

Alfalfa		Early Growth (Top 6")		
	Low-Def	Sufficent Range	High	
	<			>
N	3.5	3.8-5.5		5.6
P	0.2	.3-.8		0.9
K	1.5	2.5-5.0		5.4
Ca %	0.65	1-3		3
Mg	0.2	.35-.50		0.5
S	0.2	.25-.60		0.6
B	20	30-80		90
Cu	4	6-30		40
Fe	20	30-250		250
Mn ppm	20	30-150		200
Zn	13	20-80		90
Mo	0.6	1.2-5.0		
Al				
Alfalfa		Bloom Stage (Top 6")		
	Low-Def	Sufficent Range	High	
	<			>
N	2.2	3.2-5.5		5.6
P	0.2	0.26-.70		0.9
K	1.6	2.2-4.0		5.4
Ca %	0.7	1.0-3.5		3
Mg	0.2	.35-.65		0.5
S	0.2	.20-.60		0.6
B	20	30-80		90
Cu	4	8-30		40
Fe	20	31-150		250
Mn ppm	20	31-150		150
Zn	13	20-80		90
Mo	0.6	1.0-4.6		
Al				
Barley		Emergence of Head from Boot (Whole Tops)		
	Low-Def	Sufficent Range	High	
	<			>
N		1.75-3.00		
P		0.20-0.50		
K		1.50-3.00		
Ca %		0.30-1.20		
Mg		0.15-0.40		
S		0.15-0.40		
B		-		
Cu		5-25		
Fe		-		
Mn ppm		25-100		
Zn		15-70		
Mo		0.11-0.18		
Al				

Canola			
	Low-Def	Sufficient Range	High
	<		>
N		2.70-3.20	
P		.34-.40	
K		2.58-3.20	
Ca %		1.19-1.40	
Mg		0.49-0.55	
S		0.40-0.50	
B		15-20	
Cu		4-12	
Fe		100-200	
Mn ppm		60-110	
Zn		25-45	
Mo		-	
Al		90-150	
Costal Bermuda (Top 4-6" of Plant)			
	Low-Def	Sufficient Range	High
	<		>
N	1.8	2.5-3.0	3.5
P	0.2	.23-.40	0.4
K	1.5	1.8-2.2	2.4
Ca %		.25-.50	
Mg		.10-.25	
S	0.15	.20-.30	0.33
B		5-15	
Cu		5-20	
Fe		50-200	
Mn ppm		20-300	
Zn		20-70	
Mo			
Al			
Rice (Mid-Tillering (Whole Plant))			
	Low-Def	Sufficient Range	High
	<		>
N		3.1	
P		0.24	
K		2.4	
Ca %		0.3	
Mg		0.14	
S		0.15	
B			
Cu			
Fe		238	
Mn ppm		772	
Zn		43	
Mo			
Al			

Rice		Panicle Differentiation (Whole Plant)		
	Low-Def	Sufficient Range	High	
	<		>	
N		2.9		
P		0.22		
K		2		
Ca %		0.28		
Mg		0.19		
S				
B				
Cu				
Fe		120		
Mn ppm		300		
Zn		75		
Mo				
Al				
Small Grains		Top 6" Prior to Headin (Whole Plant)		
	Low-Def	Sufficient Range	High	
	<		>	
N	1.8	2.1-3.0		
P	0.13	.21-.43		
K	1.4	1.5-3.0		
Ca %	0.17	.20-.50		
Mg	0.13	.15-.50		
S	0.12	.17-.55		
B	4	4-20		
Cu	3-4	5-24		
Fe	11-20	25-100		
Mn ppm	11-18	25-100		
Zn	11-18	20-70		
Mo	0.03	.03-5.0		
Al		150		
Sorghum		Whole Plant Early Gro (Whole Plant)		
	Low-Def	Sufficient Range	High	
	<		>	
N	0.3	3.5-4.0		
P	0.26	.30-.6		
K	2.6	3.0-4.5		
Ca %	0.9	.90-1.3		
Mg	0.3	.35-.50		
S	0.16	.18-.50		
B	2-3	3-13		
Cu	3-7	8-15		
Fe	25	160-250		
Mn ppm	30	40-150		
Zn	30	30-60		
Mo				

