IMPROVING THE STORAGE PROCESS OF BEETROOT ROOT CROPS (*BETA VULGARIS L.*)

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Annotation. Beetroot (Beta vulgaris L.) is an important root vegetable widely cultivated for its nutritional and industrial value. However, significant post-harvest losses occur due to improper storage conditions, leading to reduced quality and economic losses. This study aims to improve the storage process of beetroot root crops by analyzing optimal temperature, humidity, and ventilation conditions. The research evaluates traditional and modern storage methods, including controlled atmosphere storage and the use of natural preservatives. The results show that maintaining a temperature of 0–2°C and relative humidity of 90–95% significantly reduces weight loss, decay, and nutrient degradation. The implementation of improved storage technologies enhances shelf life and preserves the quality of beetroot.

Keywords: Beetroot, storage, post-harvest, temperature, humidity, shelf life

Introduction. Beetroot is a valuable agricultural crop rich in vitamins, minerals, antioxidants, and bioactive compounds. It is widely used in food processing, medicine, and animal feed. Despite its importance, beetroot is highly susceptible to post-harvest losses caused by microbial spoilage, moisture loss, and physiological deterioration.

Improving storage conditions is essential to maintain quality, extend shelf life, and reduce economic losses. Traditional storage methods used in many regions often lack proper environmental control, leading to significant losses. Therefore, the development of improved storage technologies is a key issue in modern agriculture.

The objective of this study is to analyze factors affecting beetroot storage and propose effective methods for improving storage efficiency.

Materials and Methods. The study was conducted using freshly harvested beetroot roots collected from agricultural fields. The following parameters were evaluated:

- Storage temperature (0–2°C, 5–10°C, and ambient conditions)
- Relative humidity levels (70%, 85%, 90–95%)
- Storage methods:
    - Traditional storage (cellars and pits)
    - Refrigerated storage
    - Controlled atmosphere storage
- Treatment methods:
    - No treatment (control)
    - Natural coatings (wax, plant extracts)
    - Antimicrobial treatments

Observations were recorded over a storage period of 90 days. The following indicators were measured:

- Weight loss (%)
- Decay rate (%)
- Firmness
- Nutritional quality (vitamin content)

Table 1. Effect of Storage Conditions on Beetroot Quality

Storage Condition	**Weight Loss (%)**	**Decay (%)**	**Shelf Life (days)**
Ambient (20–	25–30	20–25	30

25°C)			
5–10°C	10–15	10–12	60
0–2°C + 90–95% RH	3–5	2–4	90+

Discussion. The results indicate that storage temperature and humidity significantly influence beetroot quality. Higher temperatures accelerate respiration and water loss, leading to rapid deterioration. In contrast, low temperatures (0–2°C) combined with high relative humidity (90–95%) effectively reduce moisture loss and maintain firmness.

Controlled atmosphere storage further improves storage efficiency by reducing oxygen levels and increasing carbon dioxide concentration, which slows down metabolic processes. Additionally, the use of natural coatings helps reduce water loss and microbial infection.

Traditional storage methods showed higher losses due to poor environmental control. However, improving ventilation and humidity management in these systems can partially enhance storage outcomes.

Conclusion. The study concludes that optimizing storage conditions significantly improves the shelf life and quality of beetroot root crops. The most effective storage conditions include low temperature (0–2°C) and high relative humidity (90–95%). The use of modern storage technologies and natural treatments further enhances storage efficiency.

Implementing these improved storage methods can reduce post-harvest losses, increase profitability, and ensure a stable supply of high-quality beetroot.

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