

UNIT - II



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Cultivation of Medicinal & Aromatic plants (MAP)

World have a rich heritage (History) of herbal drug some of these drugs have been subjected to systemic Cultivation based on Scientific information.

Advantages of Cultivation.

1. It insure quality & purity of Crude drug. during cultivation if we can maintain all factors then higher quantity of Crude drugs can be obtained.
2. Collection of Crude drug from Cultivated plant gives a better yield & therapeutic value.
3. Collection insure regular supply of Crude drug. For regular supply of Crude drug person donot suffer shortage of raw material.
4. The Cultivation of MAP that leads to industrialization to a greater extent.
5. Cultivation permits application of modern technique like ETC (Plant tissue Culture), Mutation,

Poly pollid. , hybridization .

Factors affecting Cultivation of MAP.

For favourable growth of Medicinal & aromatic plants, various factors an play an important role like -

- 1). Altitude , Temp & Humidity .
- 2). Rainfall or Irrigation .
- 3). Soil & Soil fertility .
- 4). Fertilizers .
- 5). Pest & Pest Control .

①. Altitude , Temp & Humidity :-

(Height) • Altitude :- Altitude is a very important factor for Cultivation of Medicinal plants .

Ex! - Clove - upto 900 meters .
Cinchona - 1000 to 2000 m .
Camphor - 1500 to 2000 m .
Coffee - 1500 to 2000 m .
Cardamon = 600 to 1000 m .
Tea = 1000 - 1500 m .

• Temp :- Temp is an another important Climatic factor for the growth of Aromatic plants .
If the drug requires a range

of temp. Luxurious growth of plants.

eg! -

- Cinchona = 60 - 78° F.
- Coffee = 55 - 70° F
- Tea = 70 - 90° F

→ Excessive temp or frost may affect the quality of the drug

• Humidity :- Some Herbal drugs requires frost whereas some plants requires dry weather for cultivation.

- eg! -
- Saffron = Cold climate only.
- Pyrethrum = Dry weather.

②. Rainfall or Irrigation.

Accept Xerophytic plant like Aloe, Acacia etc. most of the plant require proper rainfall or irrigation for their favourable development.

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3. Soil & Soil Fertility

a. Soil :-

Soil is the most important natural resources for the growth of plant. It provides mechanical encourage as well as essential elements for plant growth. It provide suitable medium for plant growth is known as Soil fertility.

• Clay :-

It contains finest particles. Clay contains adhesive & cohesive property which holds plant nutrients to prevent the leaching drain away nutrients.

→ Soil consist of mineral matter mainly in inorganic matter Air, water & organic matter.

→ Depending upon the size of inorganic mineral matter soil are classified as follows —

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<u>Particle size</u>	<u>Types of soil</u>
1. $< 0.002 \text{ mm}$	Fine clay.
2. $0.002 - 0.02 \text{ mm}$	Coarse clay or Silt
3. $0.02 - 0.2 \text{ mm}$	Fine sand
4. $0.2 - 2 \text{ mm}$	Coarse sand.

- Depending upon the percentage of clay soil are also classified.
- If organic matter $< 0.5\%$ ⇒ poor soil.
 - If organic matter $> 5\%$ ⇒ Rich soil.
 - If organic matter $0.5 - 1.5\%$ ⇒ Intermediate soil.

pH of the soil

Maximum availability of nutrients is in b/w the pH range of 6.5 to 7.5.

• Soil fertility :-

Some times the fertility of soil is decreases it is maintained by addition by animal excreta or cow dung, fertilizers or by crop rotation.

④ fertilizers :-

→ Basic needs for plant growth are CO₂, Sun, Water, mineral, soil.

→ Plants are also needs 16 nutrient elements for the synthesis of various components (Essential elements).

16 Nutrients element
(Essential elements).

① Primary Nutrients.
(In large quantity).
eg:- N, P, K.

② Secondary Nutrients.
(Small quantity)
eg:- Mg, Ca, S etc.

