

# FUNGICIDES

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## Introduction :

Fungicides are chemicals that have the ability to reduce or prevent the damage caused by fungi in plants and their products.

Fungicides are biocidal chemical compounds used to kill parasitic fungi or their spores.

## **Classification of fungicides**

### **1. On the basis of use**

- *Protective*
- *Curative*
- *Eradicants*

## **A. Protective fungicides :**

They prevent fungal infection by sporocidal activity.. E.g. Sulphur

## **B. Curative fungicides :**

It penetrate cuticle and kill young fungal mycelium growing in the epidermis and this prevents further development of fungal growth. E.g. Organomercurials

## **C. Eradicant fungicides :**

They are agents that make control of fungus even after the symptoms become visible and that kill both newly developed spores and the mycelium.

E.g. Systemic fungicides

## **2. On the basis of sources of raw material**

### **A. Inorganic fungicides :**

It includes sulfur powder, lime sulfur, copper sulfate, mercuric chloride etc...

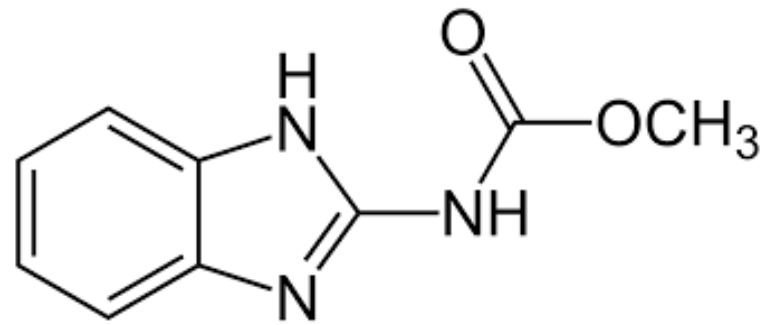
### **B. Organic fungicides :**

Ziram, Zineb, mancozeb etc....

# Chemistry, use, and mode of action of

1. Carbendazim
2. Carboxin
3. Captan
4. Tridemorph
5. Copper oxychloride

# 1. Carbendazim :



## ❑ IUPAC Name

Methyl 1H-benzimidazol-2-ylcarbamate

## ❑ Other Names

- Mercarazole
- Carbendazole

## ❑ Properties

- ❖ Chemical formula :  $C_9H_9N_3O_2$
- ❖ Melting Point (M.P) :  $302-307^\circ C$

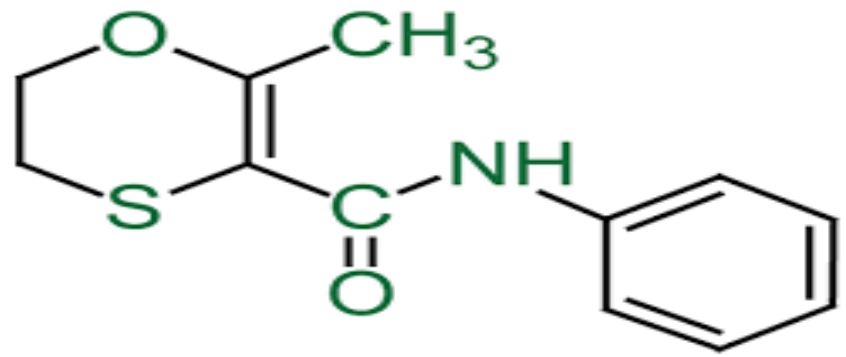
## ☐ Uses

- It is used to control plant diseases in cereals, and fruit including citrus, bananas, strawberries, pineapple etc..
- Mostly used to control Botrytis, Gloeosporium rots, powdery mildews and apple scab

## ☐ Mode of action

- ✓ Carbendazim works by inhibiting the development of fungi probably by interfering with spindle formation at mitosis (cell division).
- ✓ affects the nervous system through their main metabolite, carbon disulfide.

## 2. Carboxin :



### ❑ IUPAC Name :

6-methyl-N-phenyl-2,3-dihydro-1,4-oxathine-5-carboxamide

### ❑ Others Name :

- Vitavax
- Kisvax
- Carbathiin etc...

### ❑ Properties :

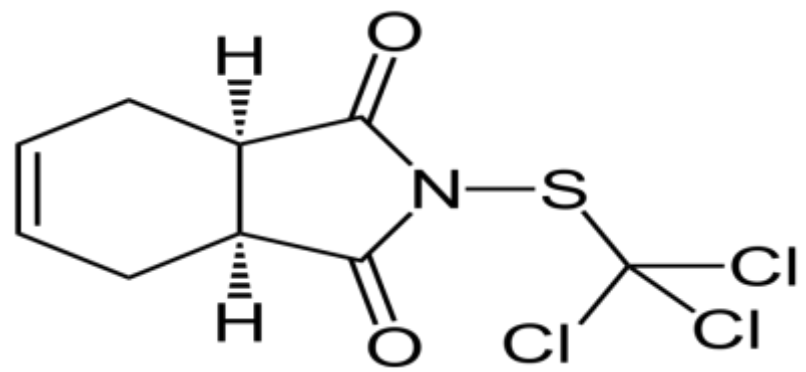
- It is an off-white crystals
- Systemic fungicide and seed protectant.
- soluble in water
- Melting point :  $91.5^{\circ}\text{C}$



## **□ Mode of action**

- ✓ The dioxide analogue of carboxin inhibit succinate cytochrome C reductase, succinate co-enzyme Q reductase or succinate reductase.
- ✓ Beside this monoxide analogue also inhibit these enzymes.

