



## **Herbal Control Of Stored Grain Pest *Bruchus Chinensis* Linnaeus (Coleoptera: Bruchidae)**

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***Abstract:***

*Stored grains are infected by number of pest insects. Cowpeas and other dicotyledons are infected with pulse beetle *Bruchus chinensis* (Lin.). The herbal pallets made from neem seed ('neem' (*Azadirachta indica* (A.) Juss.) Powder, 'Sitafal' (*Annona swuamosa*) *Annona* seed powder, Hing or asafoetida (*Serula foetida*) & chilli powder in water were tried to control the pest. Results compared with Parad tikia available in market. After 48 hours pest insect get killed. In *Tabulates* soaked in eucalyptus oil start killing insect pest after 5 minutes. Home made pallets are cheapest, non poisonous for human being.*

***Key words:*** *Bruchus chinensis, stored grain pest, herbal control, annona seed, asfoetida, eucalyptus*

### **1.Introduction**

Store grain pest causes the heavy losses to store grains and pulses all over the world. The problem is from prehistoric time and still not a novel remedy has sought out. The literature describes the use of one or two plants or herbs by the people from India and Asia to control the store grain pests. The pulse beetle, *Bruchus chinensis*, is a serious pest of stored food grains and causes damage to cowpea, gram, soybean, and pulses. This pest is distributed worldwide and is commonly found in India.

For Protecting Pulses Shri Bapjibhai Bhyalbhai Gavint<sup>3</sup> has developed a practice for storing pulses. 'Saag' (*Tectona grandis*) leaves are spread in a basket made of paddy straw rope. Dried pulses are kept in the basket along with neem leaves, ash, piece of iron and leather, 'bhoiringni' (*Solanum surattense*) and chaff of black/horse gram. The basket is then daubed with a mixture of clay and cow dung. Bapjibhai claims that by using this practice one can store the pulses for years without any damage/loss. He has been using this traditional practice for years.

Ginger can also be used for effective storage, "thirty g of ginger rhizome powder and 50 g of neem kernel powder can be mixed with one kg of any of the pulses such as cowpea, soya bean, pigeon pea, red gram etc. Grains and pulses can also be stored by mixing them with Neem oil (2-3 ml/kg of seed). The neem oil used against stored grain pests should be 1-2% by weight of the grain."

Leaves of 'notchi', neem and 'pongam' (*Pongamia pinnata*) are collected and put into the storage box or room along with the grains to protect them from pests and diseases<sup>2</sup>. The leaves can be changed regularly for better results. In another method, dried leaves of notchi, neem and pongam are put in a mud pot along with some dried chillies. These are then burnt and kept inside the storage room. The process is repeated every week depending upon the intensity of pest attack.

Fumigation of Gugal (*Commiphora mukul*) is practiced in the kitchen garden to prevent the malformation in Pumpkin<sup>1</sup>. Farmers mix the dried and powdered leaves of banyan tree (*Ficus benghalensis*) with the harvested grain for keeping it safe from pests. Sometimes neem (*Azadirachta indica*) leaves are also mixed with it.<sup>3</sup>

Camphor evaporates over time when stored. To prevent this, grains of pepper are placed along with camphor in the container. A handful of rock salt kept at the base of the storage place helps preventing pests in pulses and grains. The pests of stored rice grains can be prevented by keeping ten to fifteen dry chillies along with the rice in a container or in bags. Seeds of 'kakara' (bittergourd), 'gummadi' (pumpkin), 'pottla' (snake gourd) and

'beera' (Ridge gourd) are stored by mixing them with ash. It is believed that the plants grow well if the seeds mixed with ash are dried and then planted. (This is a wide spread practice in many parts of South Asia.)<sup>4</sup>.

The leaves of *Clerodendrum phlomides* are crushed to prepare its extract which is bitter in taste. Five hundred ml of the extract is mixed with 40 kg of grains to be reserved. The grains are dried and filled in big earthen pots. *Clerodendrum phlomides* is found in hilly areas. Ratanabhai says that many farmers in his area use the extract for preserving grains<sup>5</sup>.

Fine sand is added to the seeds of red gram (*cajanus Cajan*) and cement to seeds of sorghum as protection against storage pests. Good quality garlic bulbs, with the plant intact are brought from the fields and hung from the roof of the house. They are then used as seed when it is time for the next crop<sup>6</sup>.

