

B.Sc. III Year (Theory)
Semester –VI
Paper XX (C)
Microbiology and Disease Management

Unit-2

Disease management:
2. Control methods

C. Fungicides

vii. Systemic – Bavistin and Vitavax

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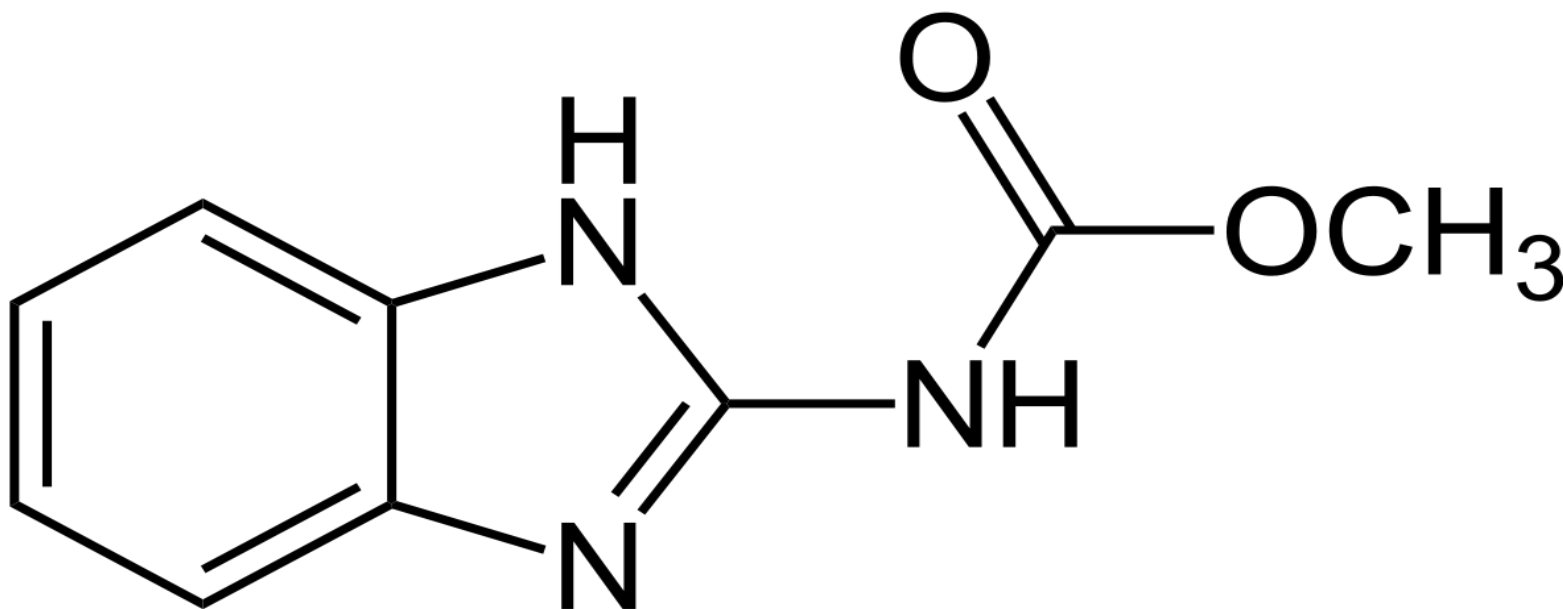
SYSTEMIC FUNGICIDES

Systemic fungicides act as direct chemotherapeutants.

Interest in chemotherapy and use of systemic fungicides was stimulated by the availability of diverse organic compounds possessing specificity for action as fungicides. Hundreds of chemicals have been tried and periodic reviews on the progress of development of systemic fungicides and chemotherapy have been published.

1) Bavistin (Carbendazim):

Bavistin is the trade name of Carbendazim (methyl-2-benzimidazole carbamate or MBC). The chemical structure is:





The empirical formula is $\text{C}_9\text{H}_9\text{N}_3\text{O}_2$ and molecular weight 191.2. It is a whitish grey powder having a faint acrid odour. Its solubility is less than 10 ppm in oil, 400 ppm in ethyl alcohol, 300 ppm in acetone and 100 ppm in chloroform. In water its solubility is 28 ppm at pH 4, 8 ppm at pH 7 and 7 ppm at pH 8. It is very stable compound, not decomposing at 50°C for two years. However, it decomposes in the presence of acids or alkalies.

It is one of the safer fungicides having a LD₅₀(oral) for rats of more than 6400mg/kg body weight. The maximum tolerable residue in food stuff is 18.75 ppm. However, tolerance from 0.1 ppm to 7 ppm has been fixed depending on the fruit, vegetable and cereals. It is found to be non-phytotoxic. It shows a broad spectrum fungitoxic activity being effective against Ascomycetes, fungi imperfecti and various Basidiomycetes.

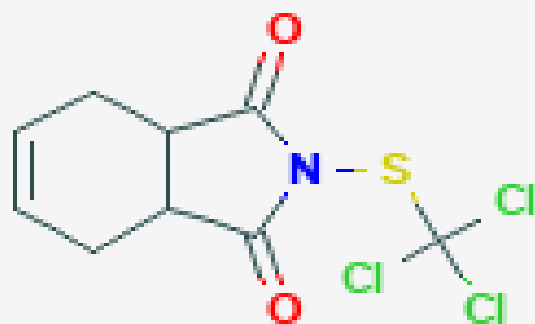
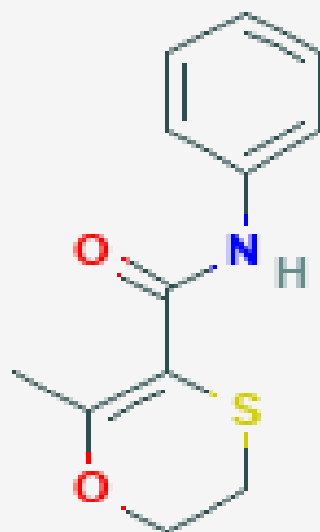
It is not effective against Phycomycetes and bacteria. With this, beneficial side effects like stimulation of growth, flowering and yield of plant as well as reduction of mite population on the treated hosts have been reported. It is used as spray, seedling dip (5-10 min.), seed dressing, soil drench, or as post harvest treatment of fruits (dip for $\frac{1}{2}$ -1 min.).

2) Vitavax:

This is oxathiin compound developed by Van Schmelting and Kulka in 1966. Two oxathiin compounds were developed

a) 2,3-dihydro-5 carboxianilido-6-methyl-1,4, oxathiin (or 5,6-dihydro-2-methyl 1,4,oxathiin-3-carboxianilide) called vitavax and

b) 2,3-dihydro,5-carboxianilido-6-methyl-1,4, oxathiin-4,4 dioxide (DCMOD) known as plantavax. Vitavax is water soluble and do not show any phytotoxic properties on crops.





It exhibits a remarkable selectivity in the antifungal spectrum. Vitavax have been found to be active against number of pathogenic fungi. Selectivity in action has been attributed to the degree of uptake and binding. Vitavax is not stable when applied to the soil and complete degradation may take place in 10-30 days. Vitavax have shown promise as a seed dressing or soil drench for the treatment of cereals against loose smut which are internally seed borne and *Rhizoctonia* disease of cotton and sugarbeet.

Vitavax have been employed against control of smuts and also for control of rusts of cereals and vegetables. The mode of action is considered to be the interference with synthesis of protein, RNA and DNA in rapidly metabolising cells. They have been found to inhibit mitochondrial respiration. Rate of use is 50-250gm/50kg of seed treatment and 10 per cent dust in soil treatment.

Thank You