Introduction and Expansion of Improved Pigeonpea (*Arhar*) Production Technology in Rainfed Upland Ecosystems of Odisha

Integrated Pest Management

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International Crops Research Institute for the Semi-Arid Tropics

Government of Odisha

IMOD Inclusive Market-Oriented Development • *Innovate* • *Grow* • *Prosper*

Integrated Pest Management

Pest is any organism with features that people notice as damaging which spreads disease or is otherwise annoyance as it destroys agriculture through feeding on crops.

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices (www.epa.gov/oecaagct/tipm.html).

Why we need IPM

- Several insect pests have developed insecticide resistance
- Degradation of natural enemies
- Secondary pest outbreaks
- Environmental pollution has become more persistent
- nputs on plant protection have increased enormously

Prevention is the first line of control. IPM starts with setting action thresholds by determining how bad a pest problem needs to be before taking corrective action. Farmers then identify and monitor pests. Other alternatives to synthetic chemical pest control include:

- **Natural Control -** Using naturally occurring parasites, predators, and disease to control insect and mite pests, the environment is disturbed as little as possible. Best suited for wilderness areas or large tracts of mixed woodlands or forest.
- **Cultural Control -** Pruning and raking; selecting resistant plants; excluding pests with mechanical barriers; irrigation; maintenance and mulching (all can be effective, depending on the species).
- **Biological Control -** A naturally occurring disease, parasite, or predatory organism is manipulated to control a pest. Many biological control organisms are relatively safe and easy to apply.
- **Alternative Chemicals -** Selected chemicals not based on synthetic chlorinated or bromated organic molecules nor based on phosphoric acid or carbamic acid. Some plant extracts are very effective, but some are very toxic. Other examples include soap, sulfur, and horticultural oils.
- **Miscellaneous Controls -** Some include pheromone traps, trap crops, boiling water (for ant hills), diatomaceous earth, and repellant plants.

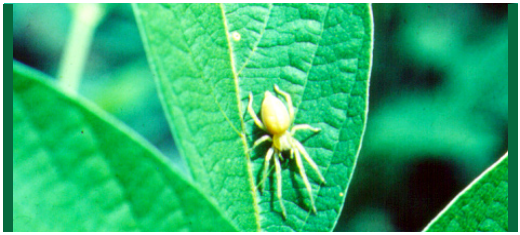
A. Economic threshold levels (ETLs) for economically important pests of pigeonpea

Common name	Scientific name	ETLs
Pod borer	Helicoverpa armigera	5 eggs or 3 small larvae per plant
Pod fly	Melanagromyza obtusa	In all endemic locations
Leaf webber	Maruca vitrata	5 webs per plant

B. IPM module for pigeonpea

- Monitoring of pod borer adults through pheromone traps @ 2-3 traps per village
- Monitoring larvae at weekly interval after flower initiation
- Erection of bird perches @ 10-15 per ha
- Spraying of Neem Fruit Extract (5%)@ 25 kg/ha
- Spraying of HNPV @ 500 LE/ha
- Mechanical shaking to dislodge the larvae
- Need based application of chemicals

Natural Control



Spider

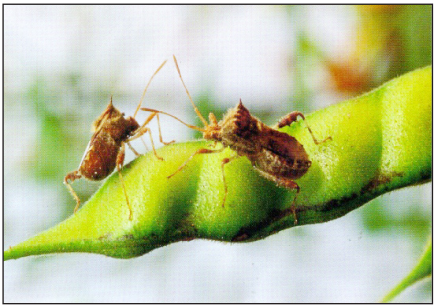
Helicoverpa larva infected with NPV

A **Mud Wasp** carrying *Helicoverpa* larva

Adult monitoring through heromone trap

An Insectivorous bird (Drongo) on a perch

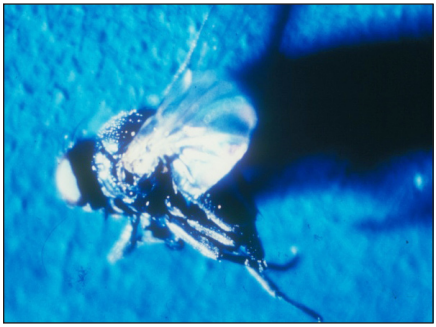
Major Important Pest in Pigeonpea



Pod sucking (*Riptortus dentipes*)


Pod borer (*Helicoverpa armigera*)


Leaf webber (*Maruca vitrata*)




