DOI: 10.17707/AgricultForest.63.2.02

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THE LEGACY OF COLLECTING MISSIONS TO THE VALORISATION OF AGRO-BIODIVERSITY

SUMMARY

The history of the civilizations is deeply linked to the history of agriculture, and this has direct links to germplasm collecting and management.

Plant collecting activities date back to the beginning of agriculture, with the first steps of plant domestication.

Since the most remote times, mankind has depended on plant species collecting to address its basic needs. For the same reasons, or for cultural and economic reasons, for millennia, people collected and carried seeds, cuttings, seedlings and plants from the places they visited or settled in, and whenever they inhabited new places, they carried the species they knew and which cultivation they mastered.

The germplasm collecting is an historic activity used in the conservation of genetic resources, especially species for food and agriculture and represents an activity of primary importance within the genetic resources conservation strategies.

Germplasm collecting missions have the following main goals: to prevent genetic erosion; to expand or complete the genetic base available in the existent collections; and to meet specific needs (breeding programmes, research or development).

Between 1977 and 2014, Banco Português de Germoplasma Vegetal (BPGV), carried out 126 collecting missions in Portugal, which resulted in 12,540 accessions of several species.

The history of collecting plant genetic resourcesin the world, its connection to plant dissemination among the continents, and the plant germplasm collecting missions carried out by the BPGV in the last 40 years is the study object of this communication, in order to demonstrate the contribution of collecting missions to the valorisation of agro-biodiversity.

Keywords: collecting missions, Genebank, Portugal

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Paper presented at the V Encontro Rural RePort and the XV Congreso de Historia Agraria de la SEHA “Old and New Worlds: The Global Challenges of Rural History. Lisbon, 27-30 January 2016".

Notes: The authors declare that they have no conflicts of interest. Authorship Form signed online.

INTRODUCTION

Plant exploration is one of the oldest activities of humanity. Since the beginning of human civilization, people collect and carry around with them new and useful plants from faraway locations. In addition, whenever people explored new territories and settled in new lands, they took with them seeds and seedlings.

Plant exploration is a fascinating study field that has been attracting many adventurists, naturalists, travelers and plant hunters. However, the golden age of plant exploration and collecting was the later part of eighteenth century when a wider concern on plants of economic utility arose, with emphasis on their introduction (Arora R.K. 1991).

From the moment when it was discovered that the plant genetic diversity is the key component of global food security, the collecting missions began to provide genetic variation useful to crop improvement and to conservation of plant biodiversity. Plant collecting has in fact been one of the most powerful stimuli to exploration through the ages. (IPGRI *et al.*, 1995).

History of plant germplasm collecting

The search for exotic plants and new crops and varieties is linked to human history. With the beginning of agriculture, which replaced the collected species of wild plants by crop cultivation, naturally arose research, discovery and introduction of new crops and new farming techniques, through travel, trade and conquest.

The first recorded plant exploration expeditions took place in 2500 BC, when the Sumerians made excursions in Asia Minor in search for grapes, figs and roses (Walter and Cavalcanti, 2005).

Records also show earlier exploits of Sankhkara Mentuhotep III (2010-1998 BC), the Egyptian pharaoh, who sent ships to the Gulf of Aden (Yemen) to collect cinnamon (*Cinnamomum verum* J. Presl) and cassia (*Cinnamomum aromaticum* Nees), which were used in the embalming of the dead (Damania, 2008; Janick, 2007).In 1495 BC, the Egyptian Queen Hatshepsut sent a team under Prince Nehasito the Horn of Africa, Northeastern Coast of Africa(i.e., the area that now includes Somalia, Djibouti, Eritrea, and Ethiopia), with the main objective of collecting plants whose fragrant resins produced frankincense (*Boswellia serrata* Roxb. ex. Colebr.) and myrrh [*Commiphora myrrha* (Nees) Engl.] (Damania, 2008; Janick, 2007; Walter and Cavalcanti, 2005; IPGRI *et al.*, 1995). The history of Egyptian civilization is marked by persistent collection and domestication of plants from the region and their subsequent introduction in the Nile valley (Damania, 2008; Janick, 2007).

Streams of immigrants and captives, as well as invasions by others such as the Persians (492-490 BCand 480-479 BC), the Greeks (335-323BC) and the Romans (27 BC-476 AD) contribute to new introductions of germplasm and technology.

