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Lathyrus and Lathyrism: An Overview

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Lathyrus sativus, sometimes known as grass pea, is an important legume crop cultivated in South Asia, the Middle East and Africa. Its nutritional value, climate resistance, and affordability make it an important crop in food-insecure and drought-prone areas. *Lathyrus sativus* L., often known as grass pea or khesari, is a tolerant legume that grows in areas prone to dryness and low soil fertility. Despite its nutritional value and agronomic resilience, broad usage is limited due to the presence of a neurotoxic chemical, β-ODAP, linked to a neurological condition termed lathyrism.

Nutritional importance of *Lathyrus sativus*

Grass pea seeds contain 20-30% protein, making them one of the best plant based protein sources among legumes. The protein contains a lot of lysine, an important amino acid that is often lacking in cereal grains. In addition to protein, grass peas contain 50-60% carbohydrates, which contribute to energy intake. It also contains dietary fiber, that helps with digestion, lowers cholesterol, and promotes gut health. Grass pea seeds contain various essential nutrients, such as iron, zinc, calcium, and phosphorus. The seeds also include B-complex vitamins and antioxidants, which contribute to general nutritional adequacy. Grass peas are a legume that are suggested for low-fat, low-cholesterol, and diabetic diets. However, excessive intake has been associated to a neurological illness called lathyrism, produced by the neurotoxin β-N-oxalyl-L-α, β-diaminopropionic acid (β-ODAP).

Lathyrism: A neurodegenerative disease

Lathyrism is a neurological condition caused by prolonged overconsumption of grass pea seeds. The disease typically damages motor neurons, causing spastic paralysis of the lower limbs. It is believed permanent and classed as a non-infectious neurotoxic disease.

Types of lathyrism

1. **Neurolathyrism**
   Caused by the neurotoxic β-N-oxalyl-L-α,β-diaminopropionic acid (β-ODAP) found in L. sativus. Upper motor neuron injury causes stiffness, weakness, and paralysis in the legs. Common in men aged 15-45 in endemic areas.
2. **Angiolathyrism**: Affects the blood vessels. Associated with *Lathyrus odoratus* (sweet pea), possibly due to a different toxin. Rare and less studied.
3. **Osteolathyrism**: Interferes with collagen cross-linking, leading to skeletal deformities. Observed mainly in animal models, particularly in chicks and rats.

Prevention and control measures

1. **Dietary diversification**

- Limit the proportion of grass pea in the diet (<30% of caloric intake).

- Encourage alternative protein sources.

2. **Soaking and cooking**

- β-ODAP content can be reduced by soaking seeds in water, boiling, or fermenting them.
- Decortication (removal of seed coat) and repeated washing are also effective.

3. **Breeding low-ODAP varieties**

- Development of improved *L. sativus* varieties with low β-ODAP content (e.g., 'Pusa 24', 'Ratan').
- Research continues in genetic engineering and traditional breeding.

4. **Policy and education**

- Public awareness campaigns in endemic regions.
- Regulatory restrictions on sale and consumption in some Indian states.

Conclusion

Lathyrus sativus is a paradoxical crop: it is a great survival meal that can become toxic if over-used. Balancing its nutritional benefits with its neurotoxic potential requires a combination of agricultural innovation, public health awareness, and socioeconomic development. The presence of β-ODAP, a neurotoxic linked to neurolathyrism, has severely reduced its usage as a staple diet. Recent advances in breeding, molecular biology, and food processing have dramatically lowered β-ODAP levels in cultivated cultivars, providing safer eating options. L. sativus can be re-established as a safe, sustainable, and climate-resilient pulse crop by continuing development of low-toxin genotypes and awareness campaigns about proper cooking methods. Agronomic innovation, policy support, farmer education, and research must all be linked for long-term success.

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