The Bechtel Plan for Fertilisers

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IT has been shown by many experimenls and the experience of difference countries that, of all the input factors in agriculture, the one which gives the quickest and most lasting results is fertiliser. The aggiegate requirement of fertilisers in the Fourth Plan on the basis of the estimates of the different States his been put at 6.5 million tonnes of plant nutrient per year 1970.71. However, considering the many limitations which make production of this order impractical the Planning Commission has proposed a target of 3.35 million tonnes for 1970-71, consisting of 2 million tonnes of nitrogen, 1 million tonne of phosphorus and 0.35 million tonne of potassium. How modest this target is can he seen from the fact that if we are to reach the level of fertiliser consumption in developed countries like UK, Japan and West Germany, (ie, about 100 lbs of plant nutrient per acre), the total output of fertilisers would have to be at least 6 times the pro. posed Fourth Plan target. Against this all the plants which arc now under production as well as those which are under construction will not yield more than 0.77 million tonnes of nitrogen by the end of 1968. There will thus remain a wide gap which will have to be filled if the Planning Commission's very modest target: is to be achieved.

A consortium of Western private industries styled as the Bechtel Corporation has shown interest in a massive fertiliser production programme by establishing five plants of standardised design which will produce approximately 3.5 million tonnes of chemical fertiliser per year containing L79 million tonnes of plant nutrient in collaboration with the Government of India. The consortium had submitted a feasibility plan *to* the Union Government early this year and discussions on it have been going on between the Bechtel Corporation and the Government.

In its report the Bechtel Corpora. tion has suggested that the proposed output of 1.79 million tonnes of plant nutrient should consist of 1 million tonnes of nitrogen (N_2) and the rest of phosphorus (P_2O_5) and potash (K_20). The individual capacity per plant has been suggested at 200,000 tonnes of nitrogen per year. Plants of this size have satisfactory operation characteristics and favourable economics. Besides, building a series of large plants of standardised design and operating characteristics will yield saving in capital, operating costs and engineering and will reduce substantially the construction time. There will also be advantages from the point of view of purchase of raw material and spare parts and establishment of operator training facilities.

The Bechtel Plan has selected urea as the most satisfactory compound for supply of nitrogen to the soils. Urea has been preferred by the Fertiliser Corporation of India also as the most suitable nitrogenous fertiliser for our soil, especially for paddy crops, It contains about 46 per cent nitrogen and can be used straight or mixed with other fertilisers.

Raw Materials

Diammonium phosphate is recommended as the phosphatie blending constituent or for direct *use.* It is a more recent type of mixed fertiliser and has a very high phosphorus con. tent, i e, 46 per cent of P.,0. and 18 per cent of nitrogen, yielding a total of 64 per cent plant nutrients. The manufacturing technology based on ammonia and phosphoric acid has been well established. The advantage of diammonium phosphate over othe-fertilisers is that besides having a high concentration of plant nutrients it can be blended with other fertilisers according to the requirement of the soil and can be easily handled, being solid.

The principal processing units proposed by the Bechtel Plan will perform the following functions: The 760 ton per day ammonia plant will produce nitrogen as ammonia and carbon dioxide as a separate co-product. Both of these materials will be required as feedstock to the area plant. Ammonia will also be supplied for the diammonia phosphate production. The urea plant will combine ammonia and carbon dioxide under high pressure to produce 1,070 tons of urea per day. The sulphuric acid plant will provide 840 tons per day of 100 per cent sulphuric acid whi:h, in treatment with rock phosphates, will produce phosphoric acid. The production of phosphoric acid will be 310 tons per day of equivalent P_2O_5.) In the granulation plant, phosphoric acid will chemically combine with ammonia to form diammonium phosphate. Urea and potassium chloride will be mixed and granulated with the diammonium phosphate to produce a 20:20:10 grade complex fertiliser or other formulations as desired. This urea-diammonium phosphate product when coated has good storage life and can be applied easily by the cultivator.

The main raw materials required for the production programme are: (a) surplus naphtha from refineries and other petroleum feedstock for the production of ammonia; (b) sulphur for the production of sulphuric acid, and (c) rock phosphate for the production of phosphoric acid. According to the tentative programme for the Fourth Plan, total refinery throughput of 11 existing and proposed restneries will be about 29,260,000 tonnes by 1970-71. This will involve an approximate foreign exchange outlay on imports of about Rs 144 crores or some 10.6 per cent of our total imports. By 1971 estimated production of gasoline wilt be about 4,780,000 tonnes, while the demand for motor spirits and aviation gasoline will be 1,458,000 tonnes. Naphtha for the petrochemical projects will account for 100,000 tonnes, for blast furnace injections 200,000 tonnes and for export and J P 1,427.000 tonnes. This will give a surplus of 1,595,000 tonnes for fertiliser production. This quantity along with available refinery gases will be more than sufficient to produce nitrogenous fertilisers equivalent to 1 million tonnes of nitrogen. No further import of crude, therefore, will be necessary.

