for SSR do not belong to the group of phenotyped accessions
Germany	7	4	Accessions phenotyped included one accession of Czech origin + 6 accessions with only passport data
Greece	7	4	
Italy	14	4	
Latvia	8	4	Accessions phenotyped included two accessions of Estonian origin One of the SSR accessions does not belong to the group of phenotyped accessions
Norway	5	3	
Serbia	11	4	
Slovakia	10	4	Accessions delivered for SSR included one <i>cerasifera</i> and three <i>domestica</i>
Sweden	5	1	Self-funded partner The SSR accession does not belong to the group of phenotyped accessions
Total	85	32	
Belgium	(6)	(6)	Self-funded partner Data not delivered yet
Final total expected	91	38	

Except for Belgian data, all data and pictures were sent to the European *Prunus* Database in Bordeaux, France (<http://www.bordeaux.inra.fr/euplumdb/>). Data will be uploaded in the EPDB by the database manager after reception of the data from Belgium.

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The partners were asked to send these data also to their National Focal Points for uploading in the EURISCO catalogue.

According to the Activity Proposal it was expected that the WG Chair, together with the project team, make a list of Most Appropriate Accessions (MAAs) to be flagged as AEGIS accessions.

The 38 PRUNDOC accessions analysed with SSRs (highlighted in green in the list provided in Annex II) showed distinct SSR profiles. Due to their genetic uniqueness, these accessions can be considered MAAs, hence eligible for inclusion in the European Collection. .

Also the 85 PRUNDOC accessions described for passport and First Priority Descriptors (FPDs) (Annex I) and listed in Annex II are in principle MAAs, as long as the genotyping of the entire set of PRUNDOC accessions will not reveal duplicates.

On the other hand, as the phytosanitary status of PRUNDOC accessions is unknown, they might not fulfil the phytosanitary requirements to be safely distributed. However, 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.

The PRUNDOC project was presented at the III EUFRIN Plum and Prune Working Group Meeting on Present Constraints of Plum Growing in Europe at Skopelos, Greece, 20-21 August 2015, and the manuscript will be published in an issue of *Acta Horticulturae*.

Expected products and final results

The “expected products/results” from PRUNDOC specified in the Activity proposal were partially fulfilled, as below:

- The list of First Priority Descriptors (FPDs) to describe plum accessions of the European Collection was agreed (see [Minutes of the PRUNDOC meeting in Leuven](#) and Annex I).
- The total number of accessions described was slightly lower than the expected 100: at time of finalising this report, 85 accessions were verified, characterized according to FPDs and prepared for uploading into the European *Prunus* Database and in EURISCO (see Annex II); this total should increase to 91 accessions upon reception of data for the 6 accessions from Belgium.
- Data uploads to the EPDB and EURISCO are yet to be performed.
- The expected “Guidelines for developing a Plum-specific procedure for the selection of MAAs, to be extended in future to other *Prunus* species” were not finalized, as PRUNDOC did not succeed in reaching consensus on the selection process of MAAs. In principle, all clonally propagated fruit crops have the same challenges to be flagged as belonging to the European Collection due to a wide range of synonyms and homonyms. However, PRUNDOC partners agreed that the specific guidelines should include precise protocols to be followed for proper verification of synonyms and homonyms and virus-free status. Genetic profiles, coupled with harmonized and accurate characterization and evaluation, are needed to exclude duplicates and include in the European Collection as much as possible the existing diversity, and the phytosanitary status must be tested to allow safe distribution.
- **The 85 PRUNDOC accessions listed in Annex II and described in the Excel table available online ([here](#)) are recommended for inclusion into the European Collection by the respective National Coordinators. The 38 plum accessions whose genetic uniqueness has been proven, should be prioritized for inclusion.**

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- Establishment of a network for further work on characterization and evaluation of plum genetic resources: PRUNDOC partners have published and will publish data from the project, and present results from the project at international conferences. These activities will stimulate partners to participate in new projects, and motivate new partners to take part.

RECOMMENDATIONS

PRUNDOC had few partners compared to the total number of members in the *Prunus* WG. Important plum germplasm holding countries like Romania and UK were not partners in the project, and more countries should be included in future projects.

PRUNDOC had a project start-up meeting, and it is advisable for this kind of projects to arrange this kind of meeting, with a defined agenda including presentations from each member where the suggested contribution is specified.

