Table 12. Tissue sufficiency ranges suited for onion production in muck soils in Western New York. Results based on small-plot studies and observational field survey, 2010 (Hoepting).

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| **Onion Tissue Analysis (7-9 leaf stage, mid- to late-July)** | | | |
| **Nutrient** | **Sufficiency Range** | **Source** | **Notes:** |
| **N** | 2 – 3 % | Maynard & Hochmuth, 1997\* |  |
| **P** | 3100 – 4500 ppm | Millis & Jones 1996\*\* |  |
| **K** | 10,974 – 18,154 ppm | Our studies (a guideline) | No correlation between tissue K & yield; M & H too high, our results would have been deficient |
| **Ca** | 29,362 – 32,950 ppm | Our studies (a guideline) | No correlation between tissue Ca & yield; M & H too high, our results would have been deficient |
| **Mg** | 1700 – 2437 ppm | Our studies (a guideline) | No correlation between tissue Ca & yield; M & H too high, our results would have been deficient |
| **Mn** | 50 – 225 ppm | Millis & Jones 1996 |  |
| **Al** | 9 – 24 ppm | Our studies (a guideline) | No sources; no correlations between tissue Al & yield |
| **Fe** | 27 – 75 ppm | Our studies ( a guideline) | No correlation between tissue Fe & yield; M & H too high, our results would have been deficient |
| **Zn** | 15 – 20 ppm | Maynard & Hochmuth, 1997 | In our study, > 30 ppm reduced yield |
| **Cu** | 3.5 – 5.9 ppm | Our studies (a guideline) | No correlation between tissue Fe & yield; M & H too high, our results would have been deficient |
| **B** | 25 – 75 ppm | Millis & Jones 1996 | In our studies, appeared to be a yield increase at > 30 ppm |

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| **Soil nutrient levels (pre-plant)** | | | |
| ***Nutrient*** | ***Sufficiency Range*** | ***Source*** | ***Notes:*** |
| **Mn** | >20 lb/A  135 lb/A was not toxic | Our trials | In our study, we saw a yield increase when foliar Mn was applied where soil was 9 lb/A pre-plant and 3 lb/A in June. In the observational study, best yield where Mn was 30-36 lb/A, lower where Mn was <20 lb |
| **Fe** | Toxicity: >200 lb/A | Our trials | >200 lb/A Fe resulted in a P deficiency that reduced yield; this was in combo with high Mn |
| **Zn** | 20 - 25 ppm | Our trials | This was the range where pH was optimal and yield was highest. Sufficient range is wider than this, but definitely is higher than 0.5 – 0.1 lb/A. |

\*Maynard, D.N. and G.J. Hochmuth. 1997. Knott’s Handbook for Vegetable Growers, 4th ed. John Wiley & Sons, pp. 582.

\*\*Millis, H.A. and J.B. Jones. 1996. Plant Analysis Handbook II: a practical sampling, preparation, analysis and interpretation guide. Micro-Macro Publishing, Athens, GA. P. 354.