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*The RIBES seed-banks
for the conservation of the
Crop Wild Relatives (CWR)*

RIBES series 2



Ex-situ conservation of Crop Wild Relatives in Sardinia: status and trends

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Crop Wild Relatives (CWR) are wild plants with close genetic relationship to the domesticated crops (Harlan & de Wet, 1971; Maxted et al., 2006). According to Harlan and de Wet (1971) the classification of CWR is based on the degree of genetic relatedness to domesticated plants on the basis of the presence of primary, secondary and tertiary gene pool. Usually, wild plants most closely related to crops are inserted as high priority species (HPS), respect to others more genetically distant, because taxa with primary gene pool are more easily used in crop improvement (Heywood et al., 2007; Maxted & Kell, 2009). Today, it is widely recognized that CWR are an important resource for human and animal food because they can be used for the genetic improvement of cultivated plants that could be more resistant to biotic and abiotic stresses (Maxted et al., 2006). Moreover, some of them have relationships with many socio-economically important crops widely used for food, forage, fodder, beverage, food additive, oil, medicinal, ornamental and forestry crops (Vincent et al., 2013). CWR are also used for food security and to ensure and support agricultural productivity in a global context where the human population increase and climate change are accelerated in the last years (Maxted et al., 2015).

Europe is considered an area where many CWR occur so representing an important centre of diversity of many crops (Maxted et al., 2015). Currently, it is being done very little for their protection and conservation: only 4% of these plants are stored in the seed banks (Dias & Gaiji, 2005). For this reason, it is necessary to carry out joint actions among institutions and research organizations to implement common protocols for the protection and conservation of these important genetic resources. As argued by Maxted and Kelly (2009), many species of CWR are under constant threat due to anthropic factors and climate change. For these reasons, we need of *in situ* and *ex situ* conservation projects to preserve and manage these critical wild plants with the aim of

their effective protection and conservation.

The Sardinian Germplasm Bank (BG-SAR) is part of the *Hortus Botanicus Karalitanus* (HBK) of the University of Cagliari. The BG-SAR preserves, studies and manages the germplasm of Sardinian endemic or threatened taxa and of the “policy species” inserted in the Habitat Directive 92/43/EEC, CITES and Bern convention (Bacchetta et al., 2004; Atzeri et al., 2012; Mattana et al., 2012; Porceddu et al., 2015). BG-SAR participates in international seed conservation consortia, such as the *European Native Seed Conservation Network* (ENSCONET; <http://ensconet.maich.gr>), the *Network of Mediterranean plant conservation centres* (GENMEDA; www.genmeda.org) and, at national level, it is a founding member of the *Italian Network of Germplasm Banks for the Ex Situ Conservation of Native Flora* (RIBES; www.reteribes.it). In the last 10 years, although the primary aim and studies were focused on the conservation of the endemic flora of the Mediterranean ecosystems (Porceddu et al., 2015), particular interest was provided to the CWR, landraces and useful plants of Sardinia. Moreover, several collaborations were carried out through projects with national entities such as *Ente Foreste della Sardegna* (EFs), *Agenzia per la Ricerca in Agricoltura* (AGRI Sardegna), *Stazione Consorziiale Sperimentale di Granicoltura per la Sicilia*, *Consiglio Nazionale delle Ricerche* (CNR) - *Istituto di Scienze delle Produzioni Alimentari* (ISPA), and through several Ph.D. thesis in Environmental and Applied Botany at the University of Cagliari. In particular, in the last years, special attention was given to the domestication processes of cultivated crop plants and to the relationship of CWR with the actual agrobiodiversity of Sardinia (Orrù et al., 2012; Sabato et al., 2015; Uccesu et al., 2015; Piras et al. 2016).

Moreover, recently, the BG-SAR has increased the efforts for the protection and conservation of CWR.

