

Lime-Sulphur--Its Use as a Fungicide and an Insecticide

By Prof. P. J. O'Gara, Pathologist. Written especially for the Medford Mail Tribune. (Copyright, 1911, by Medford Printing Company.)

(Sixth installment.) Making the Lime-Sulphur Spray.

So far we have treated mainly of the chemistry of lime-sulphur and it will now be necessary to explain how the wash is prepared commercially, as well as the making of it, by the grower himself.

As was stated in the first chapters, the amount of lime and sulphur used varied with the different formulae and the proportion of each used had no bearing on the chemistry of the spray and, therefore, it was not very infrequent that too much lime, as well as too much sulphur, was used. The first commercial lime-sulphur compounds were used as a sheep dip, just as the older preparations had been used many years before lime-sulphur was used as an orchard spray. Everyone is familiar with the Rex, Niagara, Ortho, Sampson and various other commercial lime-sulphurs.

It is not our intention to go into the matter of these so-called patent sprays, but merely to state that the commercial brands differ from the home-made wash or spray principally in that they are in a highly concentrated state. This high concentration has made it feasible to prepare the lime-sulphur wash as a commercial commodity to be stored, shipped and sold for insecticidal and fungicidal purposes. The home-made washes usually have a low concentration while the leading commercial brands are approximately nine or ten times as strong as the home-made mixtures. The best of the commercial preparations differ markedly in appearance from the wash made by the fruit grower himself in that there is no heavy sediment or settling. This has been excluded by decanting off or filtering the clear liquid. Another important property of well made commercial brands is that they are comparatively free from crystallization when subjected to sudden changes of temperature. This result has been attained by using the minimum amount of lime necessary to unite with the sulphur, and after the wash has been prepared, by keeping it in air-tight containers. However, variations in the degree of concentration of commercial lime-sulphurs may occur with different batches of the same brand. It is often impossible, even under the best of conditions, to prepare a lime-sulphur of definite strength. In the early history of the concentrated lime-sulphur manufacture it was very difficult to make different boilings of uniform density and analyses of the same brand showed great variation, sometimes all the way from 25 to 34 degrees Beaume. At the present time, however, all of the better brands show a very high degree of concentration and are generally quite uniform in density.

(CaS5) as possible. It may be stated then, that the 1-2-1 formula should be followed. Our formula will then read:

- 1 pound lime. 2 pounds sulphur. 1 gallon water.

In order to make up fifty gallons at one time, all that is necessary to do is to multiply the above formula by the factor 50. The matter of boiling the mixture is of very great importance. There is as much to be said against over-boiling as under-boiling. It is well known that the largest amounts of soluble sulphides are formed when it has been boiled about one hour. Of course, the boiling should be constant and the pot or cooker should be tightly closed by a cover so as to retain as much heat as possible. With a brisk fire the amount of sediment increases with the length of boiling, owing to the increased formation of calcium sulphite (CaSO3). The amount of free sulphur, however, decreases with the length of boiling. Where there is any sediment in the bottom of the cooker, this may be used in making another batch instead of throwing it away.

The most economical and convenient way to prepare the home-boiled lime-sulphur is to use live steam if possible. A good steam boiler, with tanks or barrels for boiling the spray, is very convenient. The main steam pipe may be connected to smaller pipes which pass into the barrel, these pipes being fitted at the bottom with a cross perforated with holes through which the steam issues. The pipes should be three-quarters of an inch and the perforations may be one-eighth or one-sixteenth of an inch in size. When the lime, sulphur and water are put into the barrel and mixed, live steam is turned on and the cooking is usually very rapid if the steam pressure is high. With this method, the use of the steam eliminates the shrinkage of water as in the case of the kettle. Enough pressure, say 175 pounds, should be used to develop a vigorous boiling and avoid unnecessary condensation, since the condensation of the steam would tend to increase too much the quantity of water.

Where accurate control of volumes and greater densities may be desired, the steam may be used in closed coils or in steam jacketed kettles, with or without mechanical agitators. Such kettles holding 100 gallons and upwards, are obtainable, but are usually very costly. In using a cooker or kettle, it is a good plan to mark a certain point on the kettle so that one may know the right amounts of water to use for the lime and sulphur employed in making a batch. Either this should be done or a measuring stick made from a lath and accurately marked.

The Home-Boiled Wash.