The amount of money for this kind of projects is extremely small to expect any significant outcome, and a large in-kind contribution is required. This kind of projects will however stimulate taking small steps and bridging the partner institutes. It should be noted that for clonally propagated fruit crops the issue of the requirements and actions to be taken for the inclusion of accessions into the European Collection should be followed-up as they do not seem to be clearly understood at the collection curator's level for field collections.

The countries maintaining the PRUNDOC accessions identified for inclusion into the European Collection are encouraged to flag these accessions in EURISCO as part of AEGIS.

BIBLIOGRAPHY

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- Sehic J, Nybom H, Hjeltnes SH, Gaši F. 2015b. DNA marker-assisted identification of *Prunus* Accessions. *Acta Horticulturae* 1101:153-158. DOI: 10.17660/ActaHortic.2015.1101.23 (<http://dx.doi.org/10.17660/ActaHortic.2015.1101.23>)
- Szalatnay D, Bauermeister R. 2006. [Obst-Descriptorien NAP / Descripteurs de fruits PAN](#). Agroscope Changins-Wädenswil ACW and Vereinigung FRUCTUS. Stutz Druck AG, Wädenswil, Switzerland. 89pp
- UPOV. 1977. Guidelines for the conduct of tests for distinctness, homogeneity and stability. European plum (fruit varieties, rootstocks excluded). UPOV, Geneva.

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ANNEX I. FIRST PRIORITY DESCRIPTORS FOR PRUNDOC

Descriptor name	References(*)	Details
Phenology: time of beginning of flowering	(2)	Time of beginning of flowering (1-9 numbered scale) using stage BBCH61
Phenology: time of beginning of fruit ripening	(2)	Season of maturity for picking (1-9 numbered scale) using stage BBCH89
Fruit: size	(1)	Average weight of fruit (1-9 numbered scale)
Fruit: shape (in lateral view)	(1)	Fruit shape (1-9 numbered scale)
Fruit: skin ground colour (after removing bloom)	(1)	Colour of the skin of fully mature fruits (1-9 numbered scale)
Fruit: skin overcolour (after removing bloom)	(1) (2)	Over colour of the skin (1-9 numbered scale)
Fruit: colour of flesh	(1) (3)	Colour of flesh (1-9 numbered scale)
Fruit: degree of adherence to flesh	(2)	Stone adherence to flesh (1-3 numbered scale)
Fruit: eating quality (global taste)	(2)	At optimum eating time (1-9 numbered scale)
Fruit: sensorial analysis of sugar/acid ratio	(1)	Subjective assessment (1-9 numbered scale)
Fruit: flesh firmness	(1) (2)	Subjective assessment (1-9 numbered scale)
Stone: shape (in lateral view)	(1)	Stone shape in lateral view (1-9 numbered scale)

(*) References (see above, Bibliography for full citations)

(1) Szalatnay and Bauermeister 2006

(2) Cobianchi and Watkins 1984 (IBPGR descriptors)

(3) UPOV 1977

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ANNEX II. PLUM (*PRUNUS* SPP.) ACCESSIONS DESCRIBED IN PRUNDOC

For full data see Excel file, available online ([here](#)).

Notes:

- All accessions are *P. domestica* except for the three accessions marked (*).

- Accessions analysed for SSR are highlighted in green.

Some additional accessions were also analysed for SSR but are not included in this list (6 accessions from Belgium, 2 from France, 1 from Latvia and 1 from Sweden). A poster on SSR data was presented at the XIth International Symposium on Plum and Prune Genetics, Breeding and Pomology held 17-21 July 2016 in Freising-Weihenstephan, Germany (poster also available online [here](#)).

- Full names of institutes are listed at the end of the table.

Country of the holding institute	Institute code	Accession number	Accession name
France	FRA057	P0062	Abricotée Jaune
	FRA057	P0072	Mirabelle Parfumée de Septembre
	FRA057	P0302	Impériale Murat
	FRA057	P0328	Madame Guttin
	FRA057	P0389	Reine-Claude Davion
	FRA057	P0410	Quetsche de Wagenstadt
	FRA057	P0449	Impériale Epineuse
	FRA057	P0812	Double Robe
	FRA057	P1671	Verdanne
	FRA057	P1808	De Montfort
	FRA057	P2737	Prune de Vars
	FRA057	P3344	Prune de Chien
	FRA057	P3692	Bonjour
	FRA057	P3705	Saint Léonard
	FRA057	P3720	Oustenque bleue (Dupuy)
	FRA057	P3726	Prune de Chien
	FRA057	P3764	Briquetch
	FRA057	P3768	Madame Bonnard
Germany	DEU451	PFL0011	Graf Althanns Reneklode
	DEU451	PFL0012	Gräfin Cosel
	DEU451	PFL0014	Haferpflaume
	DEU451	PFL0002	Bühler Frühzwetsche
	DEU451	PFL0010	Ersinger Frühzwetsche
	DEU451	PFL0030	Ruth Gerstetter
	DEU451	PFL0022	Flotows Mirabelle
Greece	GRC012	PD0003	Mpardaki elliptic
	GRC012	PD0004	Mpardaki circular
	GRC012	PD0005	Glyka Skopelou
	GRC012	PD0006	Ksina Skopelou
	GRC012	PD0007	Avgata Skopelou
	GRC012	PD0001	Asvestochoriou
	GRC012	PD0002	Praousti

