Sodium Secondary-Alcohol Sulfates as Spreaders for Sodium Chlorate Herbicides[1]

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The sodium secondary-alcohol sulfates recently recommended as penetrants by Wilkes and Wickert[2] have been tested and found satisfactory as spreaders for aqueous sodium chlorate solutions. Large quantities of sodium chlorate are used annually in the destruction of currant and gooseberry plants for the protection of white pine forests against blister rust (*Cronartium ribicola* Fischer); in this work the efficiency of chlorate sprays has been increased by adding these new alipathics as spreaders.

Comparative tests of the new spreaders and those previously used were based on (1) stop-watch measurements of the time required to wet equal weights of coiled cotton twine floated on the surface of the solutions, (2) ocular observations of the rapidity and uniformity with which freshly detached leaves of *Ribes Petiolare* Dougl. became wet when dipped in the solutions, and (3) spray treatments of vigorous 5-year-old greenhouse specimens of *R. petiolare* with dosages of sodium chlorate comparable to those now being used for the eradication of this plant.[3]

For use with neutral, slightly acid, or slightly alkaline sodium chlorate sprays (or with proprietary hygroscopic chlorate sprays) the various spreaders tested were rated in the following decreasing order of effectiveness: Tergitol[4] 7, Tergitol 4, Tergitol 08, animal glue, and ethyl alcohol. In concentrations of 0.01 to 0.1 per cent by volume of the aqueous spray solution, the superiority of the first named was especially marked.

As a result of these tests sodium secondary-alcohol sulfate has recently been substituted for animal glue as a spreader for the proprietary sodium chlorate used in large-scale field work in the chemical eradication of *Ribes petiolare*. Throughout the white-pine regions of northern Idaho and western Montana the destruction of this plant is particularly important because of its high susceptibility to blister rust disease and its part in spreading that disease to white pine.

In the large-scale eradication work on *Ribes petiolare*, 1 teaspoonful (about 6 cc.) of Tergitol 7 is added to each 10 gallons of spray solution, the latter containing about 6 pounds of effective sodium chlorate. Optimum dispersion of the spreader is obtained if it is added to the water before the weed killer is dissolved. In the spraying of freshly prepared solutions there is no apparent difference in wetting power between aqueous solutions of the spreader and its mixture with proprietary sodium chlorate sprays in the concentrations we have employed.

Sodium secondary-alcohol sulfates are relatively nontoxic to human or animal life, nonirritating to the skin, and noncorrosive to equipment used in spray work; they do not increase the fire hazard of chlorate sprays and may be stored in any glass or metal container. Their potency in lowering surface tension recommends them for field jobs where the weight and bulk of spray materials must be kept small.

The list given in the third paragraph indicates the relative effectiveness in neutral or nearly neutral sodium chlorate solutions of the five spreaders tested. If the materials are used with other common herbicides, the order of preference may be different; but the sodium secondary-alcohol sulfates should remain the most satisfactory because of their stability in strongly acid or alkaline media, their resistance to the destructive action of oxidizing agents, and their solubility in hard water.

Wide variations in spreading properties may be obtained by increasing the concentration of the sodium secondary-alcohol sulfates in the aqueous spray solution. This type of spreader might be useful for the selective killing of plants which vary significantly in their external morphology, especially those susceptible to contact foliage sprays.

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[2] Wilkes, B. G., and Wickert, J. N. "New Synthetic Aliphatic Penetrants." Ind. & Eng. Chem., vol. 29, No. 11, p. 1234 (1937).

[3] Offord, H. R., Van Atta, G. R., and Swanson, H. E. "Chemical and Mechanical Methods of Ribes Eradication in the White Pine Regions of the Western United States." U. S. Dept. Agr. Tech. Bull. in press (1938).

[4] In this article the concentrations of Tergitol compounds refer to the aqueous products as marketed in June, 1938, and it should be understood that the Department has no control over any changes that may be made by the manufacturers of proprietary compounds. The commercial Tergitols are mixtures of several sodium secondary-alcohol sulfates in aqueous solution; according to Wilkes and Wickert (ibid) the Tergitol products may be represented by the formula R_2CHSO_4Na, where R is any primary or secondary nonfatty alkyl group.

Cause of the Asymmetrical Profiles of the Typical Palouse Hill

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The typical hill of the Palouse Hills Section is strikingly steeper on the northerly side than on the southerly side. The cause of this asymmetry has been conjectured upon and explained many times by numerous individuals. Prior to 1931 it was generally accredited to dune action. In 1934 W. A. Rockie attributed its cause primarily to snowdrift erosion phenomena more or less as suggested by Kirkham after Matthes.

The writer made one-hundred profiles from the topographic quadrangle maps and supplemented them with study of pictures. A few profiles were checked by pacing. In these profiles the distance between the divide and the north drainage position was found to average but 47 per cent of the distance between drainage "channels". Some profiles were taken across ridges or across hills on both sides of which the drainage lines were incised into the basalt; the streams thus being positively fixed against lateral shifting as far as it would affect the profile of the hills or ridges. These profiles with the incised streams showed the same general relations as others in which the drainage was not so incised.

Thus in the development of this profile, those erosive factors which sought to shift the divide to the south were outweighed by those geological factors that shifted the divide to the north. This northerly position of the divide is believed to be incompatible with Rockie's supposition that snowdrift erosion was the dominant factor in producing the asymmetrical profile, though it is assumed that Rockie is correct when he says that snowdrift erosion is the dominant erosive factor under the present system of cultivation.

Dune action coupled with unlike vegetation cover and unlike resistance to seasonal erosion is believed to have been the dominant factor in the production of the typical, asymmetrical profile.