Organic Soils

THE EFFECT OF MANGANESE SULFATE ON SEVERAL CROPS GROWING ON ORGANIC SOIL WHEN APPLIED IN SOLUTION AS A STREAM OR SPRAY ON THE CROP

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Muck soil,\(^3\) with its very high proportion of organic matter, has long been recognized as being very low in content of the mineral elements needed for plant growth. In the earlier days of fertilization with minerals, the only two which were recognized as being absolutely necessary for crop production on muck were phosphorus and potassium. Within recent years, however, considerable benefit has been secured on these organic soils by the application of soluble salts of several of the less commonly used but apparently highly important elements, such as boron, copper, manganese, sodium, and zinc.

Benefits from the use of manganese sulfate, applied in the soil on several crops, was first reported by Sjollema and Hudig (11).\(^4\) Among those who first used manganese sulfate in solution and who reported control of chlorosis and increased crop yields, we should mention Gilbert, McLean, and Hardin (3), who sprayed oats, spinach, beets, and beans on heavily limed soil; Mann (8), who sprayed soybeans on highly alkaline sandy loam, McLean (9), who fed manganese salts through the stomata by spraying; McLean and Gilbert (10), who sprayed spinach on heavily limed, nearly neutral soil; Lee and McHargue (7), who applied spray to diseased sugar cane leaves on Hawaiian soil to alleviate Pahala blight; and Bryan (1), who painted cowpeas and soybeans on Florida Everglades soil.

EXPERIMENTAL PROCEDURE

The complete report of the work carried on in this study is too voluminous to be given in this paper. Therefore only representative portions are presented and a more detailed account will be published later in bulletin form. Although studies on the effects of manganese sulfate applied in solid form on Michigan organic soils were first begun in 1924 (4), the effects produced by its application in solution were not investigated until 1934. In the early experiments the use of sulfur as a corrective was also investigated (5) and, from the standpoint of economy in those days, it was more frequently recommended for the unproductive alkaline areas. Trials were, then conducted to determine the strength of manganese sulfate solution which could be used without injury to crops on alkaline muck soil. In 1934, 1935, and 1936, the solution was applied in a stream on the row of growing plants. In 1937 and later years, the applications were made as a spray. Except where noted, the manganese sulfate used in all these experiments was of the finely ground commercial grade, containing approximately 65% MnSO₄. With-