

A collage of various insects including butterflies, beetles, flies, and spiders. The insects are arranged in a grid-like pattern, with some larger than others. The colors are vibrant, with blues, oranges, reds, and greens. The background is white.

Applied Entomology

Prin Dr. S. B. Patil

Harmful Insects & Agricultural Pests

- Insects that can be considered 'harmful' are those that accomplish something negative for the ecosystem - destroying crops, structures, infestations - or can deliver painful / poisonous / venomous bites to people.
- The insect world is one of many moving parts that include both helpful and harmful species - with every bug playing its own role in some way.

Pest -

- Derived from French word 'pest' & Latin term ' pestis', means contagious disease.
- Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products.
- Causes damage to crop, stored products and animals.
- Harmful to our health, crop and livestock.
- Define as “any organism whose population increases to such an extent as to cause economic losses to crops or a nuisance & health hazard to human, their crops and livestock.”
- Mainly all harmful insects & related territorial Arthropods.
- Also includes some invertebrates & vertebrates animal.

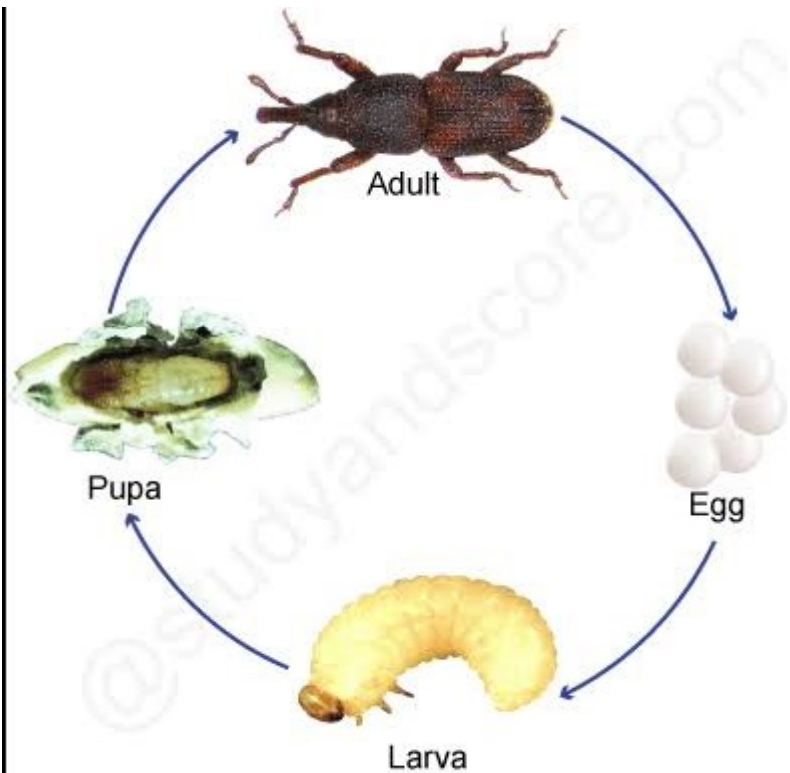


Stored Grain Pest



