



**Centurion**  
**UNIVERSITY**  
*Shaping Lives...  
Empowering Communities...*

# **Manures , Fertilizers and Soil Fertility Management**

## **07. Phosphatic fertilizer**

**Edited by Monisankar Bera**



Centurion  
UNIVERSITY

## 07.1 Phosphate Rock

- Formula for rock is  $\text{CaF}_2 \cdot 3\text{Ca}_3(\text{PO}_4)_2$  or  $\text{Ca}_{10}\text{F}_2(\text{PO}_4)_6$  – Tri calcium phosphate. Its chemical name is 'Fluorapatite'
- This compound is totally insoluble in water. Its trading is done by the name of 'Bone phosphate of lime' (BPL)
- Grounded rock is directly applied on acidic soil, but out -put is not good. The rock is made water soluble by treatment of acid.
- Rock is used for manufacture of,
  - i. Fertilizers,
  - ii. Phosphoric acid,
  - iii. Super phosphates,
  - iv. Phosphorus, and phosphorus compounds.



## 07.2 Phosphatic Fertilizers

- Phosphate Fertilizers The best use of phosphate rock is in the manufacture of single and triple super phosphates and other phosphate derivatives including phosphoric acid.
- The acidulation of phosphate rock to produce super phosphates has been the most important method to make phosphate available for fertilizer purposes
- The phosphate rock formula is  $\text{CaF}_2 \cdot 3\text{Ca}_3(\text{PO}_4)_2$  and overall reaction is as follows,
- $\text{CaF}_2 \cdot 3\text{Ca}_3(\text{PO}_4)_2 + 7\text{H}_2\text{SO}_4 + 3\text{H}_2\text{O} \rightarrow 3\text{CaH}_4(\text{PO}_4)_2 + \text{H}_2\text{O} + 2\text{HF} + 7\text{CaSO}_4$  (mono calcium phosphate)

