

The Legume Generation Lentil Innovation Community

Boosting innovation in breeding for the next generation of legume crops for Europe

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Lentil (*Lens culinaris* Medik) is traditional to European farming and cuisine. It has great potential in sustainable healthy diets. However, much of the lentil used in the EU is imported, for example from Canada. Lentil is a short-lived and cool-season legume and so can occupy niches in cropping systems. Production is based on spring sowing in northern and central Europe, and autumn sowing in the south. The goal is to develop lentil lines with high productivity and quality, suited for European farms. Our objectives are:

1. To build a knowledge-based lentil innovation community (Lentil IC).
2. To phenotype available germplasm and lines from previous projects.
3. To validate molecular markers/genomic selection for breeders.
4. To deliver breeding lines with good agronomic and/or quality performance.
5. To identify germplasm with commercial cultivar or breeding potential.

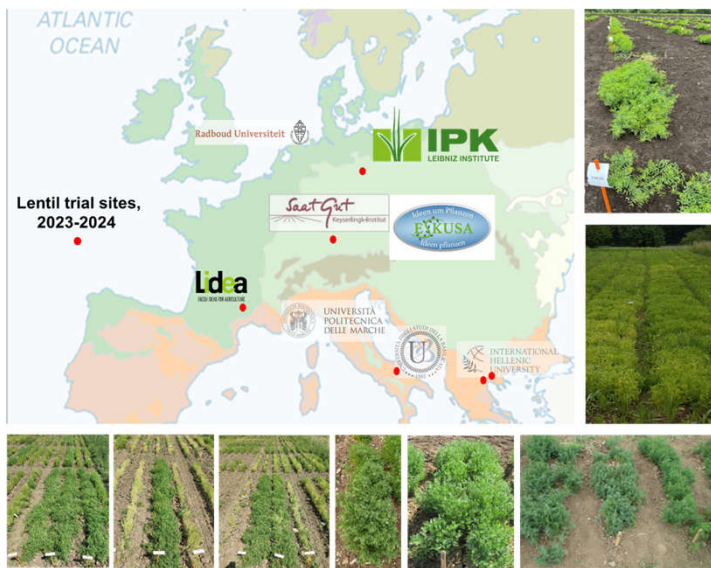


Figure 1. Lentil trials across Europe with representation of contrasting climatic conditions (3 sites Temperate (Green): IPK, KEY, LIDEA – 3 sites Mediterranean (orange) UB, IHU (2 places) (2023-2024). Phenotyping of the same accessions across Europe will provide data of the adaptability to North to South. Next step is to produce SSD lines based on individual plant performance. Source of the map (adapted): <https://printable-maps.blogspot.com/2008/09/map-of-climate-zones-in-europe.html>



Figure 2. Phenotypic evaluation of wide lentil germplasm panel, 2023-24 in Greece.

Partners

Leibniz Institute of Plant Genetics and Crop Plant Research (IPK, Germany) | Lidea Seeds, (LIDEA, France) | Euroseeds (EURS, Belgium)
 Donal Murphy-Bokern (DMB, Germany) | Keyserlink Institut (Keyserlink, Germany) | International Hellenic University (IHU, Greece)
 Universita Politecnica Delle Marche (UNIVPM, Italy) | University of Basilicata (UNIBAS, Italy) | Radboud University (SRU, Netherlands)
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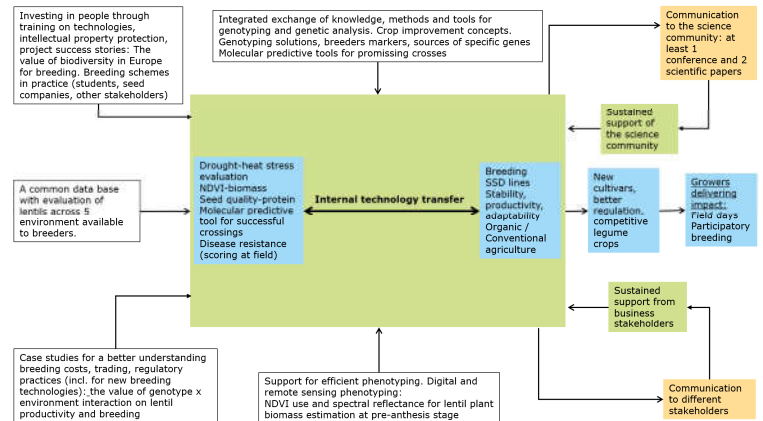


Figure 3. How the Lentil Innovation Community is integrated in Legume Generation

Approaches

1. **Phenotypic evaluation** of a wide lentil germplasm panel using common testers and common descriptors list.
2. **Breeding** using SSD based on individual plant performance.
3. **Molecular tools** to study genetic diversity and to support phenotyping.
4. **Physiology** based on documentation of responses to drought/heat stress
5. **Data management** to support the study of GxE interactions

We are testing 180 accessions from the IPK at 4 sites in Greece, France and Germany, and some of these at a fifth site in Italy. We are also testing a further 220 accessions, including landraces and improved lines originated from ICARDA, in Greece (IHU) and 200 lines mainly originating from previous project (UNIBAS, Italy) and (KEY, Germany). Standard measurement protocols are being used. Our further activities use results of Year 1 and 2. The performance of single plant selections will provide a basis of promising breeding lines developed using single seed descent. Experience of UNIVPM genomic prediction models for target traits will also contribute to estimates of potential parents. The final aim is to produce lines with good productive and quality characteristics to be evaluated in farming practice.

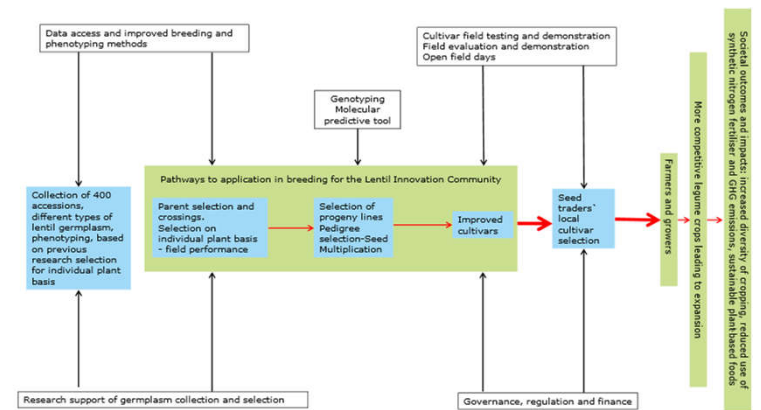


Figure 4. Pathways to application in breeding for the Lentil Innovation Community



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