Trace Elements:-

→ They are used in very less quantity for the proper growth of medicinal & aromatic plants. They are also known as Micro nutrients.

eg:- Copper, Mn, Iron, Boron, Mo, Zinc.

5. Pest & Pest Control

Due to increase in population day by day, consumption of crude drugs is increases but the production of drug is reduced or harvesting is reduced due to presence of pest that's why the cost of Crude drug is increases.

* Pest :- Pest is an undesired animal or plant species or insects which affects the crop.

✓ Pesticides

Pesticides are chemicals which are derived from synthetic and natural sources and effective in small concentration against pest.

Ex :-

- Chlorinated - BHC } Synthetic.
- Organophosphate - Malathion }
- Tobacco } Natural.
- Pyrethrum }
- Neem }

Types of Pest

(A) Fungi & viruses

Fung :- eg :- (fungi) ① Ascochyta atropae - It causes grape like irregular spot on the leaves. leads to Necrosis (मृत्यु) of the leaves.

② Corcospora atropa - It causes angular brown spot on leaves of chest nut.

3). Phytophthora nicotianae -

young leaves & branches. Drooping of
of older leaves. Yellowing
of whole apical portion & drying of
This disease is known as
Root Rot.

4). Fusarium solarii & Pythium species -

off of young seedlings and Damping
wilt (枯萎) i.e., it causes
black colouration of roots and
seeds. This disease is known
as Rot disease.

5). Fusarium oxysporum :- It causes wilt
disease i.e., (wilt)
affecting the vascular system of
the plant.

Virus :-

Eg! - 1). Tobacco Mosaic Virus (TMV).

Necrosis of leaves, petioles and
stems.

2). Cucumber Mosaic Virus (CMV).

It causes necrosis in the leaves
of digitalis, cucumber &
hyacinth.

⑧ Insects -

- In a ~~sex~~ survey it is found that total no. of insects in the world is greater than total no. of species of all other living forms.
- About one millions species of insects have been reported.

Example :-

- *Agrotis species* } occurring on
- *Heliothis* } Mature plant
- flea }
- *Diaphonia vulgarica* } In
- *Planthia viridicollis* } Rauwolfia
- *J domia species* } Plant.

★ Other older roots ~~or~~ insects are Caterpillars, Cutworms, termites, weevils, Grasshopper, spider etc.

★ All insects are belongs to Phylum Arthropoda of animal Kingdom. Their mouth parts are categorised into two categories -

①. Biting & Chewing type.

②. Piercing & Sucking type.

②. Weeds / Herbs

- Undesired plants which destroy our crop.
- Presence of weed causes -
- 1) low of Nutrients, water, light and space.
 - 2) Increases in Cost of Labour and equipments.
 - 3) low product quality.
 - 4) Entrance chances of attack of bacteria, fungi, viruses, insects -
- Some ~~weeds~~ weeds causes Allergy like - Hay fever which is caused by Ragweed and Pyrethrum etc.
- Dermatitis is caused by Poison Ivy, Oak and Yarnish tree.
- Some plants growing weeds may be poisonous like Shatura, Hemipermus species etc.

Non-Insect Pests

1) Vertebrates -

eg:- Rat, Monkey, birds, Rabbit, Squirrel, Deer, Pig.

2) Non-Vertebrate :- Nematodes, Worms, snake, mites.

Method of Pest Control

There are 4 methods -

1. Mechanical Method
2. Agricultural "
3. Biological "
4. Chemical "

① Mechanical Method →

Pest control is carried out by manual labours or by using different devices.

a. Hand picking → Hand the pest & throw away.

b. Pruning → Cutting away dead or unwanted or infected part.

c. Burning →

d. Trapping → To catching & holding animals by using flavoured funnel shaped devices.

② Agricultural Method →

It covers advanced plant breeding techniques. Capable of increasing genetic manipulation resulting in production of pest resistant species.

- a. Crop rotation :-
 b. Deep Ploughing :-
 c. Plant breeding techniques that is
 production of new hybrid variety.
 means production of pest
 resistant species.

③. Biological Method .

→ This method is practiced by
 Combating (fighting) the pest with
 other living microorganism.

