Lawn Fertilization

https://premiumgrassseeds.com/guides/best-starter-fertilizer

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Soil Fertility

Nitrogen fertilization

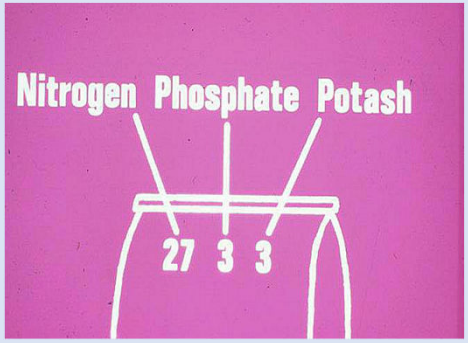
Nitrogen is usually the most important element in the turf fertilization program. Most turf fertility programs are focused on N.

Nitrogen Sources

There are 3 general categories of N fertilizers:

- Natural organic
- Synthetic organic
- Synthetic inorganic

A particular bag of fertilizer may contain a N source from one or more of the above groups.



The Fertilizer Analysis - The three numbers represent the percent bag weight of nitrogen, phosphorus and potassium in that order. Phosphorus and potassium are always packaged in the oxide form and must be adjusted for accurate applications.

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Natural Organic N Fertilizers

Examples:

- Milorganite (6-4-0) - Activated sewage sludge from Milwaukee.
- Actinite (6-3-0) - Activated sewage sludge from Houston.
- Sustane - Humus made of turkey litter.
- Nature Safe (8-5-5) - Poultry-based sources including feather meal, meat and bone meal and blood meal.
- Roots - Organic and synthetic ingredients such as bat guano, earthworm castings, fish bone meal, feather meal, and kelp: rich in phosphorus and potassium.
- Corn gluten meal (9-0-0) - A by-product of the wet corn-milling process used primarily as a natural, pre-emergent herbicide and a high-protein feed for livestock (60-65% crude protein, 2.5% fat and 2% crude fiber).
- Many others

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Positive characteristics of natural organic N fertilizers:

- Low burn potential
- Little leaching
- Slow-release N
- Some contain micronutrients
- Make use of a waste product

Negative characteristics of natural organic fertilizers:

- Low N content
- Slow turf response (microbial activity is required to release N)
- Ineffective in cold weather

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Approx. 10-40% of uncoated urea can be lost to the atmosphere (volatilization) in three to four days if not watered in after application.

Irrigation amounts after uncoated urea application:
Half to one inch - Ideal
Quarter inch - Adequate
Below quarter inch - Detrimental

Applying below one quarter inch of irrigation after uncoated urea application will only put the prills in contact with urease on the soil surface. The urease will convert the urea to ammonia gas which will be lost to the atmosphere.

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Synthetic Organic N Fertilizers (Urea)

Positive characteristics of uncoated (quick release) urea synthetic organic fertilizer:

- Quick release - quick plant response
- Water soluble - can be applied through your boom sprayer.

Negative characteristics of uncoated (quick release) synthetic organic fertilizers:

- Prices have risen sharply
- Hygroscopic
- Very high burn potential
- Leaching
- Can be lost through volatilization
- Continuous use can significantly lower soil pH

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Source	Formulation	Analysis	Microorganisms Required?
Urea formaldehyde	Granular or suspension	38-0-0	Yes
Methylene urea	Granular or liquid	~39-0-0	Yes
Isobutylidenediurea (IBDU)	Granular	31-0-0	No, hydrolysis only
Polymer coated urea	Granular	~40-0-0	No
Sulfur coated urea	Granular	~40-0-0	Yes

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Positive characteristics of coated (slow release) synthetic organic fertilizers:
- Slow-release, longer response
- Little leaching
- Low potential for burn

Negative characteristics of coated (slow release) synthetic organic fertilizers:
- Expensive
- Water insoluble
- Slow plant response
- N residual

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Positive characteristics of synthetic inorganic N fertilizers:
- Inexpensive
- N is available immediately
- Most are water soluble

Negative characteristics of synthetic inorganic N fertilizers:
- Burn potential
- Leaching
- Hygroscopic
- More applications

Most synthetic inorganic fertilizers are salts!

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Synthetic inorganic N fertilizers

Examples:
- Ammonium nitrate (34 - 0 - 0)
- Ammonium sulfate (21 - 0 - 0)
- Diammonium phosphate (18-46-0)

How can you tell if a fertilizer is an organic or inorganic?

Its an organic if there is a C/H bond in the chemical equation.

Cattle manure	$C_{10}H_{20}O_6N_2$	Organic
Urea	CH_4N_2O	Organic (synthetic)
Nitrate	NO^-_3	Inorganic

Quick release Nitrogen Sources

Source	N category	Availability
Nitrate*	Synthetic inorganic	Immediately
Ammonium*	Synthetic inorganic	Immediately
Ammonia*	Synthetic inorganic	2-7 days
Water soluble organic nitrogen	Organic	1-4 weeks
Ammonium nitrate	Synthetic inorganic	Immediately
Ammonium sulfate	Synthetic inorganic	Immediately
Diammonium phosphate	Synthetic inorganic	Immediately
Urea	Synthetic organic	2-4 days

*Can be produced naturally.

