



Legume Generation

The Legume Generation Lentil Innovation Community

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

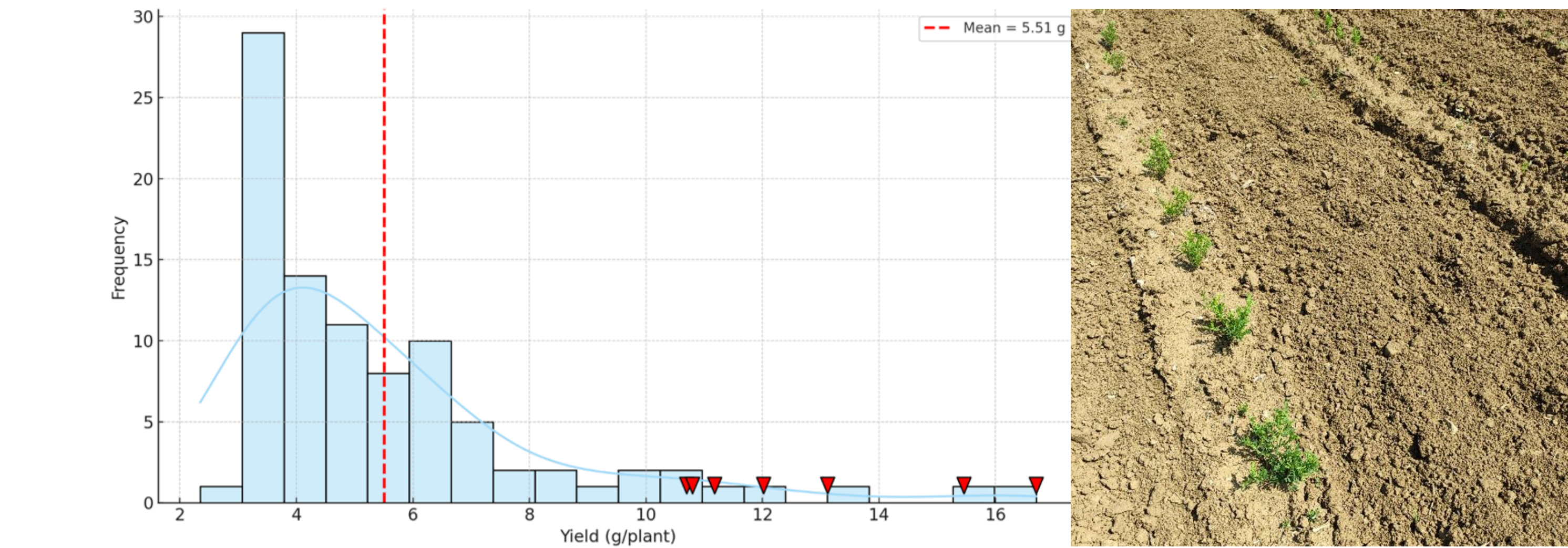
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Lentil (*Lens culinaris* Medik) is traditional to European farming and cuisine. It has great potential in sustainable healthy diets. However, much of the lentil used in the EU is imported, for example from Canada. Lentil is a short-lived and cool-season 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:

