Technical guide
2024 | SysCom Kenya

Phosphate rock management for phosphorus enrichment in acidic soils

For use by extension personnel and farmers in Muranga and Tharaka-Nithi counties, Kenya

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Phosphorus (P) is the second most essential nutrient required by plants after nitrogen.

It plays vital roles in plants:

- Stimulates root development
- Increases stalk and stem strength
- Improves flower formation and seed production
- Enhances earlier crop maturity
- Increases plant resistance to diseases and improves crop quality

Phosphorus is deficient in most acidic soils of Kenya. These acidic soils are commonly found in tea and coffee growing zones.

Identify phosphorus deficiency by checking

- Young leaves which turn dark green and develop purplish veins on the underside
- Older leaves develop a purplish color and the tips die back
- Leaves become curled, distorted, smaller, and drop prematurely

Phosphate rock as a source of phosphorus for organic farming

Phosphate rock (PR) is a naturally occurring mineral and a primary raw material for phosphorus fertilizers.

Why phosphate rock?

- It's a cheap source of phosphorus especially for organic farming systems
- In Kenya, phosphate rock is available from local agro-dealers

The mineral is packaged in 50 kg bags and labeled as Organic Hyper Phosphate. 1 kg of PR contains 122 grams of phosphorus.

Granulated phosphate rock

Why dissolve phosphate rock?

Phosphate rock exists as a hard rock with very low solubility. This reduces the amount of phosphorus available to crops when it's applied to soils. Dissolving phosphate rock before applying is recommended for short-term crops (crops that take 3-5 months to grow and produce).

Avoid: Direct application of powdered phosphate rock is not recommended.

Do: Dissolve powdered phosphate rock in citric acid solution before applying.

Phosphate rock is dissolved in acidic materials/solutions such as citric acid powder or lemon juice from lemon fruits. Note: Citric acid is allowed in organic farming.

Commercial citric acid powder

Lemon fruits

Dissolving 1-kilogram phosphate rock with citric acid

- To dissolve 1 kg of phosphate rock, prepare 5 liters of citric acid solution or squeezed lemon fruit juice
- Weigh 250 grams of citric acid powder and put it in a bucket
- Add 5 liters of water and stir until citric acid is completely dissolved
- Weigh 1 kg of phosphate rock and add in the citric acid solution
- Stir the mixture for 1 minute
- Apply the phosphate rock solution to your crops on the same day

How much phosphate rock should I apply?

- Analyze your soil to know amount of phosphorous available
- Use the recommended/required amount of phosphorus-based on crop being grown e.g., maize (27.5 kg P/acre), beans (27.5 kg P/acre), cabbages (25.9 kg P/acre), potatoes (40.5 kg P/acre)

Should I split phosphate rock application?

- Apply half of the phosphate rock dissolved in citric acid solution during planting after compost/ manure application
- Apply the remaining half at two weeks after crop emergence, or 5-leaf stage

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