→ This method is most effective,
 safe and economic method of
 pest control.

④. Chemical Method :-

The control of pest
 by chemical pesticides like -
 insecticides, fungicides, herbicides,
 Rodenticides etc. because toxic nature

of pesticide, their use is
 regulated by act in different
 countries like insecticide act in
 India, federal insecticide, fungicide

act in USA
 & Rodenticide act in
 → Poisonous substance regulation in
 United Kingdom etc.

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Ideal property of chemical pesticides

- An ideal pesticide is required to satisfy following parameters-
- It should be non-toxic & non-injurious to medicinal plant & human being.
 - It should be selective in action & highly toxic to pest in small concentration.
 - The pesticide should be stable under ordinary condition of storage, non-inflammable, non-corrosive & free from obnoxious (bad) odour.

Classification of chemical pesticides.

(a) Rodenticides (Rat killing)

- eg! -
- Warfarin
 - Strychnine
 - Arsenic trioxide
 - Tellurium sulphate
 - Red squill

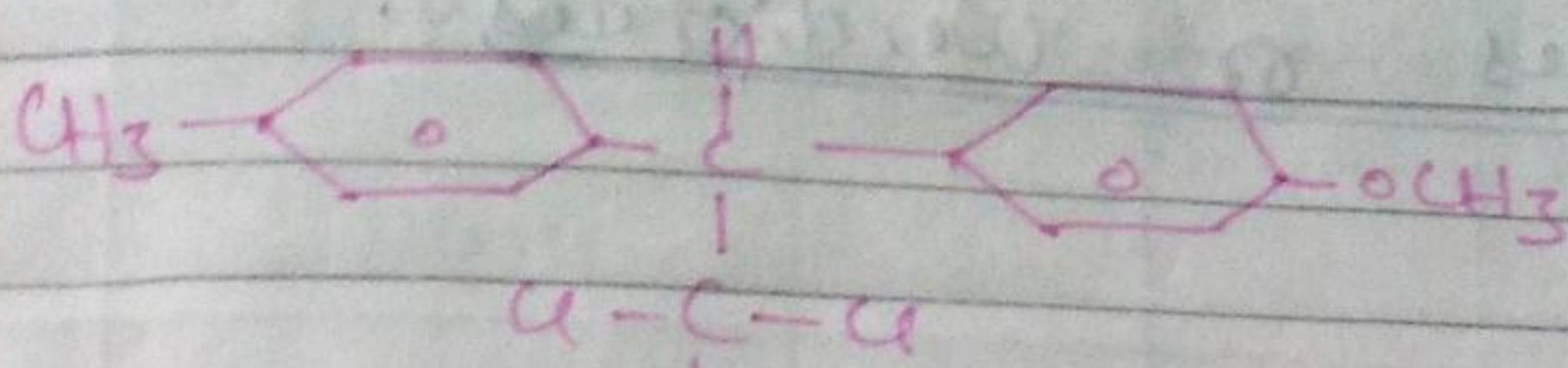
(b) Insecticide

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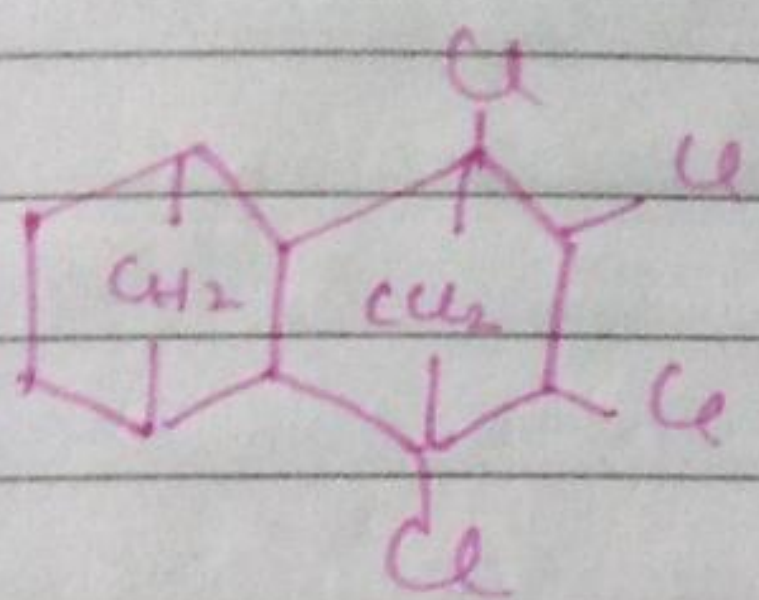
1. Chlorinated hydrocarbon

