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Can lupins be the next generation of plant-based proteins?

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INTRODUCTION & AIM

- Soy is a widely used plant-based protein source; however, overreliance on soy is not sustainable. [1]
- *Lupinus angustifolius* L. is an emerging superfood due to its superior nutritional profile, ability to thrive in harsh growing conditions, and lower production costs compared to soy. [1]
- Limited human consumption due to sensory issues, allergenicity, and the presence of antinutritional factors. [2]

Aims:

- To explore the nutritional, health, and environmental benefits of *L. angustifolius.*
- Identify challenges associated with the commercialisation of lupin-based food.
- To explore potential strategies to overcome challenges in introducing *L. angustifolius* into mainstream food applications.

Figure 1. (a) whole plant; (b) whole seeds; (c) kernels of *L. angustifolius. Source:* [2]

KEY FINDINGS

Nutritional Profile:

- Higher protein and dietary fibre than soy. [1,2]
- Lower starch and fat contents than soy. [1]
- Suitable for high protein, gluten-free food product developments. [2]

Health Benefits:

- Potential to lower blood pressure and cholesterol. [3]
- Potential to reduce heart disease risk. [3]
- Potential to reduce the risk of obesity and type 2 diabetes. [3]

Environmental Advantages:

- Nitrogen-fixing, like soy. [4]
- Lower greenhouse gas emissions compared to soy. [4]
- Higher drought tolerance. [4]
- Requires less water and synthetic fertilisers. [4]
- Can grow in poor soil conditions, unlike soy. [4]

Current Production & Consumption:

- Western Australia produces ~85% of global lupins. [5]
- Most production is used for livestock feed; only ~4% consumed by humans. [2,6]
- Opportunity to expand human consumption through products, such as high-protein lupin-based pasta, yoghurt alternatives, fermented beverages, plant-based meat analogues, bread and high-protein snacks. [1,2,5,6]

RESULTS & DISCUSSION

Current challenges:

- Low consumer awareness of the nutritional and health benefits of lupins and their potential as food ingredients. [2]
- Sensory issues: some lupin varieties have a bitter taste and a beany, grassy aroma that may limit consumer acceptance. [2]
- Negative consumer experiences with taste or texture may reduce the likelihood of repeat consumption. [2]
- Need to improve the techno-functional properties of lupin-based ingredients in food applications. [1]
- Allergenicity concerns and varying levels of alkaloids. [2]
- Strong market competition and brand loyalty of existing products. [2]

Recommendations:

- Using targeted marketing and consumer education campaigns highlighting its nutritional value and health benefits.
- Clear labelling to ensure consumer safety and focus marketing on non-allergic populations.
- Partnering with well-known food industry players for co-branding and product innovation; introduce lupin in familiar products such as bread, pasta and snacks.
- Breeding low-alkaloid, low-lipoxygenase varieties to improve flavour and sensory quality.

CONCLUSION

- Lupins are a promising food legume to cater to the growing population and demand for sustainable and nutritionally rich alternative protein sources.
- Lupins have the potential to become a mainstream superfood with increased research to improve taste, texture, and techno-functionality.
- Consumer awareness and strategic industry partnerships, are essential to improve human consumption of lupin-based foods.

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