

## LOCAL PRODUCTION AND APPLICATION OF PHOSPHATE FERTILIZER

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### Phosphate Fertilizer

The element phosphorous was discovered by the German physician and alchemist, Henning Brandt in the 17th century. Since then it was extracted from animal urine and bones until the 19th century, by which time the agronomic usefulness of phosphorus was established. With this world production from the earths crust in the form of phosphate rock grew to more than 100 million tons per year. It is expected to reach 200 million tons by the year 1990.

Due to low water solubility of Phosphate Rock its direct application as a fertilizer is only limited to few crops. Sulphuric acid has been the major ingredient used for solubilizing the phosphate rock. Single Super Phosphate (SSP), Triple Super Phosphate (TSP) and Diammonium Phosphate (DAP) are the leading phosphorus inputs in NPK fertilizer mixtures.

### Phosphate Rock - Global Scene

Total identified resources of Phosphate Rock in the world are estimated to be about 87 billion tons, out of which 65.5 billion are of sedimentary phosphorites, 8.6 billion igneous apatites and 13 billion from offshore deposits.

Total worlds production capacity stands at 180 million tons. During the year 1985 only 150 million tons were

produced and only 47 million entered the international trade. Africa exported 30 million tons and the USA contributed 10 million tons. The balance came from Europe 4 million tons and Oceania 3 million tons.

deposit economic are the size of the deposit, geographic location, geologic setting, physical characteristics of the deposit and the other chemical constituents present in the deposit.

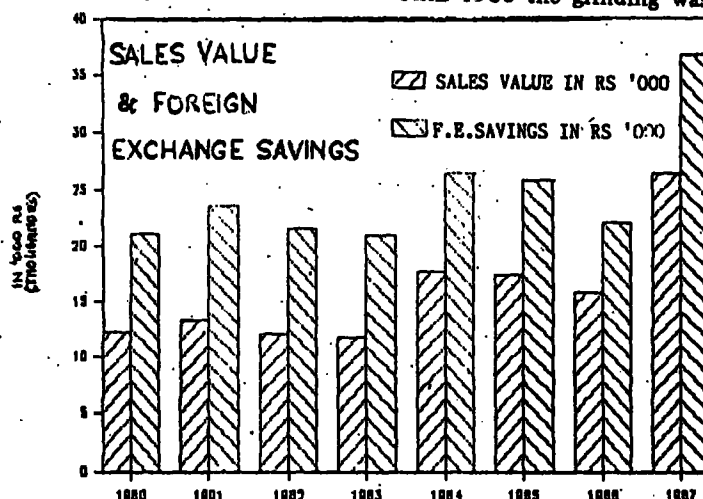
### Eppawela Deposit

A phosphate rock deposit of igneous apatite type was discovered in 1971 at Eppawela in the NCP by the Geological Survey Department. This deposit has a firm reserve of 30 million tons of phosphate rock with an average of 38%  $P_2O_5$ . The inferred reserves are in the region of 60 million tons. Even though the  $P_2O_5$  content is high, the

acid solubility is low at 2% acetic acid solubility. Its conversion to Super Phosphate is difficult due to high chloride content (1%) and the high Al and Fe contents.

### Local Production

At present the apatite rock is mined in an open cast mine using small charges of explosives. These rocks are crushed in primary and secondary crushers before ground to -100 mesh BSS. Until 1980 the grinding was done us-



ing locally fabricated ball mills. In an effort to increase the production the SMMDC acquired a five Roller Raymond Mill in 1981. Since then Eppawela Rock Phosphate production has been gradually increasing to the present 25,000 MT per annum.

### Application of Local Rock Phosphate

Eppawela Rock Phosphate is mainly used in the fertilizer mixtures of Tea, Rubber and Coconut. During 1987 the Tea sector used Eppawela Rock phosphate for 73% of its phosphorus fertilizer requirements even though 100% application of Eppawela Rock

Table - 1.  
Production & Sale of Eppawela Rock Phosphate

Year	Production MT	Sales MT	Sales Value in Rs.000	Foreign Exchange Savings by displacing IRP in Rs.000
1980	14,075	13,993	12,188	21,130
1981	15,407	15,223	13,259	23,600
1982	14,083	13,862	12,074	21,490
1983	15,723	13,494	11,753	21,000
1984	13,677	15,539	17,670	26,420
1985	17,222	15,118	17,386	25,700
1986	14,969	13,793	15,862	22,070
1987	21,236	22,963	26,407	36,740

