

NPM METHOD S

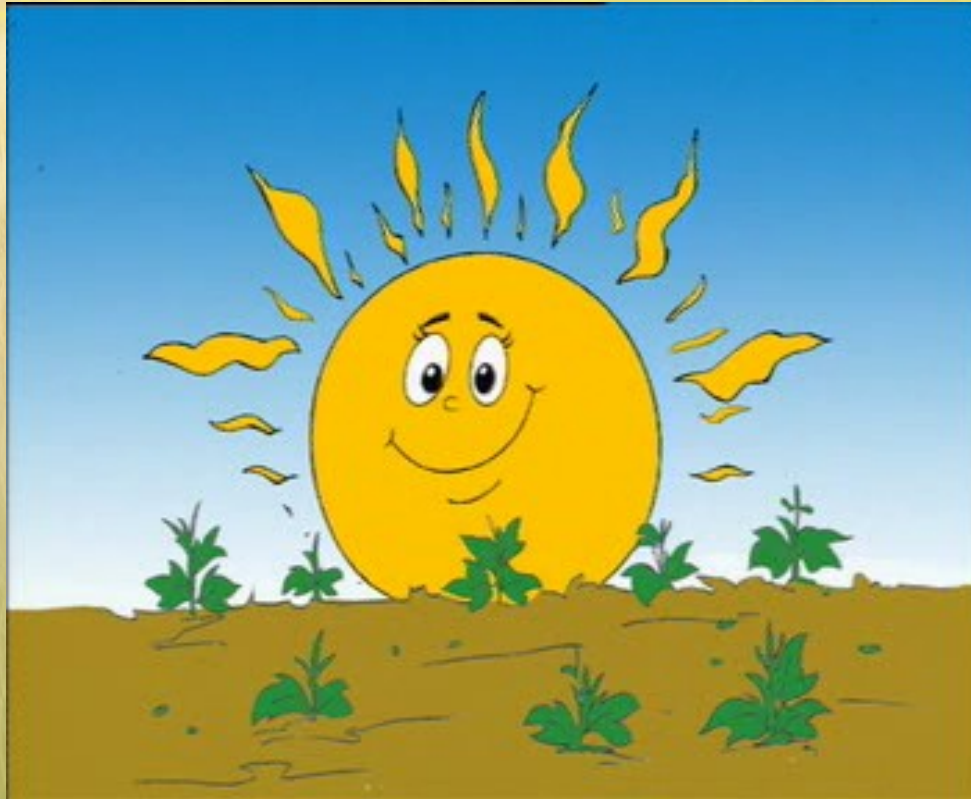
Center for Sustainable Agriculture





Why NPM ?

Balanced to Unbalanced Ecosystem



What is NPM ?

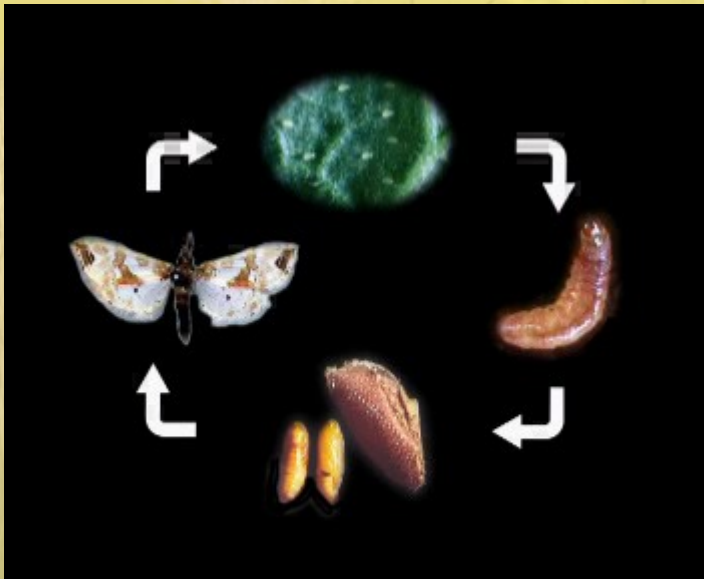
- Knowledge
- Management Skills
- Community Action
- Locally Available resource



knowledge

Understanding insects and Diseases

- Biology of insects
- Life cycle
- Each stage preventive and curative measures
- Crop Ecology
- Management Skills



Locally available Resources

Mode of action



Ingredients, options





Vulnerabilities in egg stage :

Adult insect lays 80-100 eggs singly or in groups usually on leaves of flower buds. It ensures tender, healthy food readily available to its offspring this stage lasts 4-10 days. This stage doesn't damage any crop. This stage doesn't move.

