Q30.
PAGE 97: ACE AGRICULTURE (ENTOMOLOGY)

which spin silk cocoons and reeling the cocoons for unwinding the silk filament for value added benefits such as processing and weaving.

- *Bombyx mori* is the most widely used species of silk worm among the five types of silk worms that are discusses below.
- Silk-fibre is a protein produced from the silk-glands of silkworms.
- The silk worm produces two types of proteins in the cocoon fibres, sericin and fibroin. The fibroin is the main filamentous protein which is used for the formation of silk and the sericin is involved in binding the fibres of fibroin.

TYPES OF SILK WORM

- There are five major types of silk of commercial importance, obtained from different species of silkworms which in turn feed on a number of food plants.
- Except mulberry, other varieties of silks are generally termed as non-mulberry silks.

1. Mulberry:

- The bulk of the commercial silk produced in the world comes from this variety and often silk generally refers to mulberry silk.
- Mulberry silk comes from the silkworm, *Bombyx mori* L. which solely feeds on the leaves of mulberry plant.
- These silkworms are completely domesticated and reared indoors.
- In India, the major mulberry silk producing states are Karnataka, Andhra Pradesh, West Bengal, Tamil Nadu and Jammu & Kashmir which together accounts for 92 % of country's total mulberry raw silk production.

Q46.
PAGE: 21, CCI EBOOK (FIELD CROPS)

- **RAJ-3765:** Late sowing variety, resistant to lodging
- **RAJ-4037 (2004):** Suitable for warm climate
- **RAJ-3077:** Suitable for saline and late sowing.
- **RAJ-4120 (2009):** Resistant to UG-99 race of rust, yield 48-58q/ha.

Sowing:
(a) Sowing time: -
- Based on above temperature requirement.
- It has been found that for **indigenous wheat last week of October.**
- For **long duration dwarf varieties like Kalyansona, Arjun,** etc.
- **First fortnight of November and for short duration dwarf wheats like Sonalika, Raj 821** etc.
- Second fortnight is the best sowing time. Under exceptionally late sown condition it may be delayed to latest by 1st week of December beyond which if area is very small transplanting may be practiced.

(b) Seed rate: -
- Generally, a seed rate of **100 kg/ha** has been found to be sufficient for most of the **varieties like Kalyan Sona, Arjun, Janak, etc.** which have moderate tillering and medium sized grains. But a **higher seed rate of 125 kg/ha** is desirable for **late sown wheat** and **normal sown for varieties like Sonalika, Raj 821 etc.**
- Which have bold grains and shy tillering habits.

(c) Spacing: -
- For **irrigated, timely sown wheat, a row spacing of 15 to 22.5 cm is followed**, but **22.5 cm between the rows is considered to be the optimum spacing.**

Under **irrigated late-sown conditions, a row spacing of 15-18 cm is the optimum.**
- For **dwarf wheats, the planting depth should be between 5 and 6 cm.** Planting beyond this depth results in a poor stand. In the case of **conventional tall varieties, the depth of sowing may be 8 or 9 cm.**

(d) Seed treatment: -
- The seed of **loose smut-susceptible varieties should be given solar or hot-water treatment.**
- If the wheat seed is used **only for sowing**, and **not for human consumption** or **for feeding cattle**, it can be treated **with Vitavax.**

Method of sowing: -

- Wheat is sown by the following methods: -

(a) Broadcast.
(b) Behind the plough.
(c) Drilling.
(d) Dibbling.
(e) FIRB System- The furrow irrigated raised bed (FIRB) has been recently developed and is being promoted by the Rice-Wheat consortium of the CGIAR institute.

Q40. PAGE: 31, CCI EBOOK (WEED MANAGEMENT)

9.7 HERBICIDES

CLASSIFICATION OF HERBICIDES

(A) According to selectivity of herbicides

1. Selective herbicides: 2,4-D, Simazine, Atrazine, Butachlor, Pendimethalin, Fluchloralin, etc.
2. Non-selective herbicides: Diquat, Paraquat, Pendimethalin, etc.

