Technical Note

SULFUR AS A FUNGICIDE

September 2008

Background

Sulfur has unquestionably been one of the most important and certainly one of the earliest fungicides ever used.

Development of the first fungicides was as a result of good observations rather than intent. One of – if not the first fungicide – was sea water in that wheat salvaged from the sea had little fungal infection. This observation dates back to the 17th Century.

Vines treated with Copper Sulphate for Powdery Mildew dates back to the 18th Century.

Sulfur applied as dust dates back to 1824.

Mode of Action

Despite sulfur usage now dating back some 180 years the mode of action remains unclear. What is known is that particle size influences several aspects of both fungicidal activity and application.

Actual contact of the sulfur particle with the fungus is necessary before fungicidal action can occur. There is some debate as to whether vapour inhibits spore germination.

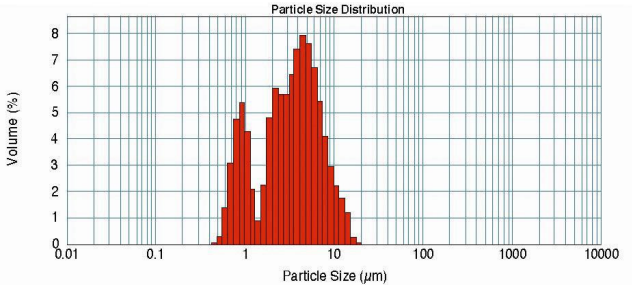
Some researchers state a categorical "yes" others are equally emphatic and state a "no". There is more reference to vapour not having any effect on the germination of spores, suffice to say the jury is still out.

Resistance management is key to disease management. Products such as sulfur and copper belong to Group Y, and have Multisite Activity. That is that they interfere with several of the (fungus) vital life functions. For this reason resistance is less likely to develop. Group C for example has single site activity and for this reason resistance can develop readily.

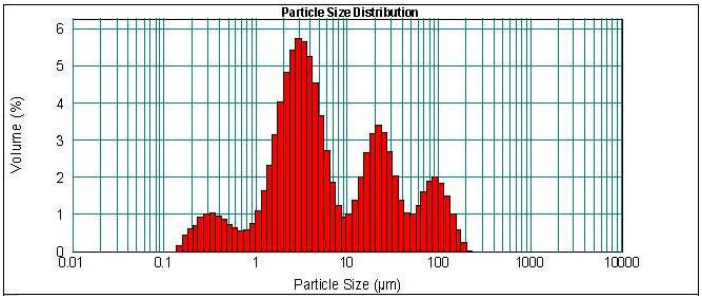
The importance of particle size in the case of sulphur products

- Too small… Small particles have a large surface area and are therefore more volatile and result in quick vapour release and has an immediate effect. Particles below 0.5 micron are extremely volatile and are the main culprits of sulphur burn. These small particles can also enter the stomata, which can then lead to more crop damage.
- Too big… Large particle are less volatile and release more slowly, therefore making them more effective over a longer period. Particles above 100 micron are undesirable and can lead to blockages of the spray equipment.

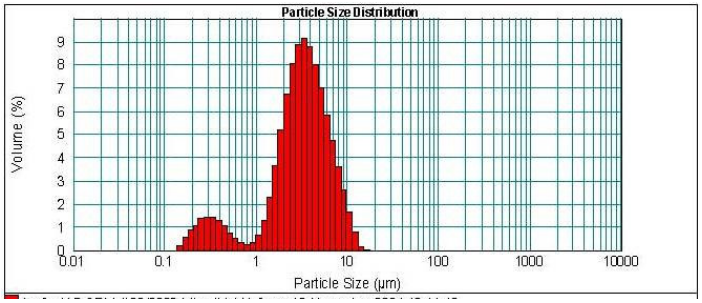
The particle size analysis differs from brand to brand as can be seen in the tables below:



Microsul WG Elite



Product B



Product C

The particle size range of Microsul WG Elite is ideal in that there are minimal 'fines', i.e. those particles below 0.5 microns and also there are no particle large enough to block jets.

Crop Effect

Field observations in the river land of South Australia confirmed minimal damage when sulphur was sprayed at surprisingly high temperatures on a very hot dry day. This tends to contradict the cautionary statement on the label. Trials conducted by SARDI in Loxton in South Australia, provided an explanation.

The presence of humidity (and temperature) increased the risk factor considerably. This was subsequently confirmed following trials at Loxton, SA.

The presence of fine particles (i.e. particles below 0.5microns) will further aggravate the problem, this is a consequence of large surface area, hence increased volatility.

Brands containing reduced "fines" should be favourable over those with a higher concentration.

Regards,

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