

Development of an in-bin fumigation system and management protocols for scientific storage of selected Indian spices

Dr. Jeyan Arthur Moses (PI)

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Dr. M. Loganathan (Co-PI)

Project Objectives

- To design and develop a pilot-scale in-bin fumigation system for selected Indian spices
- To develop and validate a three-dimensional mathematical model to predict the distribution patterns of fumigant combinations in the developed system
- To conduct long-term storage studies in the developed system with regular monitoring of spice quality

Description

Spices and condiments are indispensable components of the Indian diet. They are used as condiments and seasonings for food preparations as they add flavour, taste and colour. Spices have good antioxidant properties as well as anti-microbial and antibiotic properties, and therefore, are also used for medicinal purposes. Spices have a global demand and they can earn valuable foreign exchange. India is known as the "Home of Spices" and produces a large variety of spices. About 60 varieties of spices such as coriander, pepper, cardamom, chillies, ginger, turmeric, and cumin are grown in the country. Losses of spice are due to high moisture content during harvest and poor storage methods. Moreover, changes in quality of spices during storage are the most serious limitations of shelf life of the product, which in turn affects the consumer acceptance. Scientific storage of spices is necessary to prevent losses, increase usability and enhance income. This project is aimed to provide a complete technology package for effective storage and fumigation of selected Indian spices over extended periods of storage.

The deliverables of this work will be able to:

- Eliminate the risk of mycotoxin formation in selected (whole) Indian spices during storage
- Significantly lower losses in essential oil quality during long-term storage (> 1 year)
- Eliminate the scope of development of insect resistance due to improper fumigation practices
- Eliminate the presence of fumigant residues in selected Indian spices; unlike in conventional storage systems using uncontrolled/excessive levels of fumigants
- Ensure high market value of the product with 'near-zero' loss in spice quantity and quality

Similar approaches can be effectively implemented for other spices also.