

## Herbal Fumigant for Seed and Food Grain Protection

Insect pests cause severe loss to food grain and seed under storage condition. During storage cereal seed and grain are infested by various store grain pests like rice weevil (*Sitophilus oryzae*), lesser grain borer (*Rhyzopertha dominica*), red rust flour beetle (*Tribolium castaneum*) and grain moth (*Corcyra cephalonica*). The infested grain become unfit for human consumption due to various reasons. About 70% of food grain stored at farmer's level remains always at high risk due to pest susceptible storage methods and incompatible protection technology. Moreover, risk to human health is much more than the food grain as chemical pesticides used for their control are non-selective and harm non-target organism more than the target insects. Insects may require five to ten days exposure of fumigants to get killed while warm blooded animals including human being need only a few minute exposure for such lethal action. In India Aluminium phosphide (Phosphine) is permitted to be used under technical supervision which the farmers do not have. It is to be used under completely airtight storage structure which is not available in most of the households. The smallest ready to use formulation is 3g tablet or 10g bag which is meant for 10 quintal grain. Most of the farmers store grain in small quantity in each receptacle for which they do not have suitable formulation and packing.

Presently any non-insecticidal product is not available, which can be used effectively and economically for the control of all storage pests in the organic cereal seed.

Although, some plants have been reported to possess the pesticidal property, their activity is restricted to some specific species due to which they are not much useful for the treatment of organic seed which may be infested by all the four species during storage.

Processed products such as milled rice etc packed in 5-40 kg poly lined jute or poly bag is also most frequently attacked by insects for which we do not any suitable fumigant. Under such condition herbal fumigants may be an ideal replacement of aluminium phosphide for 14 crore households storing 175 million ton food grain because:

### Advantages:

1. The herbal fumigants are as effective as aluminium phosphide or any other fumigant.
2. They kill 100% insect population within 24 hours under airtight condition and completely suppress their progeny production in due course of storage
3. They provide 100 per cent protection against major insect pests of stored grain such as Rice Weevil, Lesser grain Borer, Red Rust Flour Beetle, Grain Moth, Rice Moth etc.
4. They can provide effective and high level protection for more than 12 months.
5. They do not alter the taste or any other organoleptic property of food prepared from treated grain / processed products.
6. They will not harm human or any other non-target organism because they are formulated from edible materials.
7. They can be used safely under any condition even in indoor storage structures without any risk or health hazards.
8. They can be used for treatment of seeds, as they do not affect the germination of seed, vigour or vitality of seedlings.
9. They can be formulated by using naturally available materials or the plants having their ingredients can be easily cultivated in many agro-climatic conditions.
10. They can be presented as ready to use formulation for treatment of grain/product in a wide range of receptacle/bin ranging from 1 to 1000 kg capacity.
11. They can be manufactured even in small scale industry due to less expenditure.
12. They can be presented in a variety of formulation and packing convenient to any type of household.