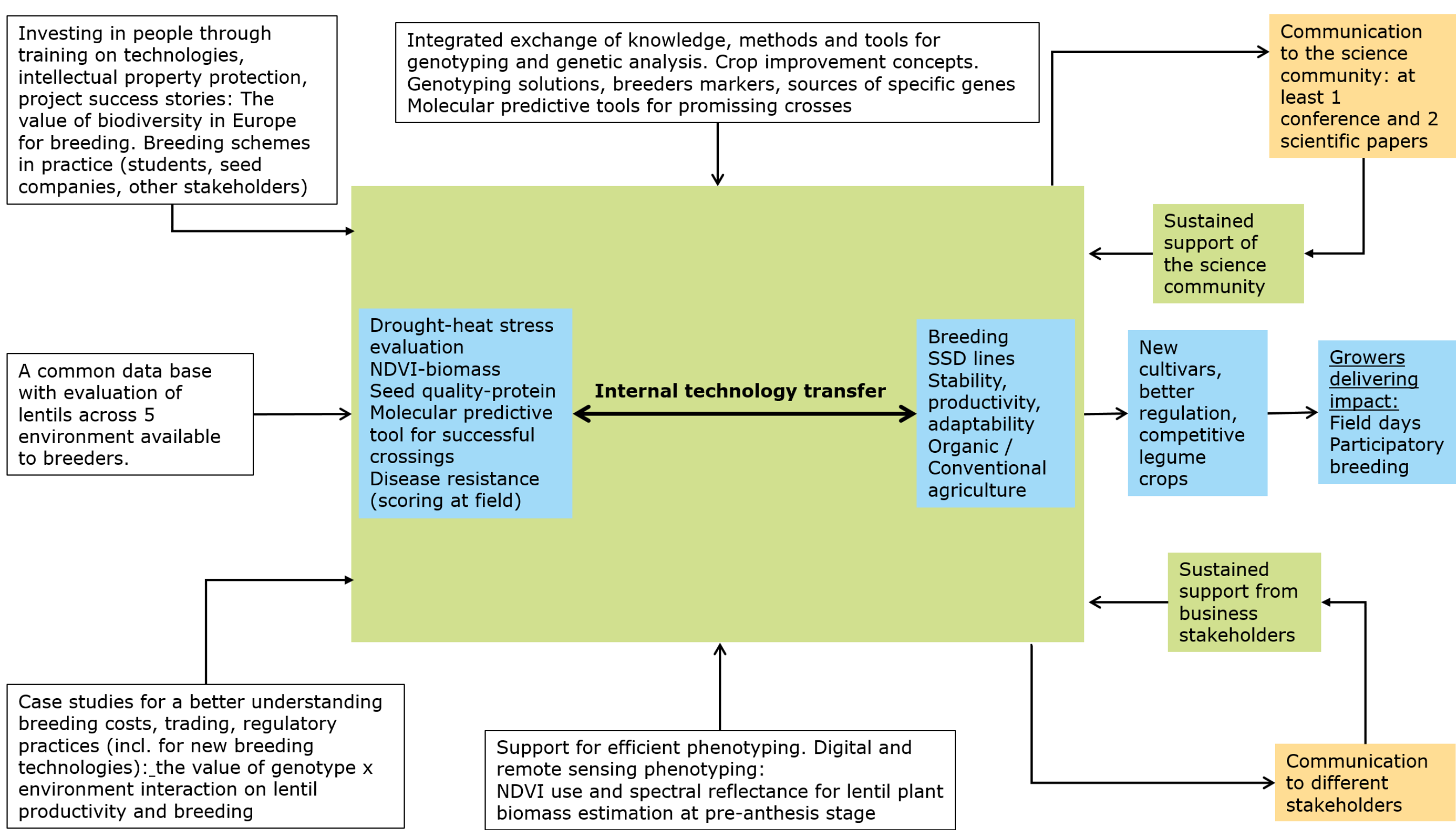
1. To build a knowledge-based lentil innovation community (Lentil IC).
2. To phenotype available germplasm and lines from previous projects.
3. To validate molecular markers/genomic selection for breeders.
4. To deliver breeding lines with good agronomic and/or quality performance.
5. To identify germplasm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



Lentil trials across Europe with representation of contrasting climatic conditions (2023-2025). Phenotyping of the same accessions across Europe will provide data of the adaptability to North to South. Based on the results we are in progress 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>



Testing yield performance on individual plant basis to produce SSD lines, under low density and *nil* competition, starting from 2024-2025.

