

Light:

- Light as an ecological factor has been defined as **all shorter wavelengths of radiant energy** up to and including the **visible spectrum**
- Wavelengths of visible parts of spectrum **range-4000 (Violet) to 7600 (Red) A°**
- As **non lethal factor**, it helps in **orientation** or rhythmic behavior of insects, **bioluminescence, period of occurrence and inactivity**
- Properties of light that influence organisms are **illumination, photoperiod, wave length of light rays, their direction and degree of polarization**

Visible and ultra violet light influences the following:

1. Growth, moulting and fecundity:

- ✓ **silkworms develop faster in light** than in darkness
- ✓ Grubs of Trogoderma also **develop more rapidly in light**
- ✓ Moths of **SBW** of cotton and **RHC** – Peak egg laying during **periods of darkness**
- ✓ The **bean weevil** lays more eggs in **total darkness** than in light

2. Other activities:

- ✓ **Honey bees** - there is a correlation between hours of sunshine and their activity
- ✓ **phototaxis** - Orientation of animals through directed movements by light
- ✓ It also depends on temperature, moisture, food and age
- ✓ **Green leafhopper, Nephrotettix spp.** - attracted to light on hot/humid evenings vice versa during dry weather
- ✓ **Chafer beetles, many moths** pass the day in **concealment**
- ✓ **Cockroaches hide during day time**
- ✓ **Dusk**- time for **flight and copulation of moths**, emergence of **winged Termites**

Based on daily activity cycle, insects or animals are categorized as

- **Diurnal:** Insects active during daylight hours
- **Nocturnal:** Insects active at night
- **Crepuscular:** Insects active at dusk

Photoperiodism: The number of hours of light in a day length (24 hours)

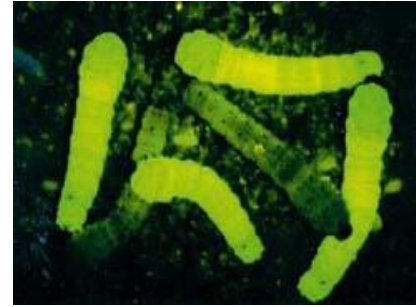
- ✓ Response of organisms to the photoperiod is known as **photoperiodism**
- ✓ photoperiod induces **diapause**
- ✓ **short day species**- diapause is induced by long day Eg: **Mulberry silkworm** *Bombyx mori*
- ✓ **long day species**- induced by short day Eg. **PBW of cotton**, *Pectinophora gossypiella*
- ✓ In reduced photoperiod **sexual forms (winged)** are produced in **aphids**

3. **Oviposition:** Light stimulates oviposition in mantids and inhibits in *Periplaneta sp.*

4. **Pigmentation:** Dark colour develops in dark areas

Bioluminescence: Glow-worms and fireflies

- **Luciferin** is oxidized by **luciferase** in the presence of oxygen and ATP producing light
- In most cases, **females produce flash of light** to attract males for mating



Use of light as a factor in insect management:

- ✓ Insects are either attracted or repelled to artificial light known as **phototaxis**
- ✓ **Grubs of *Trogoderma sp.*** show negative reaction and are termed **photonegative species**
- ✓ Most of the **moths are attracted to light** and are known as **photopositive or phototropic**

Based on this principle **artificial light can be employed as a source for attracting insects** and there after they can be trapped and destroyed and these devices are known as **light traps**

e) Other factors:

i) Atmospheric pressure:

- ✓ Locust excites and abnormal activity $\frac{1}{2}$ hr **before storm** when atmospheric pressure is low
- ✓ **Drosophila flies** stop moving when put under vacuum

ii) Wind and Air currents: an important factor in **dispersal**

- ✓ insects will not take flight when speed of wind exceeds the **normal flight speed**
- ✓ Air currents carries many insects like **aphids, white flies, scales etc.** to far-off places
- ✓ Air movement may also be directly responsible for death of insects
- ✓ Severe wind and heavy rains cause mortality and moisture evaporation from body surface

f) Edaphic (Soil) factors:

- ✓ **Loamy soils allow digging and burrowing** operation and are usually favorable for insects
- ✓ **Agrotis sp** live in soil of fairly light texture- move around freely in response to daily or seasonal temperature and moisture changes