

Use of Manganese on Organic Soils

INTRODUCTION

Organic soils, such as the muck soils near Cloverdale in Surrey, require certain management inputs that are quite different from those used on mineral soils. One such input is manganese (Mn). Mineral soils are generally very well supplied with Mn and deficiencies of this element in mineral soils are virtually unknown in B.C. However, Organic soils have a relatively low Mn content and if the soil pH level is raised too high, a serious Mn deficiency will occur. This may be a problem in the Cloverdale area.

MANGANESE DEFICIENCY

Mn deficiency is common in slightly acid to alkaline organic soils (pH >6.5). Since in their natural condition, Organic soils are usually very acid, Mn deficiency is rare. Liming these soils to a pH of 4.5 to 5.5 is essential to allow for maximum crop growth. However, as pH levels are raised above 6.0 by repeated additions of lime, Mn becomes less and less available.

A second contributing factor in the Cloverdale area is the subsidence or reduction of the organic soil layer. As this layer disappears more and more underlying mineral subsoil is mixed into the plow layer. Although this mineral soil contains more Mn, it also allows the soil pH to rise more rapidly due to liming. In 1987, a soil containing considerable mineral subsoil on the Cloverdale produce farm was found to have a pH greater than 7.0. Onions growing on this soil were yellow and severely stunted due to an extreme Mn deficiency.

It has also been suggested that lettuce shelf life problems may be related to a borderline Mn deficiency. Although this has yet to be proven, it may be prudent to apply a foliar spray to the developing heads to ensure that Mn deficiency is eliminated as a contributor to lettuce quality problems.

MANGANESE FERTILIZATION

Mn can be applied either to the soil or to actively growing foliage.

1. Soil Application

Banded Mn has been found to be much more effective than the same rate broadcast on the soil surface. Manganese sulfate (MnSO_4) has been found by researchers to be the most effective fertilizer for supplying Mn to crops.

A **preplant broadcast** application of 150–300 kg/ha (1b/acre) of MnSO_4 (40–80 kg/ha Mn) should eliminate any potential for Mn deficiency on high pH soils. If the fertilizer is **banded** or **side dressed**, 15–30 kg/ha (1b/acre) MnSO_4 should be sufficient.

Chelated forms of Mn should not be applied to the soil. Research has found that those forms may in fact make the Mn deficiency worse.

2. Foliar Application

Research has shown that foliar fertilization with Mn will effectively correct deficiencies. Both MnSO_4 and chelated Mn are effective. The following are

suggested application rates based on research reported in scientific publications:

Source for Foliar Application	Rate of Material kg/ha (lb/acre)	Rate of Mn kg/ha (lb/acre)
MnSO ₄ (27% Mn)	7.5 – 18.5	2 – 5
Mn-chelate (13% Mn)	3.8	0.50

The research literature suggests that two or three applications of the Mn-chelate (at the above rate of 3.9 kg/ha) are more effective than a single

application. If more than one MnSO₄ application is used, the total amount applied should not exceed 18.5 kg/ha.

Foliage can be damaged by excess application. Therefore, the above rates should not be exceeded, especially for MnSO₄.

MANGANESE TOXICITY

One of the main causes of poor growth on very acid soil is excess Mn. Therefore, if soil pH is less than 6.0, Mn should not be applied to the soil. If the pH is 5.0 or less, Mn applications will likely increase any growth problems on such soils.

FOR FURTHER INFORMATION CONTACT

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