To the fruit grower who makes his own lime-sulphur solution, it is important, not only to know that lime and sulphur are used, but the relative amounts as well as the length of time necessary to boil the mixture; and, finally, the determination of the strength or specific gravity and the amount of dilution necessary to use it, so that it will have the desired effect. It may be stated that, as a rule, the specific gravity or density of the preparation and the amount of sulphur and calcium in the solution is increased with the amount of lime used. When a large amount of lime is used the compound is mostly calcium tetra-sulphide (CaS4) and when the smallest amount of lime is used the mixture is more nearly the penta-sulphide (CaS5). In the undissolved portion or sediment free sulphur is usually present in largest amounts when the smallest amount of lime is used and the amount decreases when larger amounts of lime are used. Calcium sulphite (CaSO3) is present in smallest amounts when the least amount of lime is used. Just how much lime to use for making the best mixture depends somewhat upon the quality of the lime, but, in general, one pound of good lime to two pounds of sulphur and slightly more than one gallon of water, which when boiled down so as to have about one gallon of total concentrated product, will give the desired results. In some cases this formula may well be modified; for instance, if the lime falls much below 95 per cent calcium oxide, or, if the solution is to be used at once, it may be desirable to increase the amount of lime by 10 per cent. However, any greater increase in the lime is objectionable because of the resulting increase in the amount of sediment and in the tendency to crystallize in storage. Furthermore, when an excess of lime is used only the lower sulphides are formed. The object in making a concentrated wash is to have as much tetra-sulphide (CaS4) and penta-sulphide

Our Correspondents

EDEN PRECINCT ITEMS.

The usual amount of orders are going out of North Talent for garden seed.

John Robinson of Wegoner creek was down to Phoenix Friday attending the funeral of the late C. E. Houston.

C. Carey says it does pay to advertise in the Mail Tribune. After the first notice he shipped a ton of his fine early sunrise seed potatoes to Ashland, and he is cleaning up the last of them for this season. His fine quality seed has gained wide reputation, he having taken the medal at the Seattle exposition in 1909.

C. W. Wolters of Talent has his new fixtures in his bank, and one going in would feel as though he had stepped into one of the larger city banks. Every modern convenience is supplied.

Mr. and Mrs. Ike Wolf of Medford came out to Phoenix Friday.

W. E. Hartley of North Talent was a Medford visitor Saturday.

Mrs. Samantha Hewitt of North Talent went down to Medford Thursday to visit her brother and family, Mr. and Mrs. George Chandler.

Mrs. Charley McClain, a former Phoenix resident came up from Myrtle creek, the last of the week, and is visiting relatives here.

Joshua Patterson, former county commissioner, and wife, were in Phoenix Friday.

S. S. Stephens of North Talent was in Medford Saturday.

Ed Hamlin of Eden valley came into Phoenix Friday to attend the funeral services.

Mr. and Mrs. Otto Caster of East Medford were in Phoenix Friday.

W. S. Stancliff of North Talent is laid up with the grippe.

Mrs. M. Smith, niece of Mrs. James Allen, came down from Ashland to consult Dr. Malmgren of Phoenix, and found that an operation for appendicitis was necessary. She went to the Southern Oregon hospital at Ashland Sunday and was operated on Monday.

Phoenix came near having a blaze last Monday when the flue in the Theo Engle building, which is being occupied as a general merchandise store by Beardsley and Crox burned out, setting fire to the roof. Only quick action by Mr. Beardsley in playing his hose upon the roof saved the building and its contents.

Miss Clara Allen of North Talent went to Ashland Sunday to spend a few days.

C. Carey did his trading in Phoenix last Saturday morning.

The funeral services over the remains of C. E. Houston at Phoenix Friday were largely attended. Three lodges were represented.

The public school, beside the entire populace for miles around, attended. There were many beautiful floral offerings. The music was furnished by the Phoenix quartet, and was a beautiful tribute to his memory.

CENTRAL POINT ITEMS

A. W. Moon made a business trip to Grants Pass Saturday.

Mrs. Getsie and daughter of Ashland are visiting Mr. and Mrs. Parker.

Mrs. Smith returned from a two months' visit at Los Angeles and other southern cities.

Dr. Ray of Medford was transacting business here Friday.

The Central Point Junior club sang a special song at the Y. M. C. A. Sunday afternoon.

