



Mesa County - Delta County - Montrose County - Ouray County

## Characteristics of Nitrogen (N) Fertilizers

Curtis E. Swift, Ph.D., Area Extension Agent (Horticulture)  
Colorado State University Cooperative Extension  
Tri River Area

Fertilizer Name	Analysis	Source of N	Moisture Dependence	Low Temperature Response	Residual N Activity	Salt index (per N unit)
<b>Quickly Available</b>						
Ammonium-nitrate	33-0-0	ammonium nitrate	minimal	rapid	4-6 weeks	3.2
Ammonium-sulfate	21-0-0	ammonium sulfate	minimal	rapid	4-6 weeks	3.3
Ammonium-phosphate	18-46-0	diammonium phosphate	minimal	rapid	4-6 weeks	1.6
<u>Urea</u>	46-0-0	urea	minimal	rapid	4/6 weeks	1.6
<b>Slow-Release</b>						
<u>Sulfur-coated urea</u>	22-38% N	urea	moderate	moderately rapid	10-15 weeks	not applicat
ONCE	24-25% N	urea, nitrate, ammonium nitrate	moderate	moderately rapid	15-38 weeks	not applicat
<b>Slowly-soluble</b>						
<u>IBDU</u>	31-0-0	isobutylidene diurea	high	moderately rapid	10-16 weeks	0.2
<b>Ureaform reaction</b>						
Nitroform	38-0-0	ureaformaldehyde	high	slow	10-30 weeks+	0.3
FLUF	18-0-0	urea/ureaformaldehyde	moderate	medium	6-10 weeks	not applicat
Nutralene	40-0-0	methylene ureas	moderate	medium	7-12 weeks	not applicat
Methylene	39-0-0	methylene ureas	moderate	medium	7-9	0.7

urea					weeks	
Coron	28-0-0	urea/methylene ureas	minimal	moderately rapid	7-9 weeks	not applicat
N-Sure	28-0-0	triazone/urea sol.	minimal	moderately rapid	6-9 weeks	not applicat
<b>Natural Organic fertilizers</b>						
Ringers	6-1-3	blood, bone, seed meals	high	medium	10-12 weeks	0.7
Sustaine	5-2-4	composted turkey waste	high	medium	10-12 weeks	0.7
Milorganite	6-2-0	activated sludge	high	slow	10-12 weeks	0.7

---

## Notes:

### Moisture Dependence

Fertilizers that solubilize slowly need more water to get them into solution than highly soluble fertilizers. If water availability is a problem the use of a more soluble fertilizer would be advised.

---

### Low Temperature Response

The term 'Low Temperature Response' refers to the degree upon which a fertilizer is dependent on microbial activity for decomposition and nutrient release. This process is slow below 41° Fahrenheit (5° C) and above 104° Fahrenheit (40° C). The optimum temperature for this microbial process to take place is around 67° to 74° Fahrenheit (30° to 35° C).

In the table rapid release at a low temperature indicates the fertilizer is not dependent on microbial breakdown.

---

### Residual Nitrogen (N) Activity

The Residual Nitrogen Activity is a measure of how long an application of fertilizer will provide the plant the needed nutrient(s). In general, quickly available (water-soluble) materials will have a short residual activity, while less-soluble and/or temperature-dependent materials will provide a longer N residual activity.

---

## Salt Index

Water **soluble salts** can damage a plant when in excess of that plant's **salt tolerance**. Soluble salts on leaves can kill leaf tissue, and when in excessive amounts in the soil, can kill roots.

The salt concentration in the soil-water solution varies depending on the parent material(s) the soil evolved from, the **organic amendment** added, and the fertilizer used. Fertilizers are classed by their salt index. This is a measure of the fertilizer's effect on the salt level in the soil solution and is used to compute the solubilities of chemical compounds used as fertilizers.

Materials with high salt indexes cause plants to wilt or die because of the compounds' high affinity for water and the dehydration of the plant tissue. The lower the salt index, the less risk of plant injury.

---

## Leaching Potential

The extent to which nutrients are transported down through the soil profile varies considerably. Climate, soil type, and the type and quantity of nutrients present in the soil in the soluble form determine the rate and amount of leaching. The greater the leaching potential of a fertilizer product, greater care is necessary when the material is used on sandy soil as ground water contamination is more likely. On very sandy soils and areas where ground water contamination is likely, the use of less soluble (greater moisture dependent) fertilizers is recommended.

---

## Types of Materials:

**Urea** -  $[\text{CO}(\text{NH}_2)_2]$  - Synthesized from ammonia and carbon dioxide under high temperature and pressure. Urea usually contains no less than 45% nitrogen.

**Sulfur-coated urea** - A controlled-release nitrogen fertilizer consisting of urea particles coated with sulfur. The product is usually further coated with a sealant. SCU typically contains about 30% to 40% nitrogen and 10% to 30% sulfur.

**IBDU** (Isobutylidene diurea) - A product of isobutyraldehyde and urea with a minimum total nitrogen content of 30%. IBDU is a slowly available nitrogen source by virtue of particle size.

**Urea-formaldehyde Reaction Products** - (Urea Form) - A class of synthetic insoluble nitrogenous materials slowly available to plants. These products result

from a specific reaction of urea and formaldehyde resulting in a slow-release product.

**Natural Organic Fertilizers** are products that are plant- or animal-derived.

---

Excerpted in part from Turfgrass Management - Master Gardener Training (1995)  
by Dr. Tony Koski, CSU Cooperative Extension

References used:

Mengel, K. & E.A. Kirby. 1982. Principles of Plant Nutrition - 3rd Edition.  
International Potash Institute, Bern Switzerland  
Paul, E.A. & F.E. Clark. 1988. Soil Microbiology and Biochemistry. Academic Press,  
Inc.  
Farm Chemicals Handbook 1996. Meister Publishing Company.

---

Place on the Internet October 15, 1996

**Last updated:01/04/2003 20:23:14**

Comments should be addressed to [Dr. Curtis E. Swift](#), Area Extension Agent,  
Horticulture  
Colorado State Cooperative Extension  
2775 US Hwy 50, Grand Junction, CO. 81503  
voice: 970-244-1834  
fax: 970-244-1700

