

B.Sc. III Year (Theory)

Semester –VI

Paper XX (C)

Microbiology and Disease Management

Unit-2

Disease management:

2. Control methods

c. Fungicides

i) Sulphur fungicides

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SULPHUR FUNGICIDES

Elemental sulphur has been in use as a fungicide for a long time even today it is one of the best for the control of powdery mildew diseases. The elemental sulphur fungicides are available in two types of formulations viz. sulphur dust and wettable sulphur.

Mechanically ground sulphur have a tendency to form small aggregates which may be overcome by the addition of small amount of inert material such as Kaolin or lead arsenate. The fungicidal efficiency of a sulphur dust depends on the fineness of its particles, a high proportion should pass a 200 or 300 mesh sieve and still finer division is preferable. In recent years, wettable sulphur have become more popular. They form uniform suspension in water and are meant for use as sprays. This can be possible in two forms viz. paste or powder. Any form of sulphur can be made into wettable sulphur by grinding with protective colloidal materials such as sulphite lye, casein, bentonite clay etc. There are many proprietary products consisting of wettable sulphur which are available in India.

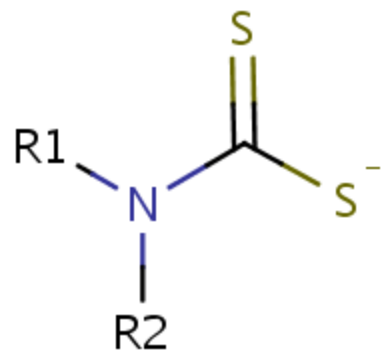
The mechanism of action of elemental sulphur has been a subject of interest for many years. Mach and Portelle (1884) first suggested that sulphur dioxide accounted for the fungicidal activity of sulphur. According to direct action theory, sulphur acts as a hydrogen acceptor in metabolic systems and disturbs the normal hydrogenation and dehydrogenation reactions in the cell. Sulphur fungicides emit sufficient vapour to prevent the growth of fungus spores at a distance of several mm from deposits on leaves.

Phytotoxicity: In warmer climate (above 80⁰F) severe burning is caused on cucurbits when sulphur is used for the powdery mildew control. Apples treated with sulphur in semi-arid areas may develop lesions on sun exposed sides. Sulphur placed on stigma of apple blossoms exhibits pollen germination. It has been observed that lime sulphur when applied on green leaves considerably reduces the photosynthesis.

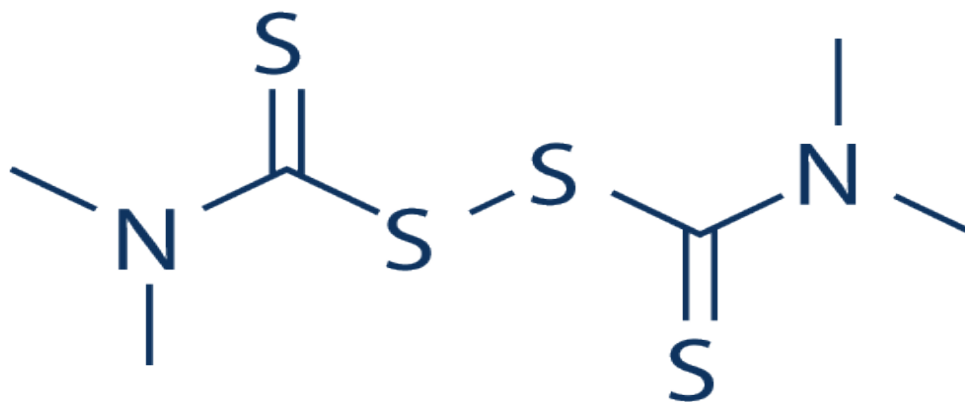
Disease control: Both elemental sulphur and lime sulphur have been widely used as fungicide for the control of different types of diseases, particularly powdery mildew and leaf spot diseases. Whereas elemental sulphur has been used as residual fungicide, lime sulphur has been mainly used as a contact fungicide.

Organic sulphur (Carbamate):

The carbamate fungicides form a very important group among fungicides. Most of these are foliage fungicides, while some are used for soil and seed treatments. All the carbamate fungicides available commercially are derivatives of dithiocarbamic acid. This acid has the structural formula:



Thiram: Thiram is coined name for tetramethylthiuram disulphide or bis (dimethylthiocarbamoyl) disulphide. The structural formula is as under:



It is sold in market under the names such as Arasan, Hexathir, Nomersan, Panoram 75, Pomasol, Spotrete, Tersan 75, Thiram, Thiride, Thylate, TMTD (TMTDS) etc. The molecular weight is 240.4. It is unstable in the presence of acids. It is white coloured substance which is essentially insoluble in water, slightly soluble in alcohol and ether and completely soluble in acetone and chloroform.

It is toxic if consumed orally. It has also been found to be irritating to nose, throat and skin. It is one of the most effective seed protectants and is less phytotoxic. It is used for seed treatment either as dry powder or as slurry. Generally, the rate of application for dry seed dressing is about 0.25%. It is also used for treating the soil and the rates of application vary between 15-25 kg per hectare. Some of the diseases controlled by thiram are: stem gall of coriander, damping off, smut, neck rot of onion, black rot of sugar beet, anthracnose and stem rot of tobacco, seedling diseases of cotton and many other soil borne diseases.

Thiram is decomposed in humus sandy soils at pH 3-4 after 4-5 weeks and in soil at pH 7.0 after 14-15 weeks. In extreme alkaline soils, initial fungicidal effect is delayed. On seed, thiram is degraded if treated seed is stored and hence a compensatory dose is required.

Thank You