Pod fly (*Melanagromyza obtuse*)

Blister beetle (*Mylabris oculata*)

Management of Bruchids (*Callosobruchus F.*) in Pigeonpea

- Cleaning seed and storing in sealed containers guards against initial attack in the stored state. Moisture content of the seed should be < 5%. Sun-drying before storing the grain helps minimize moisture.
- In case of large-scale storage, chemicals such as Malathion dust (5%) or Dichlorvos spray (0.05%) on gunny bags and racks can provide effective control.
- Stored seeds can also be protected from this insect by fumigating them with aluminum phosphide (3 grams/50 kg seed) in a sealed container for 3 days.
- Traditionally small quantities of pigeonpea seed is stored in small earthen pots after thorough sun-drying and mixing fine ash (wood or dung) at 1:10 ratio and sealing the container with mud can effectively keep the seed from bruchid infestation.
- Pigeonpea seed split for *dhal*, renders itself unattractive for oviposition and is safe from attack.

Bruchids (*Callosobruchus F.*)

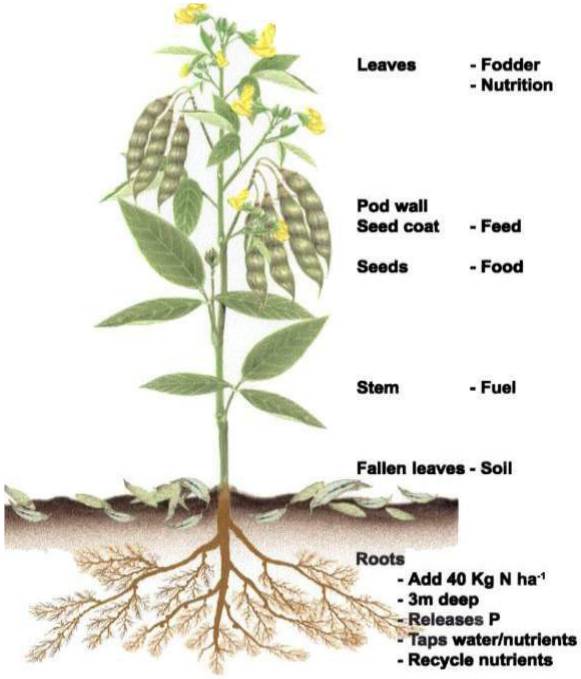
Preparation of neem fruit powder extraction

- Collect fresh, good quality neem fruits and dry them under shade.
- Powder the dried fruits.

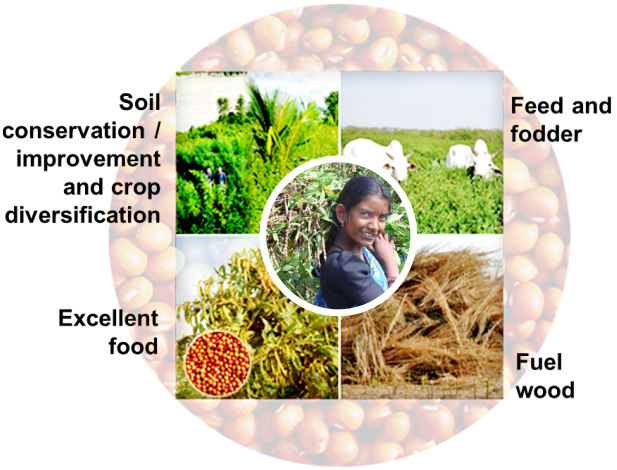
- Soak the required quantity of powder in sufficient quantity of water overnight before use (10-25kg/ha based on crop size).
- Filter the neem fruit extract through fine cloth.
- Spray the neem fruit extract obtained from 10-25 kg of powder diluted in required quantity of spray fluid based on the equipment.

Neem twig with flowers and fruits

- Add 2 - 3 grams of detergent per liter spray fluid as sticker.



The Pigeonpea Plant



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ICRISAT is a member of the CGIAR Consortium

The **International Crops Research Institute for the Semi-Arid Tropics** (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid tropics have over 2 billion people, of whom 644 million are the poorest of the poor. ICRISAT innovations help the dryland poor move from poverty to prosperity by harnessing markets while managing risks – a strategy called Inclusive Market-Oriented Development (IMOD).

ICRISAT is headquartered in Patancheru, Telangana, India, with two regional hubs and five country offices in sub-Saharan Africa. It is a member of the CGIAR Consortium. CGIAR is a global research partnership for a food secure future.

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