Alexander the Great (356- 323BC), son of Philip of Macedonia and student of Aristotle, had a profound influence on the introduction of west Asian plants in Europe. Alexander conquered Persia, Turkistan, Afghanistan, Pakistan, and north west India, including the Indus Valley. Greek settlements and commercial posts were founded between the Mediterranean and India along the western section of trade routes, which became known as the Silk Road. Alexander's campaign led to increased botanical knowledge concerning herbs and spices, and the cities that he established became the western routes for many Asian fruits. With the conquest of Egypt, the new city of Alexandria became the most important trading center between the Mediterranean and Indian Ocean, and was known as the Gateway to the East. (Janick, 2007).

The Roman Empire (27 BC-476 AD) is responsible for the introduction of a large amount of agricultural crops (cereals, forage, vegetables, vines, medicinal and aromatic plants, fruit trees) in the conquered territories (Ferrão *et al*., 2008). The Roman Empire was one of the largest in history and ruled a continuous territorial extension throughout Europe, North Africa and the Middle East, occupying an area of about five million square kilometers, which is currently apportioned among forty countries.

Although there are few detailed records and despite the fact that germplasm was not necessarily the objective of the incursions, many collecting missions and the introduction of germplasm have always existed in all ancient civilizations.

In 1011-1012, Emperor Chen-Tsung ordered the shipment of 30,000 Champa varieties of rice from Vietnam to China's Yangtze Delta, to improve agriculture. This was perhaps the first large-scale germplasm introduction (IPGRI *et al*., 1995; Twitchett and Fairbank, 2009).

Agricultural technology and new crops via the Arabs reached the rest of Europe after the incursions of the West into Jerusalem (the crusades) and from the re-conquest of the Iberian Peninsula by Christian warriors (Janick, 2007).

At the same time, the aggressive mounted tribes of Central Asia, consisting of Turks, Mongols and Tibetans, became a dominant power, under the leadership of Genghis Khan, who was proclaimed ruler of all Mongols in 1206. The Mongol Empire (1206–1368) eventually stretched from Eastern Europe to the Sea of Japan, extending northwards into Siberia, eastwards and southwards into the Indian subcontinent, Indochina, and the Iranian plateau, and westwards as far as the Levant and Arabia. During the Mongol Empire new crops and varieties were introduced in the conquered territories. Mongol invasion into India was a decisive turning point in the subcontinent. The Mughal Empire opened the way for a host of European visitors, missionaries and traders to travel throughout Eurasia. The Mughal gardens still remains in India, indicating the influence of this culture on horticulture (Janick, 2007).

During the 15th and 16th centuries, with the Age of Discovery of the New World, the Iberian navigators and conquerors unwittingly started a major programme of germplasm exchange with the Old World, generating a true food revolution (Ferrão, 2013; Janick, 2007; IPGRI *et al*., 1995; Gusmão *et al*., 1996).

Names like Marco Polo, Henrique the Navigator, Cristóvão Colombo, Bartolomeu Dias, Pedro Álvares Cabral and Vasco da Gama are remembered in various fields of knowledge. These men had as great motivator the search for desired and valuable products of plant origin, known by the generic name of spices. Such products had great value in important families of the Renaissance, who spared no efforts to have seeds, fruits, vegetables, bark, pulp, roots, rhizomes, bulbs, tubers, stems, grains, resins, leaves, herbs and berries at their table (Bracht and Dos Santos, 2011).

