

# Cooperative Granular Fertiliser Units

Report of the  
TECHNO-ECONOMIC STUDY TEAM



NATIONAL COOPERATIVE DEVELOPMENT CORPORATION

C-56, South Extension-II, New Delhi-110049

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## FOREWORD

Considerable efforts have been made in the last two decades to modernise agriculture and introduce the large scale use of chemical fertilisers. Today a position has been reached where not only are chemical fertilisers found acceptable by large majority of farmers, but occasionally difficulties are faced in meeting the total requirements of agriculturists. This is a happy sign, and if agricultural production is to be substantially increased, fertiliser consumption will have to be dramatically stepped up. However, a mere increase in the quantities of fertiliser consumed may not be enough. We will have to ensure that NPK ratios are improved, and proper and balanced use is made of each of these nutrients. Many of the advanced countries today maintain NPK ratios of 1 : 1 : 1. In India the ratio still stands at approximately 1 : 0.24 : 0.13. The belief that our soils are rich in phosphorus and potash, and therefore only require large doses of nitrogenous fertilisers is not true, as farmers even in such progressive States as Punjab, are finding out to their cost. A stage has been reached where all the three plant nutrients must be applied in the required doses after proper tests to determine the needs of the soil.

The fertiliser industry in the country, which has been developing rapidly since the 1940's, has been concentrating mainly on the production of straight nitrogenous fertilisers. The establishment of large sized units making complex NPK mixtures is a very recent development. Many of the new units are still under construction and only a few grades are being produced. In view of the need and demand for balanced fertilisers, a number of fertiliser mixing units were established in the private and cooperative sectors during the Second and Third Five Year Plans. The first granulation fertiliser unit was established in 1964. In order to encourage cooperatives also to take a lead in this direction the NCDC sponsored a scheme for the establishment of granular fertiliser factories and has so far assisted in the setting up of 17 units. The first cooperative granulation factory was set up in 1968 and today 14 units in the cooperative sector are in production, while another 4 are being installed.

In 1971 the NCDC felt that the time had come to study the progress and problems of these cooperative fertiliser units, and also assess their role in the context of the setting up of large sized fertiliser factories manufacturing complex mixtures. After detailed field studies and discussions with those engaged in the

working of these units, the study team has submitted this report which throws light on some of the important issues relating to the planning and establishment of granulation fertiliser units, their operational and production problems, the economics of their working in relation to large scale units and their methods of marketing. The report has also examined the future scope for this industry in the context of the over-all national plans for the production of fertilisers. I am sure this report will be of interest not only to the cooperatives, or those engaged in the granular fertiliser industry, but to all those who have an interest in the fertiliser industry of the country.

M.S. GILL

*Secretary*

National Cooperative  
Development Corporation

## CHAPTER-I

### OBSERVATIONS/RECOMMENDATIONS

The National Cooperative Development Corporation appointed this Study Team in January, 1971 to undertake a techno-economic study of the cooperative granular fertiliser units assisted by it under its special scheme. The Team studied the problems of installation and operation of cooperative granular fertiliser units as also their requirements of finance for block investment and working capital. It went into details of the arrangements for procurement of raw material, manufacturing process and the cost of production. It also studied the system of marketing of granular fertilisers adopted by the units and worked out the economics of manufacturing granular fertilisers. The Team also made a depth study of the scope of granular fertiliser industry upto the end of the Fifth Five Year Plan. The observations and recommendations of the Team are given in the following paragraphs :

#### **Scope for Granular Fertiliser Industry :**

1. It has been established that for exploiting the potentiality of high yielding varieties of seeds, not only N, P & K fertilisers should be available in adequate quantities but there should be a proper balance in application of these three nutrients. It is in view of the success of the combined use of the three nutrients that increasing attention is being paid to the application of balanced fertilisers which may be in the shape of powdered mixed fertilisers, granulated mixed fertilisers and complex and compound fertilisers. The granulated mixed fertilisers have distinct advantages over powdered mixed fertilisers from the point of view of standardization in quality, avoiding the possibility of adulteration and deterioration of stocks due to caking by absorption of moisture. The granulated fertilisers do not display agregation of ingredients and are less susceptible to leaching action in the soil. Granulation process can be combined with preparation of high analysis fertilisers which the mixing of powdered fertilisers does not permit. Compared to the complex fertilisers, while the granulated fertilisers may be found to be a little costlier, considering the fertiliser needs of a variety of crops/soils under different conditions of water supply, they have an edge over complex and compound fertilisers as they are capable of meeting tailor made needs.

2. The consumption of N, P & K fertilisers in the last year of the Third Plan (1968-69) was estimated at 1.13 million tonnes, 0.39 million tonnes and 0.15 million tonnes respectively. Although much short of the plan target, this was substantially higher than the level envisaged in the First Plan. In the Fourth Plan, the targets for N, P & K are 3.2 million tonnes, 1.4 million tonnes and 0.9 million tonnes respectively but according to the present indications the achievements may not exceed 3.5 million tonnes for all the three nutrients. The requirements of these nutrients at the end of Fifth Plan (1978-79) are estimated at 5.74 million tonnes of N, 2.83 million tonnes of P and 1.43 million tonnes of K. It is estimated that 1/3 of the N and 2/3rd of P & K requirements may be met from mixed/complex/compound fertilisers which may account for 4.8 million tonnes of N, P & K nutrients in 1978-79. As against this, the capacity of indigenous factories already manufacturing complex fertilisers and those under implementation or approved or proposed for implementation, is estimated at 1.00 million tonnes of N and 1.37 million tonnes of P. The gap of 1.43 million tonnes comprising 0.91 million tonnes of N and 0.52 million tonnes of P in complex/mixed form is indicative of the vast scope for the development of fertiliser granular mixing industry.

3. There are 31 granular fertiliser units in the country of which 18 are in the cooperative sector, 2 in public sector and 11 in private sector. All of them (except 2) are of 7.5 tonnes per hour capacity. Their total annual capacity is estimated at 1.64 million tonnes. This capacity accounts for hardly 50% of the gap between the demand for complex/mixed fertilisers and their supply from large scale indigenous factories providing complex fertilisers. This leads to the conclusion that there is still a scope for additional indigenous capacity of the order of 1 million tonnes for the preparation of complex/granulated mixed fertilisers.

#### **Planning the Unit :**

4. Like any other industrial project, feasibility study/report is one of the pre-requisites for establishment of a granular fertiliser unit. Among others, such a feasibility report should indicate, besides demand for fertilisers and competing products, construction costs, working capital requirements, estimates of operating revenue and operating costs and depreciation and taxes. The study may also indicate the choice of the plant, whether of 5 tonnes capacity or 7.5 tonnes capacity per hour and the profitability of the proposed unit.

5. While planning a granular fertiliser unit, it should be seen that the unit is located in a predominantly irrigated area or where the rainfall is well spread in the two crop seasons to ensure double cropping. Enlightened management and good marketing system are the other two important aspects which should be given

attention while planning the unit. Keeping in view the development of fertiliser marketing system in the cooperative sector, best results would be achieved if the cooperative wholesalers are encouraged to take up granulation of fertilisers since they will have least difficulty in matters like procurement of raw material, marketing of finished products, raising finances from banking institutions, etc., If, however, a primary marketing society is interested to set up a unit because of the demand for granular fertilisers in its area of operation, a collaboration between the wholesaler at the state level and the concerned primary marketing society is advised. In no case should a society be encouraged to take up granulation of fertilisers if it is organised only for this purpose or if it is not already involved fully in the distribution of fertilisers in its area of operation.

6. As for the location of the unit, the most important factors to be considered, among others, are the supply of water and power and nearness to railway station. To save Octroi, location of the unit in the municipal areas may be avoided and preference may be given to the industrial estates which offer facilities of utilities and railway sidings.

7. As for the size of the plant, it may be economical to set up 7.5 tonnes per hour plant, even though it is slightly more costly, and to run it in two shifts if it is not possible to run three shifts in the initial stages. For larger production this plant can be expanded to 15 tonnes per hour capacity by changing the conveyors. This approach is particularly necessary when these units are to be set up by the cooperative fertiliser wholesalers.

8. Since civil works form bulk of the capital expenditure, it has to be seen that, in the initial stages, only such works are provided as are very essential for the running of the unit. For this purpose construction of part of the civil works like storage accommodation, staff quarters, etc., may be staggered till the unit gets over the teething troubles. The construction of workshop should not, however, be staggered.

9. There are two types of lay-outs for the granular fertiliser plants, viz., vertical type and horizontal type. Both these types/arrangements have their own advantages and disadvantages which are difficult to measure in economic or even qualitative terms to enable a clear cut judgement. This matter may be left to the management of the society which is planning to take up such a unit.

10. The feasibility report should also contain a detailed financial plan for raising resources for block investment and working capital. A society should not initiate the project construction without raising bulk of the additional funds required from its members. The delay in the completion of a unit for



want of funds will result in heavily loading the unit with instalment of loan repayment and interest thereon without any return.

11. It is noticed that the cooperatives have based their feasibility studies, by and large, on the model scheme formulated by the NCDC in 1967-68 and circulated to the States. While this model scheme seeks to provide only a broad outline of the nature of fertiliser granulation process, the type of equipment and civil works required and the working capital needs, it cannot be considered as a substitute for a feasibility report. Even as a guide, there is scope for modification in the model scheme which should be revised giving separate blue-prints for 5 tonnes and 7.5 tonnes per hour capacity units and incorporating in it the pattern of financial assistance from the NCDC both for block investment and margin money for purchase of raw material and finished products, indicating clearly, the obligation of the cooperatives concerned and the State Government in raising their share of resources. It may also be advisable to give broad details of the types of granular mixtures recommended for different crops in various States/area, the cost of production and the likely-ex-factory prices for different mixtures.

#### **Establishment of the Granular Fertiliser Units :**

12. There are five suppliers of plant and machinery for granular units in India. To enable a proper comparison of the terms and conditions of contract between the customer and the machinery suppliers, it is necessary that the cooperatives may design a standardised proforma based on the terms and conditions offered so far by various suppliers so that any deviation from these terms can immediately be located and assessed for comparison with quotations received from other parties. The prices of granulation plants have progressively increased. To keep their prices low it would be desirable if the Government supplies the requisite quantity of steel to the fabricators of plants at controlled rates against firm indents placed by cooperatives.

13. As regards the minimum covered area required for different purposes, while there cannot be any hard and fast rule, some broad norms may be adopted with modifications according to the local needs. Storage capacity for one month for the raw material and 15 days for the finished products may be provided by the unit set up by the cooperative fertiliser wholesalers. In other cases a capacity sufficient enough to stock raw material for 1½ months and finished products for one month may be provided. With regard to other civil works, we consider a covered area of 2000 sq. ft. for administrative block including laboratory as adequate. A canteen of 600 sq. ft. rest house of 500 sq. ft. and a toilet block of 400 sq. ft. may also be necessary. In addition, a water tower of 10,000 gallon water capacity mounted on 50' height is large enough to meet the requirements of water supply. According

to the above estimates and keeping in view the requirements of space for transformer, well or tube-well, roads and open space, it is felt that a total area of  $2\frac{1}{2}$  to 3 acres is sufficient for a granular unit.

14. Based on the estimates, the block investment in plant and machinery and civil works for the establishment of a granular fertiliser unit of 7.5 tonnes per hour capacity would be of the order of Rs. 30.00 lakhs including price escalation and contingencies estimated at 5% of the capital investment but excluding the cost of land which may be estimated at about Rs. 50,000/- pre-operative expenses of about Rs. 80,000 and interest on capital for one year of about Rs. 3.13 lakhs. In view of the heavy escalation of cost in the past few years, the NCDC may also suitably revise its scheme which may also provide for another Rs. 15.00 lakhs needed as margin money to raise working capital for a two shift operation.

15. According to commercial pattern of financing industries, equity may match to debt. We suggest that the same pattern should be followed in the case of cooperative granular fertiliser units. Thus, the total investment of Rs. 49.43 lakhs, say Rs. 49.50 lakhs in block assets and margin money should be met in the debt equity ratio of 50 : 50. As for the ratio of members' share capital contribution to that of State Government, we suggest that normally it should be in the ration of 1 : 1 but in backward areas, as identified by the Planning Commission, the share of cooperatives to that of State Government may be in the ratio of 1 : 2.

16. The release of financial assistance from NCDC should be progress oriented and made in instalments. The granular fertiliser units take about 3 years for establishment and for running to a break-even point. It is, therefore, not desirable to expect them to commence payment of the loan instalments before 3 years from the date of the release of first instalment by the NCDC. On the lines of the Central Sector Scheme for cooperative processing units; a moratorium of three years may be allowed to cooperatives in the repayment of loan instalments. No moratorium is, however, suggested on payment of interest.

17. The societies assisted should draw up a work plan laying priority for land acquisition and land development and for obtaining water and power connection. This has to be followed by calling of tenders and collection of share capital from members. Installation of granular units by the firms on turn-key basis is a healthy practice as it involves the machinery manufacturers upto the stage of commissioning of the plant and also enjoins upon them the responsibility for any shortcomings in the technical functioning of the plant upto one year after commercial production.

## **Manpower Requirements :**

18. Since the cooperative granular fertiliser units are of the same size and design, there should not be much of variation in the staff engaged for management work and other operations. The cooperative granular fertiliser units may review their organisation and staffing pattern to see if it called for any modification in the light of staffing pattern adopted by other similar units and by the private granular fertiliser companies. The new units which are under installation may, however, follow the broad staffing pattern suggested in this report (para 6.4).

19. Since the operations involve, by and large, mechanical functions, a mechanical or a chemical engineer with atleast 10 years experience in running and maintaining a mechanical unit and preferably qualified in business administration should be engaged as a General Manager. He may be sent for training in a short-term course for senior officers in the Cooperative Training College, Poona, on the expense of the society. The Registrar of Cooperative Societies may be associated in this selection and his recruitment should be made as soon as the project is finally approved for execution so that his experience is fully utilised in planning realistically the work of the organisation. As regards other staff, most of the persons like clerks, store-keepers, class IV employees and unskilled and skilled labour may be engaged locally. For recruitment of engineers, assistant engineers, overseers, foreman, etc., outsiders may, with advantage, be appointed if the calibre of local persons is much below the desired standards. It is, however, very essential that staff are selected in full consultation with the General Manager.

20. Adequate incentives for promotion to higher grades and for efficient working should be provided. It would improve efficiency if training at the factory is imparted to the staff responsible for material management. There should be a clear-cut delegation of powers to the Chairman, General Manager and various heads of departments so that operations are conducted without any friction.

## **Production of Mixed Granular Fertilisers :**

21. A variety of grades of granulated fertilisers are being prepared by the cooperative units, but individually, only a few grades are prepared due to a number of limitations. While introducing a new grade, the fertiliser unit should proceed cautiously as a lot of promotion work has to be undertaken to the marketing zone. The cooperative granular fertiliser units may therefore, for the time being, continue to build around the grades they are now producing. They may add one or two new grades only if they are convinced that with the backing of extension work they would be able to market substantial quantities of these

grades. From economic consideration, it is desirable that, to the extent possible, only high analysis raw material like DAP, Urea, Tripple superphosphate, MOP, etc., is selected for mixing and granulation. Low analysis fertilisers should be used as raw material only for those grades which do not permit the use of high analysis fertilisers. It will help if the machinery manufacturers and chemists working in the granular fertiliser units carry on experiments to develop formulae that offer to produce high analysis fertilisers with minimum cost. It is also necessary to minimise the use of de-oiled cake for these grades. If addition of micro-nutrients is felt necessary, such grades may be prepared for specific areas in consultation with Agricultural Departments and Agricultural Universities.

22. The granular fertiliser units should obtain their supplies of raw material from the Central Fertiliser Pool or direct from the indigenous manufacturers of fertilisers on f.o.r. or ex-factory (freight prepaid) delivery basis at wholesale rate and not from the dealers at the sub-wholesalers' or retailers' prices. For this purpose, in view of the important role that these units could play in ensuring balanced application of fertilisers, the Government of India (Central Fertiliser Pool) may consider making direct allotments of Pool fertilisers to these units on the basis of production programme drawn out by them each year. Alternatively, such direct allotments may be made to these units at least at the State Government level so that they could obtain their Pool supplies on f.o.r. delivery basis at wholesale rate and not from the dealers at the sub-wholesale or retail prices.

23. Although the need for coating granular fertilisers with insecticides cannot be ruled out, considering the general attitude of our farmers in observing precautions and directions for use of fertilisers and insecticides, it is considered desirable not to advocate the use of insecticides for coating on the granular fertilisers. For distinguishing the grades from their physical appearance, it would be desirable if under ISI specifications, a standard colour is used for a particular grade by all the granulation units both in the cooperative and the private sectors, irrespective of the ingredients used. To begin with, such standards for colours may be supplied only for 4 to 5 very popular grades to be followed up progressively on other grades.

24. Since the granular units prepare balanced fertilisers, it is suggested that this industry should get the essential raw material manufactured in India on priority basis. This would be possible if the Government of India exercises its right to secure upto 30% of the indigenous fertilisers from the manufacturers at negotiated prices. This could then be allotted to the granular fertiliser units.

25. The granular fertiliser units are facing a tough compe-

tition with the FCI which is marketing "Suphala" of grades equivalent to popular grades prepared by the granular units. The FCI is able to sell its produce cheaper because it is getting DAP from the Pool at prices much below the Pool issue price at which cooperatives purchase. To put the two contenders on an even keel in the competitive field and to help in supplying cheaper fertilisers to the farmers, it is desirable that the granular units should also be supplied DAP at the same rate at which it is given to the Trombay Unit of the FCI.

26. The cooperative granular fertiliser units are bulk buyers of fertilisers. It would be advantageous for the manufacturers if concession/incentives are offered on bulk orders backed by firm commitments. The granular units can also undertake to lift naked or bagged imported fertilisers from the docks. The IPL allows concession to the extent of Rs. 5/- per tonne on lifting fertilisers from the port godown and Rs. 51/- per tonne on lifting of naked bulk fertilisers straight from jetties. Similar rebate may be allowed by the Pool also. The IPL and other indigenous manufacturers should also allow rebates to the cooperative granular units on cash purchases equivalent to the interest payable, for the interest period.

27. While allocating imported rock phosphate, the MMTC should consider demands of granular fertiliser units at equal level with other manufacturers of fertilisers. The demand of the cooperative granular fertiliser units for the indigenous Udaipur rock phosphate should also not be ignored and these units should continue to get due priority in allotments. As regards supply of dolomite, to save transport cost, it is desirable that the granular units in Punjab and Haryana make their purchases from Jodhpur and Baroda; those in Maharashtra from Jodhpur and Salem those in Mysore and Tamil Nadu from Salem and those in Bihar and Orissa from the depots in Orissa and West Bengal.

28. Manufacture of laminated bags is a recent development. Only a few units have so far been established. Since cooperative granular units have themselves a large demand for such packing material, it is suggested that a unit for production of laminated bags may be set up in the cooperative sector itself.

29. The indigenous phosphate manufacturers are contemplating to prepare granulated mixed fertilisers. Since the cooperative granular fertiliser units are at present depending upon the phosphate units for the procurement of single superphosphate, to ensure them full supply, it is suggested that either the phosphate industry is not encouraged to install granular units or the Government may take positive steps to ensure regular supplies of superphosphate to the cooperative granular fertiliser units exercising its right of procuring upto 30% of the indigenous products at negotiated prices.

## **Economics of Production :**

30. The total capital cost on block investment of a cooperative granular fertiliser unit in the present context is Rs. 34.43 lakhs comprising Rs. 14.70 lakhs on plant and machinery, Rs. 15.80 lakhs on civil works, Rs. 0.80 lakh on pre-operative expenses to be capitalised and Rs. 3.13 lakhs on interest on capital. On the assumption that effective utilisation of the capacity of a granular fertiliser plant of 7.5 tonnes per hour may not exceed 45,000 tonnes, the working capital requirements for a unit on two-shift operation work out to about Rs. 65.00 lakhs. Calculating margin money at 20 to 25% for raising bank finance for working capital, each unit would, on an average, need margin money amounting to about Rs. 15.00 lakhs. This amount will form part of the total investment of Rs. 49.43 lakhs for each unit as estimated in Chapter V.

31. The fixed costs per tonne of the granulated mixture have been estimated at Rs. 13.42, Rs. 20.11 and Rs. 40.23 on three, two and one shift basis with total expenditure per annum at Rs. 6.04 lakhs. The variable costs, on the other hand, have been the same at Rs. 110.95 per tonne for all the three shifts. The total cost on preparing a tonne of granulated mixed fertiliser thus works out to Rs. 124.37 on three shift operation, Rs. 131.06 on two shift and Rs. 151.18 on one shift. Depending upon the cost of nutrient per unit in the raw material used, net profit is returned even on one shift operation but processing a few other grades may prove economical only when the plants are run on two shifts. The secret of economic operation of plants, therefore, lies in the selection of raw material for mixing and granulation.

32. The Central and State Governments have to play an important role if the success of the granular fertiliser units as suppliers of such needed balanced fertilisers has to be ensured. The cooperative granular units should be treated as priority basis for supply of Pool fertilisers. The needs of these units for DAP, Triple Superphosphate should first be met before these fertilisers are allotted to the wholesale distributors. Similarly, the indigenous manufacturers of DAP, Tripple Superphosphate and Ammonium Sulphate should be advised to make a special registration of the demand of granular fertiliser units for supply of fertilisers on ex-factory rate allowing also quantity rebates as offered to other wholesalers.

