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Common Fertilizers Used in Virginia: Nitrogen, Phosphorus and Potassium

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Introduction

Macro elements are used in large quantities by plants for optimal growth. Ensuring an adequate nutrient supply over the growing season and applied at proper timings with correct rates is imperative for efficient fertilizer use efficiency. For fertilizers, fully understanding what nutrient sources are available and some fertilizer basic characteristics is imperative for using nutrients economically in Virginia production systems. For liquid materials, understanding the weight per gallon is needed in conjunction with fertilizer nutrient labeling (i.e. % N-P_2O_5-K_2O) to calculate total nutrient applied. While not substantial, temperature can also impact liquid fertilizer density; which slightly changes application rates (Table 1). This publication will summarize commonly used fertilizers in Virginia for nitrogen (N), phosphorus (P), and potassium (K) (Table 2). Several fertilizer products have a range for nutrient concentrations, as raw products may vary. When possible, the most common form used in Virginia is presented. However, note that your local fertilizer dealers' product may vary slightly and their label should be used instead of this document.

Table 1. Nitrogen fertilizer density and applied nutrient per gallon changes with temperature.

Material Supplying Nitrogen Fertilizer	Nitrogen (%N)	Density Temperature (°F)	Density (lbs./gallon)	Nitrogen (lbs. N/gallon)	Salt Out Temperature (°F)
Urea-ammonium nitrate	28	30	10.76	3.01	1
		50	10.70	3.00	
		60	10.67	2.99	
		70	10.64	2.98	
		80	10.61	2.97	
		90	10.58	2.96	
Urea-ammonium nitrate	30	30	10.99	3.30	14
		50	10.93	3.28	
		60	10.90	3.27	
		70	10.87	3.26	
		80	10.84	3.25	
		90	10.81	3.24	
Urea-ammonium nitrate	32	30	11.14	3.56	28
		50	11.09	3.55	
		60	11.05	3.54	
		70	11.02	3.53	
		80	10.99	3.52	
		90	10.95	3.50	

Table 2. Common fertilizer sources used in Virginia for nitrogen, phosphorus, and potassium nutrient applications.

Material Supplying	Synonyms	Chemical Formula	Nitrogen (%N)	Phosphate (%P_2O_5)	Potash (%K_2O)	Other Nutrients	Physical State	Weight per gallon for liquids (lbs./gal.)
Nitrogen								
Ammonium nitrate	---	NH_4NO_3	33-34	0	0	---	solid	---
Ammonium sulfate	AMS	$(NH_4)_2SO_4$	21	0	0	24% S	solid	---
Ammonium sulfate, liquid	---	$(NH_4)_2SO_4$	8	0	0	9% S	liquid, salt out at 15°F	10.14
Ammonium thiosulfate	---	$(NH_4)_2S_2O_3$	12	0	0	26% S	liquid, salt out at 20°F	11.18
Anhydrous ammonia	---	NH_3	82	0	0	---	gas	5.15
Calcium nitrate	Lime nitrate, nitrocalcite, lime saltpeter, Norwegian saltpeter	$Ca(NO_3)_2$	15	0	0	21% Ca	solid	---
Sodium nitrate	Chilean saltpeter, Chilean nitrate	$NaNO_3$	16	0	0	26% Na	solid	---
Urea	Carbamide	$CO(NH_2)_2$	45-46	0	0	---	solid	---
Urea-ammonium nitrate	Liquid nitrogen, UAN28	$CO(NH_2)_2 \cdot NH_4NO_3$	28	0	0	---	liquid, salt out at 1°F	10.66
Urea-ammonium nitrate	Liquid nitrogen, UAN30	$CO(NH_2)_2 \cdot NH_4NO_3$	30	0	0	---	liquid, salt out at 14°F	10.88
Urea-ammonium nitrate	Liquid nitrogen, UAN32	$CO(NH_2)_2 \cdot NH_4NO_3$	32	0	0	---	liquid, salt out at 28°F	11.06
Urea-ammonium nitrate, sulfur blend	UANS	Various	24	0	0	3% S	liquid	10.68
Urea-ammonium nitrate, sulfur blend	UANS	Various	28	0	0	5% S	liquid, salt out at 10°F	10.76

Table 2 cont. Common fertilizer sources used in Virginia for nitrogen, phosphorus, and potassium nutrient applications.

Material Supplying	Synonyms	Chemical Formula	Nitrogen (%N)	Phosphate ($\%P_2O_5$)	Potash ($\%K_2O$)	Other Nutrients	Physical State	Weight per gallon for liquids (lbs./gal.)
Phosphorus								
Ammonium polyphosphate	APP, Polyphosphate	$[NH_4PO_3]_n(OH)_2$	10	34	0	1.4% S	liquid, salt out at -10°F	11.63
Ammonium polyphosphate	APP, Polyphosphate	$[NH_4PO_3]_n(OH)_2$	11	37	0	1.6% S	liquid, salt out at <32°F	11.99
Bone, ground and raw	Raw bone meal	---	4-6	16-27	0	---	solid	---
Bone, steamed meal	Bone flour meal	---	2	20-28	0	---	solid	---
Diammonium phosphate	DAP	$(NH_4)_2HPO_4$	18	46	0	---	solid	---
Ground rock phosphate	Phosphorite, mineral phosphate	$[Ca_5(PO_4,CO_3)_3(F,OH)]$	0	5-48	0	---	solid	---
Monoammonium phosphate	MAP	$NH_4H_2PO_4$	11	52	0	---	solid	---
Poultry litter	Litter, chicken litter	---	2-4	2-4	2	0.4% S	solid	---
Superphosphate, single	SSP, ordinary supersphosphate, normal superphosphate	$Ca(H_2PO_4)_2{\cdot}H_2O$	0	16-20	0	18-21% Ca; 11-21% S	solid	---
Superphosphate, triple	TSP	$Ca(H_2PO_4)_2{\cdot}H_2O$	0	44-48	0	13-15% Ca	solid	---
Potassium								
Polyhalite	---	$K_2SO_4{\cdot}MgSO_4{\cdot}2CaSO_4{\cdot}2H_2O$	0	0	14	19% S, 4% Mg, 12% Ca	solid	---
Potassium chloride	Muriate of potash, KCl	KCl	0	0	60	48% Cl	solid	---
Potassium magnesium sulfate	Langbeinite, Sul-Po-Mag, K-Mag	$K_2SO_4{\cdot}2MgSO_4$	0	0	22	11% Mg, 22% S, <2.5% Cl	solid	---
Potassium nitrate	Nitrate of potash, NOP, saltpeter	KNO_3	13	0	44	---	solid	---
Potassium orthophosphate	Potassium phosphate solution	---	0	20	20	---	Liquid, salt out at 10°F	12.04
Potassium sulfate	Sulfate of potash, SOP	K_2SO_4	0	0	48-54	17-20% S, <2.5% Cl	solid	---
Potassium thiosulfate	KTS	$K_2S_2O_3$	0	0	25	17% S	liquid, salt out at <15°F	12.18

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