

SODIUM CHLORATE AS A HERBICIDE.<sup>1</sup>

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The aim of most experimenters with chemical weed killers has long been to find a plant poison capable of penetrating and destroying the creeping underground parts of such persistent perennials as Canada thistle, quack grass and wild morning glory. There is a strong demand on the part of farmers for a chemical of this type since it has been demonstrated that a piece of the creeping root of quack grass or Canada thistle but a half inch in length will readily start new infestation and farmers have experienced serious losses in labor, decreased yields and the lowering of land values due to infesting large areas by means of root pieces carried from small patches on cultivating implements.

After repeated failures with arsenicals, oils and other chemicals, experimenters seem to have been achieving their aims with sodium chlorate. The first experimental work with this material started in Germany and the work was continued under American conditions by the Cornell Agricultural Experiment Station with Canada thistle,<sup>1</sup> the Kansas Agricultural Experiment Station with field bindweed,<sup>2</sup> *Convolvulus arvensis*, and the Purdue University Agricultural Experiment Station with quack grass.<sup>3</sup> Thus three of the major weed problems have been partly solved, particularly the important phase presented by small areas of infestation, by the use of sodium chlorate.

In addition to the work upon quack grass, a number of sodium chlorate tests on other species of weeds have been conducted by the writer. An important economic problem on Indiana farms is the presence of poison ivy, which in many instances materially lowers the selling value of the land. In order to test the value of sodium chlorate against this pest, five fence posts heavily overgrown with poison ivy on a farm near the Clay Township School in Howard County were treated with a sodium chlorate solution on December 15, 1927, in such a manner as to thoroughly saturate the ivy. Inspection at regular intervals failed to reveal any evidence of sprouting during the growing season of 1928. An examination of the underground parts showed that the tissues were brown and dead. Poison ivy left as a check thrived throughout the season. A practical test was made on the Purdue experimental farm located near Bedford on which a heavy growth of poison ivy located in an orchard was saturated with sodium chlorate during the early part of August, 1928. Three weeks later the ivy was apparently completely dead and no further evidence of life could be seen during the remainder of the growing season. The material was applied with a power sprayer.

<sup>1</sup> Contribution from the Department of Botany, Purdue University Agricultural Experiment Station.

At the same time a heavy growth of buck brush, *Symphoricarpos symphoricarpos* (L.) MacM., was saturated with sodium chlorate applied with a power sprayer. Apparently complete killing was secured since no further evidence of sprouting was noted during the remainder of the growing season although the buck brush retained its green color for a longer period after spraying than any other weed so treated observed to date. For observations on the effect of the spray upon buck brush the writer is indebted to H. J. Reed, assistant director of the Purdue University Agricultural Experiment Station, in charge of the Bedford experimental farm. Buck brush is an important pasture weed problem in southern Indiana.

A single test with dry sodium chlorate was made against the purple barberry, *Berberis vulgaris* L., in Miami County. Two pounds of dry sodium chlorate were piled at the base of a healthy specimen approximately six feet in height on July 12, 1928. The plant was dead a week later and no evidence of sprouting could be found during the remainder of the growing season of 1928 nor during April 1929.

Upon the recommendation of Purdue University, farmers in all parts of Indiana have been using sodium chlorate against Canada thistle, quack grass and poison ivy with uniformly successful results where correctly applied. Demonstrations have been conducted in ten counties and the sprayed areas regularly inspected and in every instance a 95% to 100% kill has been secured with a single application. For example a patch of Canada thistles on a farm in White County was thoroughly saturated with sodium chlorate on July 20, 1928. An inspection on September 4 revealed no evidence of sprouting. On the Harry Matlock farm near Kokomo a patch of quack grass containing approximately five square rods and two fence posts supporting a heavy growth of poison ivy were treated on July 1. A careful examination of the roots and tops on September 11 revealed that the tissues were brown and dead, a complete kill having been secured. These are instances of numerous similar tests made in various parts of the state.

From experience and experiments made with sodium chlorate to date it seems that the material may be applied at any time of the year after the plants have made their maximum top growth, the early bloom stage being perhaps best for uniform results. Such failures as have been observed have been due mainly to lack of thorough saturation of the tops, to careless application, to mowing the weeds before using the chlorate or to applying in immature stages. For economy of material and best results the chlorate should be dissolved in water at the rate of one pound per gallon, the strength used in the tests here recorded. Where trouble in securing complete dissolving of the chemical is experienced the use of warm water gives prompt results, but this is not ordinarily necessary. Sodium chlorate during the past season cost between seven and eight cents per pound delivered in Indiana when purchased in 112 pound steel drums.

The main disadvantage of sodium chlorate is its inflammable character. When proper precautions are taken, namely mixing the chemical in the open, washing clothes upon which the chlorate has dried and keep-

ing fire from matches, tobacco and other sources away from clothes and shoes incrustated with the material, there is little danger. Only one case of chlorate fire has been reported in Indiana, an instance in which a White County man who had sprayed weeds with a sodium chlorate placed his shoes on a warm stove. In a short time the shoes broke into flames.

Sodium chlorate is also slightly toxic and livestock, particularly salt hungry animals, should not be allowed to graze on treated vegetation until after the first rainfall. No reports of livestock losses as a result of chlorate poisoning, however, have been reported in areas where the material has been used in large quantities. One doubtful case, the loss of a cow, occurred in Tippecanoe County under circumstances that may have involved chlorate poisoning but in this instance the animal seemed to have been improperly salted. It is believed that the use of sodium chlorate is relatively free from danger to farm animals, another point of superiority over sodium arsenite which has been the most widely used of chemical weed killers.

#### LITERATURE CITED.

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