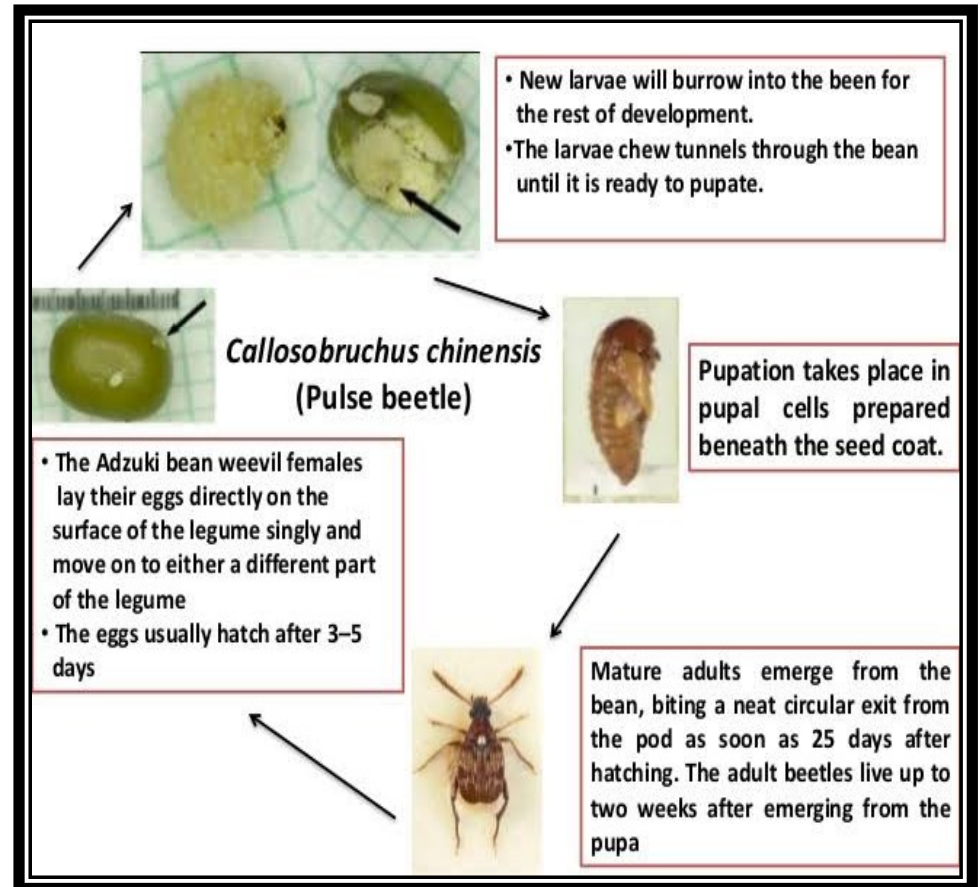
- Pulse Beetle :
- Rice weevil :
- Control Measures-
- Proper ventilation for storage area to reduce moisture
- Storage should clear and grains should dry
- Fumigation with phosphine and organophosphate
- Use of azadirachtin

Life Cycle



LIFE CYCLE OF RICE WEEVIL (*Sitophilus oryzae*)

@studyandscore.com



MANGO STEM BORER



www.shutterstock.com • 262234832

RED COTTON BUG

Dysdercus cingulatus



Brinjal Fruit Borer

Shoot & Fruit Borer of Brinjal
Introduction

Scientific classification

- Kingdom : Animalia
- Phylum : Arthropoda
- Class : Insecta
- Order : Lepidoptera
- Family : Pyralidae
- Genus : *Luecinodes*
- Species : *orbana*



50 - 90% of damage is caused by fruit and shoot borer



Shoot damage



Fruit Damage



Chemical control measures

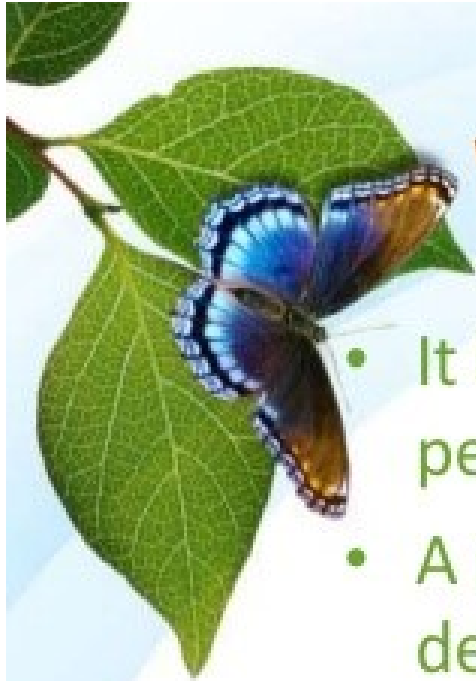
- Types and mode of Action
- Insecticidal formulation and dilutions
- Drawbacks of chemical control

Introduction

- Pest control refers to the regulation or management of a species defined as a pest, usually because it is perceived to be detrimental to a person's health, the ecology or the economy.
- The principal objective of a pest control is to protect crops by maintaining the attack of the pests and diseases at an acceptable level.