33. Normally, finances are raised by the granular fertiliser units by providing 20 to 30% margin on pledge and 30 to 40% margin on hypothecation of stocks. For the normal fertiliser distribution business, the cooperative wholesalers are able to raise working capital from cooperative and other banks at 10% margin on hypothecation against Government guarantee. It is suggested that similar facility should be offered to the cooperative

granular fertiliser units for purchase of raw material and for stocking of finished products. The viability of these units will be greatly improved if they are also treated as cooperative wholesalers of fertilisers for purposes of fertiliser distribution finance by the RBI and are offered Government guarantee for raising working capital finance.

#### **Marketing of Granular Fertilisers :**

34. While formulating a project for the granulation of mixed fertilisers, the feasibility study has to spell out clearly the arrangements envisaged for marketing and distribution of products. The important aspects to be kept in view in this regard are the potential need of the farmers for the particular grades, the effective current demand, the prospects for increasing the demand in the foreseeable future, the capacity of the unit to organise an effective sales net work, advertising, sales promotion and sales personnel and the agency through which the products are proposed to be marketed. Simultaneous with the commencement of installation of the factory, the granular fertiliser units should take up, in addition to seeding programme, preparatory work for marketing comprising a comprehensive study of the total market, types of fertilisers being distributed and the scope for grades proposed to be prepared, the distribution system and distribution agencies, skill in sales and its potential and weaknesses.

35. In a production unit of the size of a granular fertiliser factory, the unit itself should act as a wholesaler and avoid, for the sake of convenience, appointing any independent wholesale agency. It can even afford to supply fertilisers direct to the retailers eliminating the sub-wholesale marketing societies. It may, however, be desirable if, in States like Maharashtra where a large number of granular units have come up in the cooperative sector, a common agency for the sale of products is promoted instead of each factory having its own sales organisation.

36. It is recommended that the Central Fertiliser Pool and the indigenous manufacturers of fertilisers offer to the cooperative granulation units a minimum of 60 days interest-free period on the sales of raw material. The guarantee available to cooperatives from the Credit Guarantee Corporation of India on borrowings from approved credit institutions is at present limited to cooperatives which do not have an annual turnover of more than Rs. 5.00 lakhs. The cooperative granular fertiliser units, which have much larger turnover, cannot thus avail of this facility. In the interest of expansion in granular fertiliser sales, the C.G.C.I. may consider waiving its limit to cover all the cooperative granular fertiliser units irrespective of their annual sales. Further, the banks should not ask for more than 10% margin on hypothecation of fertiliser stocks when guarantee is available from the C.G.C.I.

37. There are advantages and disadvantages of both consignment system and cash-and-carry system of sales. A via-media has, therefore, to be found which permits sufficient incentive to the cooperative societies for active sales and at the same time leads to good recovery of the sale proceeds by the granular units. Such an arrangement is possible if fertiliser supplies are linked with production credit.

38. If the granular fertiliser units get one to two months interest-free credit from the fertiliser manufacturers and the Pool for raw material, it would be desirable for them to offer similar concession to their distributors excepting when consignment facilities are offered. If a village society undertakes to make cash purchases, it may be offered rebate on account of interest for one to two months as the case may be. It would also be helpful if the wholesalers allow some incentive commission on increased sales to salesmen of the marketing cooperatives/village societies and even to the V.L.Ws. to encourage them to offer personalized service.

39. Although most of the granular fertiliser units are acting as wholesalers of their products, the accounts of production should be kept separately from those of marketing.

40. The cooperative granular units have to develop a new strategy for promotion if they have to succeed in the current buyer's market. To achieve this objective, they should give a wide publicity to their products through hand-bills, wall posters, hoardings and cinema slides and by advertisements in papers and journals and radio broadcasts. They should also develop personal contacts with agricultural extension staff and provide soil testing service to growers in addition to laying demonstration plots. They should also participate in exhibition and hold meetings, seminars and conferences.

41. In addition to the publicity arrangements through different media, it would be necessary that the salesmen of the retailer and the sub-wholesalers are adequately trained in projecting a correct picture of the properties of the product. The granular units may take advantage of the training facilities offered by the Committee on Cooperative Training. Training courses may also be organised within the State jointly by all the granular units in collaboration with the state marketing federation concerned which, as wholesaler of fertilisers, may also be interested in such a programme.

42. A provision of Rs. 2/- per tonne has been made in the notional break-up towards incentive commission for distribution of fertilisers from the Central Fertiliser Pool. A similar amount may be provided by the granular units to be funded and utilised for giving incentives for fertiliser promotion. The cooperative granular units can also provide another essential service of soil



testing to the growers. All the cooperative granular units should set up a soil testing laboratory each with financial assistance from the NCDC

43. Granular mixed fertilisers, being priced higher than the combined value of constituent raw material because of addition of manufacturing cost, are assessed at the ex-factory price and are charged for the excess in price over the cost of raw material used. This is not justified. The fertilisers should be assessed on the basis of their total nutrients per unit of weight. If this is accepted, no additional excise levy would be made on granular mixtures.

44. Sales tax on fertilisers is another item whose incidence on marketing of granular fertilisers is being acutely felt compared to straight and mixed fertilisers. Sales tax is being paid a number of times, first on the purchase of raw material in the State, where the product was made, then in the State to which the raw material was carried and again on the granular mixtures prepared. Since sales tax is once paid on the raw material, it is suggested that the granular mixtures should be exempted from sales tax.

45. The cooperative granular units are preparing new grades of fertilisers. While some of them have found place in the schedule of Fertiliser (Control) Order, others should also be covered in the Order so that the granular units may not find any difficulty in selling their products. It is also necessary that the Government of India should review the schedule atleast once in three months and bring it upto-date. The granular units may also be advised to approach the State Government/Central Government to include the grade they propose to manufacture in case it is not already listed in the schedule.

46. Taking advantage of the inadequacies in enforcement of standards, the unscrupulous hand-mixing units are freely distributing sub-standard mixtures. In view of the establishment of large number of granular fertiliser units and with the coming in production of a number of factories manufacturing complex fertilisers, the hand-mixing units should either be banned to carry on this activity or they should be subjected to constant supervision to ensure that they market products according to specification prescribed.

47. It would be advantageous for the granular units in the cooperative sector to organise themselves into a national federation. Such a federation, among others, would be very helpful in negotiating with the indigenous manufacturers of fertilisers for the purchase of raw materials. Such a federation may now, however, be brought into the picture of sales and the responsibility for sales should continue to vest in the granular units themselves.

The federation, can, however, locate markets and provide advice and guidance to the member units for expanding their sales. Keeping in view the economics position of granular units, it is suggested that the NCDC may provide subsidy towards expenditure on the technical and administrative staff of the federation in full for a period of five years. In the meantime, granular units may also make a contribution at 25 paise per tonne of the granular mixed fertilisers produced by them. After a period of five years, the contribution from the units should be raised so as to meet the entire expenditure on the staff of the federation.

48. In case the organisation of such a federation is not found acceptable to the cooperative granular units, it is suggested that the NCDC may set up a special cell to watch the interests of the granular fertiliser units and to provide coordination and guidance in different spheres so as to meet the objectives laid down for the national federation.

## CHAPTER—II

### INTRODUCTION

#### Scheme for Establishment of Granular Fertiliser Plants by Cooperatives :

2.1 In the current transition from traditional agriculture to modern scientific farming, leading to Green Revolution, fertilisers are playing an important role alongwith the high yielding varieties of seeds. Emphasis is being given on the application of balanced fertilisers to achieve potential productivity of seeds as against the earlier orthodox approach of applying mainly nitrogenous fertilisers to supplement the farmyard manure and green manure. This is clearly reflected from the trends in fertiliser use which, besides improving the growth in fertiliser application in quantitative terms, also show clearly the distinguished demands for different types of fertilisers to meet the requirements of all the major nutrients for crop growth. Guided by these needs, the pattern of our imports and even indigenous production has also changed fast. Where Ammonium Sulphate was earlier the only fertiliser imported for use, a large variety of complex fertilisers containing more than one nutrient are being imported. The indigenous fertiliser industry is also utilising a large part of its capacity in the direction of manufacturing complex fertilisers, whereas the earlier factories aimed at manufacturing only straight fertilisers like Ammonium Sulphate, Superphosphates, etc.,

2.2 The transition towards application of complex/mixed fertilisers is markedly seen since the past few years. While consumption of nitrogenous (N) fertilisers has increased from 4.9 lakh tonnes in 1964-65 to 12.4 lakh tonnes in 1969-70, the ratio of supplies of 'N' in the form of mixtures or complex fertilisers has also gone up from 4.3% in 1964-65 to 10.9% in 1969-70. Similarly, while the consumption of phosphatic fertilisers ( $P_2 O_5$ ) has increased from 1.49 lakh tonnes in 1964-65 to 3.15 lakh tonnes in 1969-70, the percentage supply of  $P_2 O_5$  in mixture or complex form has significantly increased from 15.5% in 1964-65 to 63.6% in 1969-70. The use of potash ( $K_2 O$ ) in mixture form has gone up from a negligible amount to 0.14 lakh tonnes in 1969-70 which is 10.3% of the total consumption of 1.37 lakh tonnes of  $K_2 O$  in that year. Even the manufacturers of straight phosphatic fertilisers are now not able to dispose of their products with the same ease with which they could do a few years ago.

2.3 It is in keeping with this trend of subserving the needs of the farmer for better quality mixed fertilisers for different types of crops that the granular fertiliser industry took birth in the mid sixties. Although two factories came up in this field in the private sector in 1964 and 1965, the cooperatives which were the major distributors of fertilisers in the country for a long time showed interest in this direction only recently. The first unit in the cooperative sector was set-up by the Kolhapur Shetkari Sahakari Sangh in 1968. Many other cooperatives were eager to instal granular units but were not able to take up this work because of paucity of resources. Each granular fertiliser factory with a capacity of 30,000 tonnes per annum was expected to cost about Rs. 21 lakhs. Recognising the importance of granular fertilisers, and their obvious advantages over the ordinary mixtures and in view of the enthusiasm shown by the cooperatives towards fertiliser granulation, the NCDC introduced in March 1968 a scheme for the establishment of granular fertiliser units in the cooperative sector. The scheme envisaged establishment of units with a minimum capacity of 5 tonnes per hour involving a capital cost of about Rs. 21 lakhs. This capital cost was approved to be financed by way of share capital and long term loan from the State Government to the extent of Rs. 8.25 lakhs and Rs. 10 lakhs respectively. The societies were expected to raise the balance of Rs. 2.75 lakhs as share capital from their members. The NCDC was to assist the State Governments up to the full extent of Rs. 18.25 lakhs provided by them to the societies concerned. This financial assistance from the NCDC was to be outside the State Plan ceilings.

#### **Appointment of the Team :**

2.4 Under this special scheme of the Corporation to popularise the use of balanced fertilisers, the Corporation has so far provided financial assistance to the State Governments for the establishment of 15 granular fertiliser units. Besides these, three units have come up on their own in the cooperative sector without any financial assistance from the Corporation. Out of these 18 units, 12 are in production while the remaining are in various stages of installation. All these 18 units, when in full production, will have an installed capacity of about 1 million tonnes of NPK mixtures per annum.

2.5 In its meeting held on 4th November 1970, the Executive Committee of the NCDC decided that a detailed study of the progress and problems of the cooperative granular fertiliser units and of their economic viability should be made by a small team consisting of the representatives of the Corporation, Union Department of Agriculture, Union Ministry of Petroleum and Chemicals and other technical experts. In pursuance of this decision, the NCDC in their notification No. 9-32/70-Fert. dated the 14th January, 1971 appointed a Team comprising the follow-

ing for undertaking techno-economic study of the cooperative granular fertiliser units :—

- °1. Dr. K.N. Synghal,  
Specialist (Soils & Ferts.),  
Ministry of Agriculture (Deptt. of Agril.) New Delhi.
2. Shri P. Jayantha Rao, Project Officer,  
Ministry of Petroleum & Chemicals, New Delhi.
- \*3. Shri K. Padmanabhiah, Joint Registrar of Cooperative Societies, Maharashtra, Poona.
- @4. Shri Sohan Singh, Managing Director, Markfed, Punjab, Chandigarh.
5. Dr. K.S. Chari, Director, Fertiliser Association of India, New Delhi.
6. Dr. R.T. Doshi, Managing Director, Fertiplant Engineering Company Private Ltd., Bombay.
7. Shri T.M. Wakhare, Secretary, Vidharbha Cooperative Marketing Society Ltd., Nagpur.
8. Shri K. Subrahmanyam, Director (F&I), National Cooperative Development Corporation, (Convenor).

**Terms of reference :**

2.6 Following are the terms of reference for the Study Team :—

- (a) To study the problems of installation of cooperative granular fertiliser units, including selection of site, preparation of project reports, availability of consultancy services, construction of civil works, procurement and installation of machinery, etc., and to suggest measures for expeditious installation and reduction in the block capital cost;
- (b) To study the operational problems of the unit covering procurement of raw materials, manufacturing problems including availability of skilled and unskilled labour, breakdowns, repairs and replacement, factory closures and reasons therefor and to suggest ways and means of improving technical efficiency in the process of manufacture;

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\* Now working as Director (Sugar) in the Government of Maharashtra.  
@ Now working as Additional Registrar of Coop. Societies, Punjab.  
° Now working as Director (Dry Farming) Min. of Agril. (Deptt. of Agril.) New Delhi.

- (c) To study the requirements of finance for block capital investment, current expenditure on staff and labour and working capital finance for purchase of raw material and stocking of finished products, problems of raising finance from institutional agencies for various purposes and to suggest measures for securing adequate finance to meet the requirements;
- (d) To study the economics of manufacturing granular fertilisers keeping in view the marketability of the fertilisers and the competition from imported and indigenous complex fertilisers and to suggest steps for purchasing raw material at lower costs; reducing cost of production in the manufacturing process and for improving efficiency in marketing through various promotional and other measures and by developing integrated system for fertiliser marketing through cooperative channels and generally for improving their economic viability.

The Team was required to undertake studies of individual granular fertiliser units in the country, if necessary.

#### **Plan of work:**

2.7 The Team held its first meeting on the 28th January, 1971 at Aurangabad. The time and venue of this meeting was fixed to enable the members to participate in the deliberations of the Conference on Cooperative Granular Fertiliser Units held at Aurangabad on 29th and 30th January, 1971 so that they may have first-hand impression of the progress and problems of the cooperative granular industry from the participants representing all the units in production or under installation. The Study Team met again at New Delhi on the 2nd March, 1971 when besides discussing important operational problems regarding financing and installation of the units, it chalked out a programme of visits to the granular fertiliser units. It decided that with a view to appreciating the performance of granulation industry in its proper perspective, the Team may, in addition to visiting cooperative units, also visit a few established granular fertiliser factories in the private sector. In accordance with the programme, the Team visited the following granular fertiliser factories :—

#### **(a) Cooperative Sector :**

- (i) Kisan Cooperative Granulated Fertilisers & Chemicals Ltd., Eucharistic Congress Building, No. 3, Colaba, BOMBAY-1.
- (ii) Shetkari Sahakari Sangh Ltd., Post Box No. 64, Old Palace, Kolhapur, Maharashtra.

- (iii) Kolhapur District Granulated Fertiliser Cooperative Factory Ltd., 1485, Laxmipuri, Kolhapur (M.S.)
  - (iv) Granular Fertiliser Factory of Apex Federation, Maharashtra at Aurangabad.
  - (v) Tamil Nadu Cooperative Marketing Federation Ltd., (Mannargudi).
  - (vi) Punjab Fertilisers Ltd., Dhandari Kalan, Ludhiana.
- (b) Private Sector :
- (i) Bharat Fertiliser Industries Ltd., Bombay.
  - (ii) Deccan Sales Corporation Ltd., Jamunotry, 26th Road, Bandra, Bombay-50-AS.
  - (iii) D.C.M. Co. Ltd., Najafgarh Road, New Delhi.

2.8 For eliciting detailed information on all aspects of the subject, comprehensive proformae were issued to the cooperative and private sector units. The observations made in the report on the performance of the cooperatives are by and large, based on the information received in the proformae. With a view to having expert technical opinion on designs etc., of storage and factory buildings, the Team invited Shri G.V.K. Moorthy, Consulting Engineer, Madras, Shri V. Sankaran, Engineering Adviser, Central Warehousing Corporation, New Delhi and the engineering experts attached to the Punjab and Haryana State Cooperative Marketing Federations to participate in the discussions in the second meeting of the Study Team.

#### Pattern of Report :

2.9 The first chapter incorporates a summary of the team's recommendations, while the second chapter is of an introductory nature dealing with the constitution and terms of reference of the study team and the methodology adopted by it for study. The third Chapter deals with the developments relating to fertiliser distribution during the successive five year plans and the perspective for the year 1978-79. Besides, an attempt has been made in this chapter to review the progress in the manufacture of complex fertilisers and the fertiliser mixing industry and to study their relationship with the nascent granular fertiliser industry from the point of view of agronomic needs consumer preferences, etc., and also to assess the scope for further development of the granular fertiliser mixing industry. In the fourth Chapter, we have made an examination of the arrangements for planning the units. The fifth Chapter deals with the establishment of cooperative granular fertiliser units and covers arrangements for pro-

curing plant and machinery, construction of civil works and scope for reducing expenditure, procurement of spares, etc., as also the method of financing the block capital cost of the units. The sixth Chapter gives details of the manpower requirements including technical, administrative and work-charged staff. In the seventh Chapter relating to production of granular fertilisers, we proceed to discuss the grades of fertilisers being manufactured, their desirability and the selection of raw materials and fillers and also the arrangements for procurement of raw material of different types from the Central Fertiliser Pool and the indigenous manufacturers of fertilisers. This Chapter also deals with the procurement of packing material. In the eighth Chapter, an analysis has been made of the operational costs and production techniques apart from the arrangements for raising the requisite working capital. In the ninth Chapter, we have discussed the arrangements for marketing of granular fertilisers by the co-operatives and the promotional measures needed to popularise these balanced fertilisers.

#### **Acknowledgements :**

2.10 We are grateful to the managements of granular fertiliser factories in the cooperative and private sectors for ungrudgingly furnishing the requisite data, etc., for giving us the benefit of their views on various problems and for the assistance rendered to us in connection with our visits to different factories. We wish also to thank Shri M.M.K. Wali, Secretary, NCDC for the guidance and advice given by him to the Team on various issues concerning the granular fertiliser industry. We are also grateful to the representatives of the State Cooperative Marketing Federations and granular fertiliser machinery manufacturers, as also to Shri V. Sankaran of the Central Warehousing Corporation and Shri G.V.K. Moorthy, Consulting Engineer, who were kind enough to meet the Team and offer their views. We are also thankful to the officers and staff in the Fertiliser Division of the NCDC for providing the necessary background papers and for helping in the collection, compilation and analysis of data. We wish to record our deep appreciation of the services rendered by Shri S.S. Athwal, Joint Director, NCDC, on whom the main brunt of the work including preparation of notes and drafting of this report has fallen. He rendered the service with outstanding competence and understanding of the issues involved. His long experience in this field was of considerable assistance to the Team.



# CHAPTER-III

## SCOPE FOR GRANULAR FERTILIZER INDUSTRY

### Need for Balanced Fertilizers

3.1 For the proper growth of plants it is necessary that plant foods should be available not only in adequate quantities but be present in such amounts that there exists a proper balance with that of the other essential nutrients. Although the three major crop nutrients N, P & K act in their own way to exploit the inherent productive power of the seeds, their joint inter-action which is technically known as "synergy" is capable of contributing more than the sum total of the individual nutrients. This is a potent tool of the nature for getting a large effect from small resources. The response of the new high yielding varieties of crops to the interaction of all the three types of major nutrients has been proved to be very high. As an illustration, the results of experiments conducted by S/Shri Ramamoorthy, Narasimham and Dinesh to study response to fertiliser nitrogen by the wheat variety Sonara-64 on a fairly fertile alluvial sandy loam soil of Delhi by the levels of associated nutrients may be quoted. This response was the highest (14.8 K.Gs. per K.G. of added N) at the N50 level when the associated levels of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O were also low at 25 K.G. per hectare each. In order to get nearly the same high response at the higher level of nitrogen of N<sub>99</sub> the levels of associated nutrients applied were also as high as P<sub>75</sub> & K<sub>50</sub>. This type of balancing has also been found to be most economical, yielding 3.10 K.Gs of grain per rupee spent on applied fertiliser.

3.2 A similar example may be given of the results of study made by Shri Singh which shows the importance of balanced fertilisers on the yield of hybrid bajra. According to his studies, for getting the high response 17.54 Kgs of grain to applied N at the low level of N<sub>88</sub> only low levels of P & K of 33 each were required, while at the higher level of N of 176, the requirements of P was higher with value of 66 for getting the highest possible response of 12 Kgs of grain per Kg of applied N. Detailed analysis of the above bajra experiment conducted on Delhi Soil has also shown the need for balancing of the fertiliser nutrients with the available amounts of nutrients already present in the soil. In certain cases, even though a particular nutrient in

the soil is already in excess of the requirements of a crop its availability to the crop is enhanced with additional dose of that element. This has been experimentally proved through trials conducted in a farmer's field at Bakaoli village where the soil test showed medium in available nitrogen, low in available phosphorus and high in available potash. The experiment showed that addition of 150 Kg. N, 100 Kg.  $P_2O_5$  and 25 Kg.  $K_2O$  yielded 354 Kgs. per hectare of Sonalica wheat as against 300 Kgs. per hectare obtained with 150 Kg. N and 100 Kg.  $P_2O_5$ . These are only illustrations of the relationship of N, P & K nutrients in maximising production and the need for development of balanced fertilisers for crop application.