eg!

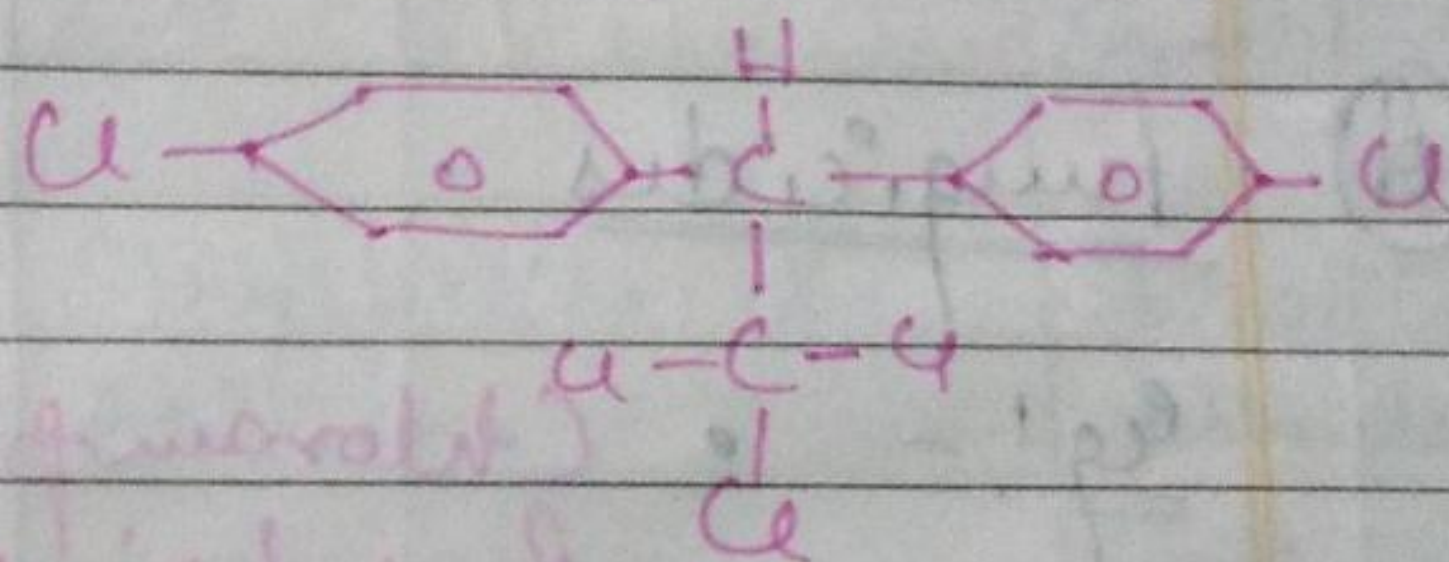
- eg! -
- Aldrin
 - DDT
 - Gammaxine (BHC)
 - Methoxychlor
 - Heptachlor



(Methoxychlor)



(Aldrin)