The Portuguese navigators and conquerors took with them seeds and seedlings that were known to ensure their own survival andto test how they adapt to new environments. The chroniclers of the Age of discovery mention their introduction on the islands of St. Helena, Cape Verde, São Tomé and Príncipe (which functioned as intermediate stations), African Coast and Brazil's,such as: almond (*Prunus dulcis* (Mill.) D. A. Webb), barley (*Hordeum vulgare* L.), black mustard (*Brassica nigra* L.), borage (*Borago officinalis* L.), cabbage (*Brassica oleracea* L.), carob (*Ceratonia silique* L.), carrots (*Daucus carota* L.), cinnamon (*Cinnamomum* spp.), coriander (*Coriadrum sativum* L.), cucumber (*Cucumis sativus* L.), fennel (*Foeniculum vulgare* Mill.), fig (*Ficus* spp.), garlic (*Alium sativum* L.), lemon (*Citrus limon* (L) Burm.), *lemon balm (Melissa officinalis* L.), lettuces (*Lactuca sativa* L.), melon (*Cucumis melo* L.) mint (*Mentha* spp.), onion (*Allium cepa* L.), orange (*Citrus sinensis* (L.) Osbeck), olive (*Olea europea* L.), pea (*Pisum sativum* L.), pomegranate (*Punica granatum* L.), radish (*Raphanus sativus* L.), rye (*Secale cereale* L.), sugarcane (*Saccharum* spp.), sesame (*Sesamum indicum* L.) spinach (*Spinacia oleracea* L.), turnip (*Brassica rapa* L.), vines (*Vitis* spp.), and wheat (*Triticum* spp.), among other species that were part of long and detailed lists which greatly influenced the agriculture and food of the people where they were introduced (Ferrão, 2004; Ferrão and Loureiro, 2013; Madeira et al, 2008).

In the New World, the Portuguese navigators came into contact with new and numerous plants, which somehow had some immediate use, particularly those who were grown and/or operated by indigenous peoples. Many of these species have earned the seas and eventually succeed to be transported and transplanted by the colonizers to regions as different as the Indian subcontinent, the southern Iberian Peninsula, the northern Europe and the American continent (Bracht and Dos Santos, 2011). From the American continent, the Portuguese collected and brought a huge number of plants. Some of these plants have quickly spread throughout the world and have deeply changed the agricultural scene and alimentary, such as: achiote (*Bixaorelana* L.), avocado (*Persea americana* Mill.), bean (*Phaseolus vulgaris* L.), cacao (*Theobroma cacao* L.), cashew tree (*Anacardium occidentale* L.), custard apple (*Annona* spp.), guava (*Psidium gujava* L.), manioc (*Manihot esculenta*Krantze), maize (*Zea mays* L.), papaya (*Carica papaya* L.), passion fruit (*Passiflora* spp.), peanut (*Arachis hypogaea* L.), peppers and chillies (*Capsicum* spp.), pineapple (*Ananas comosus* L.), potato (*Solanum tuberosum* L.), pumpkins (*Cucurbita* spp.), quinine

(*Cinchona* spp.), runner bean (*Phaseolus coccineus* L.), sunflower (*Helianthus annuus* L.), sweet potato (*Ipomea batatas* L.), tobacco (*Nicotiana tabacum* L.), tomato (*Solanum lycopersicon* L.) and vanilla (*Vanilla planifolia* Jacks. ex Andrews) (Ferrão and Loureiro, 2013).

In this period, there was a great exchange of plants between West Africa and America. The WestCoast of Africaintroduced in America plants consumed by slaves, such as: palm oil (*Elaeis guineensis*a cq.), pearl millet (*Pennisetum glaucum* (L.) R.Br.), sorghum (*Sorghum bicolor* (L.) Moench) and yam (*Dioscorea* spp.). From America to African West Coast, several plants were introduced, for example: cacao (*Theobroma cacao* L.), manioc (*Manihot esculenta* Krantze), maize (*Zea mays* L.), papaya (*Carica papaya* L.), peanut (*Arachis hypogaea* L.), peppers and chillies (*Capsicum* spp.), pineapple (*Ananas comosus* L.), potato (*Solanum tuberosum* L.), sweet potato (*Ipomea batatas* L.), quinine (*Cinchona* spp.), tobacco (*Nicotiana tabacum* L.), tomato (*Solanum lycopersicon* L.) yam (*Dioscorea* spp.) and many fruits (Ferrão, 2013).

The introduction of various species and vegetables, and the diversity of the supply of the first colonizers, served as the basic material for plant breeding, in search for a better adaptation of these species to different soil and climatic conditions.

