



DRYING BEADS

Technological intervention for seed preservation

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The major problem in most of the world's developing countries located in the tropics is seed storage, where high temperature coupled with high relative humidity results in seed destruction. With a relative humidity of above 75 % and temperatures soaring up to 30°C, storage of seeds during monsoon seasons is a major hurdle as it results in rapid deterioration. Although both relative humidity and temperature play a crucial role in storage of seeds, moisture content of the ambient air is the key factor for long term storage of seeds without compromising its qualities. In tropical developing countries, the implementation of cold storage is rather difficult owing to inadequate technical knowledge, inconsistent electricity supply, costly and unreliable labor. To overcome all these problems, drying of seeds by utilizing a handy, cost-effective, reliable technology must be put to use.



Drying Beads

Drying seeds to a considerably safe moisture content using drying beads and storing them safely in hermetic containers is the primitive principle of drying beads technology. This not only maintains a low temperature, but also prevents losses due to rodents, insects and molds. This method can be effectively utilized even during monsoon season. In addition to seeds, drying beads can also be implemented for the drying of vegetables, fruits, nuts, medicinal plants, DNA conservation, purifying



essential oil and several other horticultural produce.

Drying beads are zeolites (modified ceramic materials) that exceptionally hold water molecules very tight in microscopic pores. They take up water 20 to 25 % more than their initial weight. In desiccant-based seed storage, these drying beads absorb water directly from the seeds without the need to heat the seed materials. Zeolites are crystalline structures having longer durability and higher resistance.

Need For Drying Beads -Small Farm Holders View

Access to improved seeds is one of the most sustainable methods of improvising the crop yield and quality of the produce. Improved varieties offer innumerable benefits to the farmers through their reduced pre and post-harvest losses, enhanced quality and also fetches higher prices in the market. However, utilization of these improved varieties depends on how they store their seeds which complementarily affects the seed

germination percentage, seedling vigor, poor and ununiform crop establishment ultimately leading to drastic reduction in yield. The confidence of small landholders on their seeds and the ability to proactively store them strengthens local seed market and increases the yield. It is an economic, eco-friendly and faster way of drying which acts as a suitable alternative to existing economic methods.

Characteristics of Drying Beads

- They comprise of micro porous materials. Uniform pore dimensions and has no changes between wet and dry beads.
- Thermally and mechanically stable.
- Adsorption of heat and high temperature.
- This is a non-toxic, food grade material that absorbs about 20 – 25 % of water.



SILICA GEL vs DRYING BEADS

Although silica gels are used for drying purposes, their main drawback is that they have less affinity for water at lower humidity. When regenerated, there is a relative reduction in water holding capacity of the silica gels with every heating cycle which ultimately leads to its replacement.

Regeneration Of Drying Beads

The beads for reuse must be heated to a temperature of about 250°C for about 2.5 hours. They have to be then cooled in a closed metal container to prevent re-

Do They Damage Seeds?

When seeds are stored with an excessive amount of beads, the moisture content of the seeds will decrease to a very low level. Generally, desiccated seeds are not affected, even when dried at a moisture content of 3-5%. However, larger seeds, such as cucumbers, watermelons, bottle gourd, and beans, may be damaged by rapidly rehydrating from a very low moisture content, a process known as

In contrast, drying beads do not have any lose in water holding capacity even after regeneration. It is estimated that they can be used for about 10,000 times without lose in capacity. Also, they are non-toxic and pesticide free.

absorption of water. These cooled beads are stored in air tight moisture proof containers or packages until further utilized.

imbibition. To ensure the safety of the seed, it is recommended to remove the seeds from the storage container and let them air-dry for a period of several days before planting or exposure to liquid water. Generally, in most tropical areas, the humidity of the air will be sufficient to ensure that the seed does not become brittle. This is especially true for larger seeds such as beans.