Table - 2.  
Annual Substitution of Local Rock Phosphate for Imported Rock Phosphate

Year	Tea Sector		Rubber Sector	
	Actual %	Recommended %	Actual %	Recommended %
1982	75	100	39	50
1983	63	100(excluding	37	50
1984	65	100)nursaries	43	50
1985	58	100	35	50
1986	57	100	37	50
1987	73	100	36	50-100 (in July 87)

Source: National Fertilizer Secretariat

Phosphate has been recommended except for nurseries. In the rubber sector 36% of Eppawela Rock Phosphate was used while the recommendation was 50%. In 1988 the Rubber Research Institute recommended 100% usage in the Rubber sector. The rest of the  $P_2O_5$  came from the Rock Phosphate imported from Egypt, Christmas Island and Israel.

#### Beneficiation

The conventional method of solubalising Rock Phosphate is to convert it to Super Phosphate such as Single Super Phosphate and Triple Super Phosphate. Although this method is widely used, for a country such as Sri Lanka, Super Phosphate production can be very costly due to the necessity of importing Sulphur. The presence of high levels of chlorides in Eppawela Rock Phosphate makes the processing plant expensive as it has to be resistant to corrosion.

A product known as Partially Acidulated Phosphate Rock has been developed where the Phosphate Rock is treated with only a portion of the acid required to fully convert the insoluble phosphates to the water soluble form. In this process the Sulphur requirement is about half that of Single Super Phosphate.

A group of local Scientists headed by Prof. Keerthi Tennekoon of the Institute of Fundamental Studies has patented a process of acidulating apatite

with Hydrochloric Acid. The reaction products are mixed with Ammonium Sulphate to yield a non Hygroscopic product containing, almost all phos-

phorous in a water soluble form. If this process can be adopted in industrial scale the resultant fertilizer will be this process can be adopted in industrial scale the resultant fertilizer will be much cheaper than Single Super Phosphate.

A Polish team of Scientists have developed a process where finely ground Rock Phosphate is mixed with elemental sulphur and the mixture is inoculated with a sulphur oxidising bacteria solution. They claim that this process has several benefits such as requiring less expensive raw materials like non refined sulphur and cheap rock phosphates high in chlorides.

The State Mining & Mineral Development Corporation is presently studying the above process in detail with a view to adopting one of these methods for beneficiating Eppawela Rock Phosphate.

YEAR	RUBBER		COCONUT		TEA		OTHERS	
	IRP	LRP	IRP	LRP	IRP	LRP	IRP	LRP
1962	10.7		11.9		18.0		10.4	
1963	10.5		12.7		19.4		10.4	
1964	10.1		13.4		20.8		9.6	
1965	8.9		16.0		18.4		10.0	
1966	8.5		17.4		15.0		10.9	
1967	7.4		16.5		12.4		11.7	
1968	6.0		15.5		14.0		11.8	
1969	7.6		14.8		12.4		12.6	
1970	7.7		15.9		12.2		12.6	
1971	6.5		14.5		13.8		12.5	
1972	4.4		9.6		18.3		9.0	
1973	5.5		9.7		11.1		11.2	
1974	3.1		7.9		7.6		7.8	
1975	3.6		5.3		12.7		5.4	
1976	5.0		6.1		11.0		10.7	
1977	2.3		5.5		15.1		5.8	
1978	3.9		7.8		20.6		7.8	
1979	5.7	2.9	10.6	0.7	9.6	4.3	7.5	
1980	7.0	1.4	14.3	1.7	8.5	5.1	6.5	0.9
1981	3.0	2.7	6.6	1.4	3.2	10.4	8.8	0.1
1982	4.3	2.6	7.0	1.3	3.1	9.9	4.8	0.8
1983	5.0	2.6	8.6	0.7	5.7	8.7	4.3	0.
1984	5.4	3.7	13.2	1.1	6.4	10.6	8.5	0.4
1985	7.0	3.5	11.6	0.1	7.6	9.6	7.4	0.6
1986	7.5	4.2	9.2		6.9	8.5	4.2	0.1
1987	6.8	3.4	9.8	1.5	5.5	13.6	4.0	1.2

Source: National Fertilizer Secretariat

#### PRODUCTION & SALES OF ERP