L. L. Herrick, president of the Grants Pass bank and Trust company, addressed the Y. M. C. A. Sunday afternoon.

Mrs. Lee Ingram returned home Saturday evening from a visit with relatives and friends at Chico, Cal.

Mrs. Wilson of Milltonaire Row left Friday afternoon for her old home at Chicago. She will be absent until the first of May.

Mr. and Mrs. Manning returned from Grants Pass Friday.

Edward Kahler has been on the sick list for the past week and his many friends will be pleased to hear that he is convalescing.

Harley and Orma Welch, formerly of this place but now of Portland, were visiting friends here the last of the week.

J. W. Merritt made a business trip to Gold Hill Sunday.

S. M. Caldwell made a trip to the lower end of the valley Sunday.

J. H. Grace and Mr. Case returned from Los Angeles Saturday evening.

A. C. Walker made a business trip to Grants Pass Saturday.

William Hammett spent Sunday at Ashland.

Among the many Central Point people who spent Saturday afternoon at Medford were Mrs. Campbell and Mrs. Chiebler, Paul Lake and wife, Miss Sarah Bemm, and Miss Beulah Caldwell. Mrs. England, Henry Riley, George Parnum, H. E. Bedford, Guy Tex, E. Scott, S. A. Patterson, Homer Peart, Harry Lindsey and Gus Morris.

EAGLE POINT EAGLETS.

(By A. C. Howlett.)

Since my last, which was on the 11th inst., I have been confined to the house so that I have not been able to gather the general news as usual, but herewith submit what items I have been able to gather.

Since my last Mr. Reed of Dudley has been out to Medford to be a witness in a land case before Commissioner Cannon.

Mr. Payne, who bought the Alfred Gordon place on upper Rogue river, has spent the night here on his way home. He has his children attending school in Medford.

Charley Morine of Elk Creek was also a lodger with us.

Two men were here from Medford who were attracted by a wind puff in one of the local papers in which it was announced that we were going to build a large amount of cement sidewalk, a \$25,000 schoolhouse, etc., to see about getting a contract for cement work, and our postmaster, A. J. Florey, who is school clerk, has received quite a number of cards representing the different styles of schoolhouses. You see the advantages of advertising. Also two men were here to feel the pulse of the people with regard to opening up a saloon or two here, while quite a number have been here looking for different locations for business, and some changes have been made in real estate.

Albert Anderson of Pierce, S. D., was here looking over the situation for business, and W. E. Buchanan of Sunnyside, Wash., also spent a day and night with us. He was on his way to Butte Falls, where he expects to go into the dental business. Mr. P. M. Kershaw of the Oregon Granite company of Medford was also with us on his way up Butte Creek.

Anson Lord, formerly of Central Point, but now of Butte Falls, was also a guest at the Sunnyside.

J. D. Arnes of Medford was here inquiring for the Bradshaw place, where two of his brother-in-laws are in charge of the place; also Messrs. Ed and Mike Hanley came out, spent the night, procured saddle horses here and went up the country, re-

turning in time to join in celebrating the 36th birthday of Lew and Roy Smith, twins. Mrs. Howlett had prepared a special turkey dinner for all the boarders and a number of invited guests, among whom were Z. H. Wamsley and daughter, Miss Mabel, Mr. McNutt, Miss Lammie, our photographer, Ed Cingade, Miss Cora Sowell, Ray Harnish, John Foster, Ed Foster, Nick Young, Carl Ringer, Chalmers Ringer, Mr. Bell of Chicago, who has been looking after the interests of the company who have been putting up the water tank for the P. & E. Railroad company, Geo. West of Medford. To say that we or rather they, for I was too sick to enjoy anything but quiet, but those who expressed themselves said that they had one of the times of their lives.

Sunday evening the 12th inst. John Higinbotham, two of the McKee boys, Mrs. Fort Hubbard of Medford and her sister, Mrs. John Higinbotham, came in with their father, John McKee. They were accompanied by Dr. Holt, our local M. D. Mr. McKee was suffering so much that it was thought best to bring him out where he could have the best of care. Dr. Holt is always prompt to attend to his patients. They took rooms at the Sunnyside hotel and the venerable old gentleman passed off quietly about 1:45 p. m. Wednesday, the 15th, aged 83 years, 8 months and 18 days. The remains were taken charge of by the Perl undertaking company of Medford the same afternoon and the remains were shipped to Medford on the P. & E. car. The deceased leaves a large family of children, grandchildren and friends to feel their bereavement.

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