

## FERTILIZER CARRIERS - MAJOR ELEMENTS

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The supply of nutrients for turf is derived from the soil or from added fertilizers. The relative amounts derived from each of the two sources are dependent upon the residual fertility of the soil and upon management practices. Some turfgrasses require less food than others. Carpetgrass in the South, buffalograss in the Great Plains, and tall fescues in the transitional area may do very well with only the nutrients they derive from the native soil. Bermudagrass, bluegrass and the bentgrasses require additional fertilizer and this must come from a fertilizer bag. Apparently grass responds equally to plant nutrients applied regardless of the source. When plants respond adversely, the trouble usually lies in the amount, the timing or the method in which the nutrients are applied.

### Important Qualities and Physical Characteristics

- (1) Handling and storage requirements. Delivered in bulk or bags?
- (2) Spreading qualities of powder, dusts, granular, pelletized, prilled, frits and solubles. Easy to apply?
- (3) Effect on soil, soil pH, soil salinity.
- (4) Size of granular materials. Picked up by mowers, cut, crushed, etc?
- (5) Color pleasing, objectionable or helpful?
- (6) Odor offensive? Material offensive for people with allergies to handle or be near?
- (7) Slow or fast release formulations best for your program?
- (8) Cost of labor per application.
- (9) Requirements for special purpose turfgrasses. Don't nullify one program with another. Example: Low  $P_2O_5$  requirement for successful arsenate program of Poa annua control.
- (10) Cost - per unit of N,  $P_2O_5$  and  $K_2O$ . Supplying excesses of any nutrient? Luxury consumption?

## AAPFCO Definitions \*

AAPFCO - Association of American Plant Food Control Officials

The membership of the Association shall consist of:

(1) The officers charged by law with the active execution of the laws regulating the sale of commercial fertilizer and fertilizer materials.

(2) Such deputies as shall be duly designated by the officials named under (1) of this section.

(3) Research workers employed by State, Dominion or Federal agencies who are engaged in the investigation of fertilizers.

Since 1948, the AAPFCO has taken the place of the Committee on Definitions of Terms and Interpretations of Results of Fertilizers of the AOAC. Decisions of the AAPFCO are final and are not referred to the AOAC for approval. AAPFCO publishes an annual bulletin giving the official regulations and interpretations. Analysis - "The word analysis, as applied to fertilizers, shall designate the percentage composition of the product expressed in those terms that the law requires and permits."

Bulk Fertilizer - "The term bulk fertilizer shall mean commercial fertilizer delivered to the purchaser, either in the solid or liquid state, in a non-packaged form to which a label cannot be attached."

Compound Fertilizer - A mixed fertilizer containing at least two of the primary plant nutrients (N,  $P_2O_5$ , and K) formed by intimately mixing two or more fertilizer materials or granulating them together, usually by the processes that involve chemical reactions of the materials with each other. Compound fertilizers usually are made in registered grades.

Concentrated Fertilizers - Mixed fertilizers containing 30% or more of the primary nutrients,  $N + P_2O_5 + K_2O$ ). The average primary nutrient content of mixed fertilizers was 21.7% in 1945, 30.2% in 1958, and 39.4% in 1970.

Fertilizer Formula - "A fertilizer formula shall express the quantity and grade of the crude stock materials used in making a fertilizer mixture. For example: 800 pounds of 16% superphosphate, 800 pounds of tankage (7.40 nitrogen and 9.15 total phosphoric acid), and 400 pounds of sulfate of potash-magnesia (26% potash)."

Fertilizer Grade - "Fertilizer Grade shall represent the minimum quantity of its plant food expressed in terms of nitrogen (not ammonia), available phosphoric acid, and water-soluble potash."

Fertilizer Ratio - The relative proportions of primary nutrients in a fertilizer grade divided by the highest common divisor for that grade; e.g., grades 10-6-4 and 20-12-8 have the ratio 5-3-2.

Granulation - "A uniformly granular fertilizer is defined as one in which 95% or more of the product remains on any sieve within the range of 8 mesh (2.38 mm. opening) to 20 mesh (0.841 mm. opening), and in which the largest particle passes through a sieve having an opening not larger than four (4) times that of the sieve retaining 95% or more of the product."

Guarantees - "The statement of guarantees of mixed fertilizer shall be given in whole numbers.

"All fertilizer components with the exception of potash ( $K_2O$ ) and phosphoric acid ( $P_2O_5$ ) if guaranteed, shall be stated in terms of the elements."

