

## Recent Technological Advancements in Storage and Pest Management in India

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Minimizing post-harvest losses of agricultural products is a very effective way to gratify global food demand and to improve food security. Up to one third of the total annual global production of grain (cereals, oil seeds, and pulses) is lost primarily due to poor post-harvest management. The existing storage structures such as granaries, warehouses, non-aerated containers, gunny bags or open stockpiles were not sufficient to provide a pest free environment for long term storage. Irregular maintenance of grain moisture content, temperature and insect infestations are the most considerable factors causing post-harvest loss. The storage system can be equipped with several types of sensors to monitor and maintain the ideal storage environment. Recent technological advancements in hardware and software to continuously monitor and control storage conditions will prevent post harvest losses. Moisture content and temperature can be controlled by temperature and humidity sensors which will automate drying and aeration fans. Moisture content can also be measured lively using capacitance, microwave and infra-red radiation based sensors. CO<sub>2</sub> sensors, pheromone-assisted technique and insect trap monitoring are used to detect insect population and indicate if a control treatment is needed. Storage headspace condition monitoring and exhaust fan operation are used to avoid condensation in the storage. Monitoring of fumigants indicates the lethal doses needed for insecticides. Pest management measures of using chemical fumigants can be progressively removed due to harmful residues and replaced by biofumigants that are relatively non-toxic. The other ways of applying heat by means of dry heat, forced hot air, electric fields such as radio frequency and electromagnetic energies as a lethal temperature of pest while maintaining the product at lower temperature for good quality, hold potential for postharvest thermal disinfestation. For long term storage of fruits and vegetables, precooling by forced air cooling, hydro cooling, evaporative cooling, vacuum cooling and storage using cold storage unit with a provision of controlled atmosphere and modified atmosphere are competent to follow. Thus new technologies are offering real-time, remote, wireless sensors for monitoring and control and provides efficient atmosphere for pest management.