3.3 Among the three major nutrients, P & K being slow acting, have generally to be applied at or before the sowing time. While programming for a balanced application of fertilizers, therefore, these two nutrients are added to the soil in the form of a basal dose which also contains some nitrogen considered essential for the growth of infant plant after germination. Nitrogen is later supplemented through top dressing in one or two doses at the advanced stage of plant growth. Although farmers can themselves mix the fertiliser material of three types in fixed ratios to get the desired contents of N, P & K required for a particular crop or they can even apply the three types in separate operations, they prefer to go in for fertilisers which contain all the three elements in required proportions. Since fertiliser needs of various crops differ, both qualitatively and quantitatively, and for the same crop the requirements vary according to soil analysis and availability of irrigation water or soil moisture, a large variety of fertilisers containing one, two or all the three nutrients are available in the market. These fertilisers when they contain only one element are termed "Single" but when they contain two or more nutrients they may either be in the shape of mixed fertiliser powders, granulated fertiliser mixtures or complex or compound fertilisers.

#### **Powdered Mixed Fertilisers :**

3.4 Mixed fertilizers are physical mixtures of fertiliser material each of which contains one or more of the main single nutrients. Generally straight fertilisers are mixed to offer a balanced product suited to special crops and in consonance with the deficiency of the nutrients in the soil. Under the hand mixing process, the raw material consisting of straight nitrogenous, phosphatic and potassic fertilisers are weighed in such a proportion that they provide end nutrients in the ratio required. For instance, for the preparation of grade 8:8:8 in which percentage of N, P & K is equal and where raw material available for mixing is ammonium sulphate and urea to provide nitrogen component and superphosphate and sulphate of potash to provide P & K

components respectively following quantities of raw materials are taken for mixing:—

<i>Raw material</i>	<i>Percentage nutrient provided</i>
lbs.	
Ammonium Sulphate : 586	6% N
Urea (46%N) : 89	2% N
Superphosphate (16% P <sub>2</sub> O <sub>5</sub> ) : 1000	8% P <sub>2</sub> O <sub>5</sub>
Sulphate of Potash : 320	8% K <sub>2</sub> O
Filler material : 5	—
Total	<u>2000</u>

3.5 While the raw material fertilisers are added to provide the nutrient contents to the extent desired, filler material is added to make up the tonnage. Different raw materials in varying quantities can be selected to have the same grade depending upon the availability of the material. Although to the extent possible use of filler material is avoided, it has essentially to be used to make up the weight for a tonne while keeping the proportions of N, P & K in tact in the desired ratio in the final product. Where filler material is necessary, it is selected according to local availability from amongst dolomite, gypsum or some other material having soil amendment or fertiliser conditioning qualities. In some cases inert materials like sand, saw dust, have also been used. In certain parts of Maharashtra, oil cakes are also added sometimes as filler-cum-raw material.

3.6 In the preparation of fertiliser mixtures by hand mixing the raw materials are sieved and weighed in correct quantities and are spread on the mixing platform in layers, taking care that heavy or bulky material are placed at the bottom and lighter ones in the top layer. The materials are then mixed thoroughly with shovels from end to end, levelled and again mixed to ensure thorough mixing. Generally expert labour is engaged which are perfect in mixing job. A batch of 3-5 tons of mixture is prepared at a time for which a mixing platform of 15' × 15' is required. The average output of a gang of 10 labourers is about 10 tonnes per day.

#### **Granulated mixed fertilisers :**

3.7 For the preparation of granulated mixed fertilisers, the raw material just as in the case of hand mixing, is suitably fed into a crusher or hammer mill where it is reduced to the required fineness. The crushed material is carried through short conveyers volumetric feeders which deliver material quantities of each basic

raw material as common weigh hopper wherefrom the material falls down into a revolving drum mixer. Each volumetric feeder is adjustable in order to ensure that the correct ratio of components is fed as required. After having been mixed thoroughly in the drum the material is delivered to the rotary granulators containing ammoniating and granulating section. The raw material is again mixed in the ammoniating chamber eliminating the chances of unbalanced mixtures. In India the mixture of components is then granulated in the granulating drum with the addition of live steam and by spraying water. The granulated compound falls through a hopper into the feed end of the oil fired co-current drier drum. The combustion air is drawn through the drier and cyclones by a fan and delivered to the exhaust stack. The dried material is elevated to two vibrating screens which remove oversize and undersize material respectively. The oversize and the undersize material is sent back to the system for crushing and recycling. The granulated fertilizer from the screens has dimensions between 2 and 6 m.ms. This material is conveyed to the rotating drum cooler where cold air is cycloned by a fan and exhaust air is delivered to the stack. The product from the cooler is left in heaps for curing and then finally bagged in Polythene-lined jute bags to weigh 50 Kg. or 100 Kgs. Details regarding the various N, P & K grades and their constituent raw material are given in a subsequent chapter.

#### Complex/Compound Fertilizers :

3.8 These are chemical compounds providing more than one major nutrients. In India, in early fifties the farmers were using only ammonium sulphate and single superphosphate. These are straight fertilisers providing only N & P nutrients respectively. In mid fifties urea, ammonium sulphate nitrate and CAN were also made available to the farmers. With the march of time, the pattern in fertiliser use is fast changing and the farmers have started favouring fertilizers as are capable of supplying all the three major crop nutrients for a basal dose in required proportion. An important place is now occupied by complex fertilisers. Originally these complex fertilisers were introduced by imports from abroad but their manufacture has since been taken in the country. The complex compound fertilisers now being manufactured in the country are:—

(i) Ammonium Phosphate Sulphate	(16-20-0)
(ii) Ammonium Phosphate	(20-20-0)
(iii) Diammonium Phosphate	(18-46-0)
(iv) Urea Ammonium Phosphate	(28-28-0)
(v) -do-	(20-20-0)
(vi) Nitro Phosphates	(18-18-9)
(vii) -do-	(15-15-15)

The indigenous production of complex fertilisers amounted to 4,53,759 tonnes in 1970-71 of N, P & K nutrients. Their total distribution in this year was, however, of the order of 7,60,428 tonnes of which 1,46,784 tonnes was supplied through imports during the year and partly from other accumulated stocks. The fertiliser grades imported included DAP, nitrophosphate (20-20-0) and N.P.K. complex fertilisers of grades (15-15-15), (13-13-13), (10-26-26), (12-36-12) and (14-36-12).

#### **Advantages of Granulated mixed Fertilisers over mixed powdered Fertilisers :**

3.9 Although in terms of mixing costs, the hand mixed fertilisers involve lower operational and capital expenditure per tonne of fertiliser because of negligible investment in equipment, the application of this method is limited to the use of powdered raw material. If the granulated DAP which is cheaper per unit of N & P has to be used with potash for producing balanced fertilisers it will not be possible to do so by the hand mixing process. Besides this, limitation from the angle of raw material economy, powdered mixed fertilisers are less favoured by the farmers from the following agronomic and other considerations:—

- (i) The quality of the powdered mixtures cannot be assured satisfactorily as much depends upon the skill and attention of the workers. On the other hand, composition of the granular fertilisers is uniform because pulverising and mixing is invariably carried out before granulating.
- (ii) Granular fertilisers protect the farmers against adulteration which cannot be easily detected in mixed powders.
- (iii) Powdered mixtures absorb moisture and cake into a hard mass requiring considerable labour for breaking up. Even the disintegrated material may not attain the physical form good enough for a uniform spread in the process of broadcasting in the field. Granules are much less susceptible to lumping.
- (iv) Powdered mixed fertilisers show a tendency for segregation of the ingredients during handling or broadcasting in the field by winnowing action. The heavier particles (crystals) in the mixture spread evenly, the powder component may be blown off. Granulated mixtures cannot display segregation of ingredients which are held firmly in a hard granule.
- (v) Powdered mixtures are liable to a loss of ingredients in the soil due to leaching under heavy irrigation or in. Granules, on the other hand, are less prone to

leaching since they being hard with a reduced surface contact, give up their nutrients at a slower rate.

- (vi) On acidic soils, soluble or exchangeable iron, aluminium and manganese which increase with increasing acidity, make water soluble phosphates like superphosphate and Ammonium Phosphate less available to crops. However, Ammonium Phosphate when in granular form is more effective on highly acidic soils than is superphosphate. Similarly, CAN in a powdered mixture when applied to wet paddy lands is likely to leach heavily but if the same CAN is applied as a granular mixed fertiliser, it is greatly protected against leaching.
- (vii) The granulated fertilisers have good drilling properties and can be easily drilled alongwith the seeds in one operation. They can also be applied to the desired depth.
- (viii) The most important advantage of granular fertilisers is the possibility of producing high analysis fertilisers which is not possible in the mixing of powdered fertilisers: The production of high analysis fertilisers leads to reduction in transport handling and storage and packing costs.

#### **Granular Mixed Fertilisers Vs. Complex & Compound Fertilisers :**

3.10 It is not fair to make any comparison between granular mixed fertilisers and the complex fertilisers as the latter are admittedly better than the former from the point of price per unit of nutrients. The question then arises as to why granular fertiliser should at all be manufactured. The answer to this is quite simple. Firstly, the granular fertilisers serve to provide tailor-made fertilisers to meet the requirements of a large variety of crops grown on different types of soils based on soil test date. In fact this is the most important factor in favour of granular mixed fertilisers. Individual units are manufacturing about 5 to 7 varieties of granular mixtures according to the needs in their area of operation while none of the indigenous fertiliser factories manufacturing complex fertilisers are supplying more than 2 to 3 grades. The granular units are using, in addition to straight fertilisers, even complex fertilisers like DAP and 14-36-12 and 12-32-10 of IFFCO as raw material to cater the needs for other grades. Secondly, we are not self sufficient in the matter of supply of complex fertilisers. Large quantities of these are imported involving heavy drain of valuable foreign exchange.

3.11 In the light of the above background, we now propose to review in the following paragraphs the overall progress of fertiliser consumption in the country and to indicate a perspective

for the year 1978-79 not only for fertilisers as a whole but also the scope for granular fertiliser industry.

#### **Review of Fertilizer Consumption :**

3.12 Introduction of fertilisers in the spectrum of Indian Agriculture dates back to the thirties when their application was taken up on a limited scale on tea and coffee plantations and, in some cases, on other commercial crops. Their use in areable crop farming as a supplement to the available organic manures like farm yard manure and green manures was witnessed only after the Great Bengal famine in 1943-44 when the application of fertilisers was advocated on a campaign basis through the "Grow More Food Campaign." In the earlier stages, among the three major plant food nutrients—N, P & K, stress was laid mainly on the use of nitrogenous fertilisers. Supplies of P & K fertilisers were made to a very limited extent which is reflected from the figures for 1946-47 when, against the estimated supplies of 35,000 tonnes of nitrogen (N), supplies of P & K were only 4,400 tonnes and 1,800 tonnes respectively.

#### **Developments in First Plan :**

3.13 In the First Plan beginning from 1951-52, however, the important role of P nutrient in raising productivity to potential levels was also recognized. While formulating plans and fixing targets, due emphasis was given to the use of phosphatic fertilisers along with the nitrogenous fertilisers. When a level of 1,22,000 tonnes of nitrogen (N) was fixed for consumption for 1955-56, the P nutrient was also expected to be consumed to the extent of 40,000 tonnes. The campaigns for fertiliser consumption got a good impetus under the impact of community development programmes and the short-term credit facilities extended by the Government of India to the State Governments for the purchase of fertilisers and their distribution on credit to the farmers. As an incentive, the prices of pool fertilisers were substantially reduced and subsidy was offered on consumption of phosphatic fertilisers. With the large scale propaganda and publicity and with the laying of demonstrations by the extension staff on the cultivators' fields, considerably push was given to the usage of fertilisers although achievements in 1955-56 fell short of the targets fixed.

#### **Developments in Second Plan :**

3.14 With the consciousness created for fertiliser use in the first plan, and with the emphasis laid on intensive cultivation by the National Extension Service in the second plan for achieving self-sufficiency in foodgrains and with the establishment of I.A.D.P., in 7 districts, the growth in fertiliser consumption has been much higher, although in terms of the plan targets, the achievement was only between 50 and 60%. As against the

targets of 3.7 lakh tonnes of N & 1.2 lakh tonnes of  $P_2O_5$ , the consumption in 1960-61 was only 2.10 lakh tonnes and 0.54 lakh tonnes respectively. This shortfall was partly due to the conservatism of the Indian farmer which needed a very strong extension net work for making an effective break-through. The major single cause was, however, the non-availability of fertilisers on account of foreign exchange difficulties and lower indigenous production. Although in the second plan, consumption of potassic fertilisers was not officially targetted, their effectiveness in certain areas/crops was well recognised as a result of which consumption of  $K_2O$  rose to the level of about 26,000 tonnes in 1960-61.

### Developments in Third Plan :

3.15 Fertiliser consumption programmes received a much higher impetus in Third Five Year Plan which emphasized on increasing agricultural production more through promoting fertiliser use as compared to extension in cultivated/cropped area. This is clear from the fact that 43% of the increased agricultural production in 1965-66 was expected from utilisation of fertilisers and manures. Recognising the need for potash for raising potential yields under the programmes of intensive cultivation as also for soils and crops which are highly responsive to this nutrient it was for the first time that specific targets for consumption were laid down for potassic fertiliser in the Third Plan. The plan envisaged consumption of 10 lakh tonnes of N, 4 lakh tonnes of  $P_2O_5$  and 2 lakh tonnes of  $K_2O$  during 1965-66. Compared to the performance in the Second Plan, this high target was fixed in view of the extension of I.A.D.P., to 8 more districts and to the adoption of the approach of I.A.D.P., in 114 districts suggesting a simultaneous application of package of improved practices including recommended dosages of fertilisers in a balanced form on the lines of I.A.D.P. The actual achievements were, however, far below the target and the consumption of N, P & K in terms of nutrients in 1965-66 was reported at 5.83 lakh tonnes, 1.34 lakh tonnes and 0.90 lakh tonnes respectively.

3.16 This trend in fertiliser consumption upto the end of the Third Plan was indicative of the orthodox approach of our farmers who mainly followed their traditional systems of manuring. Fertilisers were considered as only supplements to be used in very small doses. With a majority of the farmers nitrogenous fertilisers and more specifically, ammonium sulphate and CAN were the only varieties which could show results. Use of P & K was confined to Government farms, progressive agriculturists, irrigated areas with high intensity of cropping and in areas which were found to be highly deficient in these elements. Elsewhere their use was circumstantial to the availability of only mixed or complex fertilisers when the farmers in their eagerness to apply nitrogen had also to apply P & K. This is reflected from the



percentage share of the three nutrients in the total fertilisers consumed. In 1960-61 (end of second plan), N formed 72.1% and  $P_2O_5$  and  $K_2O$  shared 18.82% and 9.97% of the total nutrients applied. While this percentage for N has been maintained at 72.2% in 1965-66 (end of third plan), the K element gained a little (11.2%) at the cost of P (16.6%).

3.17 Towards the close of the Third Plan, the Government of India reviewed the programmes and policies in the agricultural sector under the pressure of events and the opening up of new possibilities of field work and a new awareness in the nation and attempted at re-orientation of the programmes. The base of this orientation or new strategy was the evolution of high yielding hybrid varieties of maize, jowar and bajra, development of exotic varieties of paddy and multiplication and further breeding dwarf mexican varieties of wheat. These varieties were responsive to high doses of fertilisers and had given a yield factor as high as 4 to 5 tonnes over the traditional varieties. These varieties were planned to be grown under H.Y.V.P., in selected blocks with irrigation facilities or with assured rainfall. Originally, 32.50 million acres were envisaged to be covered under this programmes upto 1970-71 for which fertiliser requirements in terms of N & P material were placed at 12.9 lakh tonnes and 4.7 lakh tonnes respectively. This strategy was followed in the three year—1966-67 to 1968-69 following the Third Plan and has been extended to the Fourth Plan (1969-70 to 1973-74) with a much larger emphasis on its coverage in terms of area and crops. There has, however, been a shortfall in the achievement of the targetted levels of consumption of fertilisers. As against the targets of 1.7 million tonnes of N, 0.65 million tonnes of P and 0.45 million tonnes of K for the year 1968-69, the consumption was only 1.13 million tonnes, 0.39 million tonnes and 0.15 million tonnes of N, P & K respectively.

#### **Approach in Fourth Plan :**

3.18 The Fourth Plan envisages tentatively to bring 25 million acres of paddy, 19 million acres of wheat, 3 million acres of maize, 8 million acres of jowar and 7 million acres of bajra under the H.Y.V. programmes by the end of 1973-74. In addition, 40 million acres are proposed to be brought under multiple cropping by 1973-74. For these and other cropping programmes the consumption of fertilisers has been placed at 3.2 million tonnes of N, 1.4 million tonnes of P and 0.9 million tonnes of K—all nutrients, in 1973-74 indicating a ratio of 58.2%, 25.5% and 16.3% respectively which in the light of the performance in the Third Plan means a much higher impact of P & K both in terms of percentage as well as in the absolute quantity. Subject to the achievement of these targets and the contribution of other factors on which agricultural production has a bearing the Fourth Plan

envisages increasing foodgrain production to 129 million tonnes and that of oilseeds and sugarcane (gur) to 10.5 million tonnes and 15.0 million tonnes respectively. Similarly targets for production of cotton and jute have been placed at 8 and 7.4 million bales respectively. While the targets of agricultural production particularly in respect of foodgrains are being achieved, there have been shortfalls in the anticipated levels of fertiliser consumption during the first two years of the Fourth Plan. For the year 1969-70, the consumption of N, P & K was 1.36 million tonnes, 0.42 million tonnes and 0.21 million tonnes (nutrients) respectively. During 1970-71, the consumption of these nutrients is estimated to have risen marginally to 1.43 million tonnes 0.46 million tonnes and 0.23 million tonnes respectively. On the basis of the performance during the first two years of the plan and the targets for the third year (1971-72), it is expected that there will be considerable shortfall in the achievement of the targets for the last year of the Plan. According to the present indications, the total consumption of N.P. & K. during 1973-74 is likely to be of the order of 3.5 million tonnes only as against the target of 5.5 million tonnes. Various measures are being taken by the Government and industry to augment consumption to the levels envisaged by the Plan.

#### **Estimated requirements of fertilisers in 1978-79 :**

3.19 To study the requirements of N, P & K fertilisers in perspective in the 10 years period with a view to determining the scope of granular fertiliser industry, we may refer to a study on "fertiliser requirements for the next decade" conducted in the Planning Commission. Three different approaches have been followed to work out the estimates. These are:—

- i) On the basis of nutrient responses in relation to the production potential.
- ii) On the basis of the projected cropping pattern.
- iii) On the basis of the nutrient removal rates for different crops.

We do not propose to deal here with the details of the procedure adopted and the assumptions made in working out these estimates. We are only summarising below the estimates for the year 1973-74 and 1978-79.

(Nutrients in million tonnes)

Alternative based on	N.		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O		Total (NPK)	
	1973-74	1978-79	1973-74	1978-79	1973-74	1978-79	1973-74	1978-79
<b>1. Nutrient Response in relation to:—</b>								
i) Production Potential*								
a) At 5% growth rate	3.41	6.08	1.65	2.98	0.84	1.51	5.90	10.57
b) at 5.5% "	3.69	6.74	1.78	3.31	0.91	1.67	6.38	11.72
ii) Production								
a) at 5% growth rate	3.26	5.74	1.59	2.83	0.81	1.43	5.66	10.00
b) at 5.5% "	3.52	6.35	1.72	3.14	0.88	1.59	6.12	11.08
<b>2. Projected Cropping pattern.</b>	3.96	5.87	1.58	2.93	0.79	1.47	6.33	10.27
<b>3. Nutrient removal rates for different crops.</b>	3.96	5.09	1.76	2.26	1.07	1.36	6.79	8.41

\*Production potential is always higher than the production as the potential is achieved only after years when the resource input is fully utilised.

3.20 There are some variations, though significant in certain cases between the estimates for various nutrients worked out under the three alternatives. The estimates drawn out on the basis of nutrient response in relation to production at 5% growth rate seems to be more close to the targets officially accepted for the Fourth Plan (1973-74). Applying the same for the ten year perspective in 1978-79, we will perhaps aim at reaching 5.74 million tonnes of N, 2.83 million tonnes of  $P_2O_5$  and 1.43 million tonnes of  $K_2O$ .

