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WETTABLE SULPHUR COMPOSITION

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This invention relates to a spray composition and particularly to a material useful in the spraying of vegetation to control pest infestations, mildew and the like. More particularly this invention is concerned with provision of a dry, free flowing finely divided sulphur composition which can be readily incorporated into an aqueous spray.

Finely divided sulphur, as usually produced, is incompatible with water in that it is difficultly wettable. The present invention is concerned with modifying the sulphur to the end that it is readily water wettable and can be incorporated into an aqueous spray without difficulty. If it is attempted to introduce ordinary free flowing finely divided sulphur into a spray tank, the water has such a high surface tension relative to the sulphur that it is only wet with difficulty, it being necessary to run the spray tank agitator for hours before the sulphur is uniformly distributed and is wet with the water. This is impractical for obvious reasons. The present invention provides a composition which can be speedily incorporated into a spray tank mixture.

I have discovered that it is possible to incorporate into free flowing finely divided dry sulphur a wetting agent which lowers the surface tension of the water so that the sulphur is wetted rapidly. As is well known, wetting agents are materials which decrease surface tension. They are the alkali metal salts of sulphuric acid esters of organic compounds, particularly of the higher fatty alcohols or of sulphonated fatty acids. As such agents, I mention the several Duponols, also known as Gardinols.

A discussion and list of wetting agents will be found at page 694 et seq. in Thorpe, Dict. of Applied Chem., vol. 2 of the supplement. This invention particularly contemplates the use of the alkali metal salts of the sulphuric esters of higher aliphatic alcohols, e. g., cetyl, ceryl and melissyl, and of the fatty acids, e. g., capric, lauric, myristic, palmitic, margaric and stearic, and other materials as represented by the esters of sulphodicarboxylic acids and sodium-di-isopropyl naphthalene sulphonic acid. Except that Duponol has been found to be particularly useful because it is a solid which can be ground extremely fine (100%—200 mesh) the wetting agent can be selected from among the many members of this class, subject to certain considerations hereinafter set forth.

The wetting agents are usually quite expensive. Further, they need only be used in small amounts—in fact, they are preferably so used, such amounts being of the order of 1% by weight. I have found that it is practically economically impossible in commercial operations to incorporate the wetting agent on a commercial scale into the finely divided sulphur for an extreme mixing or grinding operation must be used. While the wetting agent can be successfully introduced and uniformly dispersed on a laboratory scale operation, in commercial practice and in commercial equipment uniform distribution can only be attained at extreme expense. I therefore preferably first incorporate the wetting agent, such as one of the aforementioned Duponols, on an inert finely divided solid such as diatomaceous earth or bentonite or other inert, water insoluble material such as a suitable clay. The filler-wetting agent mixture is then added to the fine sulphur.

In one specific composition I mixed together two pounds of bentonite, a pound and a quarter of diatomaceous earth, and a pound and a quarter of Duponol, although the Duponol range can be extended between one and three pounds. These materials were thoroughly mixed until the Duponol was uniformly distributed throughout the finely divided inert mass of filler. The Duponol is preferably used in finely divided form, preferably 100% through 200 mesh.

There are three important types of Duponol on the market, namely, "Duponol W. A.", the sodium salt of sulphonated lauryl alcohol, "Duponol C. A.", the sodium salt of sulphonated fatty acids derived from tallow, and "Duponol L. S." which represents the sodium salts of a mixture of certain sulphonated fatty alcohols. Of the three products, I prefer the former, "Duponol W. A." The Duponols are neutral, stable under acid and alkaline conditions and resistant toward atmospheric oxidation as well. They do not hydrolyze to give an alkaline reaction as do most soaps, and their high acid resistance eliminates the occurrence of splitting off of free fatty acids as may be experienced in the case of other soaps under similar conditions. The wetting agent selected need not be a Duponol but the properties thereof should correspond to those outlined. Any wetting agent can be used having the properties indicated.

Because of the difficulties encountered commercially in mixing the material and because of the effect upon sulphur, the wetting agent employed is preferably non-hygroscopic. When the mass is thoroughly mixed, it is incorporated into the free flowing finely divided sulphur in such proportion that the mass of sulphur finally contains about 1% of the wetting agent, although variation in this is possible between

0.5% and 3%. A composition employing diatomaceous earth is advisable because this earth wets readily and enhances the action of the wetting agent. The use of bentonite in combination with the diatomaceous earth is preferred because it acts as a spreader or carrier and assists adherence of the sprayed sulphur to vegetation in the presence of water, whereby, when the water runs off or evaporates, the sulphur remains on and adheres to the vegetation in a relatively uniform and heavy deposit.

The final mixture is preferably such that it is substantially neutral in an aqueous spray mix. I have found that one can mix dry wettable sulphur with other insecticidal spray materials successfully (e. g., arsenates of lead or calcium, or lime sulphur solutions), if the mix is substantially neutral. It is of the greatest importance to eliminate any substance of either an acid or an alkaline character, which may by its action upon the insecticidal arsenical spray compounds, produce and liberate water-soluble arsenic compounds which burn vegetation. In the second case it is important to avoid the introduction of any substance incompatible with lime sulphur solution, particularly substances of an acidic nature, which decompose the lime sulphur compound. With the aforementioned mixture of bentonite and diatomaceous earth, these acting as a carrier for the wetting agent, and utilizing a substantially neutral wetting agent, this difficulty is obviated. Spray tank mixes, initially of substantially neutral pH, are not affected by addition of the material of this invention.

I claim:

1. A method of manufacturing a sulphur for use in an aqueous spray comprising mixing a dry but water soluble wetting agent with a dry solid, inert finely divided filler material until said agent is substantially uniformly distributed throughout said dry filler material, and mixing sufficient of said dry mixture with dry, finely divided sulphur to incorporate into said sulphur about 1% of said wetting agent.

2. A method of manufacturing a sulphur fo use in an aqueous spray comprising mixing a dr finely divided non-hygroscopic water soluble wet ting agent with a dry solid, inert finely divide filler material until said agent is substantiall uniformly distributed throughout said dry fille material, and mixing sufficient of said dry mix ture with dry, finely divided sulphur to incor porate into said sulphur about 1% of said wet ting agent.

3. As a material for use in an aqueous spray substantially free flowing dry powdered sulphu containing about 1% of a dry non-hygroscopi finely divided wetting agent carried on about an equal volume of an inert finely divided dry solid filler acting as a carrier for said agent.

4. As a material for use in an aqueous spray, substantially free flowing dry powdered sulphur containing about 1% of a dry alkali metal salt of lauryl sulphate as a nonhygroscopic finely divided wetting agent carried on about an equal volume of dry diatomaceous earth as an inert finely divided solid filler acting as a carrier for said agent.

5. As a material for use in an aqueous spray, substantially free flowing dry powdered sulphur containing about 1% of a dry alkali metal salt of lauryl sulphate as a nonhygroscopic finely divided wetting agent carried on about an equal volume of dry mixture of diatomaceous earth and bentonite as an inert finely divided solid filler acting as a carrier for said agent.

6. A sulphur composition comprising about two pounds of dry bentonite, about one and one-quarter pounds of dry diatomaceous earth, from one to three pounds of a dry water soluble wetting agent carried in finely divided dry form on said bentonite and said earth, and finely divided dry sulphur sufficient so that the wetting agent is present in from 0.5% to 3%.

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