During the Age of Discovery, the collected plants were sent mainly to European Botanic Gardens in order to adapt to the new weather and soil conditions (Walter and Cavalcanti, 2005). In Portugal, the Botanical Garden of the National Palace of Ajuda (1768) and the Botanical Garden of the University of Coimbra (1772) had a very important role in the philosophic trips carried out in the Portuguese colonies between 1777 and 1808. This vast project, led initially by Domingos Vandelli, had the mission of collecting, preparing, sending and transporting the natural products of the Portuguese colonies established in America, Africa and Asia, in order to discover new plant species to develop agriculture (Pataca, 2011). As the exploration of the tropics by the emerging colonial powers continued, the first Botanic Gardens outside Europe were created, such as those at the Cape of Good Hope (South Africa), Pamplemousses (Mauritius), Buitenzorg (now Bogor, Indonesia), Calcutta (lndia) and Bath (Jamaica). These served as introduction and acclimatization centers for a wide range of crops, fruits, spices and ornamental (IPGRI *et al.*, 1995).

According to Walter and Cavalcanti (2005), the collectors that stood out in the 18th century were: Francis Masson (1741-1806), who collected plants in South Africa, Madeira and the Canary Islands, Azores and West Indies; David Nelson (? -1789) who explored the Middle East and Oceania; George Caley (1770-1829) which collected for over 10 years in Australia; and Joseph Banks (1743-1820) who explored the South Pacific. With Banks's death, the germplasm collecting expeditions were reduced, until in 1841, when William Jackson Hooker (1785-1865) took over part of the activities being succeeded by his son Joseph Dalton Hooker (1817-1911).

Under direction of Sir Joseph Banks (1743-1820), the British carried out many collecting expeditions in the world in the search for species that were potentially useful as food, ornamental, medicinal and timber, and brought back plants to botanic gardens, especially to the Royal Botanic Gardens at Kew, near London. They also established the Botanic Garden at St. Vincent in the Windward Islands in the Caribbean. (Damania, 2008; Walter and Cavalcanti, 2005; IPGRI *et al*., 1995).

In the 19th century and early 20th century, many germplasm collectors also stood out, including Robert Fortune (1812-1880), who collected in China and Japan; George Forrest (1873-1932), who made several expeditions to the Himalayas and to China; Ernest Henry Wilson (1876-1930) who also collected in China; Peter Barr (1825-1909) who explored areas of Spain, Portugal and the Alps; Richard Spruce (1817-1893) who collected for over 20 years in South America, covering major routes in Amazonas and Pará; Frank N. Meyer (1875-1818) who collected in Europe, China, Russia, Korea and Tibet, introducing many species from other continents in North America; David G. Fairchild (1869-1954) who made explorations in different parts of the world, particularly in Asia and South America; and Wilson Popenoe (1892-1975) who explored Central America in the early XX century (Walter and Cavalcanti, 2005; IPGRI *et al* 1995; Ford-Lloyd & Jackson, 1986).

Until the early 20th century, Portuguese, Spanish, British, Dutch and French were particularly active in the dissemination of plants between continents (Walter and Cavalcanti, 2005).

From 1922 to 1940, Nikolai I. Vavilov and his team conducted numerous expeditions in the USSR and in different parts of the world, covering more than 50 countries in Asia, Africa, Central and South America, collecting around 50,000 germplasm accessions. Vavilov organized and took part in over 100 plant collecting missions. His co-workers, including S.M. Bukasov and M.G. Popov, conducted several other missions. His major expeditions outside the Soviet Union included those to Iran (1916), America (1921), Afghanistan (1924), Mongolia (1926), Central and South America (1930), the United States (1932), the Mediterranean region, including Portugal (Bettencourt & Gusmão, 1995), Lebanon, Syria, Ethiopia (1926–1927) and Central Asia (1929). Vavilov's works on the origin and geography of cultivated plant species, has formed the basis of much of the study of plant genetic resources that is performed today. Nowadays, Vavilovis considered to be the father of crop plant exploration and collection (Damania, 2008; IPGRI *et al*., 1995; Loskutov, 1999; Walter and Cavalcanti, 2005).

Germplasm collection and conservation worldwide

After World War II, the Food and Agriculture Organization for the United Nations (FAO) became the leading organization to promote the conservation of plant genetic resources. In 1971, the Consultative Group on International Agricultural Research (CGIAR) was formed with co-sponsorship from FAO, the United Nations Development Program (UNDP) and the World Bank, with the main objective to contribute to the agrobiodiversity's preservation by establishing *ex situ* collection of plant genetic resources. The International Board for Plant Genetic Resources (IBPGR nowadays Bioversity International) was created in 1974 by the CGIAR with the basic function to advance the conservation and use of plant genetic resources for the benefit of present and future generations (IBPGR, 1983).

