BSc or MSc thesis "Phenotypic and Genetic Characterization of Seed Size, Seed Coat Thickness and Hardness in Narrow-leafed Lupin (*Lupinus angustifolius*)"

Institut für Züchtungsforschung an landwirtschaftlichen Kulturen in Groß Lüsewitz

The Project

Lupins hold great potential as a source of plant-based protein, especially in the context of sustainable and regional cultivation on low-input soils. Beyond yield and nutritional quality, traits such as seed size, seed coat thickness, and seed coat hardness are of considerable agronomic and technological relevance—for example, for seed processing, feed use, or food production. In *Lupinus angustifolius*, these traits exhibit high degree of natural variation, but have not yet been sufficiently studied.

This thesis project aims to investigate genetically diverse material of narrow-leafed lupin for variation in seed size, seed weight, seed coat thickness and seed coat hardness. The objectives are to characterize phenotypic diversity, refine measurement methodologies for key seed traits, and explore potential trait interrelationships.

Research activities and methods

The activities of the thesis projet include, but are not limited to:

- Quantitative assessment of seed size using digital image analysis
- Development and/or application of suitable methods to measure seed coat thickness (e.g., microtome sections, digital image processing, gravimetric approaches)
- Light microscopy-based analysis of seed coat microstructures
- Mechanical testing of seed coat hardness and determination of seed coat color
- Appication of molecular markers to associate seed traits with underlying genetic variation

The study will contribute to a deeper understanding of genetic diversity in narrow-leafed lupin (*L. angustifolius*) and support the identification of traits relevant for breeding. In particular, the integration of physical seed coat characteristics with molecular data offers valuable perspectives for targeted selection in future lupin breeding.

Qualification and interest

We are looking for candidates with the following qualification and interest:

- Currently enrolled in a bachelor's or master's program in the field of biological or agricultural sciences, biotechnology, or a closely related discipline.
- Experience or strong interest in microscopy
- Familiarity with phenotyping methods and/or image-based analysis
- Basic knowledge in molecular biology and genetics
- Interest of in seed traits, crop improvement and plant breeding
- Competent in written and spoken English.
- Motivation and good scientific working practices

Our offer

- a research oriented BSc or MSc thesis at the Institute for Breeding Research on Agricultural Crops which is part of the Julius Kühn Institute, the Federal Research Center for Cultivated Plants.
- an international and multi-disciplinary group with expertise on plant breeding, plant genomics and molecular genetics, plant physiology, biostatistics, bioinformatics working on current topics of breeding methodology and crop genetics.
- an enabling working environment and friendly colleagues, state-of-the-art plant cultivation facilities, laboratories and an experimental field.
- Our institute can be reached within 17 minutes by train from Rostock central station.

More information

For further details on project description and application, please contact

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