Natural Organics - By-product from processing of animal or vegetable substances that contain sufficient plant nutrients to be of value as fertilizers. This class of fertilizer includes dried blood, castor pomace, cottonseed meal, tankage, bone meal, tobacco stems, and many similar substances. The nitrogen in them is combined with carbon, hydrogen, and oxygen and sometimes other elements to form very complex compounds, which must decompose in the soil before the nitrogen is available. Bone meal is primarily a phosphatic and tobacco stems a potassic fertilizer. From 500,000 to 600,000 tons of natural organics are marketed annually in the U.S., more than half of which is in the form of dried manures.

Organic - "The term Organic when applied to the source of a fertilizer component shall include only organic materials that are insoluble in water."

Activated Sewage Sludge - "Activated sewage products are those made from sewage freed from grit and coarse solids, and aerated after being inoculated with microorganisms. The resulting flocculated organic matter is withdrawn from the tanks, filtered, with or without the acid of coagulants, dried in rotary kilns, ground and screened."

Synthetic Organic Chemicals - Calcium cyanamide and urea are produced synthetically for use as fertilizers. They contain organic combinations of elements, but behave in the soil like inorganic fertilizers.

The AAPFCO defines the nitrogen in Cyanamid and urea as "synthetic non-protein organic nitrogen."

Tankage - Animal tankage is derived from rendered, dried and ground by-products of the slaughter of animals. Some is used as fertilizer but the principal use is in animal feeds. It averages 7% N and about 10% P<sub>2</sub>O<sub>5</sub>.

Urea-Formaldehyde Fertilizer - "Urea-formaldehyde fertilizer materials are reaction products of urea and formaldehyde containing at least 35% nitrogen largely in insoluble but slowly available form. The water insoluble content shall be at least 60% of the total nitrogen. The water insoluble nitrogen in these products shall test not less than 40% active by the nitrogen activity index for urea-formaldehyde compounds as determined by the appropriate AOAC method."

\* Reference: FARM CHEMICALS HANDBOOK

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Material	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CLASS	RELEASE	EFFECT ON SOIL
Ammonium sulfate	20			C	F	IA
Ammonium nitrate	34			C	F	IA
Nitrate of soda (sodium nitrate)	16			C	F	DA
Potassium nitrate	12		44	C	F	DA
Calcium cyanamid'	20			syn. organic	S to F	DA
Urea	45			syn. organic	F	IA
Ammonium phosphate /mono	12	61		C	F	IA
di	18	46		C	F	IA
Calurea	34			syn. organic	F	IA
Calcium nitrate	15			C	F	DA
Animal tankage	7	10		organic	S	NE
Dried blood	12			organic	S	IA
Fish scrap	9	7		organic	S	NE
Cottonseed meal	6	2	1	organic	S	IA
Castor pomace	5	1		organic	S	IA
Sewage sludge, activated	6	2	2	organic	S	IA
Bone meal raw	5	20		organic	S	DA
Bone meal steamed	1	25		organic	S	DA
Ureaform	38			syn. organic	S	IA
Superphosphate						
Normal		22		C	F	DA
Enriched		27		C	F	DA
Concentrated		46		C	F	DA
Hi analysis		54		C	F	DA
Precipitated Phosphate		42			F	DA
Muriate of potash			60	C	F	NE
Sulfate of potash			50	C	F	NE
Tobacco stems	2		6	organic	S	DA
Manures				organic		
Dairy manure	1				S	DA
Poultry manure	4	1.5	1.5		S	DA
Bat guano	11	2			S	DA

S = Slow

F = Fast

C = Chemical

IA = Increases Acidity

DA = Decreases acid

NE = No effect

Note - Urea and cyanamid are defined by the AOAC as synthetic non-proteid organic nitrogen - be aware they are not slow release nitrogen sources.

Controlled release fertilizers - Fertilizers in which one or more of the nutrients have limited solubility in the soil solution so that nutrients become available to the plant over a controlled period. Typical products Ureaform, IBDU (isobutylidene urea), CDU (Crotonylidene Diurea), Osmocote, and SCU (sulfur coated urea). Mostly experimental.

AOAC - Association of Official Analytical Chemists (of North America).

AAPFCO - Association of American Plant Food Control Officials has for its object the promotion of uniform and effective legislation, definitions, rulings and enforcement of laws relating to the control of sale and distribution of mixed fertilizers and fertilizer material in the continent of North America.