From 1974 onwards, Bioversity International supported a series of collecting expeditions worldwide, with the objective to systematically collect and conserve landraces cultivated by farmers and their crop wild relatives which were being lost from fields and natural habitats (Bioversity International, 2015).

Collectors from national and international institutions collected over 225,000 plant samples during more than 500 collecting expeditions to most countries of the world. Samples of approximately 4300 different species were collected, with a focus on landraces and crop wild relatives of major crops. The most collected genera were *Oryza*, *Zea*, *Phaseolus* and *Sorghum* with more than 10,000 samples each, followed by *Triticum*, *Vigna*, *Solanum*, *Ipomoea* and *Pennisetum* with more than 5000 samples. This wealth of landraces and CWR was distributed to over 500 genebanks for conservation (Bioversity International, 2015).

During expeditions, for each one of the samples collected, the collectors make notes in field books and fill the forms with passport data about the plant and its environment. They also record valuable knowledge shared by farmers about traits they value in the plants, and the ways they cultivate, harvest and process them. This information recorded by the collectors is a treasure trove of fascinating data. It also contains information that can help us understand better the consequences of climate change and agricultural practices changes (Bioversity International, 2015).

RESULTS AND DISCUSSION

Collecting missions in Portugal

Period from 1930 to 1950

From 1930 to 1950, in Portugal, agronomists and plants breeders were aware that plant genetic resources were the starting point for their breeding programmes, so they carried out the collection and the establishment of several active and breeders' collections in various points of the country. Some examples are cited:

- In 1933, with the creation of the *Estação Agrária de Ensaio de Sementes e Melhoramento de Plantas* in Belém, Lisbon, João de Carvalho eVasconcellos established the first collection of Portuguese wheat. An extensive collection of traditional Portuguese varieties of hexaploid and tetraploid wheat, including 48 varieties of soft wheat and 51 varieties of durum wheat, were collected throughout the territory of Portugal mainland (Vasconcellos, 1933). After the extinction of the *EstaçãoAgrária* in 1936, that collection was transferred to the *Estação de Melhoramento de Plantas*, in Elvas, and nowadays is preserved in the National Genebank (BPGV), in Braga.

- In 1941 at the *EstaçãoAgronómica Nacional* (EAN), located in Oeiras, António Marques de Almeida started the organization, maintenance and enrichment of the collection of the main forage species, traditional and exotic, cultivars and ecotypes, of the most diverse geographical origins in Portugal and from international breeding centres. In 1948, this collection had more than 12,000 species and strains (Campos Andrada, 2011).
- In 1949 at the *Estação de Melhoramento de Plantas*, work of characterization of the genus *Trifolium* was carried out, describing about 40 species of the genus (annual and perennial forms) and indicating the locations of dispersion and forage interest.
- From 1940 to 1950, researchers and maize breeders Luiz Távora, Antonio Lacerda and Luis Freire de Andrade conducted some collection missions of the traditional varieties of maize (*Zea mays* L.) in Minho and Algarve Regions, to support the maize breeding programme, in Braga and Tavira (Farias and Marcelino, 1993; Farias, 1999).

Much of this germplasm, maintained during that period on several active and breeder’s collections, such as the improvement programme of forage species conducted in Elvas and Oeiras, maize in Braga and cereals in Elvas, have contributed to the obtainment of numerous varieties, listed in the National Catalogue of Varieties (CNV) and commercialized by different seed companies (Ministério da Agricultura e do Mar, 2015). However, some of the material collected and maintained in various parts of the country was lost due to the lack of appropriate conditions for medium and long term conservation (Farias and Marcelino, 1993; Farias, 1999).

Period from 1977 to 2014

In the early 1970s, a new momentum started in Portugal in order to collect and conserve the national plant genetic resources, through actions carried out by genetic resources program for the Mediterranean region(Bettencourt, 1999; Ministério da Agricultura e do Mar, 2015).In 1977, still under the genetic resources programme for the Mediterranean region, supported by FAO and Bioversity International, the Banco Mediterrânico de Milho, in Braga,was created, with the responsibility of maize collecting and conservation, that subsequently gave birth to the Banco Português de Germoplasma Vegetal (BPGV), the National Genebank (Barata *et al*., 2011b; Bettencourt, 1999; Farias and Marcelino, 1993; Farias, 1999; Ministério da Agricultura e do Mar, 2015).