American bollworm	Singly	Tender leaves, Flower Buds
Tobacco catterpillar	Laid in groups	On lower side of leaves, Cover with scales
Pink bollworm	Singly or	Flower buds bolls, small groups
Spotted bollworm	Singly	Tender leaves
Castor Semilooper	Singly	On leaves
Rice yellow stem borer	Laid in groups	Leaf tips and cover with tips
Brinjal fruit and Shoot borer	Singly	Shoot tips



Management practices :

- ☞ Clipping leaf tips of rice before transplanting would reduce yellow stem borer infestation as egg masses are removed.
- ☐ On noticing spodoptera egg masses on castor/groundnut leaves clipped.
- ☐ Eggs on trap crops are promptly destroyed and spraying with NSKE

Vulnerability at Larval stage

- Most of the neonate larvae after hatching eat on tender leaves/buds scraping on surface.
- It later feeds on flowers or fruits or shoot tips by boring inside and cause immense losses to crops.
- It is active, mobile stage moving from one part of plant to other and from one plant to the next one. This stage is the most devastating
- for any crop and lasts about 20-25 days. But through several agents in nature controls them



d) Insects doesn't like to eat some substances :

Some insects are infected by diseases :



Summer ploughing



How it manages ?



- ☞ This stage can be controlled by deep ploughing in hot summer days to expose them.
- ☐ They die of hot sunlight or birds predate on them.
- ☐ It reduces weed growth and opens up field for monsoon rains to percolate day.
- ☐ Dried, fallen and damaged plant parts should be collected and burnt it
- ☐ controls pink bollworm in cotton at the end of the crop stubbles should be removed and burnt.

Birds feed on exposed pupae



Community Bonfires



- Bonfires at monsoon showers attracts Adult moths and this will reduce 50 to 60% pest population

Border crops

Beneficial insects develops by eating pollen of the border crops

☞ All sucking pests will be moving along the wind stream and develop in favorable climate of crop canopy

☐ This prevents spread of sucking pest

☐ Prevents Pesticide drift from other crops

☐ They should be sown before the main crop



Mixed cropping:

Promoting biodiversity



- Promotes biodiversity
- Assured income in case of natural disasters even if one crop fails
- Less incidence of pest
- More income to small and marginal farmers

Crop rotation :

Avoid sowing same crop year after year

Crop choice is also important

- Rotate crops with black gram, Green gram
- Chilli after Cotton not recommended – incidence of Spodoptera will be more
- Red gram after Cotton promotes Boll worm incidence



Inter crop



- Growing intercrops gives year round food and shelter for beneficial insects
- Additional income, more crops in the same season
- Natural pest control
- Increase in soil fertility by growing pulses

Trap crop :

Insects like few crops to lay eggs



Growing and monitoring Marigold, Sunflower, Bhendi around field bunds



S.N	Pest	Trap crop
0		
1	Boll worm	Tomato, Sunflower, Marigold
2	Spodoptera	Castor, Cabbage, Groundnut
3	Spotted boll worm	Bhendi
4	Pink boll worm	Bhendi

Light Traps

All adult moths and
Sucking pests are
attracted towards light

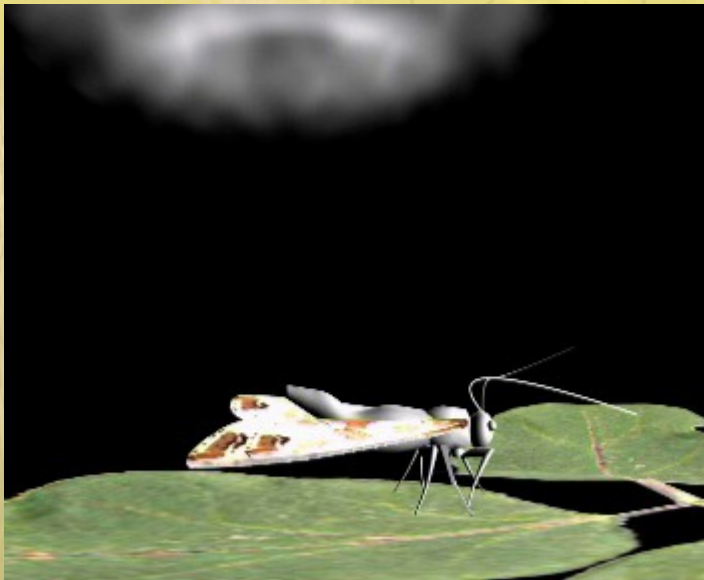


Harmful insects will fall
into the tub between 6 P.M
to 9 P.M

- After 9 P.M it should be switched off otherwise beneficial insects will fall
- Adding Kerosene in the tub kill the insects by preventing the respiration of the insect

