



Sugar Beet - Manganese

Agronomics / Background

Micronutrients play a significant role in sugar beet fertility. In particular, sufficient levels of manganese are important to optimize yield and sugar content while minimizing the effects of disease and stress.

Manganese (Mn) serves as a co-factor for a number of enzymes and is very important in photosynthesis. Mn deficiency leads to decreases in soluble sugars due to reduced photosynthesis. Mn is also important in the plant's natural defenses. Mn is a co-factor for the enzyme in lignin biosynthesis. Lignin plays an important role in plant defense against insects and pathogens by either physically blocking pathogen entry or increasing leaf toughness to make it difficult for disease agents or insects to penetrate the leaves. Finally, Mn is critical to nitrogen and carbohydrate metabolism.

Conditions Leading to Manganese Deficiencies

Recent testing has shown Mn levels are low in many soil and tissue tests. This could be caused by several factors. Typically farmers have not applied a lot of Mn in their fertility programs and have mined most of the Mn present in the soil. Another factor could be "Glyphosate-induced manganese deficiencies".

Desired Tissue Test Values

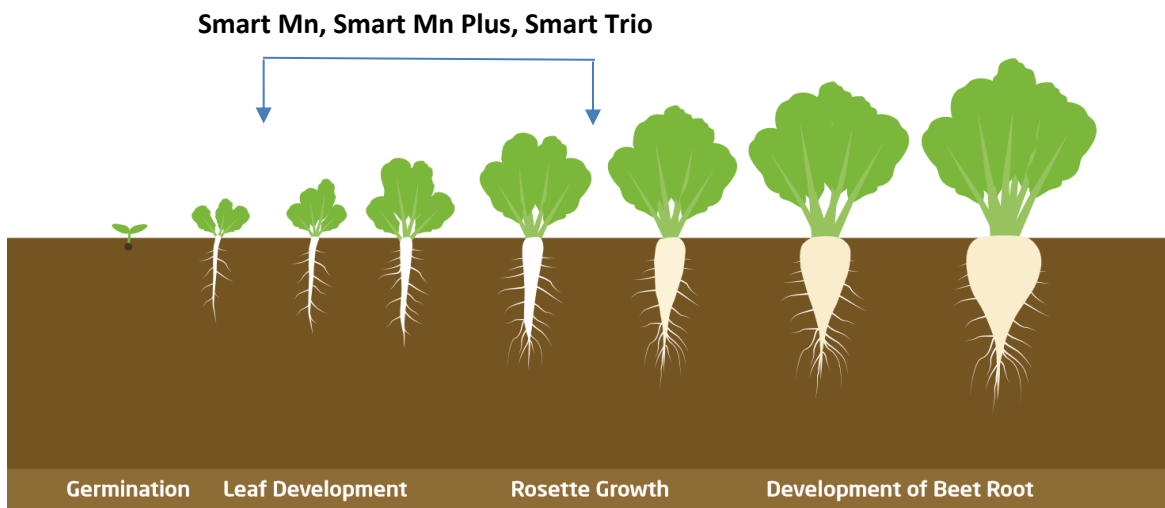
Crop: Sugar Beet			
Stage: 50 – 80 days after planting; 25 recently matured leaves			
Macronutrients %		Micronutrients ppm	
N	4.3 - 5	Fe	60 - 140
P	0.45 – 1.1	Mn	26 - 360
K	2 - 6	B	30 - 200
Ca	0.5 – 1.5	Cu	11 - 40
Mg	0.25 - 1	Zn	10 - 80
S	0.21 – 0.5	Mo	0.2 - 2

*Bryson, Mills, et al. "Plant Analysis Handbook III". 2014.



Key Application Timings and Rates

- **Foliar application of 1-2 quarts/acre of BRANDT Smart Mn or BRANDT Smart Mn Plus during leaf development**
 - Manganese in the BRANDT[®] Smart System[®] is able to get into the leaves and is highly mobile in the plant. It is formulated for superior tank mix compatibility with insecticides, fungicides and glyphosate.
- **Foliar application of 1 – 2 quarts/acre of BRANDT Smart Trio[®] during leaf development**
 - BRANDT Smart Trio is 3% Mn, 3% Zn and 0.25% B. This trio of micro-nutrients has consistently increased yields in sugar beets and other crops



Manganese Deficiency Illustrations

Interveinal Chlorosis



* <https://www.blackthornarable.co.uk/library/56/images/Deficiencies.html>

* <https://www.haifa-group.com/online-expert/deficiency-pro/sugar-beet>



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