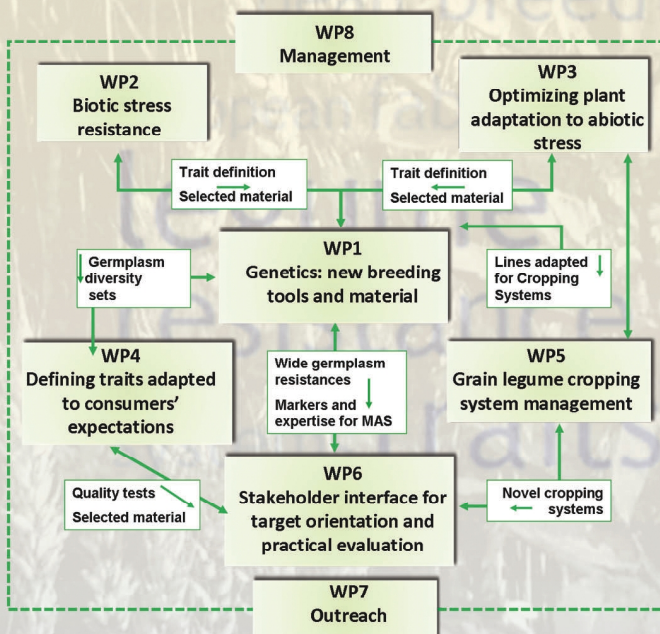


Project structure



Project Consortium



PATRIMVS INDUSTRIA SA



UNIVERSIDAD DE CORDOBA



UNIVERSITY of York



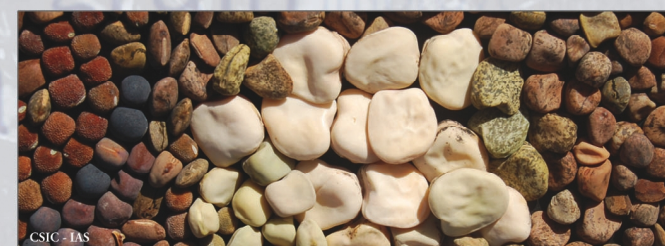
LEGumes for the Agriculture of TOMorrow

<http://www.legato-fp7.eu/>

Strategic aim

The overall aim of LEGATO is to contribute to the **sustainable reintroduction of grain legumes in European cropping systems**:

- Working on the major European grain legumes, pea, faba bean, and with specific objectives on white lupin, lentils and grass pea.
- Focusing on the identification and testing of novel legume breeding lines possessing valuable characters such as disease and pest resistance, tolerance to abiotic stresses (such as water shortage and heat at the end of the cycle) and quality for human consumption.
- Optimizing the selection of these lines for low-input agriculture and in innovative legume-centred cropping systems, intercropping and multivarietal mixtures, and testing the benefit of inoculation with rhizobium.
- Enabling a quantum leap in the use of marker-assisted selection in legume plant breeding, through the exploitation of comprehensive genomic resources which have recently become available.
- Communicating and exploiting the breadth of knowledge obtained to the gamut of stakeholders.



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Contact: Dr. Richard Thompson
INRA - UMR1347 Agroécologie
BP 86510, Dijon, France
richard.thompson@dijon.inra.fr



Legumes in Europe

Despite the nutritional value in terms of protein they provide for both humans and for livestock, the cultivation of grain legumes in Europe has been constantly decreasing over the last 40 years. It has become urgent to reverse this trend, since legumes play a key role in developing future sustainable farming systems, notably but not exclusively in terms of their potential to mitigate the adverse effects of agricultural production on the environment through: their unique ability to fix atmospheric N₂ via a symbiotic relationship with soil bacteria (Rhizobium) and therefore to have no requirement for N-fertilizers, their diversifying effect in cereal-rich cropping systems and hereby reducing the requirement for pesticides.

Grain legume seeds are rich in protein (up to 40%) and could improve Europe's autonomy for this commodity, as it imports around 70 % of its requirements in protein-rich products used for feeds (20-25 Mt of meals + 15 Mt of soybean seeds). In addition to proteins, legume seeds are rich in slowly digestible starch, soluble sugars, fibre, minerals and vitamins as well as secondary metabolites such as isoflavonoids, and can play a major nutritional role with the further benefit of anticancer and other health-promoting compounds. Thus, grain legumes are valuable and health-promoting sources of protein for human consumption, currently underused in Europe, but with an increasing geopolitical importance in view of soaring world protein prices.

However, several factors, including less investment in breeding, have combined to result in yields and profitability of legumes being lower and more variable than those of other crops. This reduces their attractiveness to farmers, and has limited their availability for consumers to a level far below their potential.

Objectives

At the pre-competitive level:

1. Screen and exploit the phenotypic and genetic diversity offered by legume collections
2. Identify genes conferring desirable traits: determination of yield and yield stability, resistance to biotic and abiotic stress, legume seed composition, nutritional and gustatory qualities
3. Develop genetic markers and pre-breeding material for fast breeding of varieties possessing desirable traits
4. Develop fast and efficient selection tools for quality traits based on spectroscopic models

At the agronomic level:

5. Design and assess ex-ante (by multicriteria analysis) the sustainability of novel legume-based cropping systems adapted to local needs, and test their effects on productivity, yield stability, quality aspects, N acquisition and biotic stress management
6. Determine the requirements for inoculation with rhizobium in pea and faba bean, and select adapted and efficient strains
7. Identify novel lines of grain legumes with desirable traits, and generate pre-breeding material combining these traits that will be provided to end-users (including SMEs) to be continued and finalized for variety registration

At the stakeholder level:

8. Prioritise the quality traits relevant for consumers through consumer sensorial analysis of innovative legume based food products such as fortified cereal breads (with flours containing mixtures of cereals and grain legumes)
9. Identify current and future consumer food habits and expectations, in terms of sustainability, nutritional and health-promoting qualities, to optimize marketing
10. Disseminate information, innovative genotypes and agro-economic practices towards stakeholders and scientific community



Results and impacts