The demand for sulphuric acid in 1965-66 is estimated at 1,195,000 ton. nes and in 1970-71 at 1.980,000 tonnes. The major part of this will come from the fertiliser industry. All production today is based on imported sulphur. Imports of sulphur are expected to amount to more than Rs 175 million by 1970-71. Production of sulphuric acid by the pyrites process is well known in the West. In India we have been contemplating on adopting this process for a long time, We have

large deposits of iron pyrites at Amjore in the Shahabad district of Bihar State. The recent estimate of the Geological Survey of India indicates a total reserve of 1,000 million tonnes spread over an area of 48 sq miles. A sulphuric acid plant based on iron pyrites is already in operation in the Sindri fertiliser factory. To save foreign exchange production of sulphur from pyrites must be expanded. At least two of the five units proposed by the Bechtel Corporation could be based on iron pyrites as raw material for sulphuric acid.

Cost Estimates

Almost all the rock phosphates needed for production of phosphatic fertilisers are at present imported. Total import in 1965-66 is estimated at 1,410,000 tonnes valued at Rs 136 million. Estimated demand in 1970-71 will be 4,260,000 tonnes valued at Rs 375 million. Phosphatic rocks are known to exist in the Singbhum district of Bihar and in Tiruchirapally in South India. Rocks from these sources could be used after a certain amount of benefication. Prospecting for phosphatic deposits has been going on in the sea-coast of Andhra and on the Arabian sea coast. Sea muds containing phosphatic rocks could be used after benefication as raw material for phosphoric acid production.

Bechtel Corporation has estimated the total cost of its massive fertiliser programme at Rs 202 crores which amount is distributed under different heads as shown in the Tabic, Considering present Availabilities of supplies in India, the Bechtel Corporation expects that some 54 per cent of the total expenditure would be in foreign currencies as indicated below:

	Rupee expenditure (per cent)	Foreign Currency Expenditure (per cent)
(1) Facility construction	48	52
(2) Initial materials and services for operation	35	65
(3) Total	46	54

The above proportions appear to have been changed to some extent in recent negotiations. From press reports it seems that the Ministry of Petroleum and Chemicals is of the opinion that the Bechtel Corporation's cost estimates are on the high side compared to the estimated cost of Rs 35 crores of the Durgapur plant designed to produce 125,000 tons of nitrogenous and 108,000 tons of phosphatic fertiliser annually. The fixed capital cost could perhaps be reduced to some extent by utilising more of indigenous production of heavy machineries as has been done by F A C T and the Fertiliser Corporation of India which has designed and constructed the new fertiliser plants at Namrup and Korba. The working capital costs could also be reduced by rationalising the price of surplus naph. tha and using more indigenous raw materials, the possibilities of during which have been discussed above. In this connection it is worthwhile mentioning that the price of surplus naphtha at the refinery was calculated at Rs 70 per ton by the Kane Committee Report on Petro-Chemicals; this was increased to Rs 80 per ton in the Hen. ny Report and the latest estimate of the Petro-Chemical Committee of the Planning Commission is Rs 90 per ton. The price of naphtha is directly based on the price of petroleum crude. In spite of the high cost estimates, however, the Bechtel Corporation expects that their plants will work economically at the present level of fertiliser prices.

The Bechtel Corporation report lays great emphasis on the marketing and distribution of fertilisers. It suggests a vigorous sales and marketing organisation employing 3,000 qualified agricultural personnel to demonstrate the usefulness of chemical fertilisers to cultivators. Credit is an import element in the marketing programme. The report estimates the credit needs of the proposed fertiliser programme at between Rs 80 crores and Rs 140 crores, depending upon the availability and utilisation of present credit sources In addition, about 17 crores will be required for initial market development.

Table: Distribution of Cost of the Five Fertiliser Plants

Head	
(1) Processing units including ammonia plant, urea plant, acid plants and granulator facility	97,82,00,000
(2) Non-processing facilities including raw material receiving, handling and storage facilities, power generation, water supply and recovery, steam supply, site development, fencing and general plant facilities, administration, building, shop, maintenance warehouse laboratory, cafeteria and the like	59,33,00,000
(3) Housing facilities for plant stiff	9,51,00,000
(4) Special facilities as required at specific plant sites, mainly wharves and ship unloading systems	4,21,00,000
(5) Cost of land	1,35,00,000
Sub-total Fixed capital	172,22.00,000
(6) Pre-production costs including start-up and training costs and initial charges of catalyst, etc, and owner's cost during construction	9,36,00,000
(7) Working capital including allowance for spare parts, 30-day storage of raw materials, interest during construction, insurance during construction, etc.	20,72,00,000
Total estimated capital requirement	202,30,00,000

Larsen and Toubro

LARSEN AND TOUBRO has ad-Jed two more activities to its already vast repertoire. It has been appointed all-India selling agents for the products of the Traco Cables Company. It has also been awarded the contract to contruct, on a turn-key basis, the Atomic Energy Establishment's Radiological Laboratory at Trombay.

Traco Cables, which is a Kerala Government project, started production early this year and is estimated to produce goods worth Rs 60 lakhs during its first year. This would be d tubled in the second year. Among the company's products are all sizes of low tension PVC insulated cables and wires and heavy duty cables rated at 1100 volts. Larsen and Toubro is confident that the new company's products will be well received in the market.

Atomic Energy Establishment's Radiological Laboratory, which will be constructed by Larsen and Toubro with the aid of a Danish engineering firm, is estimated to cost about Rs 3 crores. The laboratory will include 'hot cell' facilities and when complete will be the largest of its kind in Asia. Larsen and Toubro's contract covers civil works and fabrication, supply and erection of piping, air conditioning, electrical and other mechanical equipment.