Pheromone traps :

Mass trapping



Pest surveillance and
Monitoring



Yellow and white sticky traps :

Sucking pests are attracted to few colours

Yellow – white fly
White - Thrips



Apply grease every 3 days

Bird perches

Providing Water in small pots

Coloured rice in small bowls



Mechanical methods

Shaking method

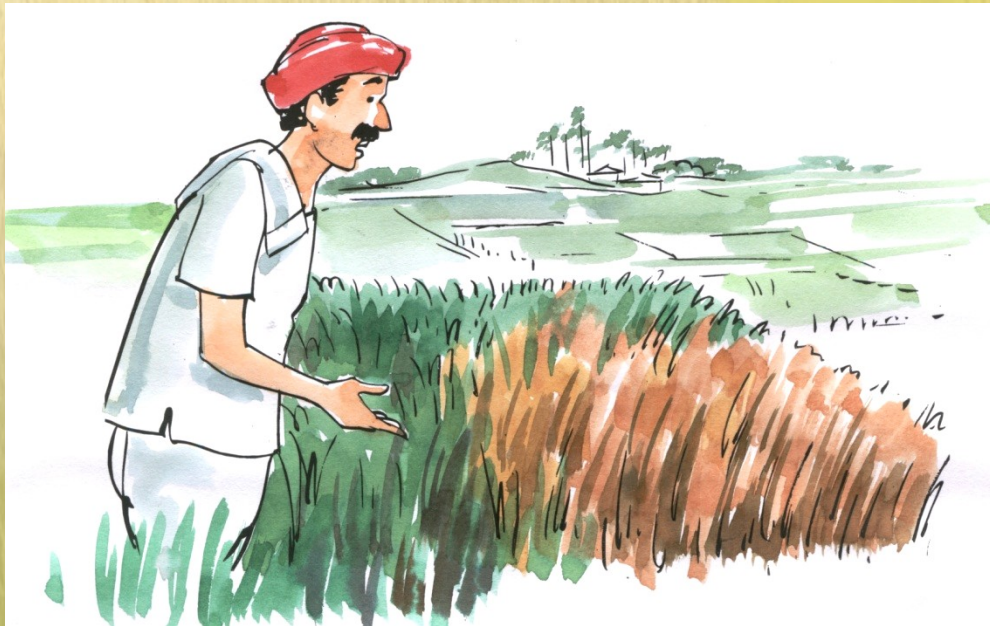


Hand Picking



Principles in Disease management

- Understanding the life cycle of the disease
- Spread of the disease
- Preventing and Control measures



