Training course: Use of Agrobiodiversity information in GBIF and other databases

Lisbon, 28 - 30 June 2017

Exercise 2:
Characterizing CWR Diversity: Assessing Different Data Sources

How to use this exercise and report template?

1. **Please download this file from the link https://goo.gl/YDh5Ab as a Word docx file.**
2. **Suggestion: rename it as "Exercise_2_group#.docx" (replace # by the number/name of your group)**
3. **Fill in the responses in the Task sections of the file.**

How to deliver the results report

1. **Create (if you haven't done so) a folder for your group at the link https://goo.gl/DXQ3gi.**
2. **Upload all the report files and attachments to the newly created folder. Name attachment files consistently as "Exercise_1_attachment#"**
3. **Upload result report of all your exercises to the same folder**

Introduction

Crop wild relatives (CWR) are species that are found in natural ecosystems, which tend to contain greater genetic variation than crops because they have not passed through the genetic bottleneck of domestication (Maxted and Kell 2009). The contribution of CWR is growing and has largely been achieved through the donation of useful genes for pest and disease resistance, and abiotic stress tolerance (Ford-Lloyd et al. 2011). To establish the degree of crop relatedness, Harlan and de Wet (1971) established the concept of the "Gene Pool", the closest relatives being found in the primary gene pool (GP1) and the more remote ones in the secondary gene pool (GP2), while the very remote ones pertain to the tertiary gene pool (GP3).

The Euro-Mediterranean region has a significant endemic genetic diversity of global value in crops of major socio-economic importance and their wild relatives, such as oats (Avena sativa L.), carrot (Daucus carota L.), apple (Malus domestica Borkh.) and sugar beet (Beta vulgaris L. subsp. vulgaris) (Kell et al. 2007). Particularly, sugar beet is the primary crop of the genus Beta L. and is the most economically valuable crop species in the Order Caryophyllales (Romeiras et al. 2016). B. vulgaris subsp. vulgaris also includes crop types used for root and leafy vegetables used since antiquity for fodder. All are ultimately derived from the wild sea beet (B. vulgaris subsp. maritima (L.) Arcang.), that is predominantly found in coastal areas around and adjacent to the Mediterranean Sea.

Our case study is focused on sugar beet species and by integrating different tools we want to characterize the *Beta* CWR diversity. We will look for all the species diversity within the *Beta* gene pool and based on the gene pool concept we want to provide a pragmatic way to establishing the degree of CWR relatedness and thus assists in establishing conservation priorities. We will used different data sources to get a full picture of sugar beet diversity, which are commonly found in coastal areas of the Western Mediterranean Region.

Task 1. IDENTIFICATION OF THE GENE POOL DIVERSITY FOR THE CROP / CASE-STUDY GROUP

a) Locate scientific plant names stored in "The Plant List" (www.theplantlist.org/) for *Beta* gene pool species found in Western Mediterranean Region (see Annex I). For each species we want to obtain information about nomenclatural details.

b) Compare the results of "The Plant List" with those obtained from Flora-on (http://flora-on.pt/) and get additional data of the flora of Portugal.

Task 2. IDENTIFICATION OF POTENTIAL AREAS FOR CROP CULTIVATION BASED ON OCCURRENCE OF THE CWR SPECIES

c) Obtain the occurrence data for the studied species, using GBIF. Understand how to download a set of distribution records. (www.gbif.org; http://dados.gbif.pt; http://datos.gbif.es/)

Task 3. DETERMINE THE CONSERVATION RISK OF WILD SPECIES

d) Assess the conservation status of each species (http://www.iucnredlist.org/), in order to highlight taxa threatened with extinction, and therefore promote their conservation.

Task 4. DISCUSS THE ADVANTAGES OF INTEGRATE DIFFERENT DATA SOURCES TO GET A PICTURE OF THE CWR DIVERSITY

e) Compare these data with other databases, namely with "Mediterranean plants database" (www.emplantbase.org/), which provides an on-line database and information system for the vascular plants of Europe and the Mediterranean region; and "European catalogue for plant genetic resources" (ECPGR - www.ecpgr.cgiar.org/), which facilitate the increased utilization of plant genetic resources in Europe.

References

Ford-Lloyd BV, Schmidt M, Armstrong SJ, Barazani O, Engels J, Hadas R, et al. 2011. Crop wild relatives-undervalued, underutilized and under Threat? BioScience; 61: 559–565. doi: 10.1525/bio.2011.61.7.10

Harlan JR, de Wet JMJ. 1971. Towards a rational classification of cultivated plants. Taxon 20: 509–517.

Kell SP, Jury SL, Knüpffer H, Ford-Lloyd BV, Maxted N. 2007. PGR Forum: serving the crop wild relative user community. Bocconea; 21: 413–421.

Maxted N, Kell S. 2009. Establishment of a global network for the In Situ conservation of Crop Wild Relatives: status and needs. FAO consultancy report, Commission on Genetic Resources for Food and Agriculture. Rome; pp. 1–265.

Romeiras MM, Vieira A, Silva D, Moura M, Santos-Guerra A, Batista D, Duarte MC, Paulo O.S. 2016. Evolutionary and biogeographic insights on the Macaronesian Beta-Patellifolia species (Amaranthaceae) from a Time-Scaled Molecular Phylogeny. PLoSONE 11(3): e0152456. doi:10.1371/journal.pone.0152456

ANNEX

Species of *Betoideae* Ulbr. a small subfamily of the Amaranthaceae**:**

This subfamily comprising five or six genera:

Beta

***Patellifolia* A.J.Scott, B.V.Ford-Lloyd et J.T.Williams**

***Aphanisma* Nutt. ex Moq.**

***Oreobliton* Durieu**

***Hablitzia* M.Bieb.**

***Acroglochin* Schrad. ex Schult.**

Species found in Western Mediterranean Region:

Beta vulgaris* subsp. *vulgaris

Beta vulgaris* subsp. *maritima

***Beta macrocarpa* Guss.**

***Beta patula* Aiton**

***Patellifolia patellaris* (Moq.) A.J. Scott, Ford-Lloyd & J.T. Wil**

***Patellifolia webbiana* (Moq.) A. J. Scott, Ford-Lloyd & J. T. Williams**

***Patellifolia procumbens* (C. Sm. ex Hornem.) A. J. Scott, Ford-Lloyd & J.T. Williams**

NOTE: Three of these species are endemic in the Macaronesian Islands: *B. patula* in Madeira archipelago; *P. webbiana* in the Canary Islands and *P. procumbens* which is found in all the Macaronesian archipelagos except in the Azores.

The relationships between and within these species are still far from resolved especially with regard to the acceptance of the genus *Patellifolia*. This genus was formerly included in section Procumbentes of the *Beta* genus.