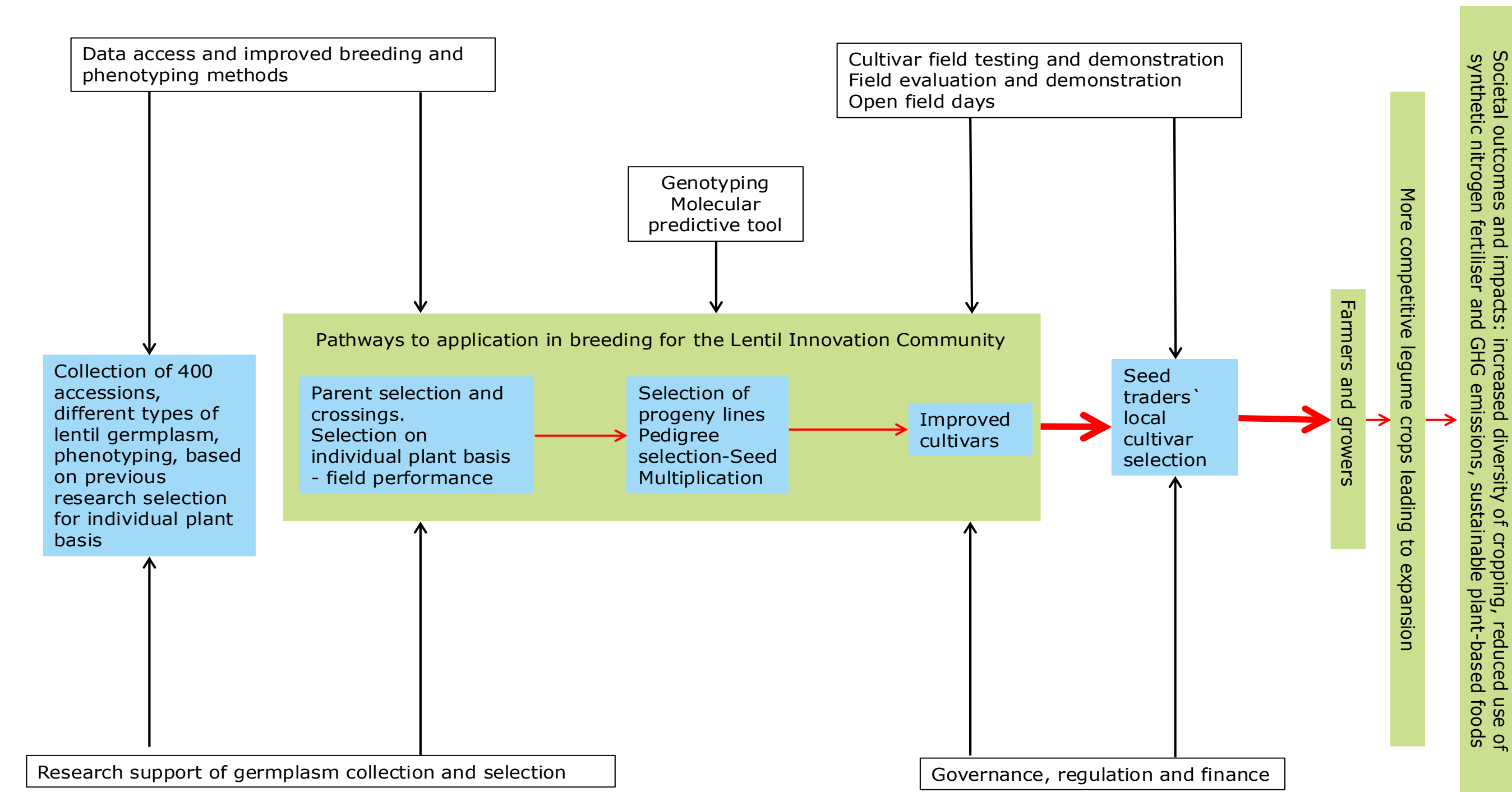


How the Lentil Innovation Community is supported in Legume Generation

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

During 2023-24 & 2024-25, multi-environment evaluation of lentil germplasm across northern and southern European sites provided valuable information on productivity and adaptability highlighting promising accessions as valuable germplasm as starting breeding material. Based on these results, we established field phenotyping schemes to select individual plants and develop SSD lines for yield improvement. In parallel, we apply genomic analyses and crossings to generate new genetic variability. We also link molecular markers to key flowering traits relevant for productivity and climate adaptation and complement this with physiological measurements to assess SSD lines under adverse conditions. Data management, in collaboration with the Lentil IC Data Champion, supports integration and further use of the results. Overall, these activities demonstrate progress toward the development of resilient and high-performing lentil lines for lentil breeding.



Pathways to application in breeding for the Lentil Innovation Community



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