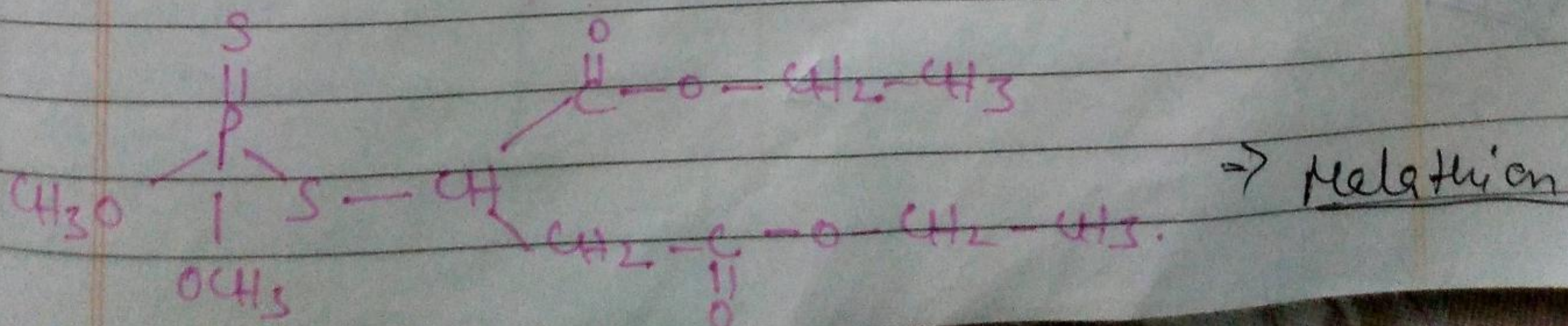
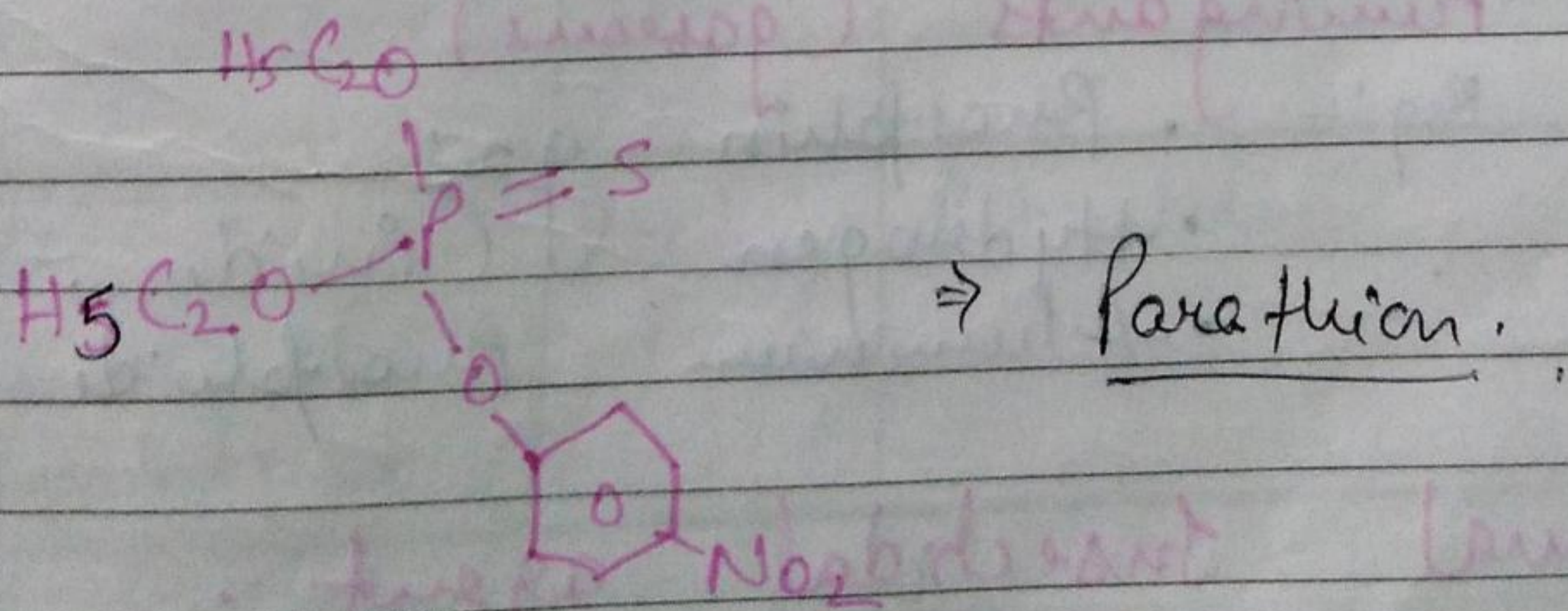