To evaluate the effectiveness of the conservation in BG-SAR, considering the Global Priority List of CWR mentioned by Vincent et al. (2013), we focused on the genera of the Italian territory and checking what of them were effectively conserved in our base collection (-25°C) (Table 1). To date, BG-SAR preserve 195 accessions of CWR relative to

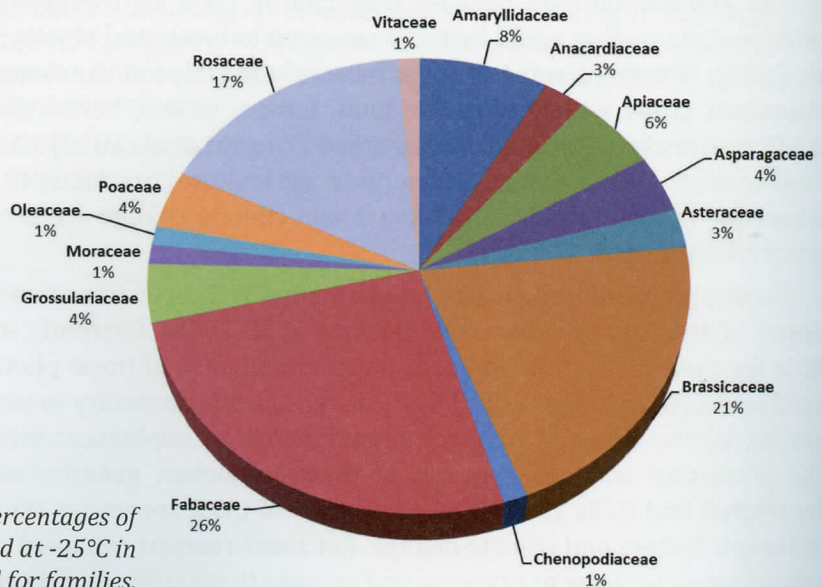


FIGURE 1. Percentages of accessions preserved at -25°C in BG-SAR, subdivided for families.

Family	Number of CWR	Genus	Number of CWR	Number of accessions
Amoryllidaceae	6	<i>Allium</i>	6	8
Anacardiaceae	2	<i>Pistacia</i>	2	6
Apiaceae	4	<i>Daucus</i>	4	5
Asparagaceae	3	<i>Asparagus</i>	3	6
Asteraceae	2	<i>Lactuca</i>	1	2
		<i>Cynara</i>	1	1
Brassicaceae	15	<i>Barbarea</i>	1	2
		<i>Brassica</i>	11	36
		<i>Hirschfeldia</i>	1	1
		<i>Raphanus</i>	1	1
		<i>Sinapis</i>	1	3
Chenopodiaceae	1	<i>Chenopodium</i>	1	1
Fabaceae	19	<i>Lathyrus</i>	2	2
		<i>Medicago</i>	6	18
		<i>Vicia</i>	5	5
		<i>Lupinus</i>	5	7
Grossulariaceae	3	<i>Ribes</i>	3	18
Moraceae	1	<i>Ficus</i>	1	1
Oleaceae	1	<i>Olea</i>	1	31
Poaceae	3	<i>Elymus</i>	2	9
		<i>Hordeum</i>	1	1
Rosaceae	12	<i>Malus</i>	1	1
		<i>Potentilla</i>	2	2
		<i>Prunus</i>	7	7
		<i>Pyrus</i>	2	2
Vitaceae	1	<i>Vitis</i>	1	19
Total	73	25	72	195

TABLE 1. List of CWR preserved at BG-SAR, with detail of family, genus and number of accessions

72 taxa, related to 14 families and 25 genera (Figure 1). The most represented families are Fabaceae (26%), Brassicaceae (21%) and Rosaceae (17%), among the genera, *Brassica*, *Prunus*, *Allium* and *Medicago* have the highest number of taxa (Figure 1).

The completed date list of the CWR present in Sardinia is in progress. In the next future the objective of BG-SAR is to classify the Sardinian CWR on the basis of the conservation priority criteria according to Maxted and Kell (2009), with the aim to preserve in the seed bank the most endangered CWR.

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