Fertilizer Calculations

How much 29-3-5 fertilizer will it take to apply 1 lb. N/1000 sq. ft. to 12,000 sq. ft.?

$$\frac{1}{1000} = \frac{x}{12000}$$

$X = 12$

$12 \div .29 = 41.38$ lbs. of 29-3-5 are required to apply 1 lb. N to 12,000 sq. ft.

Slow Release Nitrogen Sources

Source	N category	Availability
Urea formaldehyde	Synthetic organic	Several weeks to months
Methylene urea	Synthetic organic	2-12 weeks
Sulfur coated urea	Synthetic organic	2-4 weeks
Polymer coated urea	Synthetic organic	Several weeks to months
IBDU	Synthetic organic	Several weeks to months
Milorganite (6-4-0)	Organic	8-10 weeks
Sustane	Organic	2-3 weeks
Nature Safe	Organic	1-8 weeks
Corn gluten meal	Organic	3-4 months

Phosphorus (P)

	Available to Turfgrass
P - rock phosphate	relatively inefficient (only 1% is water soluble)
P_2O_5 - phosphorus oxide	yes
H_2PO_4 - orthophosphate	yes

Phosphorus fertilizer sources

- Monoammonium phosphate, 11-48-0*
- Diammonium phosphate, 20-50-0**
- Superphosphate, 0-20-0
- Triple superphosphate, 0-45-0

Fertilizer containers always report P content as % P_2O_5. To convert to actual P, multiply P_2O_5 x 0.44

*MAP produces an acidic solution, a better choice for alkaline soils.

**DAP produces an basic solution, a better choice for acidic soils.

How many lbs. of 11-48-0 would be required to apply 1 lb. P/1000 sq. ft. to a 12000 sq. ft. lawn?

$$\frac{1}{1000} = \frac{x}{12000}$$

x = 12

12 ÷ .48 = 25

25 ÷ .44 = 56.8

56.8 lbs. of 11-48-0 would be required to apply 1 lb. actual P to 12000 sq. ft.

Phosphorus (P)

P_2O_5

	Atomic Weight
P	31
O	16

2 x 31 (P) + 5 x 16 (O) = 62 + 80 = 142

62/142 = 0.44 or 44%

Example:

How much total P is in a 50 lb. bag of 11-48-0?

50 x .48 = 24 lbs. P_2O_5 in the 50 lb. bag of 11-48-0
24 x .44 = 10.56 lbs. actual P in the 50 lb. bag of 11-48-0

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Potassium fertilizer sources

- Muriate of potash, 0-0-60 (KCl)
- Sulfate of potash, 0-0-50 (K_2SO_4)
- Potassium nitrate, 13-0-44 ((KNO_3)

Fertilizer containers always report K content as % K_2O. To convert to actual K, multiply K_2O x 0.83

Potassium (K)
K_2O

	Atomic Weight
K	39
O	16

2 x 39 (K) + 1 x 16 (O) = 78 + 16 = 94

78/94 = 0.83 or 83%

Example:

How much total K is in a 50 lb. bag of 0-0-60?

50 x .60 = 30 lbs. K_2O in the 50 lb. bag of 0-0-60
30 x .83 = 24.9 lbs. actual K in the 50 lb. bag of 0-0-60

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Kentucky bluegrass in North Dakota:

High quality:	4 to 5 lbs. N/1,000 sq. ft./yr
Med. quality:	2 to 3 lbs. N/1,000 sq. ft./yr
Low quality:	0 to 1 lb. N/1,000 sq. ft./yr

- Soil texture
- Rainfall and irrigation
- Clippings management
- Intensity of use

How many lbs. of 0-0-60 would be required to apply 1 lb. K/1000 sq. ft. to a 12000 sq. ft. lawn?

$$\frac{1}{1000} = \frac{x}{12000}$$

x = 12

12 ÷ .60 = 20

20 ÷ .83 = 24.1

24.1 lbs. of 0-0-60 would be required to apply 1 lb. actual K to 12000 sq. ft.

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Fertilizing Cool-Season Grasses in North Dakota

Fall fertilization is generally recommended for cool-season grasses, because it:

- Stimulates more root growth instead of top growth.
- Increases turf density when weed competition is minimal.
- Maintains turf color longer into the fall, and hastens spring green up.
- Results in better plant health because the plant accumulates carbohydrates.

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Number of Fert.	Time	Amt. per ap. (lb./1000)
• Once a year	Early September	1.0 to 1.5
• Twice a year	Early July and early September	1.0 to1.5
• Three times per year	Late May, early July and early September	1.0 to 1.5