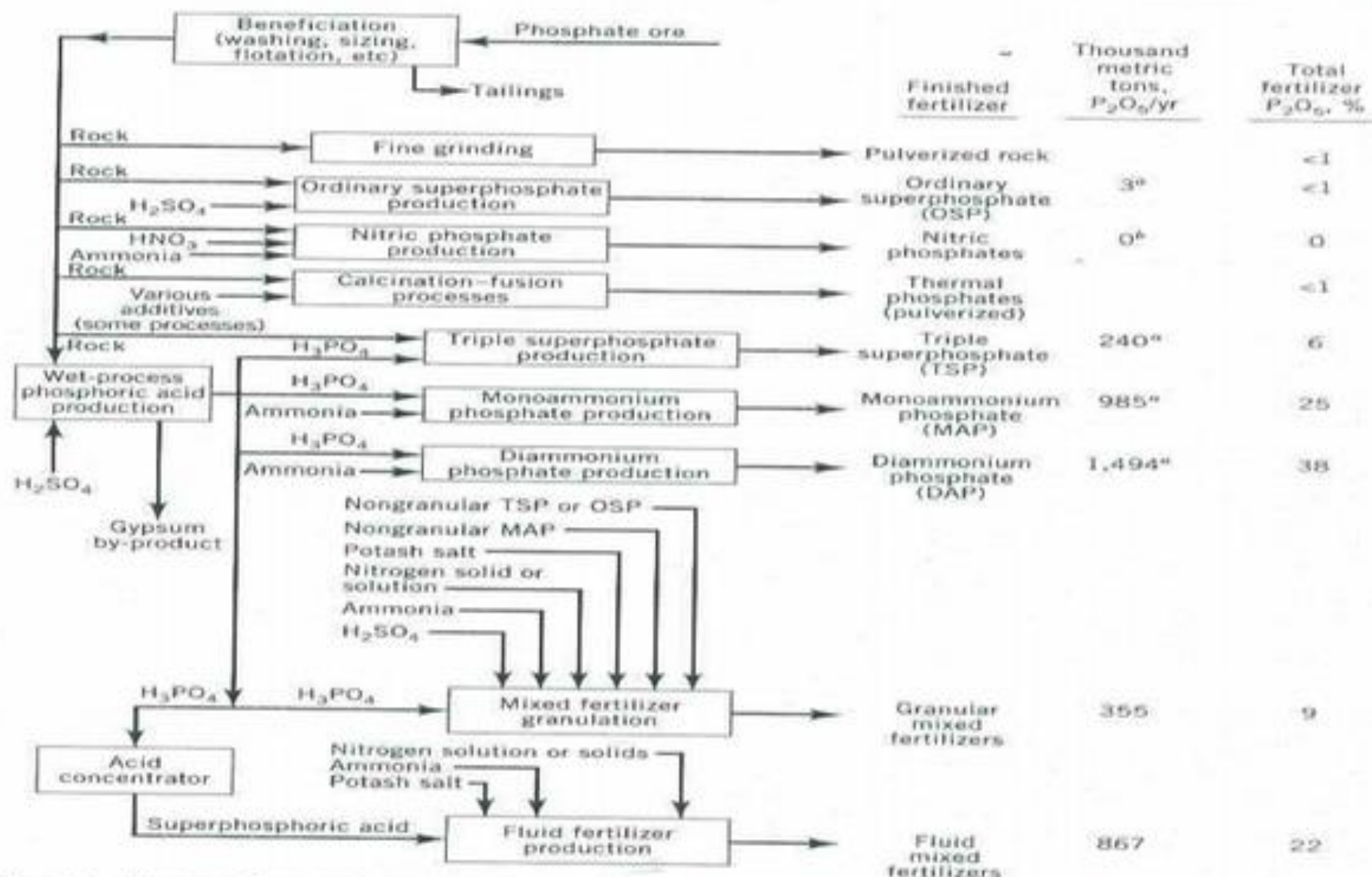


Fig. 7. Routes for making finished fertilizer from mineral phosphate. Consumption data are for year ending June 30, 1990 (5). <sup>a</sup>Includes quantities applied in dry blends; <sup>b</sup>significant quantities are made and used in some foreign countries.



Centurion  
UNIVERSITY

S  
E

## 07.3

# Super phosphate [ $\text{Ca} (\text{H}_2\text{PO}_4)_2$ ]

This is the most important phosphatic fertilizer in use.

It contains 16 Per cent  $\text{P}_2\text{O}_5$  in available form.

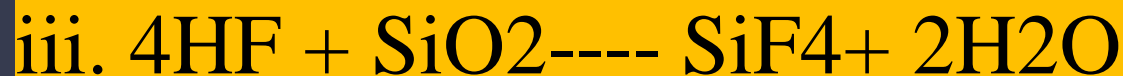
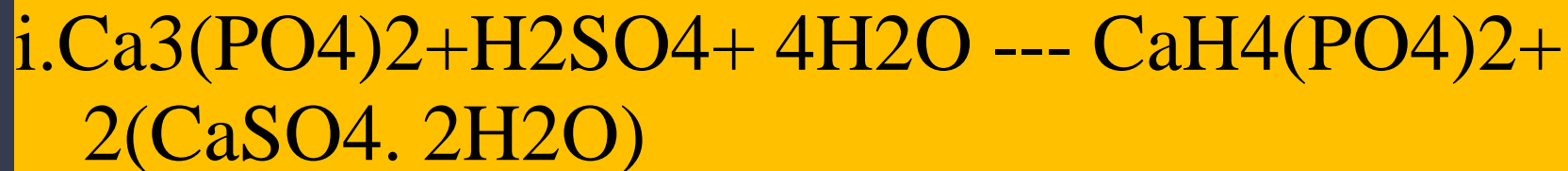
It is a grey ash like powder with good keeping or storage qualities.

Phosphatic fertilizer hardly moves in the soil and hence they are placed in the, root zone.



## 07.4 Single super phosphate

The rock is acidulated with acid ( $\text{H}_2\text{SO}_4$ ) to produce SSP. Insoluble phosphorus is made soluble in water for plant. The stage wise reactions are;



An excess of  $\text{H}_2\text{SO}_4$  is used by the impurities present in the phosphate rock like  $\text{CaCO}_3$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$  and  $\text{CaF}_2$ . +  $\text{SiO}_2$



Centurion  
UNIVERSITY

## 07.5 Triple super phosphate:

The concentrated super phosphate is called as Triple super phosphate and it contains 46 per cent  $P_2O_5$ .

This fertilizer is suitable for all crops and all soils.

In acid soils, it should be used in conjunction with organic manure.

It can be applied before or at sowing or transplanting.



Centurion  
UNIVERSITY

Shaping Lives...  
Empowering Communities...

## 07.6 Phosphorus Fertilizer Placement

- P fertilizer may be broadcast on the soil surface (liquid or dry) or it can be placed in a concentrated band
- There may be advantages to banding, including—  
Early crop growth enhancement— Concentration of P to minimize soil contact and reaction— Placement in the root zone





Centurion  
UNIVERSITY

## 07.7 P Fertigation

- P fertilizer is sometimes applied with irrigation water, although not as commonly as N
- P fertigation requires special consideration of fertilizer properties and water chemistry
- It can cause system plugging and fouling by reacting with— Calcium— Magnesium— Ammonium— Iron
- Successful P fertigation requires careful planning!



**Centurion**  
**UNIVERSITY**

*Shaping Lives...*  
*Empowering Communities...*

**Thank you**