

## PHOSPHATE.

Phosphoric acid promotes root-formation, causing young plants to root freely, and lays the foundation of a thrifty plant. It builds the framework of a plant, promotes fruiting, and hastens maturity while also increasing the nutritive value of the crops. It is supplied by the following phosphatic fertilizers:—

*Superphosphate.*—On most soils superphosphate is the most effective phosphatic fertilizer when equal amounts of phosphoric acid are compared, but for the full benefit to be received from this fertilizer the soil should contain an abundance of lime. Where sufficient lime is not present the free phosphoric acid combines with iron or alumina, forming more or less insoluble phosphates, and therefore much of the phosphoric acid is lost to the plants it is proposed to benefit. The soils in which applications of superphosphate do not have full beneficial effect are light sands and gravelly soils deficient in lime, peaty soils containing sour humus, and sour soils generally. The effectiveness of this form of phosphatic fertilizer seems to be due to the fact that owing to its solubility when put in the soil, even though it reverts quickly, it is deposited in a very fine state of division throughout the soil in the neighbourhood of the roots of plants. It has a wonderful effect in promoting rapid root-development, and thus is specially valuable to shallow-rooted plants and to short-lived crops that have to develop rapidly. In order to secure a more lasting effect for crops that have a long season of growth it is customary to use a phosphatic mixture of superphosphate and bonedust, two of the former to one of bonedust.

*Basic Superphosphate.*—This is ordinary superphosphate with which has been mixed caustic lime in the proportion of about 15 lb. to 85 lb. of superphosphate. Therefore 100 lb. of basic superphosphate has only the same amount of phosphoric acid as is contained in 85 lb. of ordinary superphosphate. It would consequently be cheaper to apply lime to the soil in autumn and use ordinary superphosphate in spring. Basic superphosphate is useful where liming has been neglected.

*Basic Slag.*—The phosphoric acid in basic slag is not nearly so soluble as that in superphosphate, and slag is on that account not so serviceable in dry soil. It is particularly useful for heavy clay soils where there is a good rainfall or where irrigation water is used. It contains a high percentage of free lime in addition to that combined with the phosphoric acid, and is therefore useful where lime is deficient. It requires from  $1\frac{1}{4}$  to  $1\frac{1}{2}$  cwt. of basic slag to supply the same amount of phosphoric acid as 1 cwt. of superphosphate.

*Bonedust.*—This consists of the bones of animals, and as the calcium phosphate in the bones is in an insoluble form, the fertilizer must be finely ground if the plants are to get much of the phosphoric acid in the year it is applied. Failing this fine state of subdivision the phosphate is but slowly available. It is usually safe to assume that the phosphate is not all used up the season it is applied, especially if the season is dry. Finely-ground steamed bones are good for use on light soils poor in lime, such as sands and gravel. Mixed with superphosphate it forms a lasting fertilizer, the superphosphate coming into use first.