

## Modern Technologies for Vegetable Seed Storage for Longer Shelf Life

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Seed storage is the technique of preserving seed in its original condition until it is required for planting. Many vegetable seeds can be kept for a year without significantly affecting germination rate or seedling vigour. The longevity of seeds depends on proper handling and storage. Germination rates and seedling vigour are both dramatically reduced by rough handling and inadequate storage conditions.

### Stages of Seed Storage

From the time the seeds acquire physiological maturity until they germinate, they are considered to be of as being in storage.

### Principle of Seed Storage

- Seeds should be dried to safe moisture levels before being stored
- Proper sanitation in seed depots
- Dry and cool storage condition is prerequisite for seed storage
- Effective pest control techniques

### Purpose of Vegetable Seed Storage

- The primary aim of seed storage is to maintain economic crops from one season to the next season.
- The preservation of the seed in good physical and physiological condition is the ultimate objective of seed storage.
- To preserve the original seed quality throughout the storage time, such as germination, physical purity, vigour, etc.



Bry-Air Seed Dryers

## Factor Influencing Seed longevity

Abiotic Factor	Biotic factor
Temperature	Insect pest
RH	Genetic make of seed
Seed moisture content	Initial seed quality
Packaging material	Provenance

Seed moisture content and storage temperature play a vital role in long term seed storage. Fluctuations in temperature and humidity can affect seeds *via* shortening the shelf life and degrading their quality. Avoid storing seeds in storage at temperatures or humidity levels exceeding 21°C or 60%. Most vegetable seeds should be stored between 2° and 4°C and the humidity should be under 40%. The typical temperature that household freezers maintain is just below 4°C.

### Storage Classification

**Short-term Seed Storage:** For short-term storage, seed should be kept in an area with temperatures approximately 15°C. Avoid such locations where the temperature falls below 1°C and rises above 20°C. It is advised to maintain relative humidity levels between 40% and 60%. The packaging of some seed varieties, such as lettuce, fennel, carrot, leek, and onion, may bear the warning, "Store at 8°C," because they are particularly vulnerable to high temperature conditions.

**Long-term Storage:** However, sometimes when seed is not used in the season for which it was designed, and producers desire to carryover the seed and plant it in a subsequent season. To ensure quality, it is advisable that seed should be use within two years of the date of purchase. If seed is carried over, it is advised that the germination rate be checked at least once a year at a facility authorised by the International Seed Testing Association (ISTA) before the seed is planted. The following types of seed are not advised for carryover: insecticide-treated seed, primed seed, bean, lettuce, or onion seed, pelleted seed.

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**Air cooled storage:** Air cooled storage basically an insulated structures that are partially above ground and cooled by the circulation of cooler air. Most vegetable seeds are often stored in air-cooled stores because they are affordable, simple to set up, and operate.

**Dehumidification storage:** For the dehumidification of seed stocks an adequate chemical desiccant is utilized as a dehumidifier. Silica gel is frequently used in seed storage systems because it has a 40% water absorption capacity.

**Insulated seed storage:** These kinds of seed storage contain insulated walls, floors, and ceilings, which aid in preserving the ideal temperature and humidity required for storing specific vegetable seeds. Despite of the season, whether it is hot or cold, the inside temperature and RH remain constant. Its installation may come at considerable initial cost.

**Refrigerated storage:** The long-term storage of high-value seed material, such as germplasm collections and breeders stocks, refrigeration is used to regulate the temperature of vegetable seed stores. However, refrigeration is useful in sub-tropical areas for preservation of different categories of seed stocks. When refrigeration is included into the control systems, extra care and attention must be given to the store's structure and thermal insulation.

**Storage in vapour proof containers:** The basic idea of this storage is that seed lots are dried to a moisture level that is slightly lower than it would be before in typical open storage and then seed should be sealed in metal cans, foil, plastics bag or other suitable moisture proof containers. This packaging allows each seed lot to be stored independently for 1-2 years at

ambient temperature and RH, or even longer, with no adverse impact on germination percentage. Seed moisture content can be reduced to minimal by using foil or plastic, hermetically sealed packs.

### **Maintenance of viability in storage**

- Store well mature seeds
- Store normal coloured seeds
- Seeds should be free from mechanical injury
- Seeds should be free from storage fungi or microorganisms
- Seeds should not have met with adverse conditions during maturation
- Storage go-down should be fumigated

### **Desiccant based seed technology for seed drying and storage**

- Higher moisture removal capacity
- Precisely control relative humidity levels in the critical Seed storage area
- Avoid costly re-packaging
- Ensure safe cold storage
- Extended storage life
- More reliable and energy efficient

### **Seed handling and transportation**

- The seed coverings of bean, pea and sweet corn seeds are particularly delicate and prone to harm from handling.
- Applied coating of the pelleted seed can shatter from incorrect handling.
- Bags of these delicate seeds should always be handled with care; never be dropped or tossed.
- Reductions in germination and seedling vigour might occur as a result of damage from poor handling.

### **Conclusion**

The current study's findings suggest that RH and storage temperature are often the two elements that have a significant impact on the longevity of seeds. Seed moisture content is controlled by storage relative humidity, which affects the quality of the seeds. Enhancing storage condition may increase seed lifespan. The results highlight the significance of seed crop, storage length, storage temperature, and relative humidity on the quality of vegetable seed and the preservation of their germplasm.

### **References**

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