PLANT TISSUE SUFFICIENCY LEVELS OF ROW CROPS

FACT SHEET

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Tissue analysis can be used as a diagnostic tool for determining actual nutrient uptake of a crop at the time of sample collection. Combined with data from past soil analyses and historical nutrient removal data, early season plant tissue analysis can help verify nutrient deficiencies in a crop so that corrective actions can be taken. Data from these tests can also be used to establish future management practices to optimize profitability in a field since other factors such as tillage, drainage, pests, etc. influence plant nutrient uptake. Comparing samples from both a "good" and a "bad" area often helps in reviewing results, especially when dealing with hybrids. Often a soil sample collected with each plant tissue sample in both areas aids in diagnosing problems in the field.

Determination of plant nutrient status requires precise laboratory analysis of plant tissue during the growing season. Collecting the correct portion of a plant and at the correct growth stage is paramount in making management decisions based on the test findings. Nutrient levels determined in a tested area can then be compared to levels of sufficiency (critical levels) established by research.

When reviewing nutrient levels in plant tissue, it is important to factor in the mobility of each nutrient in that plant. Nutrients that are mobile (nitrogen, phosphorus, potassium, and magnesium) constantly move into the active portion of the plant as it grows, leaving the older tissue deficient in those nutrients if they are limiting in the soil. Immobile nutrients (boron, calcium, copper, iron, manganese, molybdenum, sulfur, and zinc) remain in the plant portion they are in and, if deficient, will display their symptoms in the younger part of the plant.

Critical or sufficiency levels need to be reviewed cautiously. There are no exact break points between a nutrient being sufficient, deficient, or toxic. Nutrient levels should be evaluated as to where they are positioned related to the middle of a range. If they are closer to the low end of the sufficiency range, there is a greater chance of crop response by adding more of that nutrient if possible. If they are at the high end of the sufficiency range, adding more of that nutrient probably would not be of economic benefit. Provided that no other factors are limiting the yield, the critical level for a particular nutrient is defined as the plant nutrient concentration when yield is 5 to 15% below maximum.

Interactions between nutrients should also be evaluated since one nutrient being deficient could cause another nutrient to be sufficient or elevated. Finally, the sufficiency levels referenced in this fact sheet are derived from a large cross section of crop hybrids and varieties. Nutrient sufficiency levels of some hybrids will vary so it is important to compare test levels with a known control of the same hybrid. This is accomplished by testing an area of the field that exhibits healthy growth.

Plant tissue nutrient levels are reported on a dry weight basis comparing the amount of nutrient determined to the dry weight of plant tissue analyzed. Nutrients found in large quantities are reported in percent where nutrients found in smaller concentrations are reported in parts per million.

General Plant Tissue Sufficiency Levels of Row Crops

Growth stage specific sufficiency levels are displayed on reports when growth stage is provided on submittal form.

	Nitrogen %N	Phosphorus %P	Potassium %K	Calcium %Ca	Magnesium %Mg	Sulfur %S	Boron ppm B	Copper ppm Cu	Iron ppm Fe	Manganese ppm Mn	Zinc ppm Zn
FIELD CORN											
Seedling - VE thru V4	3.5 - 5.0	0.3 - 0.6	2.5 - 4.0	0.30 - 1.00	0.15 - 0.60	0.15 - 0.5	5 - 25	5 - 20	30 - 250	20 - 160	20 - 60
Prior to Tassle - V5 thru V18	3.0 - 4.0	0.25 - 0.45	2.0 - 2.5	0.25 - 0.50	0.13 - 0.30	0.15 - 0.5	4 - 25	5 - 15	30 - 250	20—150	20 - 60
Silking - VT thru R6	2.5 - 4.0	0.25 - 0.50	1.7 - 3.0	0.21 - 0.90	0.2 - 0.75	0.21 - 0.5	3 - 25	6 - 25	20 - 250	15–180	20 - 70
SOYBEANS											
Prior to Flower - VC thru V10	3.5 - 5.5	0.3 - 0.6	1.7 - 2.5	1.1 - 2.2	0.3 - 0.6	0.3 - 0.8	22 - 55	7 - 15	45 - 300	23 - 133	20 - 86
Early Bloom - R1 thru R2	3.25 - 5.5	0.25 - 0.6	1.5 - 2.5	0.35 - 2.0	0.25 - 1.0	0.2 - 0.5	20 - 60	4 - 30	25 - 350	17 - 100	20 - 60
Pod Set - R3 thru R6	3.5 - 5.0	0.24 - 0.45	1.7 - 2.5	0.35 - 1.35	0.25 - 0.6	0.2 - 0.35	20 - 50	10 - 25	45 - 200	20 - 100	20 - 50
WHEAT											
Emergence thru Tillering- F1 thru F5	3.0 - 5.0	0.3 - 0.8	2.0 - 5.0	0.2 - 1.0	0.15 - 0.4	0.15 - 0.5	7 - 25	4 - 20	20 - 200	20 - 150	20 - 50
Prior to Head - F6 thru F9	1.75 - 3.0	0.2 - 0.5	1.5 - 3.0	0.2 - 1.0	0.15–1.0	0.2 - 0.3	6 - 10	5 - 50	10 - 300	16–200	20–70
Bloom - F10	2.5 - 4.0	0.25 - 0.5	1.6 - 3.2	0.2 - 1.0	0.16 - 1.0	0.18 - 0.4	5 - 30	5 - 20	10 - 200	15 - 200	15 - 50
Head to Mature - F11	1.0 - 3.6	0.15 - 0.4	1.0 - 3.0	0.2 - 1.0	0.1 - 1.0	0.1 - 0.3	5 - 25	5 - 20	10 - 200	15 - 200	10 - 40

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