



Northern NY Agricultural Development Program 2015-2016 Project Report

Assessment of Plant Tissue Nutrient Levels in Soybean in Northern New York: Year 2

Project Leader(s):

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Cooperating Producers:

- **No samples collected in 2016 growing season.**

Background:

In the past, soybeans have often times been overlooked as a significant crop of importance in northern NY (NNY) but they show great economic promise and the acreage in the region is more recently expanding rapidly. Glyphosate-tolerant soybeans represent the vast majority of soybeans grown in the region and glyphosate is by far the most common post emergent herbicide applied to soybeans in New York State. It has been reported that glyphosate applications to glyphosate-tolerant soybeans can decrease manganese availability to the plant. As a result, many soybean growers include foliar manganese with glyphosate herbicide applications to reduce the risk of micronutrient deficiencies. The addition of the manganese is, however, made without knowing if manganese and other nutrient deficiencies are really an issue.

In addition, soil test results suggest that manganese deficiencies are unlikely in the northern NY region. This project was undertaken because no systematic assessment of the micronutrient status of soybeans has been done in NNY.

Methods:

The 2016 trial was to repeat the sampling done in 2015, i.e., soybean leaf samples were collected from 39 soybean fields in Jefferson, Lewis and St. Lawrence counties in 2015. The top fully-developed trifoliolate at the time of first flowering was the timing of the sample collections. This represents the time of the maximum rate of growth of the soybean plant, as well as the greatest extent of the root system, but is prior to the movement of nutrients from the leaves into developing seeds.

Samples for plant analysis were taken from at least 20 plants, distributed throughout the area chosen for sampling in each field. The samples were shipped to the Analytical Laboratory and Maine Soil Testing Service, Orono, Maine. The 39 plant tissue samples were analyzed for manganese, phosphorus, potassium, calcium, magnesium, boron, iron and zinc.

Results:

In 2016, we collected no soybean samples due to the extremely dry conditions. Our sampling collection timeframe was June 15 to July 15. Comparing rainfall totals for over the last 40 years, between June 15 and July 15, Jefferson County received the lowest rainfall total on record, Lewis County recorded the 3rd driest and St. Lawrence County the 6th driest. At our anticipated time of sampling many soybean plants were wilting during the day and under severe moisture stress. We did not feel that sampling would provide results consistent with more normal growing seasons to provide relevant data, so the sampling was not conducted in 2016.

The main purpose of this project was to determine if soybean leaf tissue concentrations of manganese were commonly found to be below the critical concentration levels suggested by other land grant universities. The 2015 set of 39 plant tissue sample results showed that the manganese levels were between 20.9 and 91.7 ppm; all within the accepted manganese sufficiency range of 17-100 ppm. Primary, secondary or micronutrient leaf tissue levels were all also within the accepted critical concentration ranges (Table 1).

Conclusions/Outcomes/Impacts:

Due to just one year of sampling, we are only able to note that we found no plant tissue nutrient deficiencies in 2015. All of the plant tissue samples fell within the accepted nutrient sufficiency ranges for soybeans at early flowering stage.

The most common use for plant analysis is to diagnose nutrient-related problems with crop growth, either a deficiency or toxicity. The only requirement for this project was that the soybean plants were at the R1 stage (beginning flowering) at the time of leaf sample collection. Considering the fact that soil type, planting date, variety, soil pH, soil test levels, manure and fertilizer applications were not taken into consideration, it was interesting that we did not find any deficiencies.

Table 1. Nutrient levels in 39 Field Samples Collected in NNY in 2015

ID	Ca	K	Mg	P	B	Fe	Mn	Zn
1	1.15	2.44	0.289	0.348	41.5	208	43.1	26.7
2	0.885	2.53	0.267	0.448	43	102	59.4	32.3
3	1.49	2.62	0.44	0.416	36.3	126	54.2	45.6
4	0.971	2.76	0.452	0.506	35.9	83.8	43.1	45.9
5	1.04	2.69	0.385	0.525	33.4	78.1	46.5	41.9
6	1.06	2.86	0.353	0.552	36.5	81.8	51.1	42.3
7	0.894	2.93	0.367	0.581	31.8	92.9	40.7	41.7
8	1.08	2.71	0.401	0.353	21.8	71.1	35.9	35.4
9	1.33	2.68	0.356	0.409	36.2	78.5	66.3	48.9
10	1.31	2.53	0.351	0.574	40.4	90.8	61	52.7
11	1.24	2.97	0.401	0.467	39.7	149	91.7	61.9
12	1.18	2.31	0.472	0.421	39.4	80.9	51.9	52.4
13	0.93	3	0.306	0.486	29.2	108	56.2	32.8
14	1.03	2.82	0.37	0.42	38.2	89.5	59.5	48.4
15	1.26	2.69	0.379	0.511	41.2	90.5	47.7	48.2
16	0.773	2.73	0.347	0.504	31.2	83.5	25.6	33.3
17	0.864	2.54	0.378	0.494	29.5	86.4	41.6	38.7
18	0.996	2.18	0.383	0.467	36.4	86.2	45.8	45.4
19	0.969	3.00	0.441	0.535	28.9	92.3	28.8	45.3
20	0.805	2.66	0.342	0.511	36.1	78.7	22.2	45.4
21	0.918	2.45	0.361	0.429	34.4	108	45.2	41.4
22	1.28	2.41	0.383	0.454	32.5	86.7	40.1	43.1
23	0.807	2.74	0.353	0.533	32	75.3	34.5	35.9
24	0.833	2.85	0.267	0.538	33.2	89.4	45.5	33.4
25	1.49	1.46	0.308	0.427	37.7	85.5	53.6	36.1
26	0.973	2.68	0.306	0.385	27.1	87.3	89.2	43.5
27	1.04	2.43	0.38	0.48	34.7	104	56.9	32.7
28	1.27	2.35	0.418	0.392	51.4	72.7	41.3	58.2
29	0.765	2.78	0.388	0.626	32.3	137	32.7	38.1
30	0.974	2.3	0.5	0.5	35.3	151	23.4	35.8
31	0.976	2.89	0.4	0.567	34.1	171	28.4	52.9
32	1.2	2.69	0.314	0.516	42.3	139	37.3	42.3
33	1.2	2.57	0.371	0.528	42.4	123	45	57.1
34	1.48	2.7	0.371	0.49	44.5	224	43.1	50.7
35	1.02	2.77	0.34	0.485	35.6	126	33.9	48.9
36	0.79	2.91	0.321	0.567	33.4	110	20.9	41.2
37	0.951	2.54	0.34	0.518	37.1	109	48.2	38.1
38	1.07	2.63	0.365	0.5	40.5	100	49	39.5
39	1.63	1.91	0.517	0.543	42.3	111	21	60.5
Min.	0.765	1.46	0.267	0.348	21.80	71.10	20.90	26.70
Max.	1.630	3.00	0.517	0.626	51.40	224.00	91.70	61.90

Suff. Range .8-1.4 1.5-2.25 .25-.7 .3-.6 20-60 25-300 17-100 21-80

Outreach:

Results of the 2015 survey were shared with growers that participated in the project and through extension agricultural newsletters received by other growers, agribusinesses, and crop consultants.

Next Steps:

Our first year results found that all of the plant tissue samples fell within the accepted nutrient sufficiency ranges for soybeans at early flowering stage. As evidenced in 2016, weather conditions can have an influence on soybean growth and prevented the gathering of useful data in 2016. Going forward, regional crop specialists will work with NNY growers to reevaluate the need to continue the assessment of leaf tissue concentrations for manganese and other nutrients in soybeans grown in Northern New York.

Acknowledgments:

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