

## Compound Fertilizer

Many soils require the addition of several essential nutrients to alleviate plant deficiencies. Farmers may have the option of selecting a combination of single-nutrient fertilizers or using a fertilizer that has several nutrients combined into each particle. These combination (compound or complex) fertilizers can offer advantages of convenience in the field, economic savings, and ease in meeting crop nutritional needs.

### Production

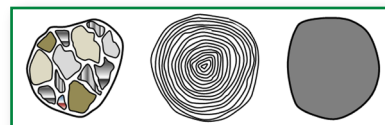
Compound fertilizers are made using basic fertilizer materials, such as  $\text{NH}_3$ , ammonium phosphate, urea, S, and K salts. There are many methods used for making these fertilizers, with the specific manufacturing processes determined by the available basic components and the desired nutrient content of the finished product. Here are four brief examples.

**Compaction** methods (agglomeration) involve binding small fertilizer particles together using compaction, a cementing agent, or a chemical bond. Various nutrient ratios can be combined using undersized particles that may not be suitable for other applications.

**Accretion-based** fertilizers are made by repeatedly adding a thin film of nutrient slurry which is continually dried, building up multiple layers until the desired granule size is reached.

**Pipe-cross reactors** are used to chemically melt  $\text{NH}_3$ , acids containing S or P, and other nutrients—such as K sources and micronutrients—into a solid fertilizer with the desired nutrient content.

The **nitrophosphate process** involves reacting phosphate rock with nitric acid to form a mixture of compounds containing N and P. If a K source is added during the process, a solid fertilizer with N, P, and K will result.



### Agricultural Use

Compound fertilizer contains multiple nutrients in each individual granule. This differs from a blend of fertilizers mixed together to achieve a desired average nutrient composition. This difference allows compound fertilizer to be spread so that each granule delivers a mixture of nutrients as it dissolves in the soil and eliminates the potential for segregation of nutrient sources during transport or application. A uniform distribution of micronutrients throughout the rootzone can be achieved when included in compound fertilizers.

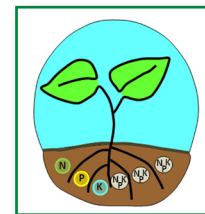
These fertilizers are especially effective for applying an initial nutrient dose in advance of planting. There are certain ratios of nutrients available from a fertilizer dealer for specific soil and crop conditions. This approach offers advantages of simplicity in making complex fertilizer decisions, but does not allow the flexibility to blend fertilizers to meet specific crop requirements. Turf managers and homeowners often find compound fertilizers desirable.

### Management Practices

Compound fertilizers are sometimes more expensive than a physical combination or blend of the primary nutrient sources since they require additional processing. However, when a consideration is made of all the factors involved with nutrient handling and use, compound fertilizers may offer considerable advantages.

Nitrogen is the nutrient that most commonly needs to be carefully managed and reapplied during the growing season. It may not be feasible to supply sufficient N in advance of planting to meet the entire demand (using only compound fertilizer) without overapplying some of the other nutrients. It may be advisable to use a compound fertilizer early in the growing season and then later apply only N fertilizer as needed.

Compound fertilizers are usually produced regionally to meet local crop needs. There is a wide range of chemical and physical properties that can be adjusted to meet these needs. For example, a desire to minimize P in urban stormwater runoff has led some communities to restrict the addition of P to compound fertilizers sold for turf and ornamental purposes. Soils of a region that are typically low in a specific nutrient may have this element boosted in the compound fertilizer. ■



### Chemical Properties

Chemical formulas vary widely. Common compound fertilizers include: 10-10-10, 12-12-12, 17-17-17, 21-7-14, and many other formulations.

Abbreviations and notes: N = nitrogen;  $\text{NH}_3$  = ammonia; K = potassium; S = sulfur; P = phosphorus

