

## FUTURE DEVELOPMENTS

The phosphate mineral, Fluorapatite ( $3\text{Ca}_3(\text{PO}_4)_2 \cdot \text{CaF}_2$ ), is very insoluble and for this reason, drastic chemical treatment with strong acids (Sulfuric Acid, Phosphoric Acid, or Nitric Acid) is necessary to produce soluble phosphate products. Single Superphosphate (SSP), Triple Superphosphate (TSP), Monoammonium Phosphate (MAP) and Diammonium Phosphate (DAP) are the major products from phosphate rock acidulation. These commercial fertilizers contain highly soluble phosphorus compounds approaching 100% water solubility. Such phosphorus quickly combines with a variety of constituents of a moist soil. Because of the high reactivity of soluble phosphorus, it moves only a short distance (usually less than an inch) from the point of application.

## MANUFACTURE OF SINGLE SUPER PHOSPHATE (SSP)

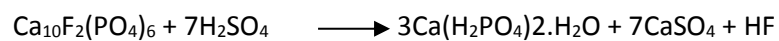
At present entire quantities of Triple Super Phosphate are imported to the country and nearly 75% of them are used in paddy sector. With the energy crisis in the world the prices of phosphate fertilizers are steadily increasing over the years resulting increase in the cost of cultivation adding burden to government. At present about 50,000 mt. Triple Super Phosphate (TSP) is imported at cost of Rs. 1,300 million annually. The government has introduced a subsidy for Triple Super Phosphate in order to give it at a lowered price for Rs. 7,000/- to the farmers to encourage them the more use. The government has to bear a heavy cost about Rs. 1,200/- million per annum for "P" fertilizer subsidy alone.

The contribution of agriculture to the national economy has been significantly dropping due to various socio economic factors and the increased fertilizer prices are one such. Manufacture of soluble phosphate fertilizer to cater to agricultural sector can improve this situation by providing a low cost phosphate fertilizer while at the same time as an effective import substitution saving Rs. 1,300 million yearly and further in coming years. To produce more soluble phosphate fertilizers there are several technologies such as treating with strong acids like sulphuric, nitric or phosphoric or fusing with sodium carbonate or phosphoric acid treating with ammonia. Out of these known processes manufacture of Single Super Phosphate (SSP) is the most suitable and economical process that very much appropriate for the developing country like ours since other processes need sophisticated technology and the higher capital. "Mahinda Chinthana" forwarded by His Excellency the President Hon. Mahinda Rajapaksha has recognized considering the above manufacture of Single Super Phosphate fertilizer as a potential industry.



Field Trials

Single Super Phosphate (SSP) also called ordinary super phosphate or acid phosphate is the oldest chemical fertilizer. It was first manufactured in far back 1840s about 160 years ago. But it has a clear demand and only in the recent past it lost its first place among the phosphate fertilizers. Single Super Phosphate has very high demand in Australia, China, New Zealand, Pakistan and Vietnam. SSP had dominated world phosphate market and had over 60% market share as late as 1955. There after its important had declined steadily because the introduction of high analysis phosphate fertilizers such as Triple Super Phosphate, Mono Ammonium Phosphate and Di Ammonium Phosphate. These phosphate fertilizers have higher amount of soluble phosphate than the SSP per unit. It should be noted that though there is a trend, SSP retains 25-30% of total phosphate fertilizer production in the world. Therefore, SSP is still supposed to be an important phosphate fertilizer and is likely to remain so. One reason for its long tenure is ease of manufacture. All that is necessary is to mixed ground rock phosphate fertilizer with sulphuric acid and wait until the mixture sets into a solid. The main overall chemical reaction is as follows.



(Figure – 37 Manufacture of Single Super Phosphate)

The reaction proceeds in two stages basically. First sulphuric acid reacts with a portion of the rock phosphate available and form phosphoric acid ( $\text{H}_3\text{PO}_4$ ) and Calcium Sulphate ( $\text{CaSO}_4$ ) the second reaction, the phosphoric acid react with more phosphate rock and form mono calcium phosphate ( $\text{Ca}(\text{H}_2\text{PO}_4)_2$ ). The two reactions take place concurrently but first reaction is completed rapidly while the second reaction continuous for several days or may be a few weeks.

One of the main advantage of manufacturing of SSP is the process is not sophisticated and it requires little technical know how and skills. The capital investment is very nominal and it can be done for less than 10% of the cost of manufacturing the other soluble phosphates. The fertilizer effectiveness of SSP in fact is unquestioned and has been used as an effective source of P fertilizer for annual crops for centuries. SSP is enabling to supply to other nutrient elements other than phosphorus that is sulphur and calcium. There is a deficiency of sulphur in the most of paddy lands. Where both phosphorus and sulphur deficient soils, SSP will be the most economical fertilizer to enrich their fertility.