AI		0-350		
Sorghum		Top Growth (40-60 D (Whole Plant)		
	Low-Def	Sufficent Range		High
	<			>
N		3.2-4.2		
P		.2-.6		
K		2.0-3.0		
Ca %		.15-.90		
Mg		.2-.5		
S		.15-.40		
B		3-10		
Cu		2.15		
Fe		55-200		
Mn ppm		8-190		
Zn		15-30		
Mo				
AI		0-200		
Sorghum		Bloom Stage (Third Lr (Whole Plant)		
	Low-Def	Sufficent Range		High
	<			>
N	2.7	3.3-4.0		4
P	0.19	.20-.35		0.4
K	1.3	1.4-1.7		1.7
Ca %	0.3	.30-.60		0.6
Mg	0.15	.20-.50		0.5
S	0.12	.15-.40		0.4
B	.5	2-10		25
Cu	2	2-7		20
Fe		5-100		
Mn ppm	10	10-190		
Zn	15	15-30		60
Mo				
AI				
Sugar Cane		Blades		
	Low-Def	Sufficent Range		High
	<			>
N	1.0-1.5	1.6-2.8		
P	0.08	.15-1.0		- Sheaths
K	.8-1.5	2.3-6.0		- Sheaths
Ca %	0.1	.10-2.0		- Sheaths
Mg	0.1	.15-1.0		- Sheaths
S	20-100	300-10,000		
B	1.2	2.35		
Cu	10-15	10-100		
Fe	10	20-600		
Mn ppm	5-10	20-400		
Zn	15	15-100		

Mo	0.05	.05-4.0	
Al			
Sunflowers			
	Low-Def	Sufficient Range	High
	<		>
N		3.40-4.00	
P		.26-.35	
K		2.50-3.20	
Ca %		1.10-1.50	
Mg		0.25-0.35	
S		0.37-0.90	
B		25-40	
Cu		6-10	
Fe		60-200	
Mn ppm		50-100	
Zn		20-35	
Mo			
Al		50-100	
Tobacco Top Mature Leaves			
	Low-Def	Sufficient Range	High
	<		>
N		3.5-4.25	
P		.27-.50	
K		2.5-3.20	
Ca %		1.5-3.5	
Mg		.20-.65	
S		.14-.40	
B		21-100	
Cu		15-50	
Fe		50-200	
Mn ppm		25-200	
Zn		20-60	
Mo		.5-1.1	
Al		<200	
Tobacco "Mature plant" Leaves			
	Low-Def	Sufficient Range	High
	<		>
N		3.00-5.00	
P		0.25-0.60	
K		2.50-5.00	
Ca %		2.20-4.00	
Mg		0.40-0.80	
S		0.25-0.80	
B		20-40	
Cu		9-30	
Fe		100-250	
Mn ppm		50-200	
Zn		30-50	

Mo
Al

20-200

Corn		Whole Plant (20" or less)		
	Low-Def	Sufficent Range	High	
	<		>	
N	2.8	3.5-5.0		
P	0.19	.30-.50		
K	2	2.5-4.0		
Ca %	0.28	.40-1.0		
Mg	0.19	.30-.60	0.75	
S	0.13	.20-.50	0.5	
B	4	6-25	35	
Cu	4	6-20	36	
Fe	23	50-250	500	
Mn ppm	18	20-250	250	
Zn	15	20-60	70	
Mo				
Al		100-200		
Corn		Ear Leaf at Silk		
	Low-Def	Sufficent Range	High	
	<		>	
N		2.8-3.8		
P		.25-.50		
K		1.8-3.0		
Ca %		.25-.85		
Mg		.20-.30		
S		.17-.30		
B		6-20		
Cu		5-15		
Fe		50-300		
Mn ppm		30-200		
Zn		19-60		
Mo				
Al				
Sweet Corn		Ear Leaf Silking		
	Low-Def	Sufficent Range	High	
	<		>	
N		2.6-3.5		
P		.25-.49		
K		1.7-2.8		
Ca %		.75-1.3		
Mg		.25-.50		
S				
B		15-30		
Cu		10-20		
Fe				
Mn ppm		45-100		
Zn		12-30		
Mo				
Al				