• There are various methods of pest control they are basically non chemical methods and biological methods





What is chemical control of pests

- It is the pest control using the chemical pesticides
- A pesticide is a chemical used to prevent, destroy, or repel pests.
- They combat pests and diseases occurring on our crops, livestock, and our possessions.



Classifications of pesticides

- Pesticides are classified in different ways
- **Sphere of activity**

They are classified according to the usefulness

Acaricides- used to control ticks and mites

Eg: carbophenothion

Insecticides-Used to control insects

Eg:Carbofuron

Fungicides- used to control fungal diseases in plants

Eg:Menab



- Herbicides-used to control weeds
Eg: MCPA
- Nematicides-Chemicals used to control nematodes
Eg:Phenamiphos
- Rodenticides-Chemicals used to control rats
Eg:Coumarin



- **Mode of action**

Contact poison

The action of these chemicals follows the action between the contact of the body of the insect and the insecticides

Eg: Carbaryl

Systemic poison

These chemicals move within the plant tissue and toxicity to sucking insects feeding on plant sap.

Eg: Carbofuran

Fumigants

Acts by its vapour action

Eg: Methyl bromide



- **Chemical constituents**

 - Botanical compounds**

 - Eg:Pyrethroids-produced by the ground flowers of daisy

 - Chysanthemum cinerariaefolium*

 - Synthetic organic compounds**

 - Organochlorines-insecticides containing C,H, and O.

 - Eg:DDT,Aldrin

 - Organophosphorus-They are made up of organic molecules containing phosphorus.

 - Carbomates-Structurally esters of unstable carbonic acid.



- Microbial compounds

Commercially produced insecticides from the natural pathogens of insect .Eg. *Bacillus thurengiensis*.

- Growth regulator compounds

Novel compounds which inhibit synthesis in insects.Eg:Atabrai-cabbage catterpillar control, Applaud-brown plant hopper control

- Synthetic pyrethroids

They are synthesized from petroleum based chemicals



Types of pesticide formulation

- Dusts
- Granules
- Emulsifiable concentrate (EC)
- Flowables
- Wettable powders
- Poisonous baits



Application of pesticides

- There numerous ways, but knapsack sprayer is the most popular spray equipment



Advantages and disadvantages of chemical pest control

- **Advantages**
- Cost effectiveness
- Timeliness and flexibility
- Quality, quantity and price of produce
- Prevention of problems
- Protection of the environment



- **Disadvantages**

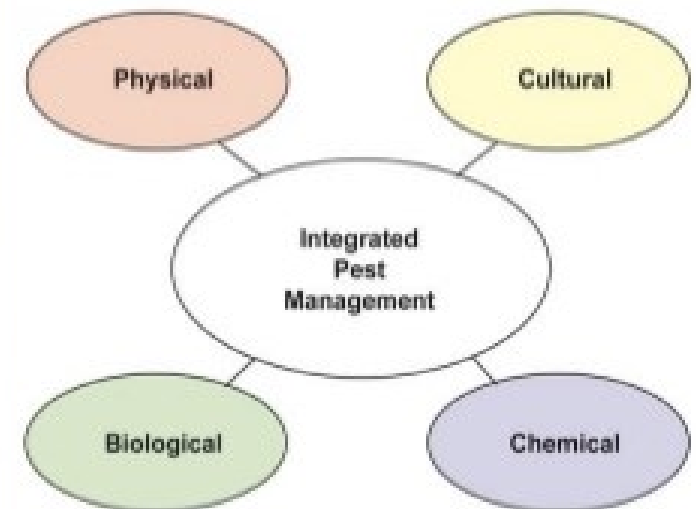
- Reduction of beneficial species. Non-target organisms, including predators and parasites of pests
- Drift of sprays and vapour during application can cause severe damage and residue problems in crops
- Residues in food for humans and feed for livestock
- Ground water contamination by leached chemicals
- Resistance to the pesticide used can develop in target pests due to overuse and incorrect use of the chemical.
- Poisoning hazards and other health effects