#### **Estimated requirements of complex/mixed fertilisers in 1978-79 :**

3.21 The paper of the Planning Commission referred to earlier reports on the basis of research that "for every unit of nitrogen needed for the plant  $1\frac{1}{2}$  units must be applied, for every one unit of phosphate, 3 must be applied, and for every one unit of potash, 2 units must be applied." However, considering the fairly good richness of Indian soils in potash and slightly less in phosphates, they suggested using of 2 units for every one of phosphates and 20% of the estimated quantity of potash required. Phosphate and potassic fertilisers are applied generally in basal dose alongwith some percentage of nitrogen. Their ratio widely varies for different crops regions, climatic and water supply conditions and the soil analysis of each field. Among the complex fertilisers available in the market those used as basal dose range in composition of nutrients from 16:20:0 to 18:46:0, 20:20:0, 28:28:0, 20:10:0, 18:18:9, 15:15:15, 15:7.5:15, 14:10.5:14. This is not an exhaustive list. There are many other grades being manufactured to suit different conditions. In view of such a variety of grades, it is not possible to determine with precision the total quantities of fertilisers that would be used as a basal dose in 1978-79 and the ratio of the three constituents in them.. It is also not safe to project this on the basis of the present level of consumption of complex, hand mixed and granulated mixed fertilisers as the difficulties of foreign exchange and imports may not permit stabilisation of any definite trend in their use.

3.22 Application of nitrogen to a majority of the crops is generally split in two doses—half at the time of sowing and half as top dressing during the course of crop growth. Assuming that due to large scale availability of straight nitrogenous fertilisers like urea, CAN and ammonium sulphate, a part of the basal dose of nitrogen will be applied through straight fertiliser. Making an allowance for this, it may be assumed that about 1/3rd of this nitrogen dose will be in the mixed form with P & K nutrients. Similarly, a part of the P & K nutrient may be used in the straight form as it is assumed that only 2/3rd of their requirements may be met from mixed/complex fertilisers. On these assumptions, it is estimated that mixed/complex fertilisers may account for about 4.8 million tonnes of N, P & K nutrients in 1978-79 pro-

viding 1.91 million tonnes of N, 1.89 million tonnes of P and one million tonnes of K.

#### Scope of fertiliser mixtures (Physical & Granulated):

3.23 At the end of September, 1970 the total installed capacity of indigenous fertiliser factories manufacturing complex fertilisers was 0.18 million tonnes of N and 0.21 million tonnes of  $P_2O_5$  in complex form. The complex fertiliser projects under implementation on that date and which were expected to go into stream within the Fourth Plan period offered production to the extent of 0.16 million tonnes of N and 0.25 million tonnes of  $P_2O_5$ . The projects approved in principle and which are expected to take up production within the Fourth Plan or upto 1974-75 are expected to produce 0.46 million tonnes of N and 0.64 million tonnes of  $P_2O_5$ . In addition to these, the plants proposed for implementation may provide another 0.20 million tonnes of N and 0.27 million tonnes of  $P_2O_5$ . All the four types of projects put together offer a production of only 1.00 million tonnes of N and 1.37 million tonnes of  $P_2O_5$  in complex form. The gap of 0.91 million tonnes between the requirements and supply of N Nutrients and 0.52 million tonnes of  $P_2O_5$  nutrient in complex/mixed form is indicative of the vast scope for the development of fertiliser granular mixing industry even after producing for one or two more major projects to go into production by the end of 1978-79.

3.24 Only one of the fertiliser factories manufactured complex N, P & K fertilisers. The total nutrient K used in its products amounted to only 12,543 tonnes in 1969-70. Other factories seem to have programmes to prepare complex fertilisers containing K element. As potash has to be an essential part of the mixed fertilisers for the supply of crops nutrients in a balanced form the scope for mixed fertiliser industry is further established as it can make tailor-made supplies containing all the nutrients for different crops.

#### Fertiliser Mixing Industry :

3.25 During the Second and Third Plans, a large number of manure mixing units in the cooperative and private sectors were established in various states to supply balanced mixed fertilisers to the farmers. Most of these units were manually operated in the beginning but encouraged by the return they offered, in some cases, they were converted into semi-mechanical and fully mechanical units. Till a couple of years back about 84% of the mixing units were manually operated, 14% used semi-mechanical process and the remaining used mechanical process keeping labour force at the minimum. With the enthusiasm shown by the cooperatives to diversify their activities and to serve their members by supplying balanced fertilisers, a separate scheme was included in the Third Plan to provide assistance to marketing societies for

the installation of mechanical and semi-mechanical fertiliser mixing plants. As a result of this and the interest shown by the societies, 269 such manure mixing plants were established by the end of September, 1970. In addition, 392 manure mixing units had been established in the private sector upto September, 1970. Their statewise break-up is as under:

State	Cooperatives	Private	Total
Andhra Pradesh	1	21	22
Assam	1	11	12
Bihar	1	11	12
Delhi	1	1	2
Goa	—	9	9
Gujarat	49	—	49
Haryana	1	—	1
Kerala	1	13	14
Madhya Pradesh	2	12	14
Maharashtra	77	69	146
Mysore	35	79	114
Orissa	1	1	2
Pondicherry	2	4	6
Punjab	1	1	2
Rajasthan	—	1	1
Tamil Nadu	33	111	144
Uttar Pradesh	61	10	71
West Bengal	2	38	40
<b>Total :</b>	<b>269</b>	<b>392</b>	<b>661</b>

3.26 The production capacity of the fertiliser mixing units varies widely according to the sales capacity of the factory. According to an analysis, 66% of the plants have a production capacity of 2000 tonnes per annum, 31% have production capacity between 2,000 and 10,000 tonnes, while 3% have production capacity of over 10,000 tonnes. "A" class district cooperative societies well established in the line and reputed firms of long standing are seen in the higher brackets of production. According to the Fertiliser Statistics published by the Fertiliser Association of India, the production of mixed fertilisers in 1968-69 amount to 7.59 lakh tonnes as against 8.68 lakh tonnes in 1967-68 and 9.93 lakh tonnes in 1966-67. Their distribution in these three years was 7.53 lakh tonnes, 8.98 lakh tonnes and 9.73 lakh tonnes respectively. The four major consuming states were Tamil Nadu, Kerala, Maharashtra and Mysore which consumed about 90%

of the total mixed fertilisers distributed in the country. Of the remaining about 9% is consumed in the West Bengal, Gujarat and Andhra Pradesh.

#### Granular Fertiliser Industry :

3.27 Guided by the preference shown by the farmers to crystalline and granular fertilisers over powdered varieties and considering the demand for balanced fertilisers, M/s Bharat Fertiliser Industries Ltd., and M/s. Deccan Sales Corporation, both of Bombay, established the first granular fertiliser units in 1964 and 1965 respectively. These firms had earlier been operating as mixing units and were thus fully conscious of the advantages in taking up fertiliser granulation on a factory scale. Encouraged by their success, the Shetkari Sahakri Sangh Ltd., Kolhapur and M/s. Phosphate Company Ltd., Rishara, West Bengal established their units in 1968. Thereafter a large number of parties in the cooperative and private sectors felt interest in this venture and established granular factories in 1969-70 and 1970-71. The co-operatives were helped in this matter by the NCDC which provided guidelines of the project and other details besides giving financial assistance towards block cost and margin money for working capital. By the end of October, 1971, 18 cooperatives were in this field of which three had organized granular units on their own without any assistance from the NCDC. Of these 18 units, 11 were in production in October, 1971. A list of these units is given in Appendix 1. In addition to these 11 granular fertiliser plants have been installed/are under installation in private/sector and 2 in public sector. The Statewise position of Granular units in cooperative and private sectors is summarised below:—

S.No.	State	Private Sector	Cooperative Sector	Total daily capacity in tonnes per hour
1.	Andhra Pradesh	1	—	7.5
2.	Bihar	—	1	7.5
3.	Gujarat	3	—	7.5 (each)
4.	Haryana	—	1	7.5
5.	Delhi	1	—	7.5
6.	Maharashtra	3	11*	12 (7.5) 2 (5.0)
7.	Mysore	—	3	7.5
8.	Orissa	—	1	7.5
9.	Punjab	1	2	7.5
10.	Rajasthan	1	—	7.5
11.	Tamil Nadu	—	1	7.5
12.	West Bengal	1	—	7.5
Total		11	20	227.5

\*Including two units set up by the Maharashtra Agro-Industries Development Corporation Ltd.

3.28 The total annual capacity of these units is estimated at 1.64 million tonnes calculated at 54,000 tonnes each for a 7.5 T.P.H. unit and at 36,000 tonnes each for a 5.0 T.P.H., plant. This capacity accounts for hardly about 50% of the gap between the demand for complex/mixed fertilisers and their supply from large scale indigenous factories providing complex fertilisers.

**Gap in Requirements and supply of complex/mixed Granular Fertiliser in 1978-79 :**

3.29 The over all picture of fertiliser requirements, in 1978-79 in complex/mixed form and the supplies from indigenous factories and granular and hand mixing units is summarised below:—

	(Million tonnes)			
	N	P	K	TOTAL
i) Fertiliser (nutrients) requirement in 1978-79	5.74	2.83	1.43	10.00
ii) Of (i) fertiliser (nutrients) required in complex/mixed form.	1.91	1.89	1.00	4.80
iii) Estimated capacity to produce complex fertilisers upto 1978-79.	1.00	1.37	0.01	2.38
iv) Gap in (ii) & (iii)	0.91	0.52	0.99	2.42
v) Supplies of mixed fertilisers (from mixing units).				0.10
vi) Supplies from granular units.				1.32
vii) Total estimated supplies of balanced complex/mixed/granular fertilisers (iii), (v), (vi).				3.80
viii) Gap between supply and requirements (ii)—(vii).				1.00

The above calculations indicate that even if all the existing granular units in private, cooperative and public sector run to their rated capacity and the indigenous factories manufacturing complex fertilisers go into stream as scheduled and even if the fertiliser mixing industry continues its operations at the current rate, there will be still be scope for an additional capacity of the order of 1 million tonnes for the preparation of complex/granular/mixed fertilisers.



## APPENDIX—I

## List of Cooperative Granular Fertiliser Units as at the end of October, 1971.

S.No.	State/Name and address of the Society	Place of installation	Annual installed capacity (metric tonnes)	Date of production	Whether assisted by NCDC
<b>Bihar</b>					
1.	Bihar State Coop. Mktg. Union Ltd. West Lawn, P.B.No. 104, Patna, Bihar.	Barauni	54,000	Under installation	Yes.
<b>Haryana</b>					
2.	Haryana State Coop. Supply & Mktg. Fedn. Ltd., Sector 17-D. P.B.No. 79, Chandigarh.	Taraori (Karnal)	54,000	-do-	”
<b>Maharashtra</b>					
3.	Maharashtra State Coop. Mktg. Fedn. Ltd., Kanmoor House, Nasshinatha St. <i>Bombay-9</i> P.B.No. 5080,	Chikalthana (Aurangabad)	54,000	29.7.1970	”
4.	Vidarbha Coop. Mktg. Society Ltd., Genesh Peth, Nagpur-2	Badnera (Amraoti)	54,000	22.6.1969	”
5.	Godavari Pravara Canal Coop. Purchase & Sale Union Ltd, Kopargaon, Dist. Ahmednagar Maharashtra.	Kopargaon	36,000	Sept. 1970	No

6.	Shetkari Sahakari Sangh Ltd., P.B. No. 64, Old Palace, Kolhapur, Maharashtra.	Rukdi (Kolhapur)	36,000	April, 1968	No
7.	Kolhapur Distt. Granulated Fertilisers Coop. Factory Ltd., 1485 Laxmipuri, Kolhapur Maharashtra.	Gadmudshingi (Kolhapur)	54,000	3.4.1969	Yes
8.	Kisan Coop. Granulated Fertilisers & Chemicals Ltd., Eucharistic Congress Building No. 3 Kolaba, <i>Bombay-1</i>	Thana	54,000	March, 1971	Yes
9.	Nasik Distt. Coop. Purchase & Sales Union Ltd., Nasik Deolali Naka, New Bombay Agra Road, Maharashtra.	Nasik	54,000	15.5.1971	Yes
10.	Poona Distt. Coop. Purchase & Sales Union Ltd., 125, Bhavani Peth, Poona-2, Maharashtra.	Nimbut (on Nira Bara-mati Road)	54,000	Under installation.	"
11.	Karad Coop. Purchase & Sale Society Ltd., Karad, Distt. Satara, Maharashtra. Mysore	Karad	54,000	-do-	"
12.	Chikodi Taluka Agril. Produce Coop. Mktg. Socy. Ltd., P.B. No. 17, Nipani, Mysore.	Khadaklat	54,000	Oct., 1971	"
13.	Raichur Agril. Produce Coop. Mktg. Society Ltd., Rajendra Ganj, Raichur, Mysore.	Raichur	54,000	30.6.1971	"
14.	Belgaum Taluka Coop. Agril. Produce Mktg. Socy. Ltd., Ganapatgali Belgaum, Mysore.	Belgaum	54,000	Under installation.	"

**Orissa**

15. Orissa State Coop.  
Mktg. Socy. Ltd., Station  
Road, Bhubaneshwar-6. Bargarh 54,000 -do- ”

**Punjab**

16. Punjab Fertilisers,  
A-2, Industrial Focal  
Point, P.B. No. 127, Dhandari  
Ludhiana-1. (Ludhiana) 54,000 28.10.1970 No
17. The Punjab State Coop.  
Supply & Mktg. Fedn.  
Ltd., P.B. No. 67, Sector  
17-B, Chandigarh. Dhuri 54,000 Under insta- Yes  
llation.

**Tamil Nadu**

18. The Tamil Nadu Coop.  
Mktg. Fedn. Ltd., 89,  
Poonamalle High Road,  
Madras-10. Mannargudi 54,000 11.4.1971 ”

## CHAPTER-IV

### PLANNING THE UNIT

#### Feasibility Report :

4.1 One of the important preliminaries required to be completed for taking up any industrial project is the feasibility study which should be able to demonstrate that the project is well conceived and that technical and economic planning has been carried out to the extent that the cost and profitability estimates for the project are reliable. It is on the basis of such a report that any financial institution would consider requests for providing financial assistance towards block investment or working capital.

4.2 A feasibility report is necessary to make the cost benefit analysis of the project. Such a report should give precise location of the unit and the acreage of various crops grown under irrigated and un-irrigated conditions in the marketing zone of the unit providing also details of the fertiliser requirements of the crops and the general agronomic practices followed in fertiliser application. This information has ultimately to lead in the direction of ascertaining the demand for various types of fertilisers including mixtures (granulated and powdered) and complex and straight fertilisers in different crop seasons which has to be given in the report. While giving market prospects, it has to be borne in mind that the cost per tonne of granulated mixtures will be slightly higher than the complex fertilisers of the same nutrient values. The idea of setting up a granular unit should be conceived only in such areas where the complex fertilisers required are not expected to be made available to the potential level where, based on soil tests or otherwise, farmers are becoming more sophisticated in their demands for fertilisers with specific nutrient values for various crops.

4.3 Based on the demand estimates, the feasibility report should indicate the choice of the plant—whether of 5 tonnes capacity or 7.5 tonnes capacity per hour details of the equipment and machinery and their cost. This may be followed by detailed project estimate covering :—

- (i) Construction costs;
- (ii) Working capital requirements;

- (iii) Estimates of operating revenue;
- (iv) Estimates of operating costs;
- (v) Depreciation;
- (vi) Taxes.

The items that may be included under each of the above heads are briefly given below :—

(i) *Construction cost* : Preliminary expenditure, engineering design, land including improvements, administrative buildings, factory buildings, plant and equipment, spares, factory utilities including water supply and electricity, roads, constructions overheads, interest during construction and contingencies.

(ii) *Working capital requirements* : These may be derived from the data relating to requirements of inventories, reserves of fuel or raw materials, spare parts as well as cash needs of the project in production and marketing. Where the credits are granted by suppliers of raw material, the requirements of working capital may be off-set to that extent. On the other hand, when credits are offered by the unit on distribution of finished products, the amounts offered have to be added to the working capital requirements. It may be appropriate to show in the feasibility report working capital estimates for a period of two years after start of production in the following form :—

Item	Initial capital	First Year End	Second Year End
<b>Current Assets</b>			
(a) Raw material			
(b) Storage (Spares)			
(c) Work in progress			
(d) Finished goods			
(e) Sundry debtors			
(f) Cash			
Total (A)			
<b>Current Liabilities</b>			
(a) Short-term loans			
(b) Sundry debtors			
Total (B)			
Net Working Capital (A-B).			

- (iii) *Estimates of operating revenue* : Estimates of revenue will require estimating sales volume and price of end product. In a freely competitive climate like that of fertiliser sales, the assured selling price of the product is extremely important in making any commercial profitability calculations. For market analysis; therefore, the prices charged by the neighbouring unit from the farmer should, therefore, act as a guide to determine backwards the ex-factory price of the product.
- (iv) *Estimates of operating costs* : These may be broken down into direct cost of production covering costs associated with the production of granulated fertilizers such as direct labour and material and overheads or indirect costs on supervisory and accounting staff, stores operation, technical staff, rent of buildings, utility costs which cannot be directly charged to the product sales promotion expenses and advertising, consultants' fee, cost of a maintenance programme, interest on working capital, material and transportation charges which cannot be directly charged to the end product.
- (v) *Depreciation* : Taking into account the economic life of the plant and machinery, godowns and civil works connected with the plant installations and the administrative blocks, the value of capital expenditure on each of three items may be depreciated. This depreciation in value will enter gross expenditure while estimating operating profits.
- (vi) *Taxes* : Taxes like sales tax, property tax, etc. may be shown in the current expenditure while income tax may have to be deducted after determining the net profit.

4.4 All the above estimates may further be presented in the feasibility report under the following three financial statements :—

- (i) Operating profit estimates;
- (ii) Cash flow statement;
- (iii) Balance sheet forecasts;
- (iv) Break-even point.

The operating profit estimate is an important forecast which will show the percentage capacity likely to be utilised in the initial stages and the period that will be taken to reach full production. The cash flow chart will show the requirements and sources of cash from the beginning till the year the unit reaches a stable

position in cash requirements. The balance sheet will depict the formation of assets and liabilities of the unit from year to year. The break-even point is that percentage of full production capacity at which the plant may recover annual fixed charges, overheads and operating costs without making any profit.

#### **Profitability of the Project :**

4.5 Besides the above estimates the feasibility study should also show the profitability for the proposed project by calculating average return on original capital investment in addition to present worth of the project. In these calculations, the minimum acceptable rate of return should be used as a discount rate and the result presented as a difference between the present worth of project income and the original capital investment.

4.6 Some of the above items of estimates are presented in the following chapters. Since they are based on the actuals of costs and income, they could be used as data bank for formulation of feasibility reports for the projects that may be taken up in future taking all safeguards against the limitations under which the units in operation have been functioning.

#### **Requisites for success :**

4.7 One of the major considerations while planning a unit is undoubtedly the demand aspect of mixed granulated fertilisers. This is very intimately connected with the availability of irrigation or assured rainfall conditions which reflect on the cropping pattern and the intensity of cropping leading to determine the extent and scope in the use of fertilisers. Other things being constant, it should be seen that the unit is located in a predominantly irrigated area or where the rainfall is well spread in the two crop seasons to ensure double cropping. While this aspect may be taken care of at the time of preparing the feasibility report, we would emphasise two other important aspects which should be given due attention while planning the unit. These are :—

- (i) Enlightened management; and
- (ii) Good marketing system.

Any sound project can run into difficulties if the board of management and the chief executive officer or other technical manager are not fully conversant with the systems of production, planning and control, material management and personnel management. Many losses can be avoided and problems solved in time if there is a proper coordination between the board of directors and the chief executive officer and there is a clear-cut delegation of powers to personnel at various levels. Similarly,

for any production organisation, marketing is as important as production itself. Without profitable disposal arrangements for the products it is useless to continue production. This is all the more important for a cooperative production unit which has to fit in the cooperative system of fertiliser distribution already in position in each State.

4.8 According to the existing arrangements, the State Marketing Federations are, by and large, acting as wholesale distributors of fertilisers in their respective States. The primary marketing societies or taluka marketing societies are acting as their sub-wholesalers and village societies as retailers. In the mandi areas the marketing societies are also acting as retailers. In Maharashtra, in addition to the State Marketing Federation, which is acting as wholesale distributor of pool fertilisers in some of the districts, the Vidarbha Marketing Society is acting as the wholesaler of pool fertilisers in the remaining districts. Besides, as a legacy of the past, some of the district marketing federations are operating as wholesalers of non-pool fertilisers in their respective district. The same is true of Andhra Pradesh where the State Marketing Federation is functioning as a wholesaler of pool fertilisers only in a few districts while in the remaining districts, the district marketing federations are functioning as wholesalers. In Kerala, the Cooperatives at mandi and village level are operating only as sub-wholesalers and retailers on behalf of the FACT which is the wholesaler of bulk of the fertilisers distributed in the State.

4.9 Keeping in view the development of fertiliser marketing system in the cooperative sector, we feel best results would be achieved if the cooperative wholesalers are encouraged to take up granulation of fertilisers. They will have least difficulty in the procurement of raw materials which are straight and complex fertilisers. They are also in the best position to channel the granular fertilisers in the existing established marketing line immediately after they are produced thus minimising also the investments on storage of raw material and finished products. These wholesalers also enjoy facilities of distribution finance from the banking institutions with margin money available from the NDCC. If, however, a primary marketing society is interested to set up a unit because of the demand for granular fertilisers in its area of operation, it may be provided facilities of finance but even in such a case we would advise a collaboration between the wholesaler at the State level and the concerned primary marketing society. In no case should a society be encouraged to take up granulation of fertiliser if it is organised only for this purpose or if it is not already involved fully in the distribution of fertilisers in its area of operation.

