



# Grass pea (*Lathyrus sativus* L.): An Evolving Model Crop for Sustainable Agriculture

## Summary

Grass pea, with its low input requirements, is a model crop for sustainable agriculture. To address current climate challenges and enhance agroecological production, it must continuously adapt. The DIVINFOOD project is supporting a precision participatory breeding initiative for grass pea in Alvaiázere, a traditional Portuguese growing region.

## Introduction

Grass pea is a versatile annual cool-season legume from the genus *Lathyrus* and a valuable option for diversifying cropping systems on more marginal lands. Grass pea likely originated in the Eastern Mediterranean or Fertile Crescent around 6,000 years ago. It is a major crop in Bangladesh, India, Nepal, Pakistan, and Ethiopia, with smaller-scale cultivation in the Middle East, North Africa, China, South America, and in various European countries. However, due to limited breeding efforts because of its neglected status, grass pea's potential has been underexploited. Nevertheless, growing interest in its use as a climate-resilient crop is driving renewed attention.

## Solution

Grass pea germplasm is conserved globally, highlighting the species' worldwide importance and its potential as a source of valuable traits. This genetic diversity offers opportunities for breeding grass pea varieties adapted to changing environmental conditions (Figure 1).

With unpredictable rainfall and rising temperatures, causing more frequent pest outbreaks, breeding



demands are multiplying. For example, simultaneous drought and flood tolerance, and resistance to pests, like aphids and weevils, is becoming increasingly important. These objectives are crucial for supporting more agroecologically sustainable production.

In Europe, most available grass pea seeds come from landraces or farmers' varieties, which are naturally diverse and well-adapted to local conditions. These materials are ideal for participatory breeding approaches that address evolving climate challenges. By involving researchers and other value chain actors (farmers, advisors, processors, consumers, etc.), these approaches can be made more effective with the use of low-cost spectroscopic and molecular tools tailored to local needs. With DIVINFOOD we are supporting the participatory development of higher quality, more resilient and resistant grass pea varieties for Alvaiázere's farmers,

small-scale processors, and consumers.

To promote a more diversified and agroecological grass pea production better suited to current climate challenges, participatory field trials are being conducted in farmers' fields in the Alvaiázere region of Portugal, supported by food technologists, plant researchers, local small-scale processors, the municipality, and technical advisors (Figure 2).



**Figure 2. Participatory evaluation at a grass pea comparative field trial, Alvaiàzere, Portugal**  
Credits: L. Gonçalves / ITQB NOVA



**Figure 3. Grass pea comparative field trials at Alvaiàzere**  
Credits: L. Gonçalves / ITQB NOVA

Each season, breeding objectives and experimental trials are collectively defined, conducted and evaluated, and solutions seek through frequent and close collaboration between all the actors, each contributing with their particular expertise. In our collaborative experimental field trials, grass pea accessions from around the world are compared with local landraces at the agronomic level (Figure 3). Spectroscopic models for predicting nutritional quality and molecular markers for stress resistance are thus refined. These precision selection tools are now starting to be applied for segregating populations or for cross-breeding promising accessions so to address local climate challenges. Avenues to involve grass pea farmers are being explored so as to value their knowledge and accelerate adoption of pre-breeding materials. Historically important in the diets of the poorer classes, and once overlooked by the wealthy, grass pea is now finding a new niche in this region as a traditional delicacy. It has recently been featured prominently in local restaurants and celebrated at annual gastronomic festivals.

## Benefits and limits

Grass pea is an appealing crop for drought-stricken, rain-fed areas with poor soil and extreme environmental conditions. Its hardy root system allows it to thrive in both drought and flooding environments. With a high nutritional value (25–30% protein), it serves both as human food and animal feed. Additionally, its symbiosis with rhizobia enhances soil nitrogen fixation, reducing input needs in crop rotations and making it suitable as green manure in sustainable farming systems. Grass pea can be consumed raw as a snack, cooked in stews, milled into flour for baking, or roasted. The DIVINFOOD project is also developing innovative fermented products, such as grass pea miso and tempeh, contributing to the diversification of its food usages. All these traits make grass pea an excellent crop for ensuring nutritional security in more marginal regions. However, the continuous improvement of varieties through more efficient precision participatory breeding is essential to keep addressing current climate challenges. Sharing of selection tools such as traits associated with molecular markers and spectroscopy prediction models is an innovative approach being used in DIVINFOOD.

## Further readings

Gonçalves L, Rubiales D, Bronze MR, VAZ PATTO MC (2022) Grass Pea (*Lathyrus sativus* L.)—A Sustainable and Resilient Answer to Climate Challenges. *Agronomy* 12:6 DOI: 10.3390/agronomy12061324

### Weblinks

Divinfood's webpage on Grass Pea: <https://divinfood.eu/grass-pea-en/>

## About this practice abstract and DIVINFOOD

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This practice abstract was elaborated in the DIVINFOOD project, based on examples provided by the EIP AGRI.

DIVINFOOD - Co-constructing interactive short and mid-tier food chains to value agrobioDiversity IN healthy plant-based FOOD, is running from **March 2022** to **Feb 2027**.

**The overall goal** of DIVINFOOD (a multi-actor, participatory project) is to facilitate the use and increase the value of Neglected and Underutilised Crops (NUCs) in food chains to foster healthier diets and more sustainable food systems.

**Project website:** [www.divinfood.eu](http://www.divinfood.eu)

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