Integrated Pest Management (IPM)

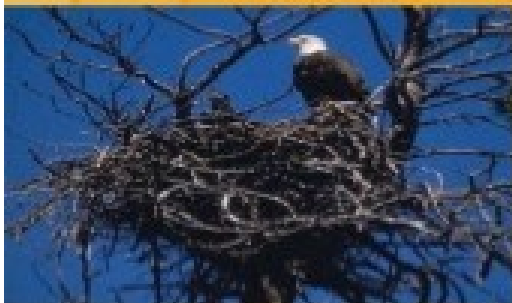
What is IPM?

- Ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties.
- It is also termed as I.D.M.(Integrated Disease Management).
- 3 principle approaches incudes-
 - Direct action against pathogen.
 - Genetic modification of the host.
 - Modification of environment to make it it unfavourable for the host.



Requirements for I.P.M.

- Chemical pesticides can impact the human health and ecosystems. Example:- DDT, a pesticide, can accumulate in the fatty tissue of animals and affect bird reproduction.
- Insects can become resistant to chemical pesticides. Approximately 500 species of insects are resistant to one or more pesticides.
- Due to exclusions it leads to transmit a large number of plant diseases worldwide. For eg.-
Leaf rust of coffee, Late blight of potato etc.



-Impact of overuse of chemical pesticides leading to endangered species of birds.



Steps in the Implementation of IPM

- Inspection
- Planning Preventive Strategies
- Identification
- Analysis
- Treatment Selection
- Monitoring
- Documentation



Advantages to IPM

- IPM program will enhance the long-term stability of the holdings over and above protection against pests.
- Provide long term solution to pest problem
- Decreased use of chemical application
 - reduces risks to the health of staff members.
 - reduces the risk of deterioration and disfigurement of holdings.
 - result in a financial savings.



Disadvantages to IPM

- IPM will require more staff time than traditional pest management
- IPM will require the coordinated effort of all staff members to properly implement.
- IPM may initially be more expensive than traditional pest management.

Useful Insects and Applied Entomology

- **Sericulture** : Rearing of silkworm for the production of raw silk.
- Silk production has a long history. Silk was discovered by Xilingji (Hsi-ling-chi), wife of China's 3rd Emperor, Huangdi (Hoang-Ti), in 2640 B.C.
- While making tea, Xilingji accidentally dropped a silkworm cocoon into a cup of hot water and found that the silk fiber could be loosened and unwound.
- Fibers from several cocoons could be twisted together to make a thread that was strong enough to be woven into cloth.
- Thereafter, Hsiling chi discovered not only the means of raising silk worms, but also the manners of reeling silk and of employing it to make garments.

The female moth lays many tiny eggs.



EGG

A tiny black caterpillar hatches out of its egg.



The caterpillar eats mulberry leaves and grows bigger and bigger. It goes through 4 molts.



LARVA

SILKWORM LIFE CYCLE

PUPA



The caterpillar spins a cocoon of silk threads around itself.



Inside the cocoon, the caterpillar changes into a pupa.



ADULT

The pupa changes into a moth. The moth comes out of the cocoon.



The adult moths mate with each other.



