

Protocol for post-harvest seed drying and storage using zeolite desiccant beads

Seeds will store much longer and retain higher vigor and viability when stored at low moisture contents. As seeds will absorb moisture from the air, it is necessary to store them inside of sealed containers. In addition, the use of desiccants to absorb the water from the seeds will lower their moisture content and extend their storage lives.

This protocol describes the use of zeolite desiccant beads to dry seeds and maintain them at low moisture contents during storage.

CAUTION: Use only surface-dried seeds. Do not add beads to wet tomato or melon seeds. Follow usual drying and processing procedures for wet seeds like tomato, cucumber and melon before putting seeds into the storage containers.

CAUTION: Do not add water directly to the beads, as they will generate heat. This can create an unsafe situation or damage plastic containers.

Steps for setting up seed storage trials:

1. Zeolite beads will absorb moisture from the air, so once the container of dry beads is opened, work quickly to distribute the beads. When handling beads, use a funnel to quickly pour the required weight of beads into airtight containers and seal them. Keep any remaining beads in a sealed air-tight container.
2. Estimate the ratio of bead weight to seed weight required based on the relative humidity of the air in which the seeds have been air-dried or stored.

Seed type	Ratio of bead weight to seed weight			
	50% RH;	75% RH,	85% RH;	100% RH;
Starchy seeds (beans, cereals, rice, spinach, sugarbeet)	0.3:1	0.5:1	1:1	1.25:1
Oily seeds (melons, tomatoes, cabbage, sunflower, lettuce)	0.2:1	0.4:1	0.8:1	1:1

3. Weigh out the required amount of beads based on the chart above and place into 3-liter, sealable, wide-mouth clear plastic jar or other container that can be sealed tightly. The beads can be in any type of container inside the jar so long as it is porous to air (paper, cloth, open jar, perforated metal container, etc.).
4. Weigh out subsamples of cleaned seed containing sufficient seeds for planned germination tests and moisture content tests. Place the samples in paper envelopes. Place the seed envelopes into the plastic container with the beads.
5. Place a small packet of indicator silica gel over the seed. Make sure the silica gel packet is visible from outside the jar. Work quickly and promptly seal the plastic container airtight. If there is any delay, be sure to keep the lid on the jar containing the beads.

6. Prepare a similar set of seed samples and place in a plastic jar without beads to serve as the control treatment.
7. Place both jars in the storage location. Remove seed packets from the dry and the control jars periodically (at least every two months) to test for seed quality.
8. If the indicator silica gel changes color, remove the exhausted beads and replace with activated (dry) beads. If the seeds are already quite dry, a smaller quantity of beads can be replaced to maintain low RH in the storage jar.

Please print HORTCRSP logo and stick to individual equipment and containers.

Reactivation of beads:

1. Once beads have absorbed approximately 18-20% of their initial weight in water, they can be reactivated by heating. Place beads into metal can (without cap) or a flat tray. Heat for 2 h at a minimum of 250°C in an oven. Carefully remove the hot metal can or tray using protective gloves, place on a heat-resistant surface and **quickly** cap airtight and allow to cool. Once beads can be handled, store in air-tight containers or vacuum seal. **Do not use hot zeolite beads. Do not allow metal cans or tray of beads to cool too long in the open air as they will reabsorb moisture.**