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Present status and future trend of phosphate industry in Sri Lanka

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Present Status and Future Trend of Phosphate Industry in Sri Lanka

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Introduction

• Phosphorus is an essential nutrient required by all crops and animals for their living

• It is a non-renewable and a dwindling resource worldwide

• Phosphate deposits worldwide are getting depleted drastically

• Available high quality deposits will be depleted in 50 years and the reserves in 150 years (Herring and Fentel, 1993)
At the first glance: Phosphorous use in Sri Lanka

- Triple Super Phosphate (TSP) is the commonest fertilizer used in Sri Lanka
  - Annuals/ Food crops (Rice, OFC, Vegetables etc.)
  - Perennials/Plantation crops (Tea, Rubber, Coconut, Minor export crops etc.)

- Annual TSP requirement is about 164,000 tons (NFS, 2022)

- Requirement is met by importation from various countries

- Cost of importation is about 177 Mn US$/ annum

- 78% of total import used for Major food crops
  - Nearly 37% used in paddy sector
  - 41% used in fruits & vegetables
Apatite deposits

- In Sri Lanka, two apatite occurrences have been discovered in Eppawala and Ridigama.
- It is a valuable Phosphate deposit with a very high Phosphorous percentage of 33%-40%.
Eppawala Apatite deposit

- Located in Anuradhapura District, North Central Province of Sri Lanka
- Within a region of high grade igneous rock phosphate deposit
- The rock phosphate deposit covers an area of approximately 324ha of land
Eppawala Apatite...

- Pale blue mineral
- Contains phosphate crystals and rocks
- Rocks are covered in red brown earth and occasional vegetation
Eppawala Apatite...

- The Eppawala phosphate deposit is currently estimated to contain about 60 million metric tons of apatite
  - Northern area has 40 MMT and Southern has 20 MMT

- The Phosphate deposit classified as a valuable, high grade deposit
  - contains 33%-40% of Phosphorous as P2O5
  - one of the ten lowest Cd containing deposits out of 414 phosphate deposits of the world
  - One of the richest and unique apatite deposits in the world

- Sustainable use of phosphate reserve will ensure providing raw material to produce soluble phosphate fertilizer for at least **200 years**
Quality of Eppawala Apatite

• Chemical analysis of the Eppawala deposit shows a concentration of 40.57% P2O5 for the apatite crystals and 33.24% for the matrix

• Solubility is very low
  • Water solubility – 0.5%
  • Citric acid Solubility – 6%

• Eppawala apatite has more Chlorine than Fluorine

• High Iron and Aluminum compounds contain in rock phosphate
Usage of Eppawala deposit

Although it is a valuable asset has it yet been fully utilized???

- Production of ERP fertilizer began in 1974

- Commercial utilization of ERP commenced in 1979 with the sale of 3000 mt and now it has come to 60,000mt/annum

![Graph showing RP Imports (mt.) from 1995 to 2003. After 2003, no importation of RP.]
Usage of Eppawala deposit …

Although it is a valuable asset has it yet been fully utilized ???...

• Plantation crop sector is self sufficient in local phosphates
  – Powdered form of this rock is being used to fulfill the phosphorus requirement of perennials such as tea, rubber, coconut and spice crops such as pepper, coffee etc.

• This deposit is not suitable for short term crops due to its low solubility

• So far, 2.6M mt of phosphate ie. around 3% of the reserves were utilized
Usage of Eppawala...

- **What action can be taken to reap the full benefit of national asset**

- After a long term comprehensive research, DOA has suggested Single Super Phosphate (SSP) fertilizer as an equally efficient phosphate fertilizer as TSP for rice

- Therefore, it was suggested to convert ERP to a soluble form such as SSP or TSP through chemical process

- The composition of this deposit with high chlorine content cause to corrosion problems during manufacture

- It unsuitable to produce phosphoric acid that used to make Triple Superphosphate (TSP) and ammonium phosphate

- Due to the high Iron and Aluminum compounds contained in rock phosphate, SSP production is more suitable than TSP production
Production of SSP using apatite from Eppawala deposit

• Achieving the objective of production of soluble phosphate fertilizer for short term crops results in:
  – Achieving self sufficiency in phosphate fertilizer
  – Saving valuable foreign exchange of about 177 Mn US$/ annum
  – Generation of Employment
  – Sulphur added to the soil
  – Fertilizer subsidy reduced
  – Cheaper fertilizer to the farmer
  – Crop productivity increased
Current status

• Cabinet has approved to produce SSP from Eppawala Rock Phosphate in 2020

• The production target is to replace the current imports of TSP with nearly 220,000 tons of SSP annually

• Exploration of the Eppawala Rock Phosphate deposit has been carried out by the Geological Survey and Mines Bureau
  – necessary preliminary studies have been completed

• Evaluation of submitted proposals for Phosphate production
The estimated cost of the production plant is 3.6 mn USD
GSSP Fertilizer Manufacturing Process

1. ERP
   - ERP Feeding to bucket elevator
   - Ball Mill
   - Vibro Sieve
   - Weigh Belt Feeder

2. Water
   - Dilution tank

3. Sulfuric acid

4. Pre-mixture
   - Mixture reactor
   - Belt DEN
   - DEN cutter
   - SSP curing store

5. Gas Scrubber
   - Granulator
   - Dryer
   - Cooler
   - Bulk storage
   - Filling and Packing
   - Finished good warehouse
   - GSSP 50kg bags

6. Stack
Future Trend

• Value addition to the locally available Eppawala rock phosphate has an important role to play in agricultural production

• The GOSL intend to call for Expression of Interest (EOI) for Public Private Partnership to manufacture SSP / TSP

• Nano technology ....
Summary

• Producing locally made phosphate fertilizer will have a direct benefit to the Economy of the country

• Rate of exploitation of this deposit should be carefully controlled

• Investors for Public Private Partnership to manufacture SSP/TSP is expected
Thank you