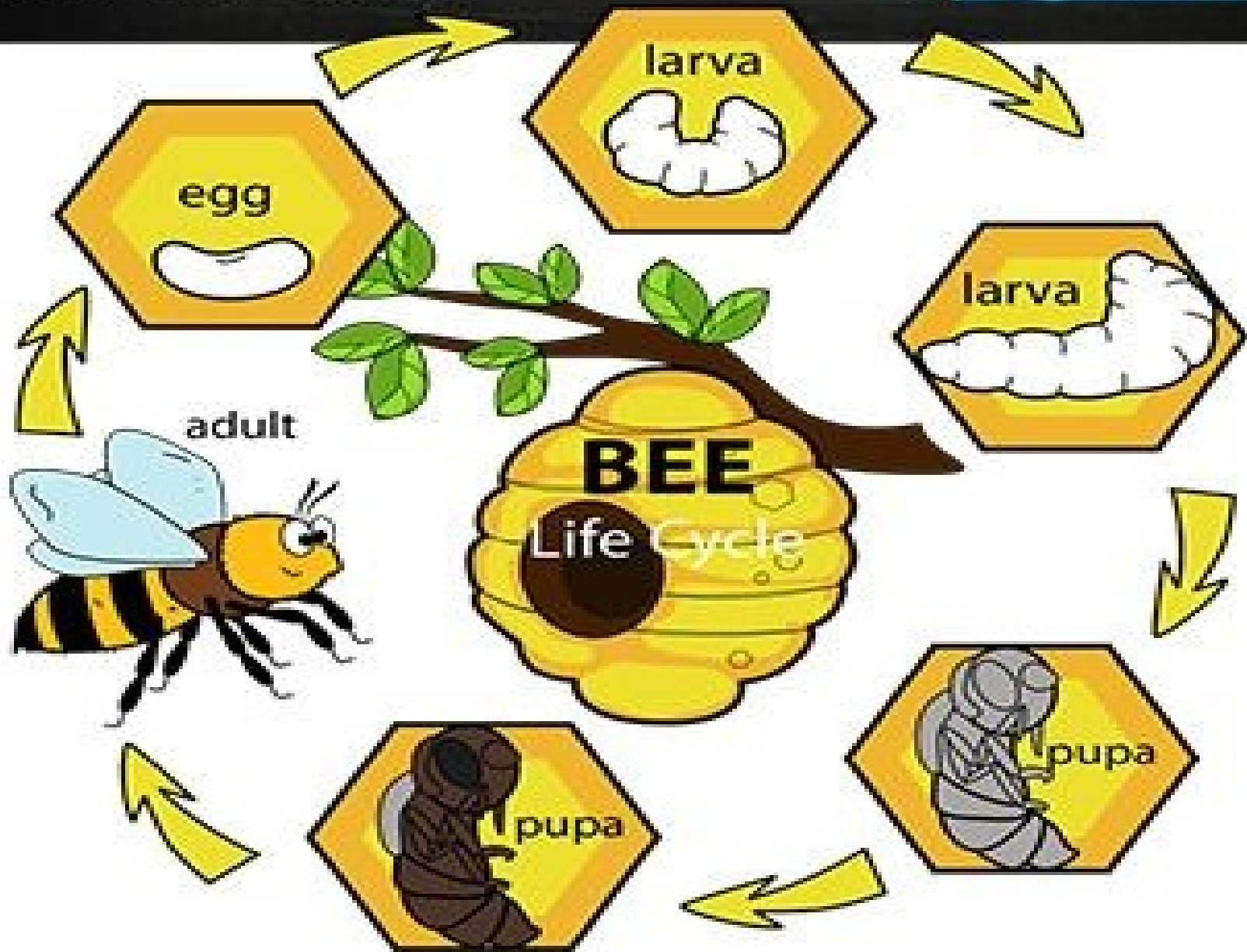
People unwind the silk thread from the cocoons to weave into silk cloth.

➤ **Apiculture:-**

- Apiculture is the scientific rearing of honey bee for the commercial production of honey and other bee products like wax, pollen, bee venom and royal jelly.
- It is also called Bee keeping.
- Bee keepers are known as apiarist and place where bees are maintained is called an apiary.

BEE Life Cycle

by Clipartino



➤ **Lac culture:**

- The scientific management and rearing of lac insects for high-quality lac to be used for commercial purposes are called lac culture.
- Management involves the selection of host plants, inoculation of plants with lac insects, rearing of lac insects, pest management and harvesting and processing of lac.