#### **Location of the Unit :**

4.10 Once the feasibility of the project has been establish-



ed in an area, the next important question is the location of the site for the plant. Some of the prime considerations in this regard would be :—

- (a) Cost of land.
- (b) Condition of site for foundation.
- (c) Adequate supply of water and drainage.
- (d) Nearness to power transmission lines.
- (e) Availability of skilled and unskilled labour
- (f) Nearness to railway station.

The most important among the above factors is the supply of utilities like water and power. In no case, this factor should be sacrificed in favour of any other consideration as their non-availability or delayed supply can be very disastrous to the establishment of the unit. This has happened in one case where due to non-availability of adequate water supply locally, the unit could not be commercially commissioned till arrangements were completed to lay mains to get water supply from a nearby rivulet. Such arrangements generally involve further complicated problems of land acquisition and may lead to protracted waiting:

4.11. In the selection of the site, the main consideration with some of the units was the availability of cheaper or free land, irrespective of its distance from the rail-head or even from the main road. The lower investment in land in such cases is more than off-set by larger investment in the construction of approach roads, higher transport cost on raw material and construction material in lorries from the railway station to the factory site and in the outward traffic of finished products by rail. In one particular case, the land was purchased without adequate foundation investigation with the consequence that considerably more expensive foundations had to be undertaken involving also much larger time for completion. All these factors are of an economic choice and have to be weighed very carefully giving, however, a slightly greater preference to nearness to railhead.

4.12 From an economic angle, two other factors also merit consideration. If the unit is located within municipal limits, it is sure to be loaded with extra costs on octroi levy on imports of raw material. Since products of the unit have essentially to move out to the mufussil towns/areas, to the extent possible, location of the unit in the municipal areas should be avoided. For this purpose, industrial estates, where established, will be more advantageous as they offer all facilities of utilities and railway siding. Land may also be comparatively cheaper. It is possible that the unit may be exempted from certain taxes in the initial years.

## Size of the Unit :

4.13 This has to be decided on the basis of demand of fertilisers in the area of operation. Earlier, plants of 5 tonnes capacity per hour were advocated but since the past few years, most of the units, including those in the private sector, have been going in for 7.5 tonnes per hour capacity plants. We are informed that expansion in capacity of a plant can be made by changing the conveyor belts with an extra cost up to 30%. We however, feel that such an expansion may be conceived only from 7.5 tonnes to 15 tonnes per hour plant. It may not prove economical to convert a 5 tonnes plant to 7.5 tonne per hour plant as the difference in the cost of machinery for the two sizes is very little. We, therefore, suggest that a cooperative may set up a 7.5 tonne per hour plant which may be run, in the initial stage, on a two shift basis. This approach will fit in well with our cooperative sector where the granular units are being set up by wholesalers of fertilisers. They can further expand these units to 15 tonnes per hour capacity by replacing conveyors. The requirements of these Federations could be visualized to be more than the production from bigger sized unit.

4.14 While the feasibility report and the detailed construction programmes would plan for full requirements of the unit in the matter of machinery and civil works, it is felt that to avoid heavy investment in the beginning and to save on interest thereon, construction of a part of the civil works may be staggered till the unit gets over the teething troubles. In this regard we consider that there is scope for staggering construction of storage accomodation both for raw material and finished products and also in the construction of staff quarters and the development of the yard. Even in the case of administrative blocks minimum essential accomodation may be provided initially. As for the machinery, we cannot advise any substantial staggering. We do, however, suggest that in view of the availability of adequate unskilled labour the units may not go in for conveyer belts to feed the raw material. They can also afford to cut the colouring apparatus and the automatic packing and weighing machines. We have noticed a tendency among the units to stagger the establishment of a workshop. This we consider as an unsound, as imperfect local arrangements for repairs and replacements often leads to heavier costs unless competitive facilities are locally available for repairs etc.

## Layout of the Plant :

4.15 There are two types of layout for the plants. While some of them are of verticle type, others have horizontal setting. Latest among the units established have favoured horizontal arrangements. The question as to which of the arrangement should be preferred came up for discussion at the seminar on

cooperative granular fertiliser units held at Aurangabad in January, 1971. In view of the inconclusive discussion, the subject was referred to this Team. We have carefully gone into the matter. Both the arrangements have their advantages and disadvantages which are difficult to measure in economic or even qualitative terms to enable a clearcut judgment. We, therefore, refrain to give any opinion favouring any one system. We would, however, list out the merits of both and would leave it to the judgment of the management of the society which is planning to take such units. The construction costs in plant room, building and civil works are lower by Rs. 1.52 lakhs in the horizontal layout and it also offers efficient supervision over the plant operations besides employment of lesser number of persons. On the other hand, the vertical layout requires lesser area and thus economises in land cost. It also makes use of gravity flow for all the rotary drums.

#### Civil Works :

4.16 There has been a great variation in the expenditure on civil works as incurred by various granular fertiliser units in the cooperative sector. Even for the units of the same capacity the expenditure on these items extended from Rs. 10.00 lakhs in one case to Rs. 32.58 lakhs in the other case. While the higher cost may partly be due to higher wages and increased transport and consumption of material or on account of higher cost of land and its development, the major factor that has been responsible for the higher expenditure on works has been the increased in construction quantities. In some cases godowns of much larger capacity have been provided and in some others administration buildings or staff quarters have been liberally provided for. Where the site for the unit was about 10 acres, the expenditure on development and compound wall has considerably added to the cost. Since civil works form bulk of the capital expenditure it has to be seen that in the initial stages only such works are provided as are very essential for the running of the unit. In other words, the construction quantities for each of the major requirements of the unit will have to be reduced to the extent that they do not impair efficiency in operations. While planning and preparing the feasibility report this aspect may, therefore, be given a very careful consideration.

4.17 Among the civil works, one of the major items of construction are the godowns for raw material and finished products. Normally, a unit may like to keep at any time about 3 months supplies of raw material and about one month's stocks of finished products. On this basis the godowns may be provided for in the feasibility report. It need not, however, be a uniform pattern for all the units. Where the cooperative wholesaler of fertilisers has set up a granular unit the storage capacity both for

raw material and finished products can be reduced a little as the wholesaler can arrange to supply raw material from its general buffer stock godown in the area and can also carry the finished products, as soon as prepared, to the sub-wholesalers. Similarly, staff quarters and pavement of the yard may not be given much priority. To the extent possible separate water tower may be avoided and overhead tanks on factory buildings may be provided. Even for a compound wall, only that area which is essentially required for the project may only be bounded. The project may, however, take care that sufficient provision is made in the plan for expansion of various requirements at a later stage. There has also been noticed a very wide range in expenditure incurred by various units on electric installation. It extends from Rs. 26,500 to Rs. 2.09 lakhs. Apparently, such large variations call for a close look even at the time of planning the unit. In order that the industry is not loaded with unnecessary capital expenditure, the plan may provide only for essential minimums i.e. there may be no need for electrifying the entire yard with tubelights and other costly fixtures. These things can later on be added when the unit starts running on profit.

### **Financial Planning :**

4.18 The feasibility report should also contain a detailed financial plan for raising resources for block investment and working capital. It is noticed that many of the granular units have been taking care of the element of block costs for purposes of mobilising resources, ignoring the urgency of raising margin money for working capital. This resulted in delay in commercial commissioning of the unit and in running it to full capacity. A society is entitled to a fixed amount of financial assistance from the State Government under the Corporation Sponsored Scheme towards block investment and margin money for working capital. On the basis of the investments assessed in the feasibility report, the society may plan to raise the balance resources from their own members. If the existing owned funds are already committed, additional share capital may have to be collected from the members. This is quite a difficult task. A society should not initiate project construction without raising a bulk of the additional funds required from its members. The delay in the completion of a unit for want of funds will result in heavily loading the unit with instalments of loan repayment and interest thereon without any return. Many units run into perpetual financial problems because of poor financial planning.

### **Planning for Marketing of Products :**

4.19 Planning for marketing of the products is one of the most important factors to be considered while formulating a project because no project can claim to be successful unless it is able

to sell off its products leaving a sufficient margin of profit on investments made. The granular unit has, therefore, to indicate in the feasibility study the arrangements it proposes to make for the marketing of the products, whether it would involve the established fertiliser distribution system in the cooperative sector or would organize its own system giving in detail the capacity of the agency/agencies to be engaged in the distribution of fertilisers. This may be judged only on the basis of the actual performance in the past few years and the organisational net work. It has also to be seen that the agency proposed for marketing does not owe its loyalty to any other wholesaler to which it may be committed to serve for a certain period. In addition, the project may also clearly indicate whether the proposed sales agency can extend its area of operation to expand the business in accordance with the increase in production of the unit on the basis of 3 shift operation. The facilities proposed to be made available to the sales agency together with the arrangement of finance have also to be spelt out.

4.20 Besides the above, the project may provide a realistic assessment of the costs involved in marketing, taking into account the warehousing costs, dealer's margins, interest on inventory and recoverables, cost of credit, shortage, overheads, advertisement and promotion etc. These details will help in determining the sale price to the farmer and to see how best this price compares with the prices of similar products available in the market. If the price for the new produce is higher, then unless there is a sufficient justification in favour of its use over other fertilisers, it may not be worthwhile to proceed on the project.

4.21 Similar to the above costs, the other important factor that affects the price structure is the ex-factory price determined on the basis of manufacturing costs. Normally, the price of the products of the plant should be fixed in such a manner that the annual earnings after providing for all the costs of depreciation and interest and all taxes, are sufficient to provide the funds necessary to declare annual dividends in an amount consistent with the rate of return the capital employed could realise in other commercial ventures and also to provide the funds necessary for reserves required by law and the capital expenditure required to enable the plant to continue to operate efficiently. Inherent in this policy is the obligation of the management of the unit so to conduct its affairs as maximum production is reached at the lowest cost. Among other things, this involves keeping funds employed in investment in fixed assets, working capital, inventories and materials at a minimum. It also requires that operating expenses be kept at a minimum by the employment of the minimum number of personnel consistent with efficient operation. It is also necessary that the operating management of the unit has freedom of action to take advantage of opportunities available to

maximise production and minimise cost. All this calls for a maximum operation of the plant much above the break-even point, if not to full capacity in three shifts.

4.22 While on this subject, we also wish to comment that in so far as the existing cooperative granular fertiliser units are concerned, it is noticed that the cooperatives had based their feasibility studies; by and large, on the model scheme formulated by the NCDC in 1967-68 and circulated to the States. This scheme of the NCDC which is in the shape of a blue-print gives broad estimates of capital investment on buildings, godowns, laboratory, machinery and equipment, electric installation, etc. for a plant of 5 tonnes capacity per hour. It also briefly mentions the working capital requirements for a plant of this size and the debt equity ratio as well as the sources of finance. While we consider that the model scheme seeks to provide a broad outline of the nature of the fertiliser granulation process, the type of equipment and civil works required and the working capital needs of the units, we feel, however, that it cannot be considered as a substitute for a feasibility report. Even as a guide there is scope for modification in the model scheme. The model offers estimates for a unit of 5 tonnes per hour capacity, but on the basis of subsequent experience, the cooperatives, barring two, have all gone in for plants with 7.5 tonnes capacity per hour. Even the estimates on plant and machinery and civil works require to be revised because of the cost escalation. The estimates for working capital need to be slightly elaborated giving a break-up of finances required for purchase of raw material and for stocking of finished products, stores, spares, etc. They may also include a part of the capital needed for marketing and running expenditure on overheads for a part of the year. We, therefore, suggest that the scheme should be revised on the above lines giving separate blue-prints for 5 tonne and 7.5 tonne per hour capacity units and incorporating in it the pattern of financial assistance from the Corporation both for block investment and margin money for purchase of raw material and finished products, indicating clearly the obligation of the societies concerned and the State Governments in raising their share of the resources. It may also be advisable to give broad details of the types of granular mixtures recommended for different crops in various States/areas, the cost of production and the likely ex-factory prices for different mixtures. These details would help the prospective granular unit to study the implications and their involvement before deciding to go in for the venture.

## CHAPTER—V

# ESTABLISHMENT OF THE GRANULAR FERTILISER UNITS

### Plant & Machinery

5.1 The main equipment for granulation of fertilisers is simple from the point of view of chemical engineering and consists of 3 units, (i) the granulator, (ii) the drier and (iii) the cooler. Each is a hollow cylinder of welded mild steel construction measuring 5' to 8' in diameter and 15 ft. to 40 ft. in length mounted on roller bearings horizontally at a slight slope and kept rotating at a slow speed by means of a gear drive. The auxilliary equipment for the granular plant consists of the followings :—

- (i) Bins & hoppers.
- (ii) Weighing & proportioning equipment.
- iii) Hammer mills, roller mills, etc.
- (iv) Mechanized screening equipment.
- (v) Conveyers for the raw materials from one stage to another.
- (vi) Furnace oil burners and oil storage installations.
- (vii) Cyclone dust collectors.
- (viii) Blowers for air and vacuum pumps.
- (ix) Purometer for temperature control.
- (x) Electric motors with starters numbering about 30 with a total installed capacity of 250 H.P. and a transformer for stepping down from H.T. lines.

5.2 The entire plant, machinery and equipment for a granular fertiliser unit is indigenously available in India. Some of the firms which have been offering to supply machinery, etc., and to undertake its erection on turn-key basis are listed below :—

- (i) M/s. FERTIPLANT Engineering Co., Pvt. Ltd., Jamunotry, 26th Road, Bombay-50.

- (ii) M/s. Humpherys & Glasgow Ltd., Common House, Caddle Road, Prabhadevi, Bombay-25.
- (iii) M/s. Phosphate Company, Ltd., 14, Netaji Subhash Road, Calcutta, West Bengal.
- (iv) M/s. FACT Engineering & Design Organisation, Udyogmandal, Via Cochin, South India.
- (v) M/s. Allied Engineering Corporation, Post Box No. 280, New Delhi.

Some of the above firms have their own designs and fabrication arrangements for the machinery while some others get the machinery fabricated from other manufacturers according to the specifications. Quite a large number of items of auxilliary equipment are, however, provided by the machinery suppliers from the open market.

### **Terms & Conditions of Supply**

5.3 The offer of supply of plants on turnkey basis by the above firms generally includes the following services :—

- (a) Supply of machinery and equipment.
- (b) Process know-how.
- (c) Detailed specifications and drawings.
- (d) Erection of the plant.
- (e) Commissioning of the plant.
- (f) Training of Customer's personnel.
- (g) Plant inspection and maintenance for a specified period after the plant is commissioned.

While offering tenders for the supply and erection of plants to the cooperatives interested to set up fertiliser granular units, the suppliers, in their proposals, have been listing the type of machinery and equipment together with the number of each item of supply under different sections such as raw material section, granulation section, dryer section, cooler dust collector section, finished material section, coating and colouring section, etc. In none of the proposals has the quality of material to be supplied been specifically given. As a result, the quotations received from different parties are not comparable except for the total cost quoted for complete supply of equipments including technical know-how, detailed drawings and specifications and erection of the plant.

5.4 The obligations of the customer in fulfilment of the



contract are, however, defined to some extent in all cases. They include :—

- (i) Site clearance, construction of roads and buildings, all unit and RCC works, structural work, hand railings, hangers. The responsibility of the suppliers is confined to loading and fixing details etc., for the plant foundations designs.
- (ii) Designing of building and machine foundation. The details of buildings required are, however, generally provided by the machinery suppliers.
- (iii) Electric supply outside the battery limits (excluding only bare transformers all light fittings, associated circuits, fuse boards and wiring, all thermal insulation and claddings.
- (iv) Water tanks and pipe line, sewerage, pipe work between the public mains and also in the battery limits.
- (v) Furnace oil installations, pipe work within battery limits and outside.
- (vi) Supply of raw materials, auxilliary materials, consumable stocks, labour, staff, etc., as would be necessary for commissioning of the plant.
- (vii) Safe and proper storage of equipments at factory site before erection and after erection. Storage should not be more than 100 meters away from the battery limits.
- (viii) Any painting of mild steel external surfaces on site (one coat of red lead primer or other appropriate protection has to be made by the machinery supplier before despatch).

To enable a proper comparison of the terms and conditions of contract between the customer and the machinery suppliers it is necessary that the cooperatives may design a standardised proforma based on the terms and conditions offered so far by various suppliers. Any deviation from these terms can immediately be located and assessed for comparison with quotations received from other parties.

## Prices

5.5 There has been a progressive increase in the price of plant and machinery offered by the fabricators for granulation of fertilisers. It has gone up from Rs. 12 lakhs in 1967-68 to Rs. 13.20 lakhs in 1970-71. The increase is understood to be due to mounting cost of steel which is used to the extent of 125 to 150 tonnes per plant of 7.5 tonne capacity per hour. Since granulation units produce an important input for agriculture it is

necessary that the cost of production is kept low so that farmers are supplied granular fertilisers at cheaper rates. In our opinion this could be possible if the Government supplies the requisite quantity of steel to the fabricators of plants at controlled rates against firm indents placed by the cooperatives.

5.6 Some of the plant manufacturers also offer coating and colouring equipment to distinguish different grades of fertilisers by giving them different colours. This equipment costs about Rs. 60,000/-. Similarly, feeding hoppers and conveyer belts costing Rs. 0.46 lakhs for automatic feeding of raw material and bagging machine and automatic packing and weighing machine costing Rs. 1 lakh are also available in the market in addition to heavy duty stitching machine and slat conveyer which cost about Rs. 30,000. Wherever labour is cheap, we suggest that cooperatives may avoid going in for these sophisticated machinery in the initial stages. One of the units (Aurangabad) has installed a weigh bridge costing Rs. 0.78 lakhs. We feel even this item may be kept out of the inventory for some years till the unit is not run on three shift basis.

#### Civil Works.

5.7 The civil works of a granular plant include besides the machine foundations, flooring, roof and walls of the plant rooms, massive godowns for the raw material and finished products. In addition the complex consists of office buildings, water tower, workers' toilet and bath, rest shed for workers, canteen, storage tank for furnace oil, transformer yard, roads, compound wall, gate house, rivetment and pitching of site, if any, etc. While the cost of machinery and its erection as incurred by the existing cooperative granular fertiliser units has varied within a narrow range from Rs. 11.38 lakhs to Rs. 15.98 lakhs, the capital cost on the civil works as reported by various units ranges between Rs. 7.76 lakhs and Rs. 32.58 lakhs. About Rs. 20 lakhs out of Rs. 32.58 lakhs was spent on the development of 3.75 acres land alone. In the case of the unit involving the minimum cost of Rs. 7.76 lakhs on civil works, the 5 acres land cost only Rs. 1,000. Among the different components of civil works again, there is wide variation in the costs incurred by different units. For instance, the godown in one unit cost only Rs. 2.95 lakhs, whereas it cost under 6 units between Rs. 3.23 lakhs and Rs. 9.64 lakhs. Similarly, the construction of administrative block including rest rooms, canteen, sanitary block and laboratory cost the cooperative granular units between Rs. 30,000 and Rs. 1.40 lakhs. Unit-wise expenditure on main items of civil works are given below for purposes of illustrating the range :—

Item of Expenditure	Kisan	S.S.S.	D.G.F.C.	Mah.	Raichur	Vidarbha	(Rs. in lakhs) Tamil Nadu
1. Main Factory Bldg.	} 3.50	3.37	3.92	4.65	2.89		3.80
2. Machinery Foundation							0.17
3. Godowns for raw-material finished products & empty bardana	8.00	5.39	2.95	9.66	3.80		2.60
4. Administrative Office	0.15	0.34	0.46	0.90	0.11		0.53
5. Laboratory	—		—	0.50	0.15		—
6. Rest Room	0.01	0.08	0.09	—	0.15		0.12
7. Canteen	—	0.06	0.08	—	—		0.13
8. Sanitary Block	0.20	0.28	0.05	—	—		0.15
9. Compound Wall	0.52	0.10	0.02	—	—		0.29
10. Roads	—	—	0.04	—	—		0.89
11. Time Office Building	—	0.09	—	—	—		0.23
12. Furnace Oil Tank	0.25	0.06	0.03	0.41	0.07		0.20
13. Water supply system	0.09	0.15	0.18	0.37	0.21		0.60
14. Miscellaneous	—	—	—	0.78	—		—
<b>Total :</b>	<b>12.72</b>	<b>9.92</b>	<b>7.99</b>	<b>16.67</b>	<b>7.38</b>	<b>*14.36</b>	<b>11.04</b>

\* In the case of Vidarbha the total cost worked out to Rs. 14.36 lakhs including expenditure on land and site development and Rs. 0.11 lakhs on water supply system.

There is a very wide variation in expenditure incurred by the advisable to compare the costs on individual items as the expenditure on smaller items in same cases has been clubbed with the major items of main factory building or administrative office. The lower cost in Raichur is partly due to non-provision of a number of essential items like canteen, sanitary block and compound wall. On the other hand, it appears that Kisan has spent unduly large amounts on compound walls and godowns and the Maharashtra unit on godowns, administrative block, furnace oil tank and water supply system.

5.8 The above costs may be compared with the following corresponding costs incurred by a concern in private sector :—

(Rs. in lakhs)	
(i) Main factory building and machine foundation	1.86
(ii) Godowns	3.74
(iii) Administrative Block (Office sanitary arrangements, laboratory, canteen, rest room, etc.)	1.25
(iv) Compound wall, furnace oil tank, etc.	0.27
(v) Water supply system.	0.16
<b>Total :</b>	<b>7.28</b>

Recognizing that the above costs represent the expenditure of about 5 to 6 years ago and allowing for the margin due to escalation of costs in the subsequent years when cooperative units were established, it is felt that the major single item on which some of the cooperatives have spent more than the optimum is the godown capacity.

