

Uses of Copper Compounds: Copper Sulphate's Role in Agriculture

Copper sulphate has many agricultural uses (see [Table A](#)) but the following are the more important ones:

- Preparation of Bordeaux and Burgundy mixtures on the farm
- Control of fungus diseases
- Correction of copper deficiency in soils
- Correction of copper deficiency in animals
- Stimulation of growth for fattening pigs and broiler chickens
- A molluscicide for the destruction of slugs and snails, particularly the snail host of the liver fluke

Preparation of Bordeaux and Burgundy Mixtures on the Farm

Because of their importance to farmers, instructions concerning the dissolving of copper sulphate and the preparation of both Bordeaux and Burgundy mixtures have been included in the text.

Dissolving Copper Sulphate

Iron or galvanised vessels must not be used for the preparation of copper sulphate solutions. Plastic vessels, now freely available, are light and very convenient. To make a strong solution, hang a jute sack of copper sulphate so that the bottom of it dips a few inches only in the water. The copper sulphate will dissolve overnight. Copper sulphate dissolves in cold water to the extent of about 3 kg per 10 litres. If more than this is placed in the sack described above, then a saturated solution will be obtained and it may be used without serious error on the basis that it contains 3 kg copper sulphate per 10 litres.

Preparation of Bordeaux Mixture

Bordeaux mixture is prepared in various strengths from copper sulphate, hydrated lime (calcium hydroxide) and water. The conventional method of describing its composition is to give the weight of copper sulphate, the weight of hydrated lime and the volume of water in that order. The percentage of the weight of copper sulphate to the weight of water employed determines the concentration of the Bordeaux mixture. Thus a 1% Bordeaux mixture, which is the normal, would have the formula 1 :1:100 the first 1 representing 1 kg copper sulphate, the second representing 1 kg hydrated lime, and the 100 representing 100 litres (100 kg) water. As copper sulphate contains 25% copper metal, the copper content of a 1% Bordeaux mixture would be 0.25 % copper. The quantity of lime used can be reduced considerably. Actually 1 kg copper sulphate requires only 0.225 kg of chemically pure hydrated lime to precipitate all the copper. Good proprietary brands of hydrated lime are now freely available but, as even these deteriorate on storage, it is safest not to exceed a ratio of 2:1. i.e. a 1:0.5:100 mixture.

In preparing Bordeaux mixture, the copper sulphate is dissolved in half the required amount of water in a wooden or plastic vessel. The hydrated lime is mixed with the balance of the water in another vessel. The two "solutions" are then poured together through a strainer into a third vessel or spray tank.

Preparation of a 1% Burgundy Mixture

Dissolve separately 1 kg copper sulphate in 50 litres water and 125 kg washing soda (or 0.475 kg soda ash) in 50 litres water and slowly add the soda solution to the copper sulphate solution with stirring. Control of fungus diseases

Bordeaux and Burgundy mixtures have been found effective in controlling a whole host of fungus diseases of plants. Normally a 0.5 % to 1 % Bordeaux or Burgundy mixture applied at 2 to 3 week intervals suffices to control most copper-susceptible fungi.

Generally once the fungus spores have alighted on the host plant and penetrated the tissues it is difficult to control them. The principle of control must in most cases depend on protection, ie preventing the fungus spores from entering the host tissues. Copper fungicides are noted for their tenacity and for this reason are much to be preferred in areas of high rainfall.

The simplest method of control is to apply a protective coating of Bordeaux or Burgundy mixture (or other copper fungicide) to the susceptible parts of the plant, so that spores alighting on them come in contact with the protective film of copper and are killed instantly. It is thus important to remember that the first spraying must ideally be made just before the disease is expected and continued at intervals throughout the susceptible period. For this reason it is important to take advantage of the early warning schemes which are in operation to ensure greater accuracy of the timing of the first spraying.

It must also be remembered that fungi are plants and that control measures that will kill them may not always leave the host plant unaffected. The use of too concentrated a fungicide mixture must therefore be guarded against, particularly for the early sprays.

Copper fungicides have been reported effective against numerous plant diseases. A list, by no means exhaustive, of some 300 diseases that have been found amenable to control by copper fungicides, appears in [Table B](#).

Correction of Copper Deficiency in Soils

Where copper deficiency has been confirmed by soil analysis or field diagnosis, whether in plants or animals, it can be corrected very simply either by applying 50 kg copper sulphate per hectare in the form of a fertiliser before sowing or by spraying the foliage of the young cereal plants, when they are about 150 mm high, with 750 grams copper sulphate (dissolved in from 400 to 2,000 litres water) per hectare. The soil application has generally given the better results and has the advantage that it may have a residual effect for more than ten years. The foliar application has to be given annually to each crop. An alternative is to add a copper containing slag (normally about 1% to 2 % copper) at a rate of a tonne to the hectare.

Correction of Copper Deficiency in Animals

A method of correcting copper deficiency in livestock is to treat the soil on which animals graze. For example, in Australia and New Zealand swayback in lambs is being prevented by top dressing copper deficient pastures with 5 to 10 kg copper sulphate per hectare some time before lambing begins.

Other methods include drenching periodically with a copper sulphate solution; incorporating copper sulphate in salt and other animal licks; or by what is probably the most general method, incorporating copper sulphate along with other minerals and vitamins in the form of carefully blended supplements in the feeding stuffs.

Stimulation of Growth for Fattening Pigs and Broiler Chickens

The inclusion of up to as much as 0.1% copper sulphate in the diet of bacon and pork pigs and broiler chickens stimulates appetite and produces increased growth rate with a marked improvement in feed conversion.

A molluscicide for the destruction of slugs and snails, particularly the snail host of the liver fluke. All likely habitats of the liver fluke snail should be treated with copper sulphate at the rate of 25 kg to the hectare at least twice a year in June and August (northern hemisphere) or December and February (southern hemisphere).