EFFECT OF ZINC SULFATE ADDED TO COPPER-LIME SPRAY ON THE YIELD OF POTATOES ON INDIANA MUCK SOIL

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Several zinc compounds have been used within the last few years to satisfy a deficiency or to control disease and insects on vegetable crops. Forsee and Neller (2) reported that corn responded favorably to the addition of zinc sulphate to the fertilizer used on Florida peat. Beckenbach and Kelbert (1), also in Florida, controlled a deficiency disease of tomato by spraying the leaves with zinc sulfate at the rate of 2 pounds per 100 gallons of water. Harmer (3) describes zinc deficiency on onions growing on Michigan muck land and recommended an application of 50 pounds of zinc sulfate per acre on new land that is to be planted to this crop. Heuberger and Wolfenbarger (5) used zinc dimethyl dithiocarbamate and zinc sulfate in experiments to control early blight and leaf hopper on Irish potatoes. They suggested that the addition of zinc sulfate and lime to any organic or inorganic fungicide increased the leaf hopper control by 20%.

In 1940 it was observed that zinc sulfate added to the regular copper-lime spray imparted a blue-green cast to the potato foliage on Indiana muck soil. The spray was applied only a month before harvest and no differences in yield resulted. From 1941 to 1944, inclusive, zinc sulfate was added to the regular spray in amounts equal to the copper sulfate used. In 3 of the 4 years significant increases in yield resulted. The data here reported are intended as a progress report, since no work has been done on quantities of the material best suited for use on the crop.

EXPERIMENTAL PROCEDURE

Spraying is a necessary part of a good potato production program in Indiana, so it was thought that minor element deficiencies could be satisfied by applying these elements in the spray similar to the work reported by Harmer and Sherman (1). Several minor elements were used, but only zinc sulfate showed any desirable effect on the potato vines on this muck soil (pH 5.2). The early sprays of 1939 and 1940 were applied by hand sprayers. From 1941 to 1944, a four-row "Bean" sprayer was used.

The plots were four rows wide and from 50 to 100 feet long. The treatments were replicated six times in 1941, three times in 1942, and four times in 1943 and 1944.

Katahdin was the variety grown in 1941, 1942, and 1943 and Sebago in 1944. Spring floods in 1943 and 1944 delayed planting and thus reduced yield. The rate of application of the spray material for the 1941 crop was 8 pounds each of Copper sulfate, hydrated lime, and zinc sulfate in 100 gallons of water. Four applications were made over the copper-lime spray by 12.19 bushels in 1942, 1 bushel in 1943, and 58 bushels in 1944, or an average increase of 32 bushels for the treatment. Since the spray application under any good management program would be scarcely more than the cost of the material.

Table 1 gives the treatments and yields in bushels per acre for potatoes grown on Indiana muck soil farm near Walkerton, Indiana. These treatments are used as a comparison. The remainder of the data will be published in more detail after further investigation.

The copper-lime spray increased potato yields by 55 bushels in 1941, 83 bushels in 1942, 132 bushels in 1943, and 58 bushels in 1944, or an average increase for the 4 years of 90 bushels per acre. The addition of zinc sulfate over the copper-lime spray by 12.19 bushels in 1942, 1 bushel in 1943, and 58 bushels in 1944, or an average increase of 32 bushels per acre.

DISCUSSION

Of most significance as shown in Table 1 is the great effect of the copper-lime spray on the potato yield. Dr. R. W. Samson found insufficient evidence of blight present to affect the yield results of the experiments. Leaf hoppers were the most serious insect pest, but no count was made on the population. The large increases from the copper-lime spray point out the necessity of a strict spray schedule for successful potato production under Indiana conditions, with the probability that the copper-lime spray is the major factor in the increased yield.