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## Collecting for the herbarium and the botanic garden of the Institut Agronomique et Vétérinaire Hassann II (IAV)

### Abstract

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Most of previous plant collecting and floristic studies were carried out by foreigners. The resulting collections including type specimens are housed in herbaria abroad. Moreover, they are in many instances difficult to use by researchers on the Moroccan flora. During the last two decades active plant collecting expeditions have taken place in the major regions of Morocco, led by IAV in conjunction with other national and foreign institutions. The creation of a Botanic Garden (BG) at IAV has stimulated further dry and living collections for *ex-situ* conservation of rare and endangered plants that are of actual or potential economic value or of interest from medicinal or nutritional aspects. These joined efforts have resulted in the collection of thousands of herbarium specimens and over 700 living plants for the Botanic Garden. Thus, the IAV herbarium has joined Index Herbariorum community and the BG has become a model for *ex-situ* conservation of endangered plants in North Africa and the Arab world. It is also meant to play a leading role in the country in the field of environmental education through its newly built Environmental Education Centre.

### I. Introduction

Morocco lies in North Africa with Atlantic and Mediterranean coasts exceeding 3,000 km and thousands of kilometres of borders running across the Sahara desert. Owing to its strategic geographical position at the confluence of Atlantic Ocean, Mediterranean Sea, Saharan and European influences, and due to its extremely varied topography, Morocco possesses the richest and most diverse flora in North Africa. It is the second most biologically diverse country in the Mediterranean basin, surpassed in species and habitat diversity only by Turkey. Also Morocco's vascular flora is estimated at 4,500 species with a high rate of endemism of about 20%. These numbers may yet increase once those relatively poorly known regions are inventoried such as the high Atlas and the southern provinces.

## II. Problem statement

Amongst the Mediterranean countries, Morocco remains not only less explored but of which the floristic study remains poor. As such many species new to science and several new indications to the Moroccan flora are being discovered annually. However the need for more plant exploration and floristic investigations remain still a priority. Thus repeated and cautious plant expeditions and explorations are needed. Moreover Moroccan plant species are at risk and threatened with extinction. Yet they hold considerable potential for enhancing agriculture development, income generation and living standards. However their importance remains largely unrecognised and unrealised in Morocco and do not receive special care. These species are suffering from habitat degradation, loss of plants due to over-exploitation of the plant or the habitat, inadequate *in situ* and *ex situ* conservation measures, inadequate information on their status which could be used to take appropriate action, and lack of awareness in Morocco of the perilous status of its plants.

In fact Morocco's population now exceeds 26 million and much of it depends on agriculture and raising livestock. Poor soil and vegetation management on the part of most agriculturists and pastoralists has caused many conservation-related problems. Uncontrolled grazing in forests and of alpine vegetation threatens many plant species and communities. For example, grazing pressures have prevented fruit setting of many species, which are now becoming rare. Another threat to Morocco's flora is widespread conversion of woodlands for summer cereals and other crops, which continues to worsen. Fuel wood collecting, natural fires and drought have also considerably reduced stands of many species. Very little information on threatened plants is available although Morocco is included in the draft list for North Africa and the Middle East, produced by IUCN threatened plant committee secretariat.

Both education and public awareness at all levels are needed to reverse the pressure on Morocco's natural ecosystems. Such activities should emphasise the economic value of the goods and services offered by natural ecosystems, and stress the ethical considerations that protecting nature is good and prudent, that loss of any species is bad, that plants play fundamental and varied roles in every Moroccan's daily life, and that maintaining a diverse array of species and their habitats has a fundamental value for our society today and in the future.

One important way to raise the public awareness of plant conservation issues is through demonstrating the value of plants to people in their daily lives. Many people experience this through their contact with horticultural plants, especially in urban areas. However the range of species used horticulturally in Morocco is far more limited than it could be, and many native Moroccan plants have great but unrealised horticultural potential. Tapping this horticultural potential has hardly begun. Yet by demonstrating this aspect of the economic value of the country's flora, not only could the daily life of many Moroccans be improved, the importance of plant biodiversity conservation could be poignantly illustrated to decision-makers who think in economic rather than scientific terms.

## III. Justification

It should be stressed that both field and laboratory work on wild species remain still very much in its infancy. Existing documents and Floras are either regional or incomplete

and are in most cases out of date. The various studies are concerned primarily with floristics in its broadest sense and very seldom have the aim to explore individual plant species or even families or genera. Moreover, many of the Moroccan collections are based in foreign herbaria including most type specimens and such less accessible. It should also be stressed that there is much lack or in any instances inadequate information on plant conservation status. Thus, there is a genuine need for urgent interventions in many directions including:

- more comprehensive, cautious and updated plant explorations and studies;
- urgent plant conservation measures (*in situ* & *ex situ*);
- strategies and actions of environmental education and public awareness.

Having the study and conservation of Moroccan plants as a main focus, the IAV herbarium and botanic garden intends to undertake several floristic activities. In this respect, it concentrates its efforts on the national native plant species.

