Phosphate Fertilizers, N-P-K Fertilizers

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Rock phosphate has virtually disappeared from the market because of its very low water solubility and high transportation costs. Rock phosphate may, however, supply sufficient P for good crop growth where soils are moderately acid and where decomposing organic matter is abundant. Application of 1,000 to 2,000 pounds per acre may be necessary for good plant growth if soil test levels for P are low. On fields with high soil tests for P. broadcasting rock phosphate to replace crop removal may be acceptable, but rock phosphate is not acceptable for a starter fertilizer because of its low water volubility. Today, rock phosphate is generally processed before it is used as a fertilizer.

Normal superphosphate (20 percent P2O5), also referred to as ordinary superphosphate, is no longer used in large quantities. Because of its lower analysis and high transportation costs, it has been replaced by concentrated superphosphate (46 percent P2O5,) and the ammonium phosphates. One of the advantages of normal superphosphate was its significant sulfur content. As consumption of this material has slowly decreased, concerns over the need for sulfur have come primarily from the fertilizer industry. Currently, sulfur from the atmosphere is keeping pace with crop removal. Concentrated superphosphate (46 percent P2O5), also known as triple superphosphate, is being used in Michigan in direct application as well as in granulated processes and in bulk blending with other materials. Consumption has decreased in recent years due to the competitiveness of diammonium phosphate (18-46-0) and monoammonium phosphate (11-48-0). These materials have better storage properties and are more desirable for bulk blending, particularly where N is required in the final product.

Diammonium phosphate (18-46-0) is a dry material being used extensively for bulk blending and for direct application where soils do not need K or where K is broadcast. It has the advantage of being highly water soluble, having a high analysis and often a price advantage. Diammonium phosphate has an acid effect upon the soil similar to anhydrous ammonia. Because of the high ammonia content, this material can cause germination injury if used in direct contact with the seed. Monoammonium phosphate (11-48-0) is a dry material being used for bulk blending or direct applications. Monoammonium phosphate has a lower ammonia content and may be less injurious to germinating seeds than diammonium phosphate. The general agronomic effects of diammonium and monoammonium phosphates are equal for most soils.

Polyphosphate differ slightly from the more common orthophosphate feorthophosphate within two weeks. Under cool, dry conditions, hydrolysis may take longer. Some claims have been made that polyphosphate will make certain unavailable micronutrients in the soil more available for plant uptake. Due to the rather rapid conversion of polyphosphate to orthophosphates in the soil, it is not likely that such complexes would be available for any significant length of time. Research at Michigan State University and Kansas State University has shown that micronutrient uptake is not enhanced by polyphosphate materials. The efficiency of polyphosphate is considered to be equal to, but not better than, the orthophosphates with more than 80 percent water solubility.