Cotton		Top Mature Leaves		
	Low-Def	Sufficient Range	High	
	<			>
N		3.2-4.5		
P		.30-.55		
K		1.6-3.0		
Ca %		1.9-3.0		
Mg		.30-.80		
S		.20-.75		
B		20-70		
Cu		6-25		
Fe		50-250		
Mn ppm		25-300		
Zn		20-100		
Mo				
Al				
Mint		Top Mature Leaves		
	Low-Def	Sufficient Range	High	
	<			>
N		2.80-4.20		
P		.25-.37		
K		2.40-3.60		
Ca %		1.00-1.80		
Mg		0.24-0.36		
S		0.24-0.36		
B		10-30		
Cu		6-20		
Fe		51-350		
Mn ppm		35-80		
Zn		30-50		
Mo				
Al		20-300		
Oats		Head Emerges from Boot (25 Whole Tops)		
	Low-Def	Sufficient Range	High	
	<			>
N		2.00-3.00		
P		0.20-0.50		
K		1.50-3.00		
Ca %		0.20-0.50		
Mg		0.15-0.50		
S		0.15-0.40		
B		-		
Cu		5-25		
Fe		40-150		
Mn ppm		25-100		
Zn		15-70		
Mo		0.20-0.30		
Al				

Peanuts		Upper Mature Leaves Prior to at Bloom Stage		
	Low-Def	Sufficent Range	High	
	<			>
N	2.8	3.2-4.6		
P	0.2	.25-.50		
K	1.4	1.7-3.0		
Ca %	0.75	1.25-2.0		
Mg	0.2	.30-.80		
S	0.16	.20-.35		
B	13	20-50		
Cu	4	6-28		
Fe	40	50-300		
Mn ppm	40	50-350		
Zn	18	20-50		
Mo	0.1	.3-2.0		
Al		<200		
Soybeans		Whole Plant (Seeding)		
	Low-Def	Sufficent Range	High	
	<			>
N	.35-4.4	4.5-5.1	5.1	
P	.25-.39	.40-1.0	1	
K	1.5-2.0	2.1-3.8	3.8	
Ca %	.20-1.1	1.2-2.2	2.2	
Mg	.20-.39	.40-1.0	1	
S	.13-.24	.25-.50	0.5	
B	16-19	20-40	40	
Cu	2-7	8-20	20	
Fe	15-59	60-600	600	
Mn ppm	15-19	20-150	151-250	
Zn	15-19	20-50	50	
Mo	0.2	.3-5.0		
Al				
Soybeans		Upper Leaves (Early Bloom) 45-53 Days		
	Low-Def	Sufficent Range	High	
	<			>
N	3.5-4.7	4.8-6.2	6.2	
P	.20-.29	.30-.50	0.5	
K	1.3-1.9	2.0-3.0	3	
Ca %	.20-.35	.35-2.0	2.0+	
Mg	.20-.29	.30-.60	.61+	
S	.14-.19	.20-.50	0.5	
B	11-19	20-80	80	
Cu	4-15	6-15	15	
Fe	30-49	50-350	350	
Mn ppm	15-19	20-150	150	
Zn	11-19	20-60	60	
Mo	0.2	.5-5.0		

Al

Soybeans Upper Leaves (Fruting) 65-86 Days				
	Low-Def	Sufficient Range	High	
	<		>	
N	4.5-4.9	5.0-6.0		6
P	.20-.24	.25-.45		4.5
K	1.0-1.5	1.6-2.5		2.5
Ca %	.20-.70	.80-2.2		2.2
Mg	.20-.29	.30-.60		0.6
S	.14-.19	.20-.50		0.5
B	11-19	20-80		80
Cu	3-5	6-20		20
Fe	30-50	51-200		200
Mn ppm	15-19	20-100		100
Zn	10-19	20-60		60
Mo	0.2	.3-.50		
Al		<200		

