

High Yields Demand High Soil Tests

Farmers and researchers planning to work toward higher yields must consider the nutrient uptake requirements for higher yields. Not only does the total nutrient removal increase, but also the *daily* nutrient requirement increases, so soil test levels must be increased to help insure that the total daily demand for nutrients can be met *throughout* the growing season. Since up to 98% of the nutrients move to the plant by diffusion, higher concentrations in the soil help increase rate of availability.

As examples of the daily nutrient supply needed to grow high-yielding crops, Tables 1 and 2 report the nutrient uptake rates measured by Dr. Roy Flannery at Rutgers University of his high-yield corn (308 bu/A) and soybeans (101 bu/A). This is one of the few studies where detailed nutrient uptake rates were measured for such high yield levels.

TABLE 1. **Nutrient Uptake per Day for Various Growth Periods of Corn—Yield 308 bu/A**

Nutrient Uptake per Day for Various Growth Periods of Corn—Yield 308 bu/A							
Sampling Stage	Days in Period	Nutrient Uptake per Day (lb/A)			Total Uptake (lb/A)		
		N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
4-leaf	32	0.38	0.08	0.58	12	3	19
8-leaf	12	1.63	0.35	3.35	20	4	40
12-leaf	15	3.43	0.90	3.37	51	14	51
Early tassel	13	11.05	2.85	15.32	144	37	199
Silk	12	-1.43	0.88	2.63	-17	11	32
Blister	18	1.00	0.70	0.68	18	13	12
Early dent	31	3.71	1.44	1.41	115	45	44
Mature	13	0.16	1.16	-1.65	2	15	-21
TOTAL (lb/A)	146				345	140	375
				lb/bu	1.12	0.46	1.22

TABLE 2. **Nutrient Uptake per Day for Various Growth Periods of Soybeans—Yield 101 bu/A**

Nutrient Uptake per Day for Various Growth Periods of Soybeans—Yield 101 bu/A							
Sampling Stage	Days in Period	Nutrient Uptake per Day (lb/A)			Total Uptake (lb/A)		
		N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
3rd Trifoliolate	40	0.75	0.25	0.68	30	10	27
6th Trifoliolate	11	1.45	0.55	2.72	16	6	30
Full bloom	16	7.81	1.75	5.75	125	28	92
Early pod	15	9.13	2.27	9.6	137	34	144
Soft seed	21	11.43	2.76	2.43	240	58	51
Near mature	16	-3.38	-1.25	-2.25	-54	-20	-36
TOTAL (lb/A)	119				494	116	308
				lb/bu	4.89	1.15	3.05

References:

- Flannery, Roy. 1986 Better Crops with Plant Food, 6-7
 Tisdale, et al. 1993. Soil Fertility and Fertilizers, Chapter 7.

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