## 3. Captan :



### ❑ IUPAC Name :

2-(trichloromethylsulfanyl)-3a,4,7,7a-tetrahydroisoindole-1,3-dione

### ❑ Others Name :

- Captaf
- Hexacap
- Captab

# □ Properties

- Odorless
- white crystalline powder
- Melting point  $172.5^{\circ}\text{C}$
- Slightly soluble in ethylene dichloride
- Noncorrosive in nature

## ☐ Uses :

- ✓ Captan is predominantly used in agriculture as a fungicide on a wide variety of fruits, vegetables, and ornamentals on plant seeds, and also on food crop packaging boxes.
- ✓ Captan is also used in cosmetics
- ✓ pharmaceuticals
- ✓ oil-based paints
- ✓ wallpaper paste
- ✓ Plasticizers
- ✓ rubber stabilizers
- ✓ textiles etc.....

## □ Mode of action

- ✓ Captan is non specific thiol reactant with protective and curative action that works by inhibiting respiration of numerous species of fungi and bacteria
- ✓ The mechanism of action may involve the degradation of captan in to the short lived thio phosgene which is highly reactive with thiols and other functional group

# 4. Tridemorph

## □ IUPAC Name

2,6-Dimethyl-4-tridecylmorpholine

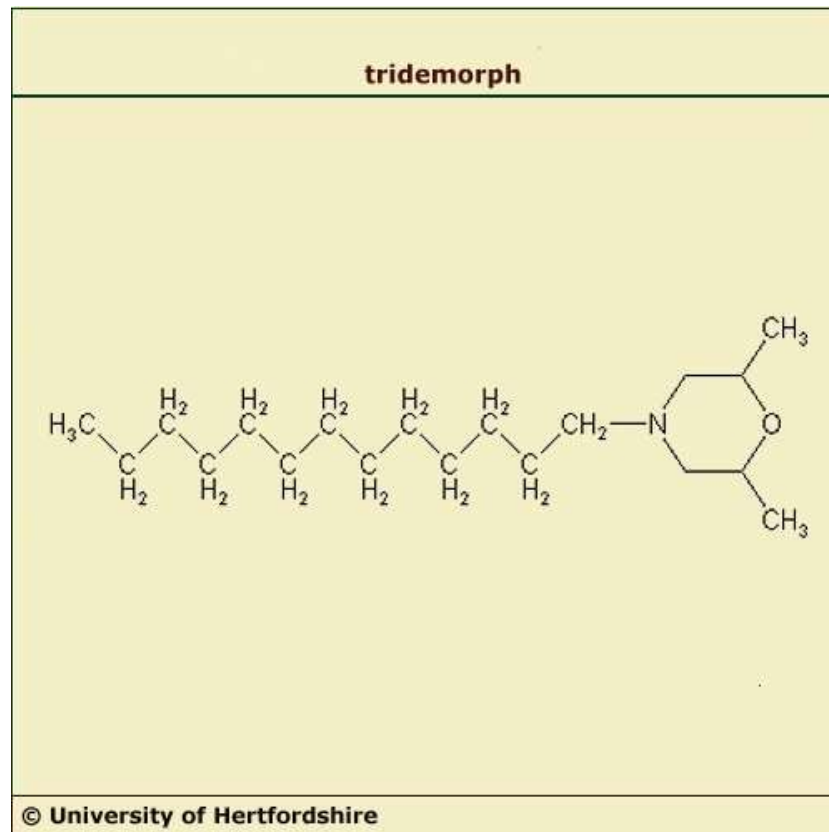
## □ Molecular Formula

$C_{19}H_{39}NO$

## □ Properties

➤ Boiling point :  $134^{\circ} C$

➤ Yellow oily liquid



## ☐ Uses :

- fungicide used to control *Erysiphe graminis*
- moderately hazardous

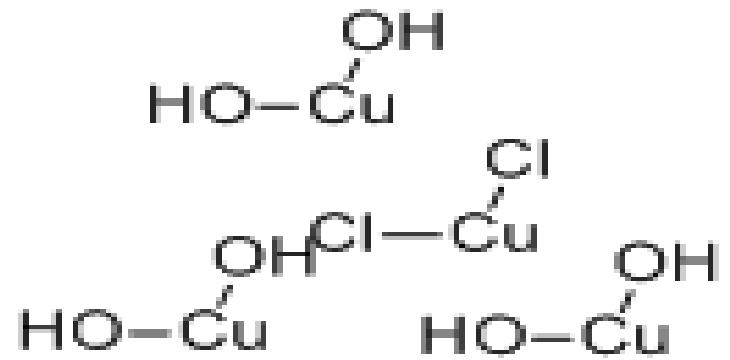
## ☐ Mode of action

- ✓ Inhibit protein and RNA synthesis
- ✓ Inhibit lipid synthesis and
- ✓ Often inhibit sterol biosynthesis

## 5. Copper oxychloride

### □ IUPAC Name

Dicopper Chloride Trihydroxide



### □ Properties

- Not flammable
- Highly toxic fungicide
- Insoluble in water

### □ Uses :

Copper Oxychloride is for the control of fungal and bacterial diseases in fruit and vegetable crops, citrus, stone fruit, pome fruit and ornamentals.



# □ Key Features and Benefits

- Economical control of a wide range of fungal and bacterial diseases in many crops and situations
- pH neutral product and ultra-fine particle size with majority of particles less than or equal to 2-micron diameter
- Free flowing product for easy mixing and application
- Can be applied in tank mixes with a wide range of other chemicals and/or fertilisers.

## **Mode of action :**

- ✓ Interferes with the enzyme system of mycelium and spores.

Thank

you

