

Crop Nutrient Removal

While nutrient removal does not enter directly into UVM nutrient recommendations, it is an important consideration in some cases. For example, the potassium recommendation for corn harvested for silage, in which the entire above-ground plant is removed, is much greater than for grain corn. Typical nutrient removal for common field crops is shown in Table 19.

Fertilizer Nutrient Sources

Crop nutrient need not met by manure and/or previous crop residue can be supplied by various fertilizer materials (Table 20). Most local fertilizer suppliers can provide blends of these materials to accommodate a range of N, P, K, and other nutrient requirements.

Table 19. Typical crop nutrient removal.

Crop (units)	Per unit of yield			Typical yield/A	Removal for given yield		
	N	P ₂ O	K ₂ O		N	P ₂ O	K ₂ O
Corn (bu)	.75	0.4	0.3	120 (bu)	90	50	35
Corn silage (T) ⁴	9	5	11.	20 (T)	180	100	220
Grain sorghum (bu)	0.5	0.6	0.8	120 (bu)	60	70	95
Forage sorghum (T) ⁴	9	3	10	15 (T)	135	45	150
Sorghum/sudangrass ⁴	8	7	7	15 (T)	120	105	105
Alfalfa (T) ^{2,5}	50 ¹	15	50	5 (T)	250	75	250
Red clover (T) ^{2,5}	40 ¹	15	40	3.5 (T)	140	55	140
Trefoil (T) ^{2,5}	50 ¹	15	40	3.5 (T)	175	55	140
Cool-season grass (T) ^{2,5}	40	15	50	4 (T)	150	60	200
Bluegrass (T) ^{2,5}	30	10	30	2.5 (T)	75	25	75
Wheat/rye(bu) ³	1.5	1	1.8	60 (bu)	90	60	110
Oats (bu) ³	1.1	0.9	1.5	80 (bu)	90	70	120
Barley (bu) ³	1.4	0.6	1.5	75 (bu)	105	45	110
Soybeans (bu)	3.2 ¹	1	1.4	40 (bu)	130	40	56
Small grain silage (T) ⁴	17.0	7.0	26	6 (T)	100	40	160

Note: Adapted from Beegle, 2003.

¹Legumes fix all their required nitrogen. However, they also are able to use nitrogen as indicated.

²For legume-grass mixtures, use the predominant species in the mixture.

³Includes straw.

⁴65% moisture.

⁵10% moisture.

Table 20. Nutrient content and other properties of fertilizer materials.

Fertilizer material	Chemical formula ¹	%N	%P ₂ O ₅	%K ₂ O	Other nutrient, % ²	Equiv. acidity ³	Salt index ⁴
Nitrogen sources							
Anhydrous ammonia	NH ₃	82	0	0		148	47
Urea	(NH ₂) ₂ CO	46	0	0		84	75
Ammonium nitrate	NH ₄ NO ₃	33-34	0	0		63	105
Urea-ammonium nitrate (UAN)	(NH ₂) ₂ CO + NH ₄ NO ₃	28-32	0	0		54	74
Ammonium sulfate	(NH ₄) ₂ SO ₄	21	0	0	24 S	112	69
Phosphorus sources							
Diammonium phosphate (DAP)	(NH ₄) ₂ HPO ₄	18-21	46-53	0		74	34
Monoammonium phosphate (MAP)	NH ₄ H ₂ PO ₄	11-13	48-52	0		65	30
Ammonium polyphosphate		10	34	0		53	-
Ordinary superphosphate	Ca(H ₂ PO ₄) ₂ + CaSO ₄	0	20	0	14 S, 20 Ca	0	8
Triple superphosphate	Ca(H ₂ PO ₄) ₂	0	46	0	1.5 S, 14 Ca	0	10
Potassium, magnesium, sulfur sources							
Muriate of potash	KCl	0	0	60-62		0	116
Potassium sulfate	K ₂ SO ₄	0	0	50	18 S	0	46
Potassium nitrate	KNO ₃	13	0	45		-26	74
Potassium hydroxide	KOH	0	0	70		-89	-
Magnesium sulfate	MgSO ₄	0	0	0	10-16 Mg, 14-21S	0	
Magnesium oxide	MgO	0	0	0	45 Mg		
Sulfate of potash magnesia (Sul-Po-Mag or K-Mag)	K ₂ SO ₄ MgSO ₄	0	0	22	11Mg, 22 S	0	43
Calcium sulfate (gypsum)	CaSO ₄	0	0	0	15-18 S, 19-22 Ca	0	
Micronutrient sources							
Borate	Na ₂ BO ₄				20 B		
Solubor	Na ₂ BO ₄				21 B		
Iron (ferrous) sulfate	FeSO ₄				20 Fe, 12 S		
Manganous sulfate	MnSO ₄				28 Mn, 16 S		
Zinc sulfate	ZnSO ₄				36 Zn, 18 S		
Zinc oxide	ZnO				50-80 Zn		
Zinc chelate	Zn chelate				6-14 Zn		

Note: Adapted from Beegle, 2003, Cornell Guide for Integrated Field Crop Management, 2003, and other sources.

¹Water of hydration (H₂O) not included in formula.

²Actual analysis varies with specific product formulation. B = boron, Ca = calcium, Fe = iron, Mg = manganese, Zn = zinc.

³Pounds of calcium carbonate equivalent/100 lb of fertilizer material. Positive numbers indicate that the material increases soil acidity, that is, lowers soil pH. Negative numbers indicate that the material reduces acidity, that is, raises soil pH.

⁴Salt index of equal weights of the fertilizer material compared to sodium nitrate which equals 100. Useful for comparing the salt effect of different fertilizer materials.