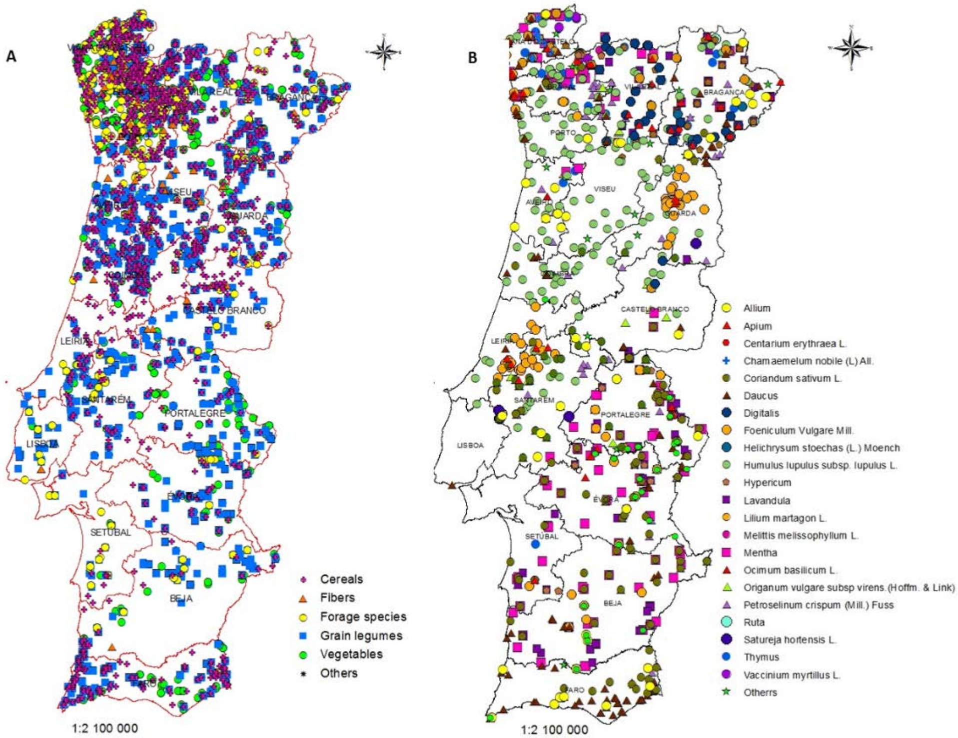

Figure 1. Collecting sites in Portugal, by species group: (A) Cereals, Fibers, Forage species, Grain legumes and Vegetables; (B) Medicinal and aromatic plants.

From 1977 to 2014, numerous germplasm collecting missions for cereals, fibers, forage species, grain legumes, medicinal and aromatic plants, vegetables and crop wild relatives of major crops were carried out in Portugal (Barata *et al*., 2009; Barata, *et al*., 2011a; Barata *et al*., 2011b; Barata *et al*., 2014; Bettencourt and Gusmão, 1981; Bettencourt and Gusmão, 1982; Bettencourt, 1999; Farias, 1989; Farias *et al*., 1992; Farias and Marcelino, 1993; Farias, 1999; Farias, 2002; Lopes *et al*., 2015; Marcelino, 1994; Marcelino, 2002; Mota *et al*., 1981; Mota *et al*., 1982a; Mota *et al*, 1982b; Mota *et al*, 2005; Rocha, 2000; Rocha, 2005; Rocha *et al*., 2008; Rocha *et al*., 2010a; Rocha *et al*., 2010b; Rocha *et al*., 2010c; Rocha *et al*., 2011; Rocha *et al*., 2013; Rocha *et al*., 2014;Rocha *et al*., 2017).