5.9 In view of the fact that the higher investments in civil works ultimately influence the cost of processing and reflect on the sales of fertilisers and economy of the plants, it is necessary that the cost on these items is kept at the minimum. This can be done by putting the requirements at the least essentials and by having such a design as would meet the twin objectives of involving to the extent possible, local raw material for construction and requiring least expenditure on annual maintenance. The choice of an agency for constructing the civil works is another factor relevant for keeping down the costs.

### Requirements of Space

5.10 As regards the minimum area required for different purposes, while there may not be any hard and fast rule, we

would give broad norms which may be adopted in future programmes with modifications according to the local needs. In so far as building for the plant room is concerned, the covered area has to be determined keeping in view the design/layout of the plant. In the case of a horizontal layout, the building space may be 35 M × 30 M × 9.5 M above floor level. A vertical layout design with a three storey building occupies a space of 31M × 19M with a height of 16 meters. Adjoining the plant building, a loading area of 15M × 14M of 3.5M height is required for feeding the plant with raw material. Similar built-in area is required on the other side of the plant house for curing room. It has been estimated that the maximum area for a horizontal layout for housing the plant and for feeding and curing houses, may be of the order of 1470 square meters or about 14,000 square feet.

5.11 The requirements of godown space may not be uniform for all the units. Where a unit is established by an apex cooperative marketing federation acting as wholesaler of fertilisers as in the case of Punjab, Haryana, Maharashtra, Tamil Nadu, Bihar and Orissa, a smaller storage capacity can suffice as the apex society will be able to deliver the finished products to its sub-wholesalers immediately after they are prepared. Even for raw material the society can, to some extent, draw upon its existing storage capacity for buffer stocks. Therefore, storage capacity for one month for the raw material and for 15 days for finished products may be provided by the units set-up by cooperative wholesalers of fertilisers. In other cases, we consider that capacity sufficient enough to stock raw materials for 1½ months and finished products for one month may be provided. There is one unit (Vidarbha) which is located in a predominantly mono-crop area where the demand of fertilisers is, by and large, in the Kharif season. It was argued that in such cases storage capacity for a larger period should be provided. We do not, however, support this contention. We suggest that this society should better keep the products in the distribution pipeline with the sub-wholesalers who will be having large unutilised storage capacity.

5.12 At the full rated capacity on three shifts a unit is expected to produce about 45,000 tonnes of granular fertilisers. To begin with, it is felt that the cooperatives may not be able to operate beyond two shifts raising only about 30,000 tonnes. For the production of this quantity, an average unit would require to store 6,200 tonnes of raw material and finished products at a time (3,700 tonnes of raw material and 2,500 tonnes of finished products). Calculating at 6 Sq. Ft. per tonne, the total storage capacity needed in terms of space works out to 37,200 Sq. Ft. In the case of State Marketing Federations acting as wholesalers of fertilisers, the storage capacity for their granular units may not exceed 3,750 tonnes requiring 22,500 sq. ft. covered area. It may, however, be mentioned that the existing storage capacity with the

granular units set-up by the Punjab State Cooperative Marketing Federation Ltd., and the Tamilnadu State Cooperative Marketing Federation is only 3,500 tonnes and 3,000 tonnes respectively. These units feel that in the context of their present operations this existing storage capacity is adequate to meet their requirements.

5.13 With regard to the other civil works, we suggest the following space coverage for various items :—

(i) Administrative Block including laboratory.	2000 sq. ft.
(ii) Canteen.	600 „ „
(iii) Rest House.	500 „ „
(iv) Toilet block.	400 „ „
Total :	<u>3500 „ „</u>

We further consider that a water tower of 10,000 gallons capacity mounted on 50 ft. height is large enough to meet the requirements of water supply. Based on the above estimates and keeping in view the requirements of space for transformer, well or tube-well, roads and open space, it is felt that a total area of 2½ to 3 acres is sufficient for a granular unit.

#### Cost on Civil Works

5.14 The Team has gone into the details of the designs adopted/suggested for construction of roofs and floors of different types of civil works, the raw material required for each design and the cost involved. For the construction of roof of main factory building, the Cooperative Granular Fertiliser Unit at Mannargudi (Tamil Nadu) has used R.C.C. 'T' shaped beams spanning 30M to give uninterrupted space to suit machinery layout. These beams (11 in number) were cast in place using high strength bars as reinforcement with concrete class M350. The gap between the 'T' shaped beams was filled up with pre-cast R.C.C. plans. On the top of the plans, one inch concrete screed has been laid on the periphery. R.C.C. columns have been provided at 3.5M c/c braced at three levels. This type of construction has cost them about Rs. 28 per sq. ft. The cost on constructing roofs with asbestos sheets supported on structural stilts and steel trusses with 100 ft. span is, however, estimated at Rs. 32 per sq.ft. This type of roof has been provided by most of the other units in production. For other civil works excluding godowns and water tower generally concrete roofs are preferred because of their low maintenance cost. Their construction is estimated to cost about Rs. 32 per sq. ft.

5.15 For the construction of godowns which form the biggest single item of civil works, a number of designs have been adopted. There is the asbestos roof supported on tubular trusses with a 60 ft. span. The cost on this is estimated at Rs. 14 per sq. ft. Another design is the folded plate roof with 60 ft. span, which is estimated to cost Rs. 17/- to Rs. 18/- per sq. ft. The shell type design which has been popular with the F.C.I., etc. costs, Rs. 22 per sq. ft. because of higher shuttering costs. The ordinary R.C.C. roof also costs about Rs. 22 per sq. ft. Another design of dome type has been adopted by the Tamil Nadu unit. This is an umbrella type construction without any columns or beams. The roof consists of R.C.C. dome and thickness of the shell being only 70 m.m. The dome is supported on a ring beam which, in turn, is supported on 12 Square R.C.C. columns. This is considered as the cheapest and long lasting structure for godowns. It is estimated to cost about Rs. 14 per sq. ft.

5.16 In choosing the design for the roofs, it is necessary to look into the availability of raw material in the vicinity of the plant site. If stone aggregate and sand are freely available and there is no shortage of cement, it may be advisable to go in for R.C.C. construction. On the other hand, if steel and asbestos sheets are abundant, steel construction may be given due consideration. There is an advantage in both the above types of constructions. Their height can be raised according to the needs for accommodating larger number of bags in the minimum space. According to the existing experience, fertiliser bags can be stocked 34 deep. This would mean a clean height of about 25 ft. for bags. The dome type, although less expensive from the point of view of cost per sq. ft., has the limitation of maximum height. The godowns already constructed with this design are 11 ft. high. This can at best be raised to 15 ft. Therefore, if space has to be economized, R.C.C. construction on tabular trusses with asbestos sheets may be adopted. Where space is no problem it may be economical to go in for dome type godowns. Construction of shell type godowns involved high quality supervision and may prove relatively more expensive.

5.17 Based on the above analysis of space requirements and cost per unit, following estimates are made for block investment in plant and machinery and civil works for the establishment of a granular fertiliser unit of 7.5 tonnes per hour capacity ;

Item	(Cost Rs. in lakhs) For the minimum essentials
1. Plant and Machinery including freight upto site. Also includes transformer.	14.00
2. Civil Works :	

(i) Machinery Foundation	1.40
(ii) Building for plant room including loading and curing areas 14,000 sq. ft. × 32	4.48
(iii) Godowns 37,200 Sq. ft. × 16	5.95
(iv) Adm. Block including laboratory 2000 Sq. ft. × 30	0.60
(v) Canteen, Rest House, Toilet Block 1500 Sq. ft. × 30	0.45
(vi) Water Tower and Tube well	0.30
(vii) Roads	0.60
(viii) Compound Wall	0.15
(ix) Oilstorage tanks and Service tanks	0.20
(x) Control Room.	0.07
3. Electricity and Lighting :	
(i) Electric installation	0.27
(ii) Yard lighting.	0.10
	28.57

Another 5% may be added to cover price escalation and contingencies which puts the capital investment in block assets at Rs. 30 lakhs. In addition to the above items following equipment may be required if greater automation is intended to be introduced :—

Feeding hoppers.	Rs. 10,000
Bolt conveyors.	Rs. 20,000
Bypass belt conveyers.	Rs. 16,000
Magnetic Separator.	Rs. 30,000
Hopper for bagging plant.	Rs. 10,000
Bagging Machine.	Rs. 90,000
Stitching machine and salt conveyor.	Rs. 30,000
	Total : Rs. 2,06,000

As earlier observed, in view of the need for economising on investments we do not consider it advisable for the cooperatives to go in for the above additional equipment.



## Total Cost on a Granular Unit

5.18 It would thus be seen that a granular unit would cost about Rs. 30.5 lakhs including the cost of land which may be estimated at about Rs. 50,000 for a plot of about 2 to 3 acres. To this may be added pre-operative expenses to be capitalised Rs. 0.80 lakh. Interest capital for one year to be capitalised Rs. 3.13 lakhs and margin money for raising working capital Rs. 15 lakhs. This may be compared with the investment of Rs. 21 lakhs originally conceived by the NCDC in its scheme and which also included an element of working capital funds. In view of the heavy escalation of costs in the past few years, we suggest that the NCDC may revise its scheme basing the investment at an estimated cost of Rs. 49.43 lakhs as indicated above for a unit of 7.5 tonnes capacity per hour.

## Method of Financing Capital Cost

5.19 In the original scheme of the NCDC it was envisaged that the cooperatives would raise Rs. 2.75 lakhs from their owned funds while the balance of Rs. 18.25 lakhs was to be provided by the concerned State Government (to be fully reimbursed by the NCDC) by way of share capital and long-term loan in the ratio of 8.25:10. Although the stake of the cooperative society in the above pattern of sharing was hardly about 13% of the total investment on fixed assets, in actual practice, the society had to meet much larger share of the cost from its own resources, in as much as the capital investment excluding margin for working capital had been of the order of Rs. 25 lakhs to Rs. 30 lakhs in almost every case. With Govt. assistance at Rs. 18.25 lakhs per unit, the cooperatives invested about Rs. 7 lakhs to Rs. 12 lakhs from their owned funds which worked out to about 28 to 40% of the total block investment.

5.20 Under the existing scheme of the NCDC for financing cooperative granular fertiliser units, as revised to provide for assistance amounting to Rs. 7 lakhs for margin money, the State Govts.' assistance amounted to Rs. 25.25 lakhs and the society is required to invest Rs. 9.75 lakhs from its owned funds. Out of the total amount of Rs. 35 lakhs, loan portion amounted to Rs. 10 lakhs only making a debt equity ratio of 1:2.5. We consider the equity portion to be much higher than what is desirable. According to the commercial pattern of financing industries, equity may match the debt. We suggest that the same pattern should be followed in the case of cooperative granular fertiliser units. Thus, the total investment of Rs. 49.43 lakhs, say Rs. 49.50 lakhs in block assets and margin money should be met in the debt equity ratio of 50:50. On this basis, following pattern will emerge for sharing by the society and the State Govt. :—

Type of Society	Share of	
	Coop. Society	State Govt.
1. Share capital/owned funds.	25% of the cost i.e., Rs. 12:375 lakhs.	25% of the cost i.e., Rs. 12.375 lakhs.
2. Long term loan	—	50% of the cost, i.e., Rs. 24.75 lakhs.

The above pattern is suggested for granular units to be established in economically developed areas which offer good prospects for collecting additional share capital by the societies from their members. In the backward areas, as identified by the Planning Commission, we propose that out of the total equity, the share of the cooperatives and the State Governments may be in ratio of 1:2.

#### Mode of Release of Financial Assistance by the NCDC

5.21 We expect that the NCDC would continue to provide 100% financial assistance to the State Governments outside the State plan ceilings for financing these societies on the pattern given above. We, however, consider necessary that the release of financial assistance from the NCDC should be progress-oriented. For this purpose following schedule is suggested :—

No. of instalment	Conditions for release of instalment	Share of State Govt.	
		Share capital	Loan
1	2	3	4
1st instalment	On approval of project.	50% of Govt. share capital.	—
2nd „	On acquisition of land and placing of orders for machinery.	50% of Govt. share capital.	—
3rd & 4th instalment	According to progress of investment in plant and machinery & construction of civil works.	—	50% of long term loan.
5th „	After the unit is commissioned.	—	50% of long term loan.

## Moratorium

5.22 The granular fertiliser units take about 3 years for establishment and for running to a break even point. It is, therefore, not desirable to expect them to commence repayment of the loan instalments before 3 years from the date of release of first instalment by the NCDC. On the lines of the Central Sector Scheme for cooperative processing units, we suggest that a moratorium of 3 years may be allowed to cooperatives in the repayment of loan instalments. However, we do not propose to make any change in the total period of 14 years in the repayment of the loan. This means that the society would repay loan in 11 annual equated instalments commencing from the fourth anniversary of the first instalment of the loan. As regards interest, it is, however, suggested that no moratorium may be allowed in its payment.

## Work Plan Schedules

5.23 Before we conclude our observations on the installation aspects of the granular fertiliser units, we would draw attention to the need for organising by the society a work plan which would help in planning the use of resources including money and material in the most optimum fashion and to develop realistic schedules. First priority in this regard has to be given to acquisition of land after the project has been approved on the basis of feasibility study. As soon as this is completed arrangements for development of site may be taken up, if necessary. Simultaneously steps may be taken to obtain water connections if the area is served by municipal water supply system, otherwise suitable measures for digging well or installing a tube-well may be initiated. Similarly, the Electricity Board may be moved to supply electric power connection of the desired voltage so that by the time the installation of plant and machinery is conceived, the unit has the electric connection.

5.24 The society will be having the obligation to meet a specific proportion of the block capital from its own funds. Since fund raising is a very difficult task, the society will have to do this work on a campaign basis soon after the project is approved so that by the time the tenders for machinery are invited, a substantial amount of their share is collected.

5.25 The next important task in the schedule should be calling of tenders for the purchase of plant and machinery. This should not be difficult in view of the fact that complete addresses of the few firms dealing in fertiliser granulation machinery are already available. While finalising the contract the obligations of the contractors and the concerned society should be precisely defined. This should include the schedule of work for each stage and by each party. To be able to obtain effective control over

the contractors there should be incentive and penalty clauses which may be linked with the achievement of milestones fixed in the schedule of work. According to the current practice, the installation of granular units is undertaken by the firms on turn-key basis. We consider this a healthy arrangement as it involves the machinery manufacturers upto the stage of commissioning of the plant and also enjoins upon them the responsibility for any shortcomings in the technical functioning of the plant upto one year after commercial production.

5.26 After the placement of orders for the plant and machinery, the society will have to make arrangements for the preparation of design and plan for buildings and the cost estimates thereof. For this purpose the society may engage, in consultation with the State Cooperative Department, a competent consulting architect/engineer. In the meantime, the society may also proceed to appoint a mechanical/civil engineer and a supervisor who have to look after the construction work. One of the societies has awarded a contract to the suppliers of machinery even for the construction of civil works. We do not support this arrangement as it would be much more costly an affair for the society and can also be a cause of delay. In fact, we would prefer an arrangement by which the cooperatives undertake the civil works departmentally. In this case, it should be ensured that the departmental organisation has the requisite expertise and skill to carry on this work otherwise contractor system may be better. Selecting a contractor on the basis of the lowest bid only would not ensure that a competent contractor is chosen. Besides, the price, the past performance and the capability should be the criteria for selecting a contractor. Prior approval of the State Registrar of Cooperative Societies should also be obtained for appointing a contractor.

## CHAPTER—VI

# MANPOWER REQUIREMENTS

### **Character of Management**

6.1 Cooperative granular fertiliser units, besides being associations of farmers/societies to meet a common social purpose, are also essentially business enterprises. While for a pure social purpose, the economic aspects may be ignored, a unit which combines in its objectives the "best advantage of the members", surely it has to be saved from losses and failures if not ensured any profit. It is in this context that a much greater emphasis should be laid on having a good management. Management itself is a many sided complex job particularly for the big size agro-industrial-units like the granular fertiliser factories, and involves every aspect from conceiving the plan to installation and operation of the factory including ultimate marketing of the products. Management is performed in a chain commencing with the General Body of members of the society and ending with the lowest of the paid personnel with Board of Directors, Executive Committee, Managing Director or General Manager as intermediary management channels. We are, however, not going to discuss here the duties and responsibilities of the democratic bodies themselves but will confine our suggestions to general staffing and personnel management.

### **Staffing Pattern :**

6.2 There is a very wide variation in the number and types of personnel engaged by the various cooperative granular fertiliser units to perform the skilled and unskilled operations. For instance, while the Punjab Fertilisers and the Shetkari Sahakari Sangh, Kolhapur each have one factory manager and one assistant manager besides a production engineer for almost similar work, the Vidarbha Society has engaged in addition to a factory manager and a production engineer, one general manager, one sales manager, one purchase manager and one assistant engineer. The DGFC, Kolhapur, has employed a secretary in place of a factory manager. He is assisted by an assistant manager, one Purchase Manager, one Production Engineer and one Assistant Engineer. Similarly there is much larger variation in the staff engaged for accounts work and stores, watch & ward, etc. A comparison can be made from the details given in Annexure 6.1.

6.3 We do not consider that the staffing pattern of each units should be the same. We do, however, feel that since the

units are of the same size and design there should not be much of a variation in the staff engaged for management work and other operations. It may help if the cooperative granular units take advantage of the experience of the granular fertiliser units established for quite some time in the private sector. The pattern of staff followed by two of such private sector units is given below :

S. No.	Type of Staff	M/s. Bharat Fertilisers, Bombay		M/s. Deccan Sales Corporation, Bombay	
		No.	Pay (Rs.) P.M.	No.	Pay (Rs.) P.M.
1	2	3	4	5	6
1.	Factory Manager/Chief Executive.	1	1500	1	1200
2.	Secretary.	1	1500	1	600
3.	Manager.	—	—	—	—
4.	Sales Manager.	} 1	1000	—	—
5.	Purchase Manager.				
6.	Chemist.	1	1000	1	70
7.	Laboratory Attendant.	1	500	—	—
8.	Overseer.				
	a) Electrical.	1	500	—	—
	b) Mechanical.	1	500	—	—
	c) Civil.	—	—	—	—
9.	Accountant.	1	1000	2	800 (each)
10.	Store Keeper.	2	500 (each)	1	550
11.	Sales Representative.	—	—	—	—
12.	Other Clerks.	7	3000 (Total)	14	4140 (Total)
13.	Peons.	5	1600 (Total)	3	560 (Total)
14.	Security Personnel.	5	1600 (Total)	3	530 (Total)
15.	Supervisors.	1	500	—	—
16.	Gardeners.	—	—	1	225
Other skilled and unskilled staff appointed for production work by these two units is listed below :					
1.	Foreman.	—	—	1	650
2.	Staff incharge.	—	—	3	970 (Total)
3.	Welder, Cutter.	—	—	5	1800 (Total)
4.	Marker.	—	—	—	—
5.	Drivers.	—	—	2	550 (Total)
6.	Operators.	—	—	—	—
7.	Helpers.	—	—	—	—
8.	Stitchers.	—	—	—	—
9.	Electrician.	—	—	—	—
10.	Others.	70	18000 (Total)	40	14270 (Total)

6.4 In the above list as also in that given in the annexure 6.1 blanks have been shown against some of the posts. Since there is not standardization in the designations for different posts, it is possible an operator performing the same function has been classified differently by the other unit and shown separately. The cooperative granular fertiliser units may review their organisation of staffing pattern to see if it called for any modification in the light of staffing pattern adopted by other similar units and by the private granular fertiliser companies. We are, however, inclined to suggest the following pattern for the administrative staff and the operational or production staff:

**Administrative Staff :**

S.No.	Type of Staff	Number
1.	General Manager/Chief Executive.	1
2.	Purchase Manager.	1
3.	Sales Manager.	1
4.	Chemist.	1
5.	Assistant Chemist.	1
6.	Accountant.	1
7.	Clerks.	8
8.	Sales Representatives.	4
9.	Security Personnel.	4
10.	Driver.	1
11.	Peons	4

**Operational Staff (Per Shift) :**

1.	Shift incharge.	1
2.	Operators.	4
3.	Helpers.	8
4.	Electrician.	1
5.	Welder.	1
6.	Machine Operator.	1
7.	Fitter.	1

This is only a guide and may be modified according to individual needs. The new units which are under installation, may with advantage adopt the pattern suggested.

6.5 In addition to the above, some labour will be engaged on contract basis for unloading of raw material, its stacking and feeding in the machines, curing of the finished product and its filling in bags, weighment of bags and their stitching and stacking and loading of the same in trucks for transport to destinations.

Printing of bags is also to be got done on contract basis. The Punjab Fertilizers have done these jobs at Rs. 5.20 per tonne while the Vidarbha Unit is reported to have engaged daily wage or monthly paid labour for most of these operations. They engaged contract labour for printing of bags, filling, stitching, weighing and stacking them at Rs. 8/- per tonne. The Kolhapur S.S. Sangh engaged 16 labourers per shift at a contract rate of Rs. 2.50 per tonne. The corresponding rates paid by Bharat Fertilisers and Deccan Sales Corporation are Rs. 5/- and Rs. 7.50 per tonne.