In collaboration with many research, development or extension institutions both national or foreign such as ISc (Institut Scientifique), RNG (Reading University), FFI (Fauna and Flora international) and BGCI (Botanic Gardens Conservation International) and with the financial support of the European Union, the British Council, the British Embassy and the Stainly Smith Horticultural Trust, the Herbarium and the Botanic garden have considerably improved their capacities through various the main objective of which was to build the herbarium and Botanic garden capacities to be able to participate actively in the overall approach of plant conservation at national and international levels and to increase public and decision makers awareness of the importance of phylogenetic resources.

But faced with very rich Moroccan flora, the Botanic garden, with its improved but still scarce facilities, could not overpass a certain limited action scale in its conservation interventions. It is then necessary to proceed to a prioritisation of the plant species to be *ex situ* conserved in the Botanic garden.

The aim of this paper is to put forward some ideas and thoughts on the collecting and conservation aims and activities of the IAV Botanic Garden and Herbarium, thus contributing to the improvement of our plant knowledge leading to making satisfactory suggestions for better plant utilisation and conservation.

#### IV. About the IAV Botanic Garden

##### IV.1- Objectives

Amongst the many objectives assigned to the IAV Botanic Garden, the following should be stressed:

- ♦ **Conservation of national plant heritage:** priority should be given to species of economic, medicinal, nutritional or ecologic value.
- ♦ **Environmental education** aiming raising public awareness of environmental issues.
- ♦ **Teaching and research** in order to support IAV's teaching and research activities.
- ♦ **Recreation:** in this respect, the Garden is to be used as a public park for "educational" amenity.

#### *IV.2- Living collections:*

Due to the richness of the Flora and the lack of appropriate space for cultivation in the botanic garden, only selected living plant collections were made.

In order to identify priority species for conservation at the botanic garden there was a need to establish adequate criteria for species selection. The criteria for the identification of target taxa included:

- a. the conservation status of a given taxon: this involves giving priority to species at high risk of extinction or those most vulnerable because of high pressure on them or their habitat destruction.
- b. the distribution pattern: in this respect endemic taxa are given more weight and have priority over largely distributed ones. Within the endemic taxa, the more restricted a species is, the more likely to be selected for the purpose of ex-situ conservation.
- c. the value of the taxon: priority is given to species of actual or potential use such as key wild plant genetic resources used that are likely to be of importance for local food security and for future crop improvement. Some plants are of economic value, as sources of timber, fuel wood, medicines, oil, fibres, diets, horticultural amenity and so on.

#### **V. About the IAV Herbarium**

The dry collections of the IAV Herbarium have been carried out throughout Morocco for many years and by many contributors either in organized or non organized expeditions.

*Target species:* The collecting has concerned all existing specimens of all species found in the field with special emphasis on groups of specialisation of particular staff (Appendices 1, 2 & 3). It is worthy of remark that many studies and investigations emanated from this institution (Appendix 4).

#### **VI. Some achievements**

Over the last four years, there have been great advance in many ways:

- ♦ Development of the Infrastructure of the herbarium and the garden (buildings, pathways, irrigation system,...)
- ♦ Over 30000 herbarium specimens were collected throughout the country
- ♦ Over 500 living plants were introduced to the garden, many of them are of high economic value or at risk of extinction
- ♦ Over the last four years, five training sessions, held in the IAV Botanic Garden and Herbarium, were organised for NGOs, teachers and students in order to increase awareness of the importance of biodiversity and the need for its sustainable use.

## VII. Partnerships

Tied links and partnerships were made at the national and international levels with various institutions such as:

- ♦ Ministries
- ♦ Moroccan universities & research institutions
- ♦ Moroccan NGO (SPAN, AESVT, AMB,...)
- ♦ Fauna and Flora International (U.K)
- ♦ Botanic Gardens Conservation International (U.K)
- ♦ European Union
- ♦ University of Reading (U.K)
- ♦ Royal Botanic Gardens Kew (U.K)
- ♦ British Embassy in Morocco & British Council, Rabat ♦ Stanley Smith Horticultural Trust (U.K)
- ♦ Institut National de la Recherche Agronomique de Tunisie
- ♦ Some European botanic gardens (Palermo, Cordoba, Bordeaux,...)
- ♦ Association des Jardins Botaniques de France et des pays francophones.

## VIII. Perspectives

In order to get the Botanic Garden and the Herbarium to a more suitable standard to fulfil its aims and objectives there still are considerable efforts to make. Thus it is necessary to underline some of the many perspectives:

- ❖ Improve the infrastructure and equipments
- ❖ Enrich the different plant collections
- ❖ Develop the seed bank and plant conservation activities
- ❖ Strengthen cooperation and partnership nationally & internationally
- ❖ Improve staff skills.

## XI. Conclusion

Despite the many achievements and developments made at the IAV Botanic Garden and Herbarium, it should be noted that this is only the beginning for so much to be done in order to overcome challenges facing the knowledge, the conservation and the rational use of our green heritage in a sustainable way. There is also a genuine need for national support to these two institutions and a necessity to strengthen cooperation and partnerships nationally and internationally. Moreover, it should be mentioned that a clear strategy for development and action plan is needed.

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