Soybeans Upper Leaves (Early Growth)				
	Low-Def	Sufficient Range	High	
	<		>	
N	4.5-4.7	4.8-6.1		6
P	.25-.29	.35-.50		0.5
K	1.5-1.9	2.0-3.0		3
Ca %	.20-.99	1.0-1.5		1.5
Mg	.20-.39	.40-.60		0.6
S	0.14	.20-.50		0.5
B	11-19	20-60		60
Cu	4-7	8-15		15
Fe	30-49	50-400		400
Mn ppm	15-19	20-150		151+
Zn	15-19	20-60		60
Mo	0.2	.3-5.0		
Al				

Soybeans Upper Leaves (Full Bloom)				
	Low-Def	Sufficient Range	High	
	<		>	
N	4.5-5.1	5.2-6.2		6.2
P	.20-.29	.30-.50		0.5
K	1.5-1.9	2.0-2.5		2.5
Ca %	.20-.69	.70-2.0		2
Mg	.20-.29	.30-.60		0.6
S	.14-.19	.20-.50		0.5
B	11-19	20-70		70
Cu	4-15	6-15		15
Fe	30-50	51-300		300
Mn ppm	15-20	20-100		100-450
Zn	10-20	20-60		60

Mo	0.2	.3-5.0	
Al			
Soybeans Upper Leaves (Mature) 90-103 Days			
	Low-Def	Sufficient Range	High
	<		>
N	2.5-3.3	3.4-5.5	5.5
P	0.1	.10-.25	.25-.30
K	.70-1.0	1.0-2.0	2
Ca %	.20-1.0	1.1-2.2	2.2
Mg	.20-.29	.30-.60	0.6
S	.14-.20	.20-.50	0.5
B	11-19	20-80	80
Cu	3-5	5-20	20
Fe	30-80	80-200	200
Mn ppm	15-19	20-200	200
Zn	10-19	20-60	60
Mo	0.2	.3-5.0	
Al		<200	
Wheat Seeding Stage			
	Low-Def	Sufficient Range	High
	<		>
N	2.0-2.9	3.0-5.0	5
P	.2-.29	.30-.80	0.8
K	1.5-1.9	2.0-5.0	5
Ca %	.1-1.19	.20-.80	0.8
Mg	.1-.14	.15-.40	0.4
S	.10-.14	.15-.50	0.5
B	3-5	6-25	25
Cu	2-4	5-20	20-70
Fe	10-19	20-200	200-500
Mn ppm	10-19	20-150	151-300
Zn	10-19	20-50	51-150
Mo	0.1	.1-2.0	2
Al		0-100	100-400
Wheat Top 6" Prior to Heading			
	Low-Def	Sufficient Range	High
	<		>
N	1.9	2.3-3.0	
P	0.2	.20-.40	
K	1.35	1.5-3.0	
Ca %	0.15	.20-.75	
Mg	0.1	.10-.75	
S		.11-.30	
B	4	5-25	
Cu	3-4	5-25	
Fe	12	25-100	
Mn ppm	13	25-100	
Zn	13	18-50	

Mo
Al

Wheat

Early Growth

Low-Def

Sufficient Range

High

<

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N	2.0-3.6	3.0-4.5	4.5
P	.20-.24	.25-.50	0.5
K	1.5-1.7	1.8-4.0	4
Ca %	.11-.19	.20-1.0	1
Mg	.10-.15	.16-1.0	1
S	.11-.19	.20-.40	0.4
B	3-5	6-40	14-55
Cu	3-5	6-50	50-70
Fe	11	12-300	300-500
Mn ppm	10-15	17-200	200-300
Zn	10-15	20-50	50-150
Mo		.03-5.0	
Al			