Farmers use various non-chemical, indigenous techniques to preserve the grains using dry chilly, salt crystals, leaves of 'neem' (*Azadirachta indica* (A.) Juss.), wheat chaff etc. But there are some women who store grains with their own methods. Arkhiben Mithabhai Vankar of Bamna village (of the drought ridden taluka Bhiloda in Sabarkanthadistrict) reported use of dry leaves of 'khakhra' (*Butea monosperma* (Lam.) Taub.) to preserve grains. In a moist free pit, after putting a layer of 3-4 mats (layers) of dry *Butea* leaves, grain is filled up to one and half feet and then another layer of *Butea* leaves is placed. Finally the *Butea* leaves are placed on top of the pit before closing it. No insect is reported to affect the grains stored this way. "We have been using this traditional method for many years", adds Arkhiben<sup>7</sup>. (*Butea monosperma* is known for insect repelent properties<sup>11, 12</sup>. Hing or asafoetida (*Serula foetida*) has the properties of ceasing the unwanted growth of plants such as banyan (*Ficus benghalensis*) and wild herbs that grow in cracks and corners in buildings during the rains, mainly in the eastern part of India. These plants grow again even when pulled out from the roots and make cracks in walls. Duryodhan Biswal says that people generally get rid of this problem by sprinkling hing powder on the part of the stem from where it is cut. Hing acts as herbicide<sup>8</sup>. Storing grains for a long period of time has always proved tedious for the armers. Vasantbhai Bhagora of village Bavalia uses dried leaves of 'meethi dodi' (*Leptadenia reticulata*). The grains are filled into container layered with these sun-dried leaves. The leaves make the container air-tight. The grains can be stored thus for over a year<sup>9</sup>.

The survey of above literature indicates traditional use of plants and herbs for control of storage grain pest. The aim of the present project is to formulate the herbal tabulates for control of storage grain pest, to provide scientific base to traditional knowledge, and promote the use of herbal pesticides so as to prevent the use of synthetic fumigants and pesticides and there by reducing the hazards caused by chemical pollutants.

## 2. Material And Methods

The seeds of Neem and Annona (sitaphal) were collected and dried in the sun, made in powder form. These were mixed as 50gm of neem powder+50gm of Annona `Sitafal' (Annona swuamosa) powder +50gm of hing (Serula foetida) powder+50gm of chili powder in water. The tabellates of 5gms were prepared, dried in the sun. Eighty individuals of Pulse Beetle *Bruchus chinensis* (L) along with cowpeas (chana) about 500gms were placed in one liter capacity jar. Five tablets immersed in Eucalyptus oil were inserted in the jar. This is the first set of experiment. It was also conducted without eucalyptus oil. Similarly Parad tikia available in the market were also tried for the same pest as second experimental set. At the same time control experiment was also run without any herbal pesticide to record the natural death. The results recorded after every 24hours at room temperature. The results obtained are tabulated. Photographs were taken.

## 3. Observation And Results

The results obtained are given in the table no. 1.

Sr.No.	Death Time (hrs)	Control	Set1a	Set1b	Set 2
1	24	All alive	All alive	All died in 25 minutes	All alive
2	48	--	5-10	--	5-10
3	72	--	7-15	--	10-17
4	96	--	15-25	--	16-25
5	120	--	25-40	--	26-42
6	144	--	40-60	--	42-63
7	168	--	60-80	--	63-80

Table 1: Death of pulse beetle *Bruchus chinensis* (L.) with herbal & parad tikia

- Set : neem + Annona+ hing+ chili tabelates
- Set : neem + Annona+ hing+ chili tabelates soaked with eucalyptus oil
- Set2: Parad tikia

#### **4.Conclusion**

The death of storage grain pest recorded both in set 1a with our pallets and set 2 with commercial parad tikia after every 24 hours is almost the same. No death observed in controlled experiment. In present study when tabellates soked in eucalyptus oil utilized gives best results and the deaths started in first 5 to 10 minutes & kills the hundred percent pests in about 25 minutes. Eucalyptus cameldunsis (Labill) was found to be the strongest toxicant against the post harvest stored product pests, viz., *Aspergillus flavus*, *Penicillium italicum* (fungal pests), *Rhizopertha dominica*, *Tribolium castaneum* and *Trogoderma granarium* (insect pests). The oil as a contact toxicant killed all the test organisms in just 5 minutes, however, as a fumigant, at 10% concentration; it required 4 hrs to kill all insects and heavy doses of fungal inocula. The oil's toxicity was thermostable up to 1000C and did not disappear even after 60 months of storage, the maximum unit taken into consideration. Moreover, the oil did not show any phytotoxic effect on stored food grain up to 50% concentration. Besides, it is also reported as harmless to human health (Shukla et al, 2004).

Tablets we prepared are non poisonous, cheap and can be prepared at home and used to control the store grain pest. However the results obtained here are at preliminary level and need further study.

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