(B) Time of application of herbicides

1. Fallow application: Application of herbicides well in advance of sowing i.e.,>10 days before sowing. It is applied for problematic weeds with higher dose.
2. Pre-plant application: Applied 2-4 days before sowing/ planting i.e.,Fluchloralin, Alachlor, etc.
3. Pre-emergence: 1-4 days after sowing, i.e., Simazine, Atrazin, Butachlor, Pendimethalin, etc.
4. Post-emergence: 30-40 DAS, i.e. 2,4-D, Diquat, Paraquat, Isoproturon, Dalapan, etc.

(C) Their chemical Groups

Sl No.	Chemical Groups		Associated herbicides
1.	Sulphonyl ureas	:	Sulphosulfuron, Chlorimuron- ethyl, Meta sulfuron-ethyl
2.	Aliphatic	:	TCA, Dalapan
3.	Amide	:	Alachlor, Butachlor and Propanil
4.	Bipyridiums	:	Paraquat, Diquat
5.	Dinitroanilines	:	Fluchloralin, Pendimethalin
6.	Chloro phenoxy compound	:	2,4-D, 2,4,5-T etc

Q39. PAGE 23: CCI EBOOK (AGRICULTURAL ENTOMOLOGY)

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

3. **Fumigants**
   Acts by its vapour action **Eg: Methyl bromide**

C. **Based on chemical constituents**

1. **Botanical compounds**
   - **Pyrethrum**- Produced by the ground flowers of daisy Chysanthemum cinerariaefolum.
   - **Rotenone**- Derived from the roots of Derris elyptica.
   - **Azadirachtin**- From seeds and leaves of Neem (Azadiracta indica).
   - **Nicotine**- Derived from the roots of tobacco (Nicotiana spp.)
2. **Synthetic organic compounds**
   a. **Organochlorines**- Insecticides containing C, H, and O. **Eg: DDT, Aldrin**
   DDT is the first commercial organochlorine discovered by **Paul Muller** in the year 1939 and for the first time used in agriculture in 1941. But due to their long residual (poisonous) effect, it was banned in US in 1972 and then in India in the year **1989**.
   b. **Organophosphate**- They are made up of organic molecules containing phosphorus.
   c. **Carbamates**- Structurally esters of unstable carbonic acid.
3. **Microbial compounds**
   Commercially produced insecticides from the natural pathogens of insect. **E.g. Bacillus thurengiensis.**
4. **Growth regulator compounds**
   Novel compounds which inhibit synthesis in insects. **E.g.: Atabrai-cabbage caterpillar control, Applaud-brown plant hopper control**
5. **Synthetic pyrethroids**
   These are the synthetic derivatives of natural pyrethrum.
   - **Allethrin:** It is the first synthetic pyrethroid (1949)
   - **Permethrin:** First photostable synthetic pyrethroid (1970)
   - **Deltamethrin:** Used in stored grain pest management
   - **Etofenprox:** Non-ester synthetic pyrethroids

TYPES OF INSECTICIDES

Name	Trade name	Formulation	Target Pest
Organochlorines			

Q42. PAGE 48, CCI EBOOK (PRINCIPLES OF AGRICULTURAL AGRONOMY)

E. RATOON CROPPING

- Ratooning or Ratoon cropping may also be classified under sequential cropping.
- In Ratoon cropping a fresh crop is grown from the subtle (lower part of the crop left out after harvesting) or suckers of the plant crop without replanting.
- Ratoon cropping is used extensively in sugarcane, bananas, etc.

In ratoon cropping, replanting of crop is not done. Therefore, it is also known as stubble cropping, re-harvesting or second crop.

F. RELAY CROPPING

- Relay cropping can be defined as growing two or more crops simultaneously during the life cycle of each.
- A second crop is planted after the first crop has reached its reproductive stage of growth, but, before it is ready for harvest.
- Generally, 2nd crop is planted after the first has reached its reproductive stage of growth but before it is ready for harvest e.g. Potato is planted before the harvesting of Maize.
- Relay cropping is also called overlapping cropping.

DID YOU KNOW?

The concept of Relay farming has been derived from the Relay race in which four runners run in the field having the flag in their hand. The first runner passes on its flag to the succeeding partner 2nd to 3rd and 3rd to the 4th runner