BELIS - Breeding European Legumes for Increased Sustainability

Duration: From 1 October 2023 to 30 September 2028

Project summary

The aim of BELIS is (i) to increase the competitiveness of the EU and Associated Countries legume breeding industry by improving the methodologies and the governance structures of the breeding sector; (ii) to design conditions that allow an efficient delivery of the achieved genetic progress to the breeders and seed industry, and to the other actors (registration offices, extension services, feed and food industry, farmers). The project will focus on seven forage crops and seven grain crop that are currently grown to produce feed (for ruminants – cattle, sheep, goat and monogastric animals – pig, poultry), food (as is or after processing) or to deliver ecosystem services. BELIS has three main objectives: (1) To develop tools and methodologies for cost-effective breeding programmes and deliver proofs of concept, with and for breeders, (2) To facilitate the economic and regulatory environment: variety registration, variety recommendation and business models, (3) To implement an efficient, ambitious and durable transfer of innovation through the BELIS platform that includes a network of breeders and actors from scientific research, extension services and seed, food and feed industries, as well as a training portfolio. By enabling the creation of improved varieties in many species, adapted to different areas and uses in Europe, this project is relevant for the destinations towards "Biodiversity and Ecosystem Services", mainly contributing to "Access to a wider range of crops and breeds with a broadened genetic base is improved in line with global biodiversity commitments". It also supports the "Practices in agriculture and forestry support biodiversity and the provision of other ecosystems services". In addition, BELIS will have a positive input on natural biodiversity, reduction of air and water pollutions and farming system sustainability.

Objectives

BELIS objectives

1. To develop tools and methodologies for cost-effective breeding programmes and deliver proofs of concept, with and for breeders.

2. To facilitate the economic regulatory environment variety registration, variety recommendation and business models

3. To implement an efficient, ambitious and durable transfer of innovation through the BELIS platform that includes a network of breeders and actors from scientific research, extension services and seed, food and feed industries, as well as a training portfolio.

Activities

The following activities will be developed:

- Bring together the community of breeders and other key actors of the value chain around themes of shared interest, to facilitate transfer and exploitation of BELIS outputs in order to boost legume breeding
- Communicate and disseminate, through multiple stakeholder groups and geographical levels, the activities messages, achievements and main results of BELIS
- Optimize/update of breeder´s friendly (i.e. cost effective for many samples application) screening tools for important legume traits.
- Develop more efficient low-cost genotyping solutions for grain and forage legumes.
- Identify trait-marker associations and develop genomic selection models for key agronomic traits.
- Establish a data repository for curated marker, phenotype and marker-trait association data.
- Validation of enhanced phenotyping techniques.
- Validation of Marker Trait Associations, with focus on introduction of disease and pest tolerance.
- Validation of genomic prediction models, enabling the selection of genetically complex traits such as drought resistance, yield and protein content.
- Generating a ´one-stop-shop´ comprising phenotyping and genotyping protocols and tools used for all 14 target species in BELIS
- Increase cost-efficiency and accuracy of DUS (Distinctness, Uniformity, Stability) testing for variety registration and seed lot certification, using molecular markers.
- Facilitate and increase efficiency of VCU (Value for Cultivation and Use) assessment of varieties to be registered; and optimize VCU field trials at the agrizone level.
- Reinforce and adapt variety recommendations for increased deployment of legume species and varieties in the current and future agroclimatic conditions in Europe.
- Evaluate existing as well as to identify, co-create, develop, pilot and support innovative and viable governance and business models facilitating the breeding of legumes as the basis for feed and food market development as well as providers of public ecosystem services.

Results and project impact

- Cost-efficient and accurate phenotyping protocols, genotyping tools, overview of genetic diversity, molecular breeding methods (toolbox), participatory breeding methods, data.
- Implementation of new methods in breeding programmes as proofs of concept for conventional and organic breeding.
- Tools, methodologies and organisation proposed to/with registration offices to improve cost efficiency and accuracy of the legume variety registration and its relevance to all stakeholder needs.
- The agronomic characteristics of varieties listed on the Catalogue of legume species described and available.
- Adaptation of the main variety types to European regions described
- Results delivered to stakeholders (extension services, farmers, food & feed industries) and breeders (breeding targets).
- Optimised economic models for legume breeding including participatory breeding, with propositions of new types of governance and business models for financial supports proposed to breeders
- Tool to calculate return on investment of a breeding programme released
- BELIS platform, centred on a breeding actor network
- Training portfolio

Role of CIHEAM Zaragoza in the project: Lead of WP2 BELIS breeding actor's platform – networking, communication, dissemination and transfer.

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- Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria (CREA), IT
- Agencia Estatal Consejo Superior Investigaciones Científicas (CSIC), ES
- Tsentar Po Rastitelna Sistemna Biologiya I Biotehnogiya (CPSBB), BG
- Instituto Andaluz de Investigación y Formación Agraria, Pesquera, Alimentaria y de la Producción Ecológica (IFAPA), ES
- Fachhochschule Südwestfalen (FH-SWF), DE
- International Center for Agricultural Research in the Dry Areas (ICARDA), LB
- Groupe d'Etude et de contrôle des Variétés et des Semences (GEVES) FR
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- Terres Inovia (TI), FR
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- Agritec Plant Research S.R.O (Agritec), CZ
- Société d'intérêt collectif agricole des sélectionneurs obtenteurs de variétés végétales (Sicasov), FR
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- Processors & Growers Research Organisation (PGRO), UK