

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

Unit-2
Disease management:
2. Control methods
C. Fungicides
ii. Copper fungicides

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COPPER FUNGICIDES

The fungicidal activity of copper sulphate was first recognised by Prevost (1807). Today copper fungicides are used widely in many countries. The copper fungicides have been used control of many vegetables, fruit and flowering plant diseases. They have been commonly used in plantation crops like tea, rubber, coffee etc.

Bordeaux mixture:

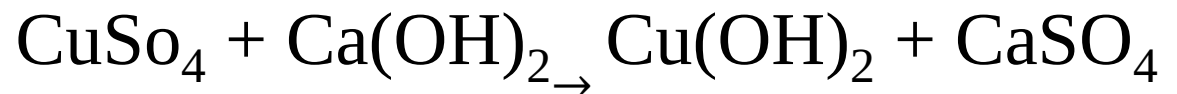
It is commonly used fungicide. The common formula for mixture is 4:4:50 or 5:5:50 ie. 1.5 kg of CuSO_4 and 1.5 kg of lime in 200 liters of water. It is prepared in following manner:

- a) CuSO_4 is powdered and dissolved in 100 liters of water.
- b) Quick lime is slaked with small quantity of water is mixed with 100 liters of water.

c) These two solutions are poured in to a third wooden container, mud pot or brass vessel through a strainer to retain large particles of unslaked lime and other contaminants.

d) The mixture is tested for free copper by placing a knife blade, a brown coating of copper will be seen on the surface indicating excess of copper which is phytotoxic. In such a case additional quantity of lime should be added for neutralisation.

e) The chemical reaction involved in Bordeaux mixture is:



The mixture is neutral or slightly alkaline and is not injurious. The cupric hydroxide is the active principle when soluble and is toxic to spores and sporelings. The fungicidal action is due to soluble copper. It is used in downy mildews, late blight of potatoes and areca nuts, coffee rusts, various leaf spot diseases, anthracnose etc. Its phytotoxic effect is characterised by chlorosis followed by brown or purple flecks on the leaves or fruits.

Bordeaux paste:

The content of Bordeaux paste is similar to that of Bordeaux mixture. It is primarily used for tree wound dressing to prevent fungal attacks e.g. in the control of stem bleeding disease of coconut. It is normally prepared by adding one lb each of copper sulphate and lime in one gallon of water.

Burgundy mixture:

This was introduced by Mason (1887) in Burgundy (France) in place of Bordeaux mixture in which lime is replaced by sodium carbonate crystals. This preparation was developed at that time good quick lime was not easily available in Europe. A 4:4:50 formula has been reported to satisfactory. It is slight less effective than Bordeaux mixture.

Cheshunt compound:

This compound was suggested by Bewlay in 1921. It contains two parts of CuSO_4 and 11 parts of ammonium carbonate. These are well powdered and mixed and are stored in air tight receptacle for 24 hours before using. One ounce of mixture is dissolved in a little hot water and the solution is made up to two gallons with cold water. It is used to drench nursery beds for the control of damping off.

Chaubattia paste (copper carbonate preparation):

This paste was developed at the Government Fruit Research Station, Chaubattia in Almora district of U. P. This was developed as wound dressing fungicide to be applied to pruned parts apple, pear and peach trees. The paste is prepared by mixing copper carbonate (800gm) and red lead (800gm) in 1 liter of lanolin or raw linseed oil and mixed in glass or chinaware pot. It is not washed easily by rain.

Copper Oxychloride preparation:

This is low injurious copper fungicide not found to be effective as Bordeaux mixture. It has been formulated both as wettable powder and as a ready-to-use dust. Copper oxychloride ($\text{CuCl}_2 \cdot 3\text{Cu}(\text{OH})_2$) is readily formed by the action of air on cupric chloride solutions or scrap copper. Formulations containing 4 to 50% metallic copper in the form of copper oxychloride are available in India. Copper oxychloride containing 4-12% metallic copper is used for dusting and 50% metallic copper for spraying. Some of the commercial preparations are: Blimix 4%, Blitox 50, Cupramar, Micop D-06, Micop W-50, Fytolan and Blue copper '50'.

Cuprous oxide preparation is another low soluble copper recommended for spraying 50% copper in water (100 gallons).

Thank You