6.6 These rates are only illustrative. Labour may be cheaper at some centres than others. Each unit has, therefore, to determine its own rates according to the labour position. It may be advantageous to engage contract labour for some items like printing of bags, their filling, weighting, stitching and stacking as it involves less of supervision. For feeding the raw material also contract labour may be useful but much greater supervision is needed in this operation.

### **Recruitment of Personnel**

6.7 Out of the list of personnel suggested to man a granular unit, recruitment of general manager or Managing Director is the most crucial. He is the person who has to execute the policies determined from time to time by the general body or managing committee of the society and also to render suitable advice to the management based on sufficient imagination for developing and expanding the business of the unit. He should also be in a position to understand technicalities of most of the operations performed in different sections of the factory. Since the operations involve, by and large, mechanical functions we would advise that a mechanical engineer with at least 10 years experience in running and maintaining a mechanical unit should be engaged as a general manager. A chemical engineer could also be considered. Preference may be given to a person qualified also in business administration.

6.8 Working of a cooperative is a way different from the private companies. The General Manager should know cooperative methods and principles. He has also to maintain good relations with the members as also with the Public. While selecting a general manager his aptitude towards these aspects should be kept in view. There is a tendency in the societies to have persons from the State Cooperative Department on deputation to work as general managers. This is generally done on the advice of the State Registrar of Cooperative Societies who is mindful more of the large investments made by the State Governments in the share capital of the granular fertiliser units. While we feel that such deputationists are generally well conversant with cooperative discipline, law and audit, they may be lacking the percep-



tion essentially needed for a business enterprise. It is, therefore, suggested that the Registrar of Cooperative Societies may be associated in the selection of a general manager but candidates may be called for interview generally from the open market. Officers of the Cooperative Department may also be considered in competition with others. If a person from the open market is selected, he may be sent for training in a short term course for senior officers in the Cooperative Training College, Poona on the expense of the society.

6.9 The recruitment of general manager should be made as soon as the project is finally approved for execution so that his experience is fully utilised in planning realistically the work of the organisation. As regards other staff, most of the persons like clerks, store keepers, class IV employees and unskilled and skilled labour may be engaged locally. Similarly, even for recruitment of engineers, assistant engineers, overseers, foreman, etc., preference may be given, to local persons but if the calibre of local persons is much below the desired standards outsiders may, with advantage, be appointed. It is, however, very essential that staff are selected in full consultation with the general manager.

6.10 We find that maintenance of accounts and stores is not upto the mark in many of the units. These are not difficult jobs but the employees lack experience. We feel that training for a day or two may be arranged at the factory by inviting really experienced persons from other cooperatives or even private sector companies. During the course of their employment, individuals may be sent for longer training of a fortnight, particularly in the slack season, in some established institutions or in other companies. This will help in widening their outlook and in improving their standards.

6.11 We do not propose to dilate upon the conditions and rules of service of the employees or their prospects of promotion and the activities of the management towards welfare of the staff. We should, however, like to emphasise that these are matters which are directly related to efficiency of the staff. It would, therefore, be in the interest of the unit if rules for different technical and non-technical staff are so designed that persons may have chances for promotion to higher grades. The management may also provide for suitable canteens and water connections and recreation facilities. The management may also think of giving incentives by way of advance increments to really efficient and capable persons.

### **Materials Management**

6.12 Materials management in economic terms cannot be the physical materials that are purchased, received, stored, inventoried and handled. Broadly speaking this is concerned with the

entire range of functions which effect the flow, conservation, utilisation, quality and costs of material. It has been observed that in quite a few units the operations of a section and consequently some other depending sections have been badly affected because of non-timely purchase of a particular type of material and in others some particular materials has been purchased so much in excess of the requirement the unit is incurring heavy costs on its storage besides interest on investment. These instances happen in purchase of raw material, machine parts, gunnies, fuel oil, etc. It is necessary that each man responsible for any aspect of material management is given proper training so as to improve efficiency. Such training can again be arranged at the factory by inviting experts to deliver talks.

### **Delegation of Powers**

6.13 Good delegation of responsibility is one of the marks of good management. In cooperatives, most of the functions which should ordinarily be performed by a general manager, are undertaken by the chairman. This results in dampening the initiative of the manager who is not more than a dignified clerk. The chairman's job is to give a general or specific policy direction and its execution should be left to the general manager. Similarly, clear cut delegation of powers should be made for various heads of departments working under the general manager so that operations are conducted smoothly without any friction.

6.14 Once a line of policy is decided the managing committee may carry on periodical reviews of the progress, difficulties experienced, weakness in the policy itself, etc. This will help them in modifying the course of action. The managing committee need not get into petty complaints against lower staff. These should be within the purview of the general managers and even his subordinates to look into. This will help in promoting better discipline among the staff.

## Administrative Staff, Other Employees and Labour Engaged.

No. of posts and total monthly (in Rs.)  
emoluments of those in position.

S. No.	Type of Staff	Punjab Fertilisers	Vidarbha	Kin sa Bombay	Sah. Sangh (Kolhapur)	Kolhapur (DGFC)	Bharat Fert. (Bomby)	Deccan Sales. Corpn. Bombay
1	2	3	4	5	6	7	8	9
1.	Factory Manager	1—771/-	Gen. Mgr.-1 885/- Fact. Mgr.-1 404/-	1	1—397/-	—	1500/-	1200/-
2.	Secretary	—	—	—	—	1—549/-	1500/-	600/-
3.	Asstt. Manager	1—550/-	—	1	1—309/-	1	—	—
4.	Sales Manager	—	1—876/-	—	—	1—350/-	1000/-	—
5.	Purchase Manager	—	1—590/-	1	—	1—250/-	—	—
6.	Production Engineer	1—1200/-	1—410/-	1	1—386/-	—	—	—
7.	Assistant Engineer	—	1—410/-	—	—	1—175/-	—	—
8.	Chemist	Jr. Chemist 1—450/-	1—350/-	—	1—291/-	1—300/-	1000/-	470/-

1	2	3	4	5	6	7	8	9
9. Lab. Attendants	1—250/-	—	—	Sr. 1—284/- Jr. 1—226/-	—	—	590/-	—
10. Overseers:		1—305/-	—	1 —	—	—	500/-	—
Electrical		—	—	—	—	—	500/-	—
Mechanical		—	—	Civil-1	1—350/-	—	—	—
Civil.		—	—	214/-	—	—	—	—
		—	—	Wiremen-2	—	—	—	—
		—	—	346/-	—	—	—	—
		—	—	Helper-1	—	—	—	—
11. Accountant	1—442/-	1—482/-	—	1 1—239/-	1—525/-	—	1000/-	2 1600/-
	Sr. Asstt-1	—	—	—	—	—	—	—
	398/-	—	—	—	—	—	—	—
	Clerk-3	—	—	—	—	—	—	—
	200 × 3-600/-	—	—	—	—	—	—	—
	Stenotypist-1	—	—	—	—	—	—	—
	300/-	—	—	—	—	—	—	—
	Typist-1—269/-	—	—	—	—	—	—	—
12. Store Keeper		2x150=300/-	1 1—209/-	1—150/-	2 1000/-	1	550/-	—
		—	Sr. 11—65/-	—	—	—	—	—
13. Sales Representative		8x320=2560/-	6 —	2—300/-	—	—	—	—
14. Other Clerks		7x250=1750/-	8 13—2000/-	22—3525/-	7 3000/-	14	4140/-	—
15. Watch & Ward		—	—	—	—	—	—	—
16. Supervisors.		—	—	1—193/-	1—225/-	1	500/-	—

	1	2	3	4	5	6	7	8	9
17. Watchman or Security Personnel			Chowkidar 4x120=480/-	4x150=600/-	4	Watchman-3 615/- Security Persons-3 219/-	7x75=875	5-1600/-	3-530/-
18. Gardners		1-120/-	1-135/-	1	—	2-240/-)	5-1600/-		1-225/-
19. Peons		2x120=240/-	3x180=540/-	1	—	6-630/-)			3-560/-
20. Foreman			1-245/-		—	1-300/-)			1-650/-
21. Shift incharge			—		—	1-250/-		—	3-970/-
22. Welder, cutter, Marker		Cleaner-1 100/-	—	4	—	—	Skilled staff & operators 70-18000/-		5-1800/-
23. Driver		1-290/-	9x215=1935/-	—		4-575/-	700/-		
24. Any other employee on regular establishment (please specify)			3x150=450/-						
		Foreman-1-500/- Asst. Foreman-4 250x4=1000/- Time keeper-1-300/-				Finance Officer 1- 585/- Excise Officer-1 270/-			Sweeper-2 425/-

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1

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3

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Head Mistry-1  
250/-  
Sr. Fitter-1  
250/-  
Fitter-6x150=  
900/-

Supervisor  
270/-  
Cashir-1  
270/-  
Clerks-2  
440/-  
Electrician-1  
250/-

Welden Fitter-1  
175/-

Elec. Supervisor-1  
200/-

Asst. Electrician  
2x150 300/-

Time Office Clerk-2  
2x200 400/-

Store Clerk-6  
1307/-

Incharge Store-1  
308/-

Incharge Raw  
material-1  
269/-

1	2	3	4	5	6	7	8	9
Store helper-1. 120/-								
Delivery helper-1 120/-								
Helper Store Eng. 3x120 360/-								
Mechanic attendant helper-39 4680/-								
Store Keeper Eng. 1x200=200/-								
Cleaner-2x100=200/-								
Total :	96	18274/-	47	16207/-	31	33 persons	62 persons	33900/- 40 14270/-

**Workcharged staff (engaged only  
when factory is in operation)**

1. For feeding raw material.	Done through contract labour expenditure @ Rs. 4 20 per M/tonne.								
Skilled personnel (categorywise)		3x120=360/-	1		16 per shift contract rate Rs. 3/- per tonne.	2	240/-	} 4000/-	2 } 1525/- 6 }
Unskilled labourers.		21x105=2205/-	8 (contract basis)			2	240/-		

1	2	3	4	5	6	7	8	9
2.	To attend processing plant. Skilled personnel (category-wise) Unskilled labourers.	6x120=7201/-  45x105=4725/-		2  0 (daily wages)	Skilled-nil unskilled-9  Skilled-5 561/- Unskilled-22 2328/-	9  2	1080/-  .240/-	
3.	In the curring Section : Skilled (category-wise) Unskilled labourers.	3x120=360/- —		2 8	} 16 per shift contract rate Rs. 2.50 per tonne.	3 11	360/- 1080/-	4 800/-
4.	Printing & Packing of bags. For printing of bags.  For putting poly-three lines	Done through contract labour expenditure @ Rs. 1.00 per M/tonne.	On contract basis @ Rs. 3/- per 100			} Rs. 5/- per M/ tonne.		
			On contract basis @ Rs. 8/- per tonne includes stocking & stitching etc.					



1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

For filling &  
Weighing.

6 (contrat basis)

For stitching.

1 (dailywages)

For stacking.

3 (contract basis)

TOTAL.

39 persons  
Rs. 3924/-

4000/- 3505/-

CHAPTER—VII  
**PRODUCTION OF MIXED GRANULAR  
 FERTILISERS**

**Grade selection for fertiliser granulation plants**

7.1 Every crop, as also every variety of the same crop, removes different amounts of nutrients from the soil under irrigated and unirrigated conditions. This is revealed by the following table for paddy and wheat varieties:—

TABLE  
**Plant Nutrients Removed by Paddy & Wheat Varieties**

Crop	Yield in Kgs. per Hactare.		Nutrients removed in Kgs. per Hactare.		
	Grain	Straw	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
<b>A. Paddy :</b>					
i) Tall indica variety.	2802	5604	82	23	123
ii) Taichung Native-1;					
Rabi	8000	8640	152.0	84.7	322.3
Kharif	5020	5420	92.0	36.6	252.5
iii) Tainan-3					
Rabi	6400	7460	113.0	59.6	268.2
Kharif	4120	3900	82.0	32.1	181.6
iv) Chainug-242					
Rabi	7850	9300	162.0	73.3	312.6
Kharif	3190	3870	58.0	29.8	144.3
<b>B. Wheat :</b>					
i) Tall Variety	2242	4483	59	29	67
ii) Dwarf High yielding varieties.					
—Sonara-64	in Kgs. per		2.50	0.80	2.10
—Sharbati	Qtl. of		2.80	1.25	2.92
—Sonara	grain pro-				
—Kalyan Sona	duction.				
S-227			2.36	0.82	N.A.

*Source :* Fertiliser Statistics 1969-70 (page 380)

The range in removal of 'N' per hectare extended from 58 Kgs. to 162 Kgs., that of  $P_2O_5$  from 23 Kgs. to 84.7 Kgs., and that of  $K_2O$  from 123 Kgs. to 322.3 Kgs. In the case of wheat different dwarf varieties lifted for each tonne of grain 24 to 28 Kgs. of N, 8 to 12.5 Kgs. of  $P_2O_5$  and 21 to 29.2 Kgs. of  $K_2O$ .

7.2 The complexity of the biological phenomenon is further confounded by the variety of soil which widely vary in their texture and chemical composition. According to the soil map of India, there are 28 different types of soils of which 7 types are of alluvial origin, 2 of desert variety, 6 of black type three of ferruginous soil, 2 of lateritic origin, 2 of forest, 2 of mountaneous and 4 of miscellaneous other qualities. Details about the types of soils may be seen in the soil map of India. Upto 6 to 7 varieties may be stratified in each State. The range in chemical composition of different types of soils is illustrated from the following analysis of the soils found in Punjab, Harvana and Himachal Pradesh.

Soil	pH range	Ca CO <sub>3</sub>	O.M. %	Available Kg./Ha.		
				N %	N	P <sub>2</sub> O <sub>5</sub>
1	2	3	4	5	6	7
Meadow soils	6.5 to 7.5	0.1 to 1.0	173	0.19	316	16
Non calcic brown soils	5.3 to 6.6	Nil	2.10	0.17	226	14
Grey-brown podzolic soils	4.5 to 6.5	Nil	1.11	0.16	176	18
Reddish chestnut soils	6.5 to 7.5	0.16	1.00	0.08	128	17
Tropical arid brown soils	7.0 to 8.5	0.17	0.80	0.06	110	21
Sierozen	8.0 to 8.6	1.84	0.50	0.04	88	20
Desert soils	8.5 to 9.0	2.30	0.23	0.02	84	18

CaCO<sub>3</sub> : Calcium Carbonate O.M. : Organic matter. N: Nitrogen  
P<sub>2</sub>O<sub>5</sub> : Phosphatic acid.

In the above list, the meadow soils are, by far, the richest in plant nutrients and the desert soils are the poorest. Nitrogen per hectare in the meadows is about 4 tonnes of that in the deserts and  $P_2O_5$  in meadows is about  $2\frac{1}{2}$  times of that in desert soils.

7.3 In the light of the above observations, the variety of fertilisers that would be needed to feed all types of crops and their varieties grown on different types of soils can be assessed. However, since consciousness among the farmers in general in India about the nutrient requirements of various varieties of crops on the basis of soil tests has not reached any significant degree of sophistication, there has not so far been any craze for fertiliser grades best suited according to agronomic needs of the crops. In fact, till the last few years farmers were accustomed to apply straight fertilisers in an ill-balanced way much against the doses recommended by the Departments of Agriculture. It is only with the better results received with the introduction of complex fertilisers and the NPK mixtures, more specifically granulated mixed fertilisers, that a realization has dawned among the farmers on the need to apply balanced fertilisers according to the intake of the variety and the chemical composition of the soil.

7.4 There is also an increasing demand for soil testing facilities and to cater to the needs in this regard, the State Governments and fertiliser manufacturers and others have been setting up soil testing laboratories. At the end of 1969-70 there were 148 soil testing laboratories established by Government in various States and 35 set up by manufacturers and dealers of fertilisers. In addition to these, regional research stations, agricultural educational institutions and vigyan mandirs have also undertaken soil testing work. Besides, the Punjab State Cooperative Marketing Federation has also set up 8 soil and water testing laboratories to provide this important service to its clients as fertiliser promotion measure. The National Cooperative Development Corporation has also introduced a scheme for giving financial assistance to cooperatives through the State Governments for setting up soil testing laboratories. Assistance for four such laboratories has so far been sanctioned.

7.5 As a result of the intensive propaganda for use of balanced fertilisers and with the backing of soil testing facilities there is now a growing demand for N.P.K. complex fertilisers and mixtures. The demonstrative effect of balanced fertilisers applied by progressive farmers is rapidly increasing the demand for balanced fertilisers. In addition to the availability of a few complex fertilisers containing two or three major nutrients, now there are available in the market about 10-12 grades of granular mixed fertilisers catering to the needs of major crops and their varieties. Considered against the sophisticated agronomic needs of crop varieties, the range of existing grades is by no means very satisfactory.

In U.S.A., some states produce in excess of 500 different grades of fertilisers each year. In India, the transportation, handling and storage problems prohibit having a multitude of grades. However, compared with the few grades of complex fertilisers in the market, the granular mixed fertilisers seem to meet the requirements to a much greater degree of satisfaction. We, however, hope that with the increasing consciousness among the farmers to specific needs of the crop varieties under different soil conditions, the granular fertiliser industry will rise to the occasion and match their supplies with a much larger variety of grades that may be demanded in future.

7.6 Besides the other advantages of granular mixed fertilisers over hand mixed fertilisers and complex fertilisers as given in chapter III, it is expected that granular mixed fertilisers would seek to supply all the basic nutrients required by crop in one dose/operation and would, serve to apply in one basic dose some of the plant nutrients required in small quantities. It is keeping these requirements in view that the following eleven grades are being produced by the cooperative granular fertiliser units :—

- |                 |                |
|-----------------|----------------|
| (i) 8:8:8       | (vi) 20:10:10  |
| (ii) 15:5:5     | (vii) 15:15:15 |
| (iii) 15:15:7.5 | (viii) 18:18:9 |
| (iv) 20:20:0    | (ix) 18.18:10  |
| (v) 10:20:10    | (x) 12:6:9     |
|                 | (xi) 9:9:9     |

Among these again, in pursuance of a specific demand for 1% organic nitrogen from certain areas, use of deoiled cake is made in the preparation of grades. Similarly, citrate and water solubility of  $P_2O_5$  may also be different in the same grade depending upon the type of raw material used to provide phosphate radicle. While it is admitted that these grades would not meet the varied agronomic requirements of nutrients for all crops grown, we suggest that the fertiliser granular units should proceed cautiously in this regard. Before introducing a new grade a lot of promotional work has to be undertaken in the marketing zone to build up confidence about the efficacy of the new fertiliser. Another important limitation in increasing the number of grades is the time and labour wasted in shifting from preparation of one grade to another. It takes about a day to remove all stuff of the grade being produced from the pipe line and to thoroughly clean all machines before feeding the raw material for other grade. A cautious approach is also necessary to save the farmer from confusion in selecting a grade for his crop. In the light of this it is suggested that for the time being the cooperative granular fertiliser units may continue to build around the grades they are now

producing. They may add one or two new grades only if they are convinced that with the backing of extension work they would be able to market substantial quantities of these grades.

7.7 For the preparation of the same grade a number of formulae have been adopted by different units depending upon the availability of raw material. For instance, for the production of 15:5:5 grade, the Vidharbha Unit used only 334 Kgs. of ammonium sulphate per tonne of the final product. As against this, Kolhapur Shetkari Sahakari Sangh Ltd., used 360 Kgs. of ammonium sulphate, Kolhapur District Granulated Cooperative Factory applied 384 Kgs. of this raw material. A private unit, on the other hand, applied as much as 510 Kgs. of ammonium sulphate per tonne of the grade. For balance requirements of nitrogen radical varying quantities of urea, DAP and de-oiled cake have been used by different units. The same is true of superphosphate which has been applied at the rates of 150, 250, 280 and 312 Kgs. per tonne of the product by various units. Those using lower doses have supplemented the need by adding DAP, triple superphosphate and rock phosphate. A statement giving the different types of raw materials used by various units for various grades is placed at Annexure 7.1.

7.8 Although from agronomic angle all products of the same grade are equal and are capable of producing almost the same results (if water solubility of  $P_2O_5$  is also the same), unfortunately some of these products may not be of economic advantage to the farmer. This will also be borne out by the statement at Annexure 7.1 which furnishes estimates of cost of raw material used for preparing different grades of granular mixed fertilisers applying different formula. A summary of the same is given below :—

#### Cost of Raw Material Per Tonne of Finished Product

(At prices ruling in 1969-70)

S. No.	Grade	I (Rs.)	II (Rs.)	III (Rs.)	IV (Rs.)	V (Rs.)	VI (Rs.)
1.	15:5:5	456	530*	508*	528*	487	
2.	15:15:7.5	557	655	619	652	679	700
3.	18:18:10	735	799*	755*			
4.	18:18:9	646	733				
5.	15:15:15	607	677				
6.	8:8:8	371					
7.	20:20:0	717					
8.	20:10:10	645					
9.	10:20:10	634					

\*Provides 1% organic N.

The above comparison makes a very interesting revelation. The raw material for the same product costs upto 18% more on

adoption of one formula. This is a point which should attract serious attention of the granular units. The cost of the fertiliser to the cultivator is a major factor which can seriously limit its use. In the current buyers' market, it would not be prudent to expect a cultivator to pay an exorbitantly high price per unit of plant nutrient. An average cultivator is a shrewd person and only that produce which would help in maximising his profit would be favoured by him.

