

## Micronutrients for Crops Grown On Organic Soils

### INTRODUCTION

Due to the occurrence of several physiological and deficiency related problems during the past growing season, a number of producers have expressed concern about their fertilizer practices in general and the use of minor elements in particular.

### MICRONUTRIENTS

Micronutrients such as manganese (Mn), boron (B), copper (Cu), iron (Fe), zinc (Zn) and molybdenum (Mo) play a vital role in the overall health of plants. One common characteristic of all micronutrients is that they are required in small amounts and it is important to ensure that they are applied at the correct rate. High levels of micronutrients, especially boron and manganese, are toxic to plants.

Micronutrients are sometimes deficient in the soil resulting in reduced crop production. Soil and/or tissue analyses are the only accurate ways to determine if these elements are lacking. If they are needed, micronutrients can be added to blended fertilizers or may be foliar applied.

### RECOMMENDATIONS

The following general recommendations are derived from Michigan State University Bulletin 425 – *“Organic Soils: Their Formation, Distribution, Utilization and Management”*.

**Table 1** is the key to crop response and must be referred to when using **Tables 2 – 4**.

**TABLE 1 – CROP RESPONSE TO MINOR ELEMENTS**

Crop	Minor Element Response			
	Manganese	Boron	Copper	Others
Blueberries	None	None	Medium	
Broccoli	Medium	Medium	Medium	
Cabbage	Medium	Medium	Medium	
Carrots	Medium	Medium	High	
Cauliflower	Medium	High	Medium	Molybdenum

Celery	Medium	High	Medium	Sodium
Cucumbers	Low	Low	Medium	
Corn	Medium	Low	Medium	Zinc
Grass	Medium	None	Medium	
Lettuce	Medium	Medium	High	Molybdenum
Oats	High	None	High	
Onions	High	None	High	Zinc, molybdenum
Parsnips	Low	Medium	Medium	
Potatoes	High	Low	Low	
Spinach	High	Medium	High	Molybdenum
Sweet corn	Medium	Low	Medium	
Table beets	Medium	High	High	Sodium
Turnips	Medium	High	Medium	

## I. COPPER (CU)

**TABLE 2 – COPPER RECOMMENDATIONS FOR ORGANIC SOILS – ELEMENTAL BASIS (CU)**

Crop Response	Cu – Pounds per acre Soil pH Before Liming		
	pH 5.4 or less	pH 5.5 – 6.4	pH 6.5 or higher
High	12	8	4
Medium	8	4	0
Low	4	0	0

### Example Problem and Solution:

How much copper should I apply to my lettuce field?

1. Determine your pH from a soil test (assume pH 5.8).
2. Go to Table 1, down “crop” list to “lettuce”, over to “copper” column; note that response is “high”.
3. From Table 2, go down “crop response” list to “high”, then over to second column under pH 5.5 – 6.4 (actual 5.8).
4. This tells you that you should apply 8 pounds per acre of actual copper, as a broadcast application, prior to planting.

## II. MANGANESE (MN)

**TABLE 3 – MANGANESE NEEDED FOR ORGANIC SOILS – ELEMENTAL BASIS (MN)**

Crop Response	Mn – Pounds per acre		
	pH 6.0 - 6.6	pH 6.7 – 7.2	pH 7.3 – 8.0
High	10	20	40
Medium	5	10	20
Low	0	5	10

The **Table 3** values assume that part of the manganese is banded in.

### Specific Recommendations For Manganese:

- A. High Risk Areas (**Shallow Mucks**) (O.M. 20% or less, and/or pH>6.5).
  1. 50 lbs. Per acre per year or MnSO<sub>4</sub> preplant.
  2. Foliar spray 3 – 5 times per crop with 2 lbs per acre of MnSO<sub>4</sub> in 200 L of water.
- B. Low Risk Areas (**Deep Mucks**) (O.M. 3-% or more, and/or pH<6.0).
  1. 2 – 3 foliar applications per crop of 2 lbs per acre of MnSO<sub>4</sub> in 200 L of water.
  - 2.

**NOTE: Excess Mn applied to soils with a pH less than 6.0 may result in toxicity problems.**

Boron may also be applied as a foliar spray. Amounts suggested are 0.1 to 0.4 pounds per acre per application of actual boron. Rates greater than 1 pound per acre per application of actual boron have been found to be toxic to celery.

### III. BORON (B)

**TABLE 4 – BORON RECOMMENDATIONS FOR ORGANIC SOILS – ELEMENTAL BASIS (B).**

Crop Response	Pounds per acre	
	pH 5.0 – 6.4	pH 6.5 – 8.0
High	3	5
Medium	1	3
Low	0	1

### IV. ZINC (ZN)

- 2 – 5 lbs per acre per year to responsive crops.
- ZnSO<sub>4</sub> is usually the carrier.
- May already be present as an impurity in some fertilizers.
- Certain fungicides contain zinc (thiram, zineb and mancozeb).

### V. MOLYBDENUM (MO)

- 0.4 lbs per acre per year to responsive crops, applied in a band near the seed;
- or**
- foliar spray or seed treatment of several ounces of sodium molybdate per acre per year to responsive crops.

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