1. Detection of phosphorus deficiency

- Crop plants are stunted (slow growth compared with plants with sufficient P)
- Maize leaves are coloured reddish-purple
- Soil analysis shows that the amount of phosphorus in the soil is less than 20 mg kg⁻¹ P (Bray II test) or less than 30 mg kg⁻¹ P (Olsen test)
- Presence of indicator plants

- Crops deficient in phosphorus have poor root systems that result in:
  - Delayed and retarded growth
  - Stunted roots resulting in poor nutrient uptake
  - Poor drought tolerance
  - Poor anchorage

2. Effect of phosphate fertilizer on crops grown on phosphorus deficient soil

Without phosphate fertilizer

With phosphate fertilizer

Soybean

Maize

3. Prevention of phosphorus deficiency

- Install soil conservation barriers.
- Retain crop residues in field or apply farmyard manure (10-15 tonnes per hectare) each cropping system.

4. Correction of phosphorus deficiency?

- Use phosphate fertilizer
  - Common phosphate fertilizers include TSP (46% P₂O₅), SSP (20% P₂O₅), rock phosphate (30% P₂O₅), DAP (18% N, 46% P₂O₅)
  - TSP is a fast acting soluble fertilizer
  - SSP is a fast acting soluble fertilizer that also contains sulphur (10%)
  - DAP is a fast acting soluble fertilizer that also contains nitrogen (18%)
  - Rock phosphate is slow acting sparingly soluble fertilizer
  - Compound fertilizers usually contain phosphate
  - Apply 30-50 kg P per hectare equivalent to:
    - 120-200 kg per hectare of TSP or DAP
    - 200-400 kg per hectare of SSP
    - 300-600 kg per hectare rock phosphate
- If soil pH is low (<5.5) it may be beneficial to apply lime (2-5 tonnes per hectare).
- Is phosphate fertilizer use economic?
  - Calculate the fertilizer response (output:input ratio)
  - Assess the ratio of input to output prices
  - Calculate the value:cost ratio
  - Calculate the net returns (value:cost ratio)