(DDT)

2) Organophosphate :-

eg:-

- Malathion
- Methyl Parathion
- Phorate
- Carbofenthion
- Tetra ethyl Pyrophosphate



(c) Herbiocides or Weedicides.

eg:-

- 2,4-Dichlorophenoxy acetic acid.
- Calcium arsenate
- Sulphuric acid.

(d) Fungicides.

eg:-

- Chloramphenicol
- Bordeaux mixture
- Ordinary Ammonium Compounds.
- Antifungal & Antibiotics.

Other Example of Insecticides.

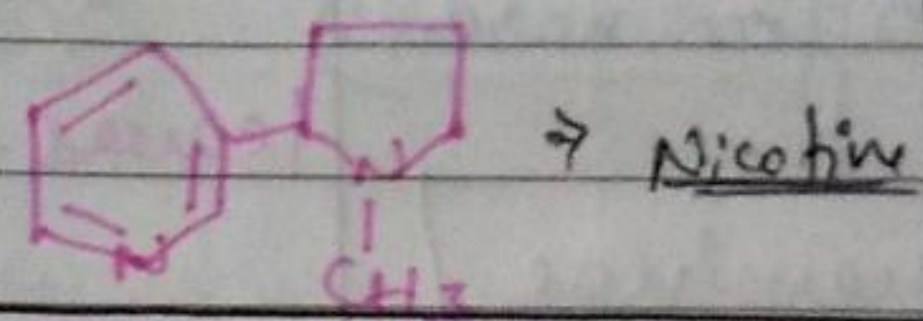
- 1) Carbamates
- 2) Inorganic Compounds
 - eg:- Calcium Arsenate
 - lead arsenate
 - Zinc phosphide
- 3) Fumigants (gaseous)
 - eg:- Phosphin gas
 - Hydrogen Cyanide
 - Aluminium phosphide

★ Natural Insecticidal agent.

Vinyl

Name of Plant & Biological source	Parts	Chemical Constituents	Uses
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①. Tobacco (*Nicotiana glauca*) Family: Solanaceae
 Parts: Dried leaf
 Chemical Constituents: Nicotine & Anabasine
 Uses: CNS stimulant, Cardiac stimulant, Insecticidal.



②. Nuxvomica (*Strychnos nuxvomica*) Family: Loganiaceae
 Parts: Seed
 Chemical Constituents: Strychnine & Brucine
 Uses: Spinal cord stimulant, Cardiac stimulant, CNS stimulant, Rodenticide.

③. Pyrethrum (*Chrysanthemum cinerifolium*) Family: Compositae
 Parts: Flower
 Chemical Constituents: Pyrethrin (I, II) & Cinerin (I, II)
 Uses: Insecticide.

④. Neem (Botanical name: *Azadirachta indica*) Family: Meliaceae
 Parts: Leaves
 Chemical Constituents: Nimbin, Nimbidin, Azadirachtin
 Uses: Antiviral, Insect repellent, Antibacterial.

⑤. Derris (*Derris elliptica*) Family: Leguminosae
 Parts: Roots & Rhizome
 Chemical Constituents: Rotenone
 Uses: Insecticidal, Contact Poison.

⑥. Sassafras (*Sassafras officinale*) Family: Liliaceae
 Parts: Seed
 Chemical Constituents: Sassafrin & Veratrine
 Uses: Insecticidal, Use to Kill house fly

⑦	<p>Rynia (Rynia spiciosa) Flacourtiaceae</p>	<p>Root Stem</p>	<p>Ryudin</p>	
⑧	<p>Citronella (Cymbopogon nardius) [! - Gramineae]</p>	<p>leaves</p>	<p>Citronellal Geraniol</p>	<p>Insect repellent in the form of perfume</p>