7.9 Three major factors are responsible for the differences in the cost of raw material for the same grade prepared with different formulae. The most important of these is the choice of the raw material meant to provide N & P nutrients. Some of the straight fertilisers are costlier than others in terms of plant nutrient per unit of N and  $P_2O_5$ . For instance, ammonium sulphate costs at the pool issue price Rs. 2,645 per tonne of N as against Rs. 2,000 paid for N from Urea. Similarly,  $P_2O_5$  from superphosphate costs Rs. 2,300 per tonne compared to Rs. 2,040 per tonne from triple superphosphate. It is still cheaper to obtain N&P from compounds like DAP which cost only Rs. 1,953 per tonne of N&P nutrients. The second factor is the provision of 1% organic N in the granular mixture. This is added by mixing de-oiled groundnut cake which contains only about 6.5 to 7.5% N, 1.3%  $P_2O_5$  and 1.5%  $K_2O$ . This cake costs about Rs. 517 per tonne and thus supplies nutrients at a very exorbitant rate of Rs. 5170 per tonne. One can imagine the extent to which high price of de-oiled cake reflects on the cost of material if the cost of 15:5:5 fertiliser grade prepared by the Kolhapur Shetkari Sahakari Sangh is compared for the two formulae (Columns 6 & 7 of Annexure 7.1) of which one provides 1% organic N and the other all inorganic N. Despite the fact that a much higher quantity of ammonium sulphate with a higher cost per unit of N has been mixed in the grade supplying all inorganic nitrogen, the cost per tonne of this grade was only Rs. 487 as against Rs. 528 for the grade containing 1% organic N.

7.10 The third factor is the price at which raw material is procured by the units. There has been a lot of variation in the price at which different types of raw materials were purchased by the units. For instance, in 1968-69, while Kisan Cooperative and Deccan Sales Corporation purchased ammonium sulphate at Rs. 474 to Rs. 478 per tonne, the Kolhapur District Cooperative Granular Factory purchased the same at Rs. 523 per tonne. The same is true of purchases of urea which were made at Rs. 813 and Rs. 820 per tonne by the former two units but at Rs. 1000 per tonne by the latter. The average per tonne purchase price of each type of mixing ingredients as paid for the whole lot bought by different units in 1968-69, 1969-70 and 1970-71 are given in the statement in Annexure 7.2. The maximum and minimum prices paid for each item of raw material are given below. These are also compared with the corresponding pool issue prices (for cooperatives) for some of the fertilisers.

**Purchase Price Per Tonne**

(Rupees)

Items of raw Material	1968-69			1969-70			1970-71		
	Max.	Min.	Pool	Max.	Min.	Pool	Max.	Min.	Pool
Ammonium Sulphate (white)	523	474	447	520	450	484	477	400	474
Urea 46% N	1000	813	780	903	857	(863)	(909)	(899)	843
D.A.P 18-46% P <sub>2</sub> O <sub>5</sub>	1089	1055	1000	1230	1055	1122	1205	1096	1122
Super Phosphate 16% P <sub>2</sub> O <sub>5</sub>	335	315	(312)	(359)	(315)	(282)	(393)	(359)	280
Triple Super Phosphate 45% P <sub>2</sub> O <sub>5</sub>	933	—	875*	1014	—	875*	—	—	875
M.O.P. 60% K <sub>2</sub> O.	493	477	445@	500	480	483@	539	500	473£
Rock Phosphate.	256	—	140\$	233	—	144\$	233	—	144\$
De-oiled cake	517	501	—	557	500	—	513	500	—
Dolomite	105	—	—	100	92	—	108	98	—

\* Ex-works price

@ Ex-godown at Port

£ F.O.R. destination

\$ Ex-jetty price.



While the purchase prices of fertilisers in certain cases were comparable with the pool issue prices, some of the units made their purchases at much higher rates as they could not succeed in drawing their supplies from the pool and had to make alternative arrangement of procurement at cultivator's price from the open market and sometimes even higher than that.

7.11 Keeping in view the economic considerations which should underline any programme of preparing granulated fertilisers by the unit in cooperative sector, it is desirable that, to the extent possible, only high analysis raw material is selected for mixing and granulation. Among the nitrogenous fertilisers, urea is the highest solid nitrogen carrier in the industry. Similarly, DAP (18-46-0) represents the highest analysis phosphate carrier. Muriate of Potash for that matter is the cheapest potassic fertiliser per unit of  $K_2O$ . These three fertilisers represent the most economical sources of nutrients in general use today. They are very high analysis fertilisers. The low analysis fertilisers should, therefore, be avoided as raw materials they are very expensive. Their use may be taken up only for those grades which do not permit the use of high analysis fertilisers.

7.12 Having arrived at the conclusion that urea, DAP and Muriate of Potash present the best economic base, it has also to be seen that the granular products possess the requisite physical properties relating to density, hardness, sphericity, hygroscopicity, stability and storage. It has also to be seen that the material possesses drying characteristics in terms of water loss as a function of time, material softening point, decomposition point and other properties. The compatibility of mixing with common fertiliser material has also to be considered. Similarly, water solubility of  $P_2O_5$  in the product should also be given due consideration while selecting mixing ingredients. Out of the above three donors of N, P & K, while DAP & MOP offer a wide range of compatibility and are relatively easier to adjust, urea based fertilisers are hygroscopic to the extent that moisture pick up will occur under all but the most favourable conditions. The critical relative humidity (CRH) values for urea based grades at 25° C ranges between 40 & 55 depending upon the formulator and as humidity of the atmosphere in most areas almost always exceeds 55%, special care is needed for the protection of fertiliser materials against moisture pick up. With this limitations, in most of the high analysis NPK granular grades, nitrogen from urea has been supplemented from N from DAP. For low analysis fertilisers, ammonium sulphate has been treated as the basic N ingredient supplemented by urea because the low grade fertilisers are difficult to granulate without the use of ammonium sulphate. However, considering the shortage of ammonium sulphate, experiments were conducted by M/s. FERTIPLANT Engineering Co. to formulate a 15:5:5 grade without use of ammonium sulphate and they have

been successful in having such a grade with groundnut de-oiled cake as one of the ingredients. The composition of this grade is:

Urea	= 305 Kgs.
G.N. Cake (de-oiled)	= 125 "
Superphos.	= 313 "
MOP	= 83 "
Dolomite	= 174 "
Total :	<u>1,000 Kgs.</u>

The product that comes out is reported to be extremely good and hard but care is required to be taken to adjust the intake flow rate on a little lower side and to make the operation a continuous one so as to avoid acute lump formation in the drums.

7.13 We suggest that besides using urea for high analysis granular fertilisers, to the extent possible, maximum use of this material may also be made for preparing low grade fertilisers. It will be also help if machinery manufacturers and chemists working in the granular fertiliser units carry on experiments to develop formulae that offer to produce high analysis fertilisers with minimum cost. It is also necessary to see the extent to which use of de-oiled cake in these grades can be minimised, if not altogether avoided. The only apparent advantage of groundnut cake is addition of organic matter. This can be supplied through cheaper organic manures like farm yard manure, compost or green manure. It is further suggested that each of the granular fertiliser units should obtain their supplies of raw material from the central fertiliser pool or direct from the indigenous manufacturers of fertilisers on FOR or ex-factory (freight pre-paid) delivery basis at wholesale rate and not from the fertiliser dealers at the sub-wholesaler's or retailer's prices.

### Need for Adding Micronutrients

7.14 Besides three major nutrients (NPK) the crops also remove boron, the copper, zinc, molybdenum, iron and manganese in different proportions from the soil. Their deficiency is particularly noticed in the case of high yielding varieties of crops. It is not desired to go into detail of the symptoms caused nor the loss in yield caused by their deficiencies in different crops. The quantity of these micro-nutrients removed from the soil by crops like paddy, potato and wheat in a crop rotation is,

however, depicted below which will help in assessing their importance in obtaining potential results :—

(Grams/Hectare)

Crop Rotation	Boron	Copper	Zinc	Molybdenum	Iron	Manganese
Paddy 6.5 tonnes grain & 9 tonnes straw	56	76	191	3.5	640	645
Potatoes 13 tonnes tubers and 2.5 tonnes leaves and stems.	31	13	41	1.0	350	118
Wheat 7.0 tonnes grain & 8.1 tonnes straw.	218	236	383	13.0	3650	580
<b>Total :</b>	<b>305</b>	<b>325</b>	<b>615</b>	<b>17.5</b>	<b>4640</b>	<b>1243</b>

This shows that in one rotation, about 7145 gms. of these six micro-nutrients are removed per hectare. Some suggestions have been made that the granular fertilisers prepared in the units may also add these micro-nutrients according to the recommendations made by the agriculture departments. While the need for their addition in the fertilisers cannot be minimised, we refrain to make a positive recommendation in this regard. We would rather suggest that cooperative granular fertiliser units may not undertake this at this stage. The main reasons for this are that neither it is possible to determine precisely the quantity of these nutrients required to be added nor it is feasible to have a large variety of grades providing different doses of these micro-nutrients. We also apprehend that use of these nutrients without proper advice may prove toxic to crops and bring disrepute to the fertiliser unit. In case they feel the necessity of adding micro-nutrients they may get in touch with the State Agriculture Departments and Agriculture Universities which are making special recommendations for certain areas.

### Coating granular fertilisers with Insecticides

7.15 Some of the soil borne insects cause serious damage to the crops. For instance, termites may play havoc to sugarcane, wheat, cotton, chillies and certain fruit trees. Similarly, root knot nematodes attack many vegetable crops causing knots on the roots which are later subject to attack of fungi resulting in stunted growth of the crops. The spring crop of potatoes is often attacked

by cutworms which cut the young plants at the ground level and later bore into the tubers. These insects are at present controlled by applying insecticides at or before sowing time. A suggestion was made at the seminar of cooperative granular fertiliser units held at Aurangabad that granular fertilisers should also be coated with insecticides so that alongwith the basic dose, the soils are also treated against insects that damage the underground parts of the crops. For the destruction of termites, the practice advocated is to apply 10% BHC or 5% aldrin dust @10 Kgs. or 15 Kgs. per acre. Sometimes aldrin dust is mixed with wheat seed and drilled with it. For the control of root knot nematode DD is applied at least one month before sowing. To check against attack of cutworms to potato crop 2.7 litres of aldrin 30 EC per acre is applied to upper 10-15 cms. of soil.

7.16 All these insecticides are deadly poisons. Although need for coating granular fertilisers with these insecticides cannot be ruled out, considering the general attitude of our farmers towards precautions and directions for use of fertilisers and insecticides, it is considered desirable not to advocate the use of insecticides for coating on the granular fertilisers. Limited experiments may, however, be tried in areas where farmers are accustomed to large scale application of insecticides/pesticides on their own without aid of the plant protection staff of the agricultural departments or the insecticide formulation agencies. Before trying this, compatibility of these insecticides with the fertilisers may also be checked up and it should be ensured that the granules retain all the good properties of fertilisers from the point of view of their density, solidity, hygroscopicity, etc.

### **Need for Colouring the fertilisers**

7.17 Granular fertiliser units in the cooperative sector are preparing fertilisers without addition of any colouring agent. As a result, the fertilisers marketed by these units are of varying colours depending upon the raw materials used. Even a fertiliser of the same grade produced by a unit may have different colour according to the formulation of the batch. It is, therefore, not possible to distinguish the grades from their physical appearance. It was stated that some of the unscrupulous dealers are fraudulently packing low grade fertilisers in bags marked for high grade. It was suggested that each unit should give all the grades prepared by it, different colours. While certainly there is weight in the argument for colouring the grades, the solution suggested does not seem to be appropriate. It would serve little purpose if one grade of a fertiliser is coloured differently by different units. It will rather create more confusion. It would, therefore, be desirable if a standard colour is used for a particular grade by all the granular fertiliser units both in the cooperative and private sectors irrespective of the ingredients used. This is, however,

possible if colour specifications for different grades are prescribed by the Indian Standards Institution.

7.18 At present specifications have been prescribed by the ISI for moisture and nutrient contents of different fertilisers as also their particle sizes and water/citrate solubility of  $P_2O_5$ . The ISI may, therefore, be consulted jointly by the granular fertiliser units in this regard. For an approach of this type, the FAI may be the appropriate institution. It may, however, be suggested that to begin with, such standards for colours may be prescribed only for 4 to 5 very popular grades like 15:5:5, 15:15:7.5, 15:15:15, 18:18:10 and 20:10:10. With the success achieved in their adoption, other grades may be progressively covered under the I.S.I. colouring standards.

#### **Procurement of Raw material**

7.19 The types of raw material utilised by the granular units have been indicated in the earlier part of this chapter. Among the straight nitrogenous fertilisers, ammonium sulphate and urea are the major ingredients while  $P_2O_5$  has generally been taken from superphosphate and triple superphosphate and only recently from rock phosphate. Besides, complex fertiliser DAP has been very largely used both for N & P elements. As regards  $K_2O$ , Muriate of Potash has, by and large, been the chief contributing material. To give organic content to the product de-oiled groundnut cake has been used by units in Maharashtra, while Dolomite formed the chief filler material with about all the units.

7.20 There are three major sources of supply of raw material (i) Indigenous Fertiliser Industry, (ii) Central Fertiliser Pool and (iii) Indian Potash Limited. Among the feed stocks for preparing granular fertilisers the indigenous fertiliser manufacturers can supply ammonium sulphate, urea, DAP and single and triple superphosphates. The Central Fertiliser Pool has also been importing (among others) ammonium sulphate, urea and DAP in the past years and would continue to supplement indigenous supplies to fill the gap in requirements and supplies. The relative share of indigenous and imported products is shown below:

(Quantity in tonnes)

Type of Fertiliser	1968-69		1969-70		1970-71	
	Indigenous Production	Imports	Indigenous Production	Imports	Indigenous Production (estimated)	Imports
Amm. Sulphate	594234	1273808	597419	742062	680000	83322
Urea	458303	1036588	845321	937613	1130000	740257
DAP	54657	213200	52838	125096	60000	12026
Single Superphos.	618686	29360	629528	1965	652000	—
Triple Superphos.	2718	—	7485	—	8000	—
Total :	1728598	2552956	2132591	1806736	2530000	835605

It will be seen from above that import of five fertilisers in 1968-69 was about  $1\frac{1}{2}$  times of the indigenous production while in the next year imports were about 90% of the indigenous production. These imports were mainly, confined to nitrogenous fertilisers and DAP. Imports of superphosphates were very insignificant. As regards potassic fertilisers, the country is entirely dependent upon imports which are imported through M.M.T.C. and distributed on monopoly basis through IPISA (now IPL).

7.21 The granular units had, therefore, to procure their requirements of raw material from stockists/distributors of all the three agencies mentioned above but the arrangements made in many cases were not at all satisfactory. It is only where the granular unit was set up by an established cooperative wholesaler of fertilisers that it could get the fertiliser raw material on the factory/pool issue rates otherwise the units had to pay very exorbitant prices for scarce fertilisers like DAP & ammonium sulphate. This has been clearly revealed from the comparative chart prescribed earlier in this chapter of Pool issue prices and the maximum and minimum prices paid by the cooperatives for various types of fertilisers. Delays in receipt of shipments also often dislocated supplies of the requisite materials as a result of which the units had either to shift to production of other grades possible with material available in the market or they had to purchase the required material at retail prices. Such haphazard arrangements at uneconomic prices cannot be considered conducive to efficient operation of the units.

7.22 Whatever have been the problems in the past, if the granular units have to stay in this highly competitive field, they have to streamline their systems for the procurement of raw material. (They have to work out long-term plans, atleast on yearly basis; for the quantities of each grade of fertiliser to be prepared and determine each type of raw material required for the same. They will have to enter into contract with the manufacturers, the pool agencies and the IPL for the supply of the same according to a clear cut schedule of deliveries. They should not, however, become complacent after negotiating terms with the suppliers. There could be a number of factors disturbing the flow of material. The units should, therefore, always keep in reserve stock requirements for  $1\frac{1}{2}$  month. The supplies from the Pool could be much more uncertain and may not, therefore, be depended upon to any great extent. Some alternative arrangements should always be kept in mind in their case.

7.23 Procurement of raw material, particularly Pool supplies is an acute problem being faced by the cooperative granular fertiliser units, particularly in States like Maharashtra. (The Central Fertiliser Pool has not so far recognised the granular fertiliser units for making direct supplies.) The policy of the Government of India continues to be that these units should

register their requirements of Pool fertilisers with the concerned State Governments. The entire allotment of imported fertilisers meant for a State is placed at the disposal of the State Government, which in turn allocates the same to the cooperative wholesalers (generally state marketing federations/district marketing federations), agro-industries corporation, state agricultural department, and even private wholesalers. The granular units are expected to draw their requirements from some of these agencies at sub-wholesaler's or retailer's price. Under this procedure the granular fertiliser units are not only finding it difficult to obtain adequate and timely supplies but also have to pay higher prices for the raw material thus affecting the economics of their operation. In view of the important role that these granular fertiliser units could play in ensuring balanced application of fertilisers, the Government of India (Central Fertiliser Pool) may consider making direct allotments of Pool fertilisers to these units on the basis of production programmes drawn out by them each year. Alternatively, such direct allotments may be made to these units at least at the State Government level so that they could obtain their Pool supplies on f.o.r. delivery basis at wholesale rates and not from the dealers at the sub-wholesalers' or retailers' prices.

7.24 A serious problem has, however, risen in getting fertilisers like ammonium sulphate, DAP and triple superphosphate from the indigenous manufacturers. For ammonium sulphate, the FCI almost holds the monopoly. Owing to production at much below the capacity and the increasing demand from the paddy growing area because of its nonleaching aneoneical nitrogen, the F.C.I. has been dictating terms to the distributors for the supply of ammonium sulphate. They have already reduced the distribution margin and also require the distributors to lift certain proportions of unpopular fertilisers like suphala. Apparently, granular units, as manufacturers, cannot afford to sell other's products. Similarly, the limited production of DAP and triple superphosphate goes into private channels as they are fast selling. Since the granular units prepare balanced fertilisers much advocated for increasing agricultural production, it is suggested that this industry should get the essential raw material manufactured in India on priority basis. This would be possible if the Government of India exercises its right to secure upto 30% of the indigenous fertiliser from the manufacturers at negotiated prices. These could then be allotted to the granular fertiliser units.

7.25 The granular fertiliser units are facing a tough competition with F.C.I., which is marketing "Suphala" of grades equivalent to popular grades prepared by the granular units. Suphala is also a granular mixed fertiliser and is prepared by mixing rock phosphate and imported DAP and muriate of potash



with nitrogenous feed stock. Although, in terms of water solubility and citrate solubility sulphala 18 : 18 : 9 and 15 : 15 : 15 is inferior to the corresponding grades produced by granular units, the F.C.I. is able to sell its produce cheaper because it is getting DAP from the Pool at prices much below the Pool issue price at which cooperatives purchase. To put the two contenders on even keel in the competitive field and to help in supplying cheaper fertilisers to the farmers it is highly desirable that the granular units should also be supplied DAP at the same rate at which it is given to the Trombay Unit of the F.C.I.

7.26 The Cooperative Granular Fertiliser Units are bulk buyers of fertilisers. It would be advantageous for the manufacturers if concessions/incentives are offered on bulk orders backed by firm commitments. They would be saved of problems relating to overhead expenditure, storage and even working capital. The I.P.L. allows bulk rebates on supplies of potassic fertilisers to the dealers indenting for stocks in excess of 500 tonnes at a time. The rates of rebate range from Rs. 3 to Rs. 12 per tonne on the following basis :

Slab (Tonnes)	Rate of Rebate in rupees per tonne
500-999	3
1000-1999	5
2000-3999	7
4000-7999	9
8000-& above	12

In place of interest free credit, a cash balance of Rs. 8/- per tonne is allowed for full payment and taking immediate delivery of a minimum of 100 tonnes at a time. Pool may also offer similar concessions to a bulk purchaser. The present concession of Rs. 7 to Rs. 8 per tonne allowed to cooperatives irrespective of the quantity lifted may be revised to provide for rebate on expanding scale in direct proportion to the quantities purchased. These concessions should be worked out at the end of the year for the total quantities lifted and not for each consignment.

7.27 The granular units can also undertake to lift naked or bagged imported fertilisers from the docks. The I.P.L. allows concession to the extent of Rs. 5/- per tonne on lifting material from the port godown and Rs. 51/- per tonne on lifting of naked bulk fertilisers straight from the jetties. Similar rebate may be allowed by the pool also. In such a case the margin for rebate should include transport charges by trucks from the port to an average deatination in Maharashtra and by rail to other states.

7.28 The pool offers interest free credit for a period of two

months from the date of R/R. Similar credit is also allowed by the I.P.L. and other indigenous manufacturers but the interest free period allowed varies according to the demand of the fertiliser and the bargaining power of the buyer. In many a case the cooperative granulation units would be in a position to make purchase on cash payment. It is suggested that a rebate on cash purchases equivalent to the interest period should be allowed to the cooperative granular units.

7.29 The cooperative granular unit can enjoy maximum of these rebate if they appoint a common agency to negotiate on their behalf and place firm orders with the suppliers of fertilisers. A suggestion was made at the Aurangabad Conference for the establishment of a National Federation of Cooperative Granular Fertiliser Units which would attend to the problems of procurement of raw material besides undertaking promotional work and other services. This proposal received a mixed reception. We, however, feel that such a federation would be of immense help to the units provided its business functions are contained to