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Country of the holding institute	Institute code	Accession number	Accession name
Italy	ITA380	249	Sighera
	ITA380	59	Caleca
	ITA380	196	Paradisu
	ITA380	214	Prunella
	ITA380	240	Sanacore
	ITA380	189	Muninca
	ITA380	220	Ramassin Giallo
	ITA380	62	Cariadoggia
	ITA380	438	Agostana
	ITA380	216	Ramassin
	ITA380	219	Ramassin di Pagno
	ITA380	128	Gaiotti 1
	ITA380	147	Lazzarinu
	ITA380	264	Susino Secondo
Latvia	LVA015	LVA01010	Latvijas Dzeltēnā Olplūme
	LVA015	LVA01009	Lāse
	LVA015	LVA01013	Latvijas Sarkanā Olplūme
	LVA015	LVADPru2	Juliuss
	LVA015	LVA01006	Aizputes
	LVA015	LVA02549	Zilā Lāse
	LVA015	LVA01008	Kārsavas
	LVA015	LVADPru1	Suhkruploom
Norway	NOR053	255	Edda
	NOR053	1389	Eikerplomme
	NOR053	1429	Helgøyplomme
	NOR053	1398	Tråneplomme
	NOR053	1422	Blåplomme frå Lier
Serbia	SRB028	PD 0102	Zlatka
	SRB028	PD 0201	Crvena ranka
	SRB028	PD 0204	Govedaca
	SRB028	PD 0207	Turgulja
	SRB028	PD 0203	Rosička zutka
	SRB028	PD 0205	Gorcivka
	SRB028	PD 0206	Metlas
	SRB028	PD 0101	Pozegaca
	SRB028	PD 0103	Cacanska lepotica
	SRB028	PD 0104	Cacanska rodna
	SRB028	PD 0202	Moravka
Slovakia	SVK001	svk-prundoc-004	MY-BO-1 (*)
	SVK001	svk-prundoc-010	MY-VS-1 (*)
	SVK001	svk-prundoc-001	Kozlienka
	SVK001	svk-prundoc-002	Trencianska okruhlicka
	SVK001	svk-prundoc-003	S-BO-1
	SVK010	svk-prundoc-007	Droblienka
	SVK010	svk-prundoc-005	Tina
	SVK010	svk-prundoc-008	Duranzia
	SVK010	svk-prundoc-009	Myrobalan z Obdokoviec (*)
	SVK010	svk-prundoc-006	Edita

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Country of the holding institute	Institute code	Accession number	Accession name
Sweden	SWE051	BAL BF0229	Hackman
	SWE051	BAL BF0243	Ive
	SWE051	BAL BF0337	Opal
	SWE051	BAL BF0237	Herman
	SWE051	BAL BF0249	Jubileum

(*) = *P. cerasifera*

Decoded institute codes

Country	INSTCODE	Full name
France	FRA057	French National Institute for Agricultural Research (INRA), Fruit Research Station of Bordeaux
Germany	DEU451	Julius Kühn-Institut, Federal Research Centre for Cultivated Plants
Greece	GRC012	Institute of Plant Breeding and Genetic Resources, Department of Deciduous Fruit Trees in Naoussa
Italy	ITA380	Consiglio per la Ricerca in agricoltura e l'analisi dell'Economia Agraria, Unità di ricerca per la Frutticoltura di Forlì (CREA-FRF)
Latvia	LVA015	Latvia State Institute of Fruit-Growing
Norway	NOR053	Njoes naeringsutvikling
Serbia	SRB028	Faculty of Agriculture, University of Novi Sad
Slovakia	SVK001	Plant Production Research Institute Piešťany
Slovakia	SVK010	Research Institute of Fruit and Ornamental Plants Bojnice
Sweden	SWE051	Department of Plant Biology, Swedish Agricultural University