The Key point dates of collecting missions are:

- 1977 - First germplasm landraces collecting mission of cereals;
- 1978 - Systematic landraces collecting missions of grain legumes;
- 1979 - Collecting mission for maize landraces in Azores;
- 1980 to 1983 - Collecting missions for cereals and grain legumes and in Portugal and Spain;
- 1985 - Systematic collecting missions of forage species;

- 1987 - Systematic collecting missions for flax;
- 1990 to 1994 - International collecting missions for vegetables;
- 1991 - International collecting missions for cereals, grain legumes, fibers and vegetables in Madeira; International collecting for broad beans in Portugal mainland;
- 1994 - Systematic prospection and collecting missions for genus *Allium*;
- 1997 to 1999 - Systematic prospection and collecting for wild hop;
- 2000 - Systematic collecting for medicinal and aromatic plants;
- 2001 - International germplasm collecting mission for genus *Daucus*;
- 2006 - International collecting mission for genus *Lupinus*;
- 2009 to 2010 - International germplasm collecting missions for forage species, medicinal and aromatic plants and grain legumes, in Portugal and Spain;
- 2014 - Systematic collecting of crop wild relatives of major crops (*Avena, Daucus, Hordeum, Lathyrus, Lens, Malus, Medicago, Pisum,* and *Vicia*) in Portugal.

During this period, BPGV carried out 126 collecting missions in Portugal, which resulted in 12,540 accessions of several species.

Figure 1 are represented the collecting sites in Portugal by species group: (A) Cereals, Fibers, Forage species, Grain legumes and Vegetables; (B) Medicinal and aromatic plants, as a result of collecting missions from 1977 to 2014.

The following table – Table 1 – shows the number of collecting missions and accessions by decades.

Table 1. Number of collecting missions and accessions by decades.

Decade	Number of collecting missions	Number of accessions
1977 to 1987	14	1690
1988 to 1997	39	5712
1998 to 2007	43	2506
2008 to 2014	30	2632
Total	126	12540

According to the results, the decade in which more collecting missions were carried out is 1998-2007 (43), followed by the decade from 1988 to 1997 (39). However, the decade in which more genetic material was collected was the period of 1988 to 1997 (5712).

The original passport data of each accession (which includes collecting number, scientific name, common names, date of collecting, collectors name, geographical location, topography, habitat characteristics, characterization of the collecting site, sample characteristics, ethnobotanical information) weredocumented and now are available in the Grin-Global database platform (http://bpgv.iniav.pt).

During this period, there were some colleagues who have stood out in germplasm collecting missions in Portugal and abroad, namely Rena Martins

Farias, Eliseu Bettencourt, Miguel Mota, Manuel Tavares Sousa and Luís Gusmão. Along almost 40 years of plant genetic resources conservation in Portugal, many others, from many different institutions in the country and around the World, have been involved in germplasm collecting missions of different crops and crop wild relatives.

CONCLUSION

The history of the civilizations is deeply linked to the history of agriculture, and this has direct links to germplasm collecting and management.

Plant collecting activities are one of the oldest activities of mankind. Since the dawn of civilization, individuals have gathered new and useful plants from faraway places. Seeds and seedlings were routinely included as part of the household as people explored new territories and settled in new lands. From centuries ago until the middle of the 20th century, many collecting expeditions were carried out worldwide in the search for species that were potentially useful as food, ornamental, medicinal and timber.

Today, because genetic diversity is the key to maintaining and improving agriculture, plants are collected and valorised in order to preserve genetic variability.Over the last four decades Bioversity International supported a series of collecting expeditions worldwide, with the objective to systematically collect and conserve representative samples of genetic diversity for many crops and their crop wild relatives.

Nowadays, many collections of crop diversity are conserved in the world gene banks and can be found in online accessible databases, which include collecting mission information.

With the same objective, between 1977 and 2014, numerous systematic germplasm collection missions have been held in Portugal, for cereals, fibers, forage species, grain legumes, medicinal and aromatic plants, vegetables and crop wild relatives of major crops.

The germplasm collection in Portugal resulted in the preservation of a large legacy, representative of the genetic variability in the country. These collections are an important source of germplasm to address future needs of organic farming production and other sustainable agriculture programmes, as well as a response to global climate change conditions and to ensure local and global food security.

The spread of crops throughout the world, which is occurring since the first plant exploration expeditions, as well as the amount of plant genetic resources, which are currently conserved and are available in Genebanks, as a result of the collecting expeditions carried out in the last years worldwide, demonstrates the contribution of this international activity for the valorisation of agro-biodiversity and agricultural systems.

ACKNOWLEDGEMENTS

The authors wish to thank Eliseu Bettencourt for his review and critical reading.

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