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Estimated Nutrient Content and Uptake by Kentucky's Crops

K.L. Wells and W.O. Thom

A commonly asked question by crop producers is, "how many pounds of plant nutrients do my crops take up?" While the absolute answer to this varies by yield and soil fertility, useful estimates can be made from research data to enable a producer to have a "ball park" value for nutrient uptake by some of the major crops of Kentucky. The following tables contain estimates of nitrogen (N), phosphorus (P), and potassium (K) contained in certain crops and the amount of N, phosphate (P_2O_5), and potash (K_2O) taken up by tobacco, corn, soybeans, wheat, alfalfa hay, clover grass hay, and pastures. Values are based on good yields for tobacco, corn, soybeans, and wheat, and are expressed on a per ton of production for hay and pasture (example: a ton of alfalfa con-

tains about 50-14-55 lbs/A of $N-P_2O_5-K_2O$, respectively). A grower with 5 T/A yield of alfalfa would

thus have removed 250-70-275 lbs/A of $N-P_2O_5-K_2O$ per year). For cattle grazed land, it is important to

note that most of the nutrients taken up and consumed are recycled back to the surface of the field (in a non-uniform pattern, particularly with low to normal stocking rates). Beef cattle retain only about 25-20-15% of $N-P_2O_5-K_2O$ intake, respectively. For dairy cattle, retention of $N-P_2O_5-K_2O$ is about 35-30-20%, respectively. Nutrients contained in stalks, stover, and straw are also of note. If recycled back onto fields, these plant residues can be a valuable source of nutrients.

Values shown in these tables are from research data and may not exactly fit a particular field or farm. They should be used only as estimates of nutrient uptake.

Table 1. Estimated Plant Nutrient Content of Some Kentucky Crops

	Content (% by Dry Weight)				
	N	P*	K**	Ca	Mg
Tobacco					
leaf	4.40	0.27	3.50	4.00	0.65
stalk	3.00	0.24	3.20	1.10	0.27
Corn					
grain	1.30	0.28	0.50	0.12	0.16
stover	0.70	0.15	1.20	0.37	0.16
Soybeans					
beans	5.88	0.60	1.80	0.20	0.24
straw	3.85	0.16	1.20		
Wheat					
grain	2.30	0.40	0.48		
straw	0.65	0.10	1.13		
Alfalfa hay	3.00	0.35	2.40	1.40	0.24
Clover-Grass hay	2.00	0.30	2.50		
Pasture	1.70	0.25	2.35		

* $P \times 2.29 = P_2O_5$

** $K \times 1.2 = K_2O$

Table 2. Estimated Plant Nutrient Uptake by Some Kentucky Crops

Crop	Yield	Uptake (lbs/A)*		
		N	P ₂ O ₅	K ₂ O
Tobacco				
leaf	2,600lbs/A (dry wt.)	115	16	110
stalk	2,200lbs/A (dry wt.)	65	12	85
	TOTAL	180	28	195
Corn				
grain	150bu/A (15.5% moist.)	95	45	45
stover	8,000lbs/A (dry wt.)	55	27	115
	TOTAL	150	72	160
Soybeans				
beans	50bu/A (13.5% moist.)	150	35	55
straw	2,600lbs/A (dry wt.)	100	10	37
	TOTAL	250	45	92
Wheat				
grain	60bu/A (13.5% moist.)	72	30	18
straw	3,100lbs/A (dry wt.)	20	7	42
	TOTAL	92	37	60
Alfalfa hay	1T (12% moist.)	50	14	55
Clover-Grass hay	1T (12% moist.)	35	12	53
Pastures	1T (12% moist.)	30	10	50
	excreted** by beef cattle	22	8	42

* Dry matter basis.

** lbs/A/ton of ingested pasturage recycled in urine and dung deposits.


Extension Soils Specialist