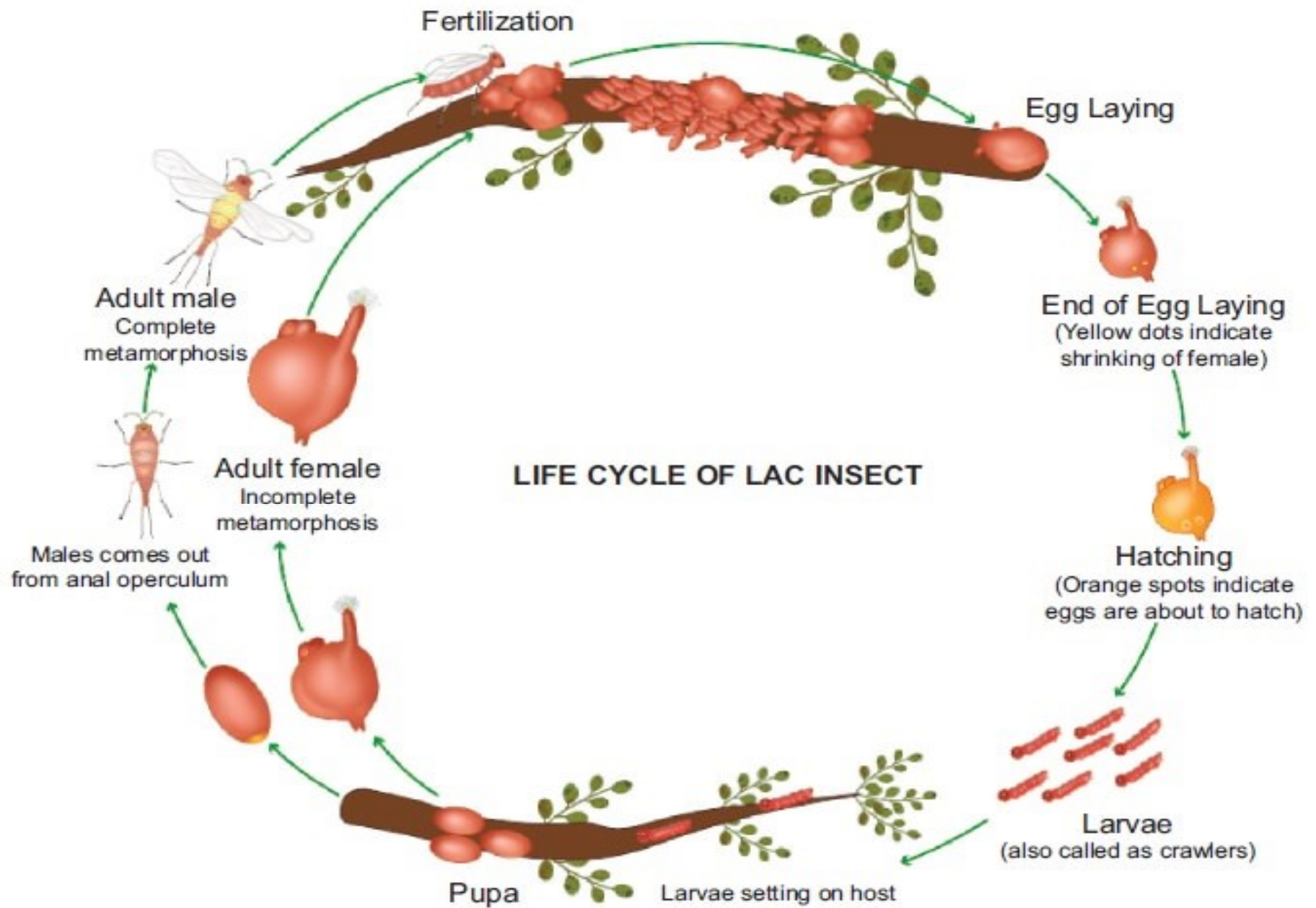


Figure 13.7 – Life cycle of lac insect



Button Lac



Stick Lac



Seed Lac



Shellac