Understanding the life cycle and infection of Disease

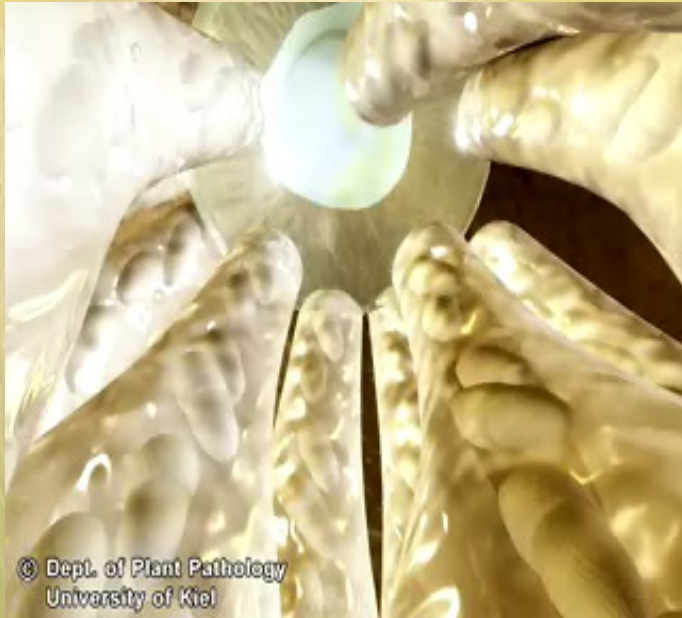
Life cycle

© Dept. of Plant Pathology, Kiel University



Dissemination of diseases

**Dissemination of spores
from diseased to Healthy**



Infection



Transmission of Viral diseases



Wind, water dissemination

Wind dissemination



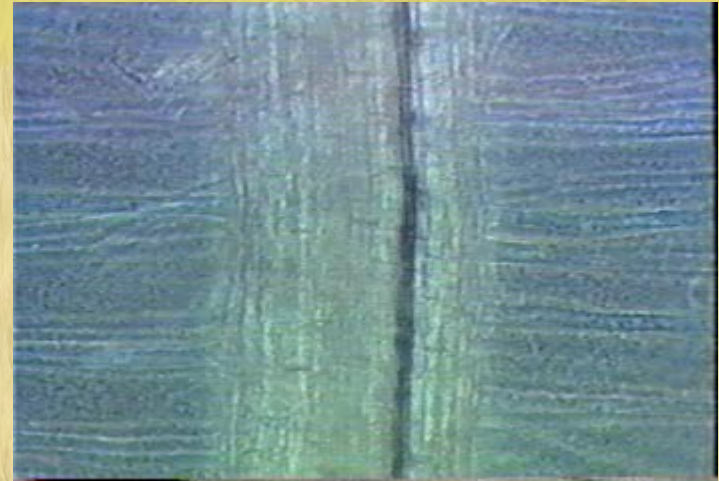
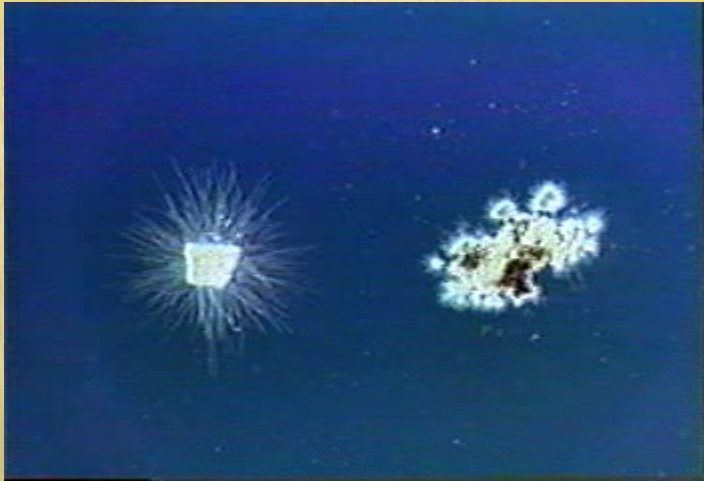
Water dissemination



More the Humus more healthy soil

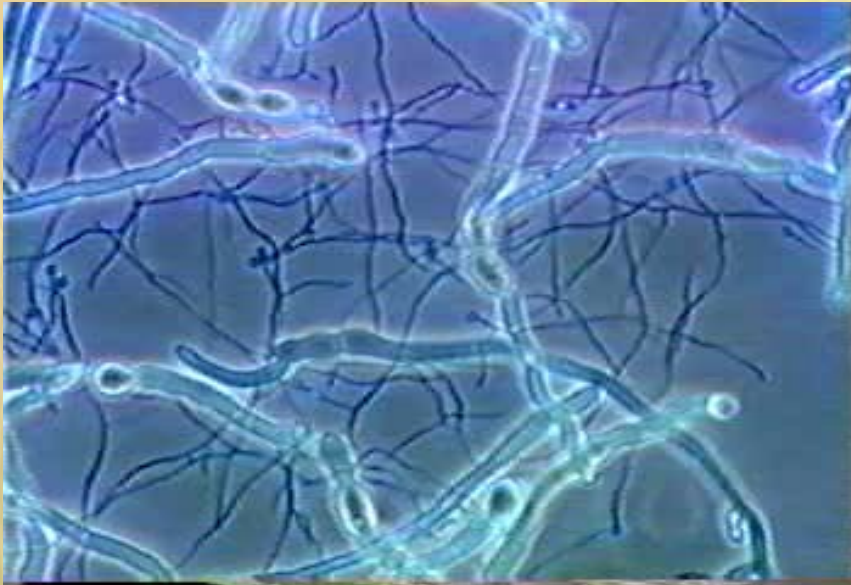
Antagonism of Beneficial and Harmful fungus in soil

