# The PHASELIEU project

The PHASELIEU project (Improvement of sustainable *Phaseolus* production in Europe for human comsumption, FAIR5-PL97-3463) developed under the FAIR Program of the European Union was born in 1998.

The overall aim of PHASELIEU was to coordinate the ongoing research on *Phaseolus* and to elaborate and integrated strategy model for the improvement of *Phaseolus* production in Europe for human consumption. Also, this project would like to avoid the duplication of current research and other RTD activities at national and transnational level on *Phaseolus.*

Therefore, the strategic aims of the project are the following ones, concerning to the organization and management of research and development in *Phaseolus*:

* The **establishment of an EU wide netw ork of experts** in order to exchange and disseminate the knowledge and expertise regarding the issues concerned. This includes also the exchange of genetic material within the participating groups and other outside the network.

* The **organization of thematic w orkshops-gr oup meetings** , as open as possible, in order to discuss specific subjects, to develop an integrative strategy model approach, and, on the basis of this model, to prepare follow-up research proposals to develop joint shared cost project in *Phaseolus* improvement.

* The **publication of sev eral scientific and technical documents** such as: **a**) progress and final reports, **b**) scientific and technical articles, **c**) handbooks and catalogues and **d**) contribution in international conferences. It is planned to publish all of them both as hardcopy version, electronic one in Internet and CD-ROM.

* The **scientif ic exchang e as training visits** are one of the aspects of the project. There will be two kinds of exchange visits among laboratories: 1) short visits, like targeted restricted meeting and 2) visits, for technology transfer and diffusion of information notably for younger scientist. First year all of them will be focused in genetic variability, crooping systems and diversification and quality analysis. During the following years (with the agreement required from the Commission) the subject of the visits will be focused in

transferring expertise on biotical and abiotic stresses, molecular markers, regeneration and transformation and breeding.

Eleven european countries (Austria, Belgium, France, Germany, Israel, Italy, Portugal, Spain, The Netherlands and the United Kingdom) and twelve partners with their research groups and fellowships participated in the PHASELIEU project (List of PHASELIEU participants is included). Also, well known scientific institutions such as International Plant Genetic Resources Institute (IPGRI), European Association for Grain Legume Research (AEP), and "Centro Internacional de Agricultura Tropical" (CIAT) supported PHASELIEU project as linked organizations.

# PREFACE

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Bean genetic resources shall again contribute to the well-being of humans, to the quality and diversity of their food. This time, they undertake once more the journey back of the galleons through the Ocean Sea. In Europe, where cultural aspects so much reflect in every day food, *Phaseolus* beans, although all introduced crops, have integrated that human perspective, ending into many different dishes and recipes. Crop histories initiated on one side of the Atlantic Ocean enable the common bean, scarlet runner and Lima bean to continue their evolution beyond the other seashore. Bean uses were noted all across the Americas, and were tried again in the Old World on the beans that successfully made the journey. European peoples also tried with the newly adopted beans agronomic and culinary practices that were developed for centuries on peas, lentils, chickpeas, grasspeas, and haba beans, resulting thus in increased selection pressures. One should note that in comparison to these Old World pulses the newcomers react with astonishing variability in seed morphotypes exciting further the curiosity of European gardeners.



Maybe *Phaseolus* beans were domesticated first as snap bean for their young developing pods or for their young developing seeds, when the early Amerindians observed doves and parakeets feeding on them. And 8,000 years later snap bean is a key market in Europe and the Mediterranean region. It has become so popular that it has been named “Garden” bean, as there would be no other bean in your garden! It is also called “French” bean – a strong indication of its adoption by *gourmets* of both sides of North Atlantic. Although less favored by the European public now in comparison to snap bean, with fewer mutations, “String Bean” varieties have been grown by European gardeners from Brittany to Friesland. Perhaps the development of these cultivars would not have been possible without the “*exotl*” of the ancient Mexicas. Among the use of “greens” in beans, one should not forget the consumption of flowers and young leaves by the Tzotzils of Chiapas, and that of leaves by farming communities in the African Great Lakes region or in Java.

Green shelled beans, that once were so important for many Amerindians in cool and humid altitude regions of Mesoamerica and the Andes, because of obvious advantages in cooking time and digestibility, are making an important comeback in many regional dishes of southern Europe. The “pochas” of Navarra correspond to the plates of “petaco” of Antioquia or “ixich” of Huehuetenango. Popping beans were roasted before ceramics on hearthside in the Andes, and perhaps in other parts of ancient America as well. Dry beans once ceramics was discovered were part of the Amerindian plant trilogy and the food foundation of so many prestigious pre-Columbian civilizations. Dry beans under dozens of combinations of seed colors and sizes now form the daily food of millions of people in Latin America and Africa, but also enter into processed food for urban humans worldwide where time and health are a concern. Apart from snacks, salads and main courses, beans have been served as sweets for dessert from the Coast of Peru to Thailand. Dry beans are also the banner of many typical dishes in Europe: the *fabada asturiana* of Spain, the *cassoulet toulousain* of France, or the *uccelletti ai fagioli* of Italy. Sailors could not travel across all world seas without Navy beans. One can surely bet that astronauts will take some beans, perhaps nuñas, in their future odysseys!

Such a diversity of bean products and thus of opportunities for further crop development invites us to re-visit *Phaseolus* bean genetic resources and re-examine methods of evaluating them. This “Handbook on Evaluation of *Phaseolus* Germplasm” sums up recent advances in techniques for germplasm evaluation. Chapter 1 presents a practical methodology for the *ex situ* conservation of *Phaseolus* genetic resources in order to make them available for evaluation at any time now and in the future. Chapter 2 presents basic and additional passport descriptors as well as those needed for the sound management of *Phaseolus* collections. Chapter 3 complements the former one with descriptors for phenology and morphology of both vegetative and reproductive plant parts. The comparison of descriptor sources in both germplasm and seed industry (i.e. certification of new varieties) sectors makes these contributions particularly useful for genebank curators, agronomists, and bean breeders. Users will also appreciate a set of color pictures explaining some of the most used qualitative traits in pods and seeds. Chapter 4 presents a thorough compilation of heritability coefficients and correlation between different economically important traits, which shall help the breeder namely to focus on certain descriptors if not all can be evaluated at the same time. Chapter 5 introduces important nutritional characteristics and antinutritional factors of dry beans, and the necessary tasting protocol. Chapter 6 presents the use of bean germplasm in breeding with thorough information about sources of variability and useful genes, as well as breeding strategies. This practical handbook is a timely Phaselieu publication, for the further characterization of the rich heritage of bean landraces in Europe, and for the future breeding efforts, when the European peoples have a renewed and justified interest for these types of crops. It also serves beautifully as a link between researchers and disciplines, by providing contacts and a common technical language.

For sure, it deserves an enthusiastic welcome by all phaseologists!

# Introduction

To improve the utilization of European *Phaseolus* germplasm collections is a current challenge. It is well known that a very low percentage of germplasm collection is used in breeding programs and this percentage is lowest if we are looking at accessions with the highest genetic variability as landraces are.

To make easy the use of PGR collections it is essential to offer to the users accessions well documented. It means that the general characterization and the evaluation specially interesting for the crop are made and the resulting data are correct presented in a data base easy to handle.

So, the aims of this handbook must be to serve as a good orientation to any research that need to manage a *Phaseolus* collection, to give them the descriptors more appropriated in each case and to offer the best methodology to obtain the more representative data for each descriptor.



All these objectives are developed of course under the light of the current state of art and ratified by us as the European specialists in *Phaseolus*.

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