

Triple Super Phosphate (TSP)

Properties of normal superphosphate and triple superphosphate

The formula of triple superphosphate fertilizer, shortly called as TSP, is $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O}$ (43-44% P_2O_5). When it dissolves in water, its phosphorus is negatively charged (-1). While a part of phosphorus content in TSP can dissolve in water, the rest is in ammonium citrate. However both of them are in plant absorbable forms.

The formula of normal superphosphate fertilizer, briefly referred to as NSP, is $3\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O} + 7\text{CaSO}_4$ (18-19% P_2O_5). The letter (N) in NSP abbreviation refers to the word “normal” rather than nitrogen (N) as in the other nitrogenous fertilizers. So there is no nitrogen in NSP.

Agricultural use

NSP and TSP fertilizers are preferred as starter fertilizer for low pH soils in which where tea and hazelnut are cultivated and for areas where high-quality tobacco is grown. It can be used for all plants that are grown in the soils with low or moderate phosphorus availability. When phosphorus is applied less than required or applied phosphorus has low efficiency due to soil conditions, fine root development and plant growth are reduced and as a result of this, yield as well. Especially in winter time, color changes occur in old leaves (firstly appearing). These changed colors are observed as scarlet red and purple. When phosphorus playing important role in energy metabolism of plants is deficient, while yield decreases, quality is corrupted.

Application

As both fertilizers contain calcium (Ca) element, they are used in soils with slightly acidic and acidic pH.

If TSP is used in strongly acidic soils, its phosphorus incorporating with Fe and Al might convert into unavailable forms. In such cases, lime application must be done 2-3 months prior to the fertilizer use and soil pH must be increased up to around 6.5. When used in calcareous soils, the effectiveness of TSP fertilizer decreases.

Chemical effects and functions of phosphorus in NSP fertilizer are similar to that of phosphorus in TSP. However, NSP fertilizer contains nearly 2.5-fold less phosphorus than TSP. Thus, 10 kg TSP fertilizer is equal to 25 kg NSP fertilizer. Another difference is that TSP fertilizer does not contain gypsum (CaSO_4), while NSP fertilizer does. Because of this characteristic, NSP should not be used in calcareous soils.