A bacteria suppressing the harmful fungus in soil



Trichoderma controlling harmful fungus

Harmful fungus



To maintain good soil health

**Regenerating Humus that
promotes beneficial
microbes**






Local resources : Plant Extracts

Reactive sprays

- Insect population may reach pest status if the preventive steps were not taken in time,
- changes in weather conditions
- and insects coming from neighboring farmers fields.
- In these situations based on the field observations farmers can take up spraying botanical extracts and natural preparations (Green sprays)



Reactive Sprays are divided into 4 types

Aqueous or solvent extracts:

- for example, Neem Seed Kernel Extract is very effective against many pests. There is a wide variation in the way these extraction is prepared. For extracting 'Allecin' from garlic kerosene is used as a solvent. After extraction this solution is mixed with chilli extract and used against sucking pests (Prakash and Rao 1997, Vijayalakshmi *et.al* 1999, Prasad and Rao 2007).



Decoctions

- for example, plants like tobacco, *Nux Vomica* etc contain volatile compounds which can be extracted by boiling them in water to get the decoction. Several decoctions are used in pest management (Prakash and Rao, 1997, Vijayalakshmi *et.al*, 1999, Prasad and Rao, 2007).



Concoctions:

- ☞ concoctions are mixtures. For example, five leaves mixture which is a aqueous extract of any five latex producing leaves is used to control pests in Tamil Nadu and other parts of south India (Prakash and Rao, 1997, Vijayalakshmi *et.al*, 1999, Prasad and Rao, 2007).



Fermented products:

- products made by fermenting the different botanicals with animal dung and urine. These products have rich microbial cultures which help in providing plant nutrients in addition to acting as pest repellents and pest control sprays. For example cow dung urine-asafetida solution is used to manage Rice blast (Prakash and Rao, 1997, Vijayalakshmi *et.al*, 1999, Prasad and Rao, 2007).

Neem Extracts : How it works

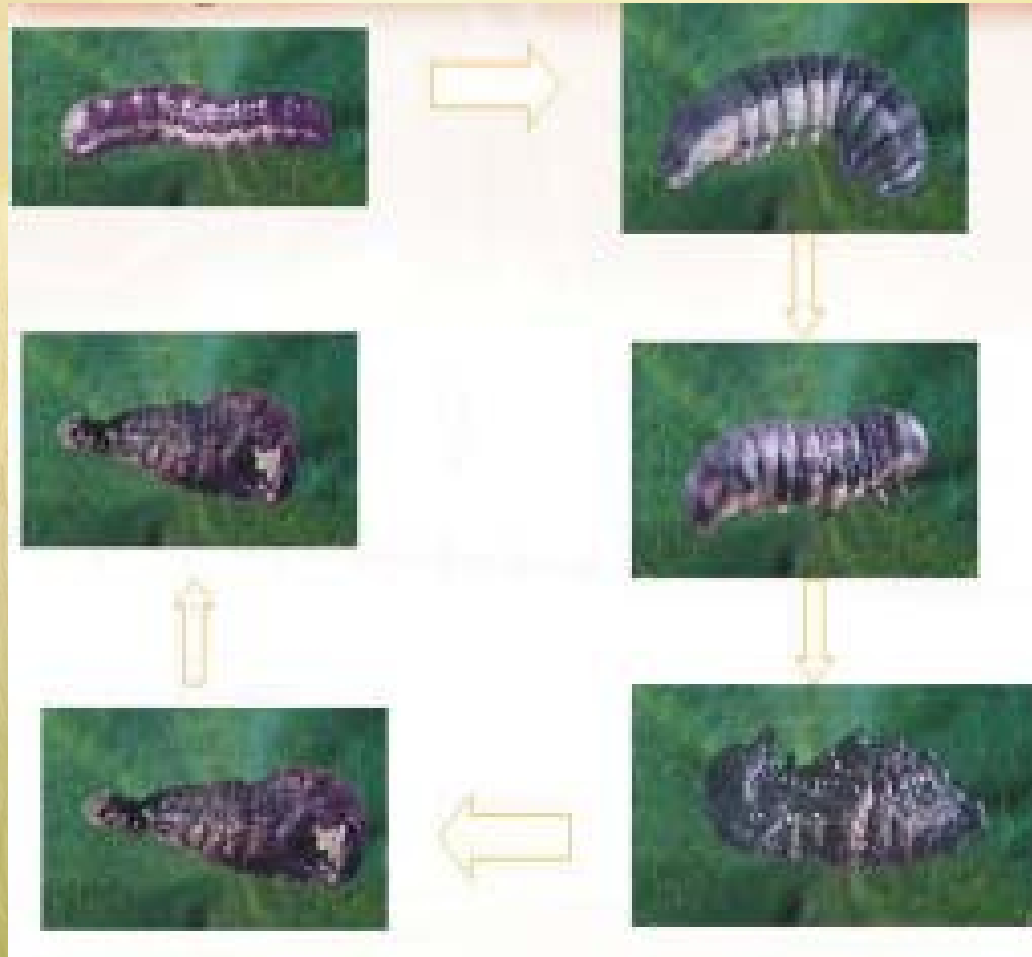
Neem Contains

- 200 Limnoids
- Known Limnoids -9
 - **Azadiractin** – Controls the process Of Metamorphosis, Insects will not molt, Breaks their life cycle, Repellent, Antifeedent, Anti-Harmonal
 - **Salannin** - Inhibits feeding
 - **Meliantriol** - Feeding inhibitor
 - **Nimbin** - Antifungal

Nimbidin- Antibacterial



Effect of Neem on Spodoptera



Chilli –Garlic Extract

Chilli –Contains -**Capcicin**

Garlic –Contains **Allecin**

- Capcicin- Dissolves in water
- Allecin – dissolves in Kerosene
- Capcicin + Allecin – Synergy – Irritant reaction on insect
- Knock Down effect



Cowdung urine

Microbial Culture



**Reduces microbial
deficiency**

Growth Promoter



Repels insects



Aegel marmelus to control diseases

One of the active principles isolated and purified from the essential oil extracted from *A. marmelos* has been found to be terpenoid in nature.

Attempts are being made to isolate additional active principles from *A. marmelos* and *O. sanctum*.

Disease incidence (%)

<i>Treatment</i>	<i>0-day</i>		<i>11-days after application</i>	
	<i>Foliar blast</i>	<i>Neck blast</i>	<i>Foliar blast</i>	<i>Neck blast</i>
Control (no application)	13.8	2.2	26.0	31.4
Sprayed with formulation	7.2	5.0	8.0	5.6

Effect of spraying with *Aegle marmelos* formulation on blast incidence in farmers' field at Ghasiputa, Cuttack (dry seson, 1992).

Cow dung –urine –Hing controlling diseases

Cow dung urine promotes
Microbial culture

Hing contains Sulphur

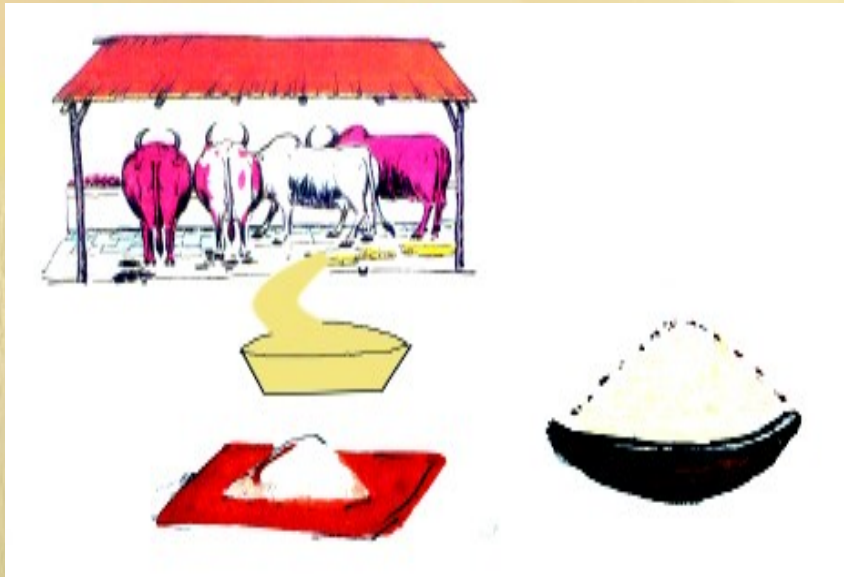


Cow urine – Ash – Hing seed treatment

Cow urine Antifungal,
Antibacterial

Ash reduces the moisture
in the seed

- Hing Contain sulphur and
Limnoids –Antifungal





Methods for long term storage

- Steamed aqueous extract, essential oil and ethanolic extract of *O. sanctum* leaves retained the fungitoxic properties up to 1, 16 and 24 months of storage at room temperature, respectively.
- On the other hand, steamed aqueous extract of *A. marmelos* leaves lost its fungitoxic effect even after 24 hours of storage. Nevertheless, essential oil from these leaves and ethanolic extracts retained their fungitoxic properties up to 12 and 27 months of storage at room temperature, respectively.