



A Monthly e Magazine
ISSN:2583-2212

Popular Article

May, 2025 Vol.5(5), 7037-7040

Lentil an underutilized legume crop for nutritional security

Chandani kumari, Fathima bibi, Ravi Prakash, Aditya Pratap singh, Vikrant kumar

PG Scholar, Dr. Rajendra Prasad Central Agricultural University

[DOI:10.5281/ScienceWorld.15424583](https://doi.org/10.5281/ScienceWorld.15424583)

Abstract

Lentil (*Lens culinaris* Medik.) is a highly nutritious yet underutilized legume crop with significant potential for enhancing global food and nutritional security. It is rich in protein, dietary fiber, essential micronutrients, and bioactive compounds, making it a valuable component of a balanced diet, particularly in regions facing malnutrition. Despite its nutritional benefits and adaptability to diverse agro-climatic conditions, lentil remains underexploited due to limited production, lack of awareness, and inadequate research investments. Promoting lentil cultivation can contribute to ecological agriculture improving soil fertility through biological nitrogen fixation and offering a climate-resilient alternative to major staple crops. This article explores the nutritional profile, agronomic benefits, and challenges associated with lentil production while emphasizing the need for policy interventions and research advancements to enhance its role in food security and sustainable development.

Introduction

Food and nutritional security remain major global challenges, with protein-energy malnutrition and micronutrient deficiencies affecting millions of people, particularly in developing countries. Pulses, including lentils, play a crucial role in addressing these issues due to their more protein content, essential amino acids, vitamins, and minerals. Lentil, an ancient legume crop, is recognized for its adaptability to arid and semi-arid environments, making it a promising option for resource-poor farmers.

Despite its nutritional and agronomic advantages, lentil is often overshadowed by other staple crops such as wheat, rice, and maize. Factors such as low productivity, limited market access, and lack of awareness about its health benefits contribute to its underutilization. However, with the rising global demand for plant-based proteins and sustainable agriculture, there is a renewed interest in promoting lentil cultivation. This article examines the potential of lentils in ensuring nutritional security, their



role in sustainable farming systems, and the necessary strategies to enhance their production and consumption.

Mechanism used by underutilized leguminous crops boost food security

Underutilized the legumes play a significant role in enhancing food security thanks to their rich nutrient content, capacity to enrich soil nutrients, and potential to mitigate the impacts of climate change. They are resilient against adverse climate conditions, such as erosion and the emergence of diseases, and also possess capabilities for controlling plant diseases and managing weeds.

Phytochemical and compounds in underutilized leguminous crops

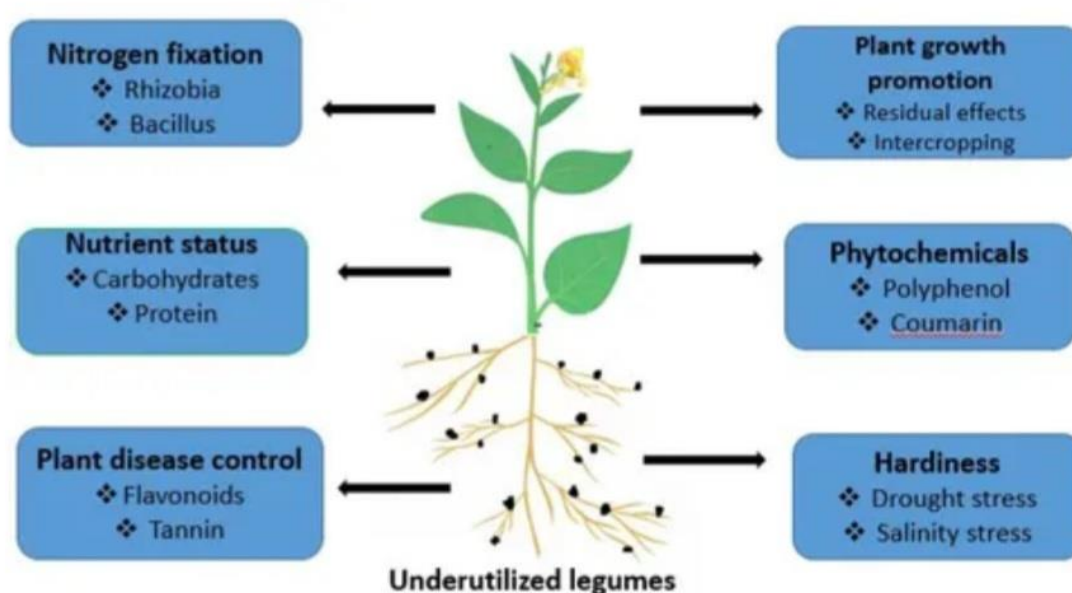


Figure 1: Mechanism of underutilized legumes in food security promotion

Underutilized legumes play a significant role in enhancing food security thanks to their rich nutrient content, capacity to enrich soil nutrients, and potential to mitigate the impacts of climate change. They are resilient against adverse climate conditions, such as erosion and the emergence of diseases, and also possess capabilities for controlling plant diseases and managing weed.

Biological Nitrogen fixation in underutilized legumes species

Nitrogen is one of the most essential nutrients, significantly enhancing crop yield. It makes up about 79% of the total gases in the atmosphere, but in its inert state of nitrogen, it cannot be absorbed by plants. Instead, plants utilize nitrogen in the forms of ammonium and nitrate, which can be decreased from the soil through processes like Dissimilatory Of nitrate reduction, crop harvesting, and leaching. The introduction of legumes, which can fix nitrogen, plays an important role in improving food



security in agriculture sector. Legumes are nitrogen-fixing plants or crops that establish a mutual relationship with a group of bacteria known as rhizobia. These rhizobia reside in specialized structures on the roots of legumes called nodules, where they convert atmospheric nitrogen into a form that plants can use (ammonia) with the help of the nitrogenase complex enzyme they contain. Rhizobium is gram-negative, oxygen is required, motile, rod-shaped, non-sporing bacteria that thrive in water, soil, and plants, multiplying through cell division while utilizing acids, alcohol, and sugars as their energy sources. Nodulation refers to the formation of nodules on the roots of leguminous plants or crops. Initially, flavonoids (plant metabolites) are released into the root zone of legumes plants.

Pest diseases management

In the use of plant extracts from underutilized legumes crops to manage plant diseases is an area that hasn't been thoroughly investigated. Some plant hormones found in these legumes, which are also present in various other, it also shown to help control plant diseases. For instance, African yam bean contains tannins. While tannins are known as antinutrients that can hinder nutrient absorption during consumption, their potential to combat plant diseases could be beneficial. Similarly, Adegboyega et al. reported in the presence of tannins and phytates in the seeds and tubers of winged beans. Common beans have also been found to contain flavonoids, tannins, and phenols, with their concentrations increasing under water-stressed conditions. Fenugreek is rich in coumarin polyphenols and flavonoids, while saponins have been identified in common beans, chickpeas, lablab beans, winged beans, faba beans, and pigeon peas, as established by Sparvoli et al. and Ajibola et al.

Factor impeding usage of underutilized legumes crops for food security

The use of underutilized leguminous enhance food security faces several challenges. These include the presence of anti-nutrients and nutrient, lengthy cooking times, decreased consumer demand, pod shattering, high production costs, and poor digestibility. Additionally, some climbing legumes need staking, which adds extra expenses for farmers. For example, the African yam bean requires supporting or staking, which can be prohibitively costly for the farmers.

Conclusions

Lentils are an underutilized legume crop with immense potential for enhancing global nutritional security. High in protein, fiber, essential vitamins, and minerals, lentils contribute to a balanced diet, particularly in regions facing malnutrition and food insecurity. Their ability to fix nitrogen also improves soil fertility, making them a sustainable crop for diverse agro-ecosystems.

Despite their benefits, lentil production and consumption remain limited due to challenges such as low yields, lack of awareness, and inadequate investment in research and development. To unlock their full



potential, there is a need for improved varieties, better agronomic practices, and policies promoting their cultivation and consumption.

By integrating lentils into mainstream agriculture and diets, we can enhance food security, support sustainable farming, and provide a cost-effective solution to nutritional deficiencies worldwide.

References:

- Verywell Health. (2023). Lentil Benefits: Nutrition, Health, and Uses. Retrieved from <https://www.verywellhealth.com/lentil-benefits-nutrition-8575752>
- Healthline. (2021). Are Lentils Good for You? Nutrition Facts and Health Benefits. Retrieved from <https://www.healthline.com/nutrition/lentils>
- The Guardian. (2020). Why Lentils Are the Secret Weapon Against Climate Change and Hunger. Retrieved from <https://www.theguardian.com/food/2020/feb/16/lentils-sustainability-superfood>
- FAO (Food and Agriculture Organization of the United Nations). (2016). International Year of Pulses: Lentils. Retrieved from <http://www.fao.org/pulses-2016/news/news-detail/en/c/411288/>
- Science Daily. (2020). Legumes and Their Role in Sustainable Agriculture. Retrieved from <https://www.sciencedaily.com/releases/2020/07/200706102403.htm>
- National Geographic. (2019). How Ancient Legumes Could Help Feed the World. Retrieved from <https://www.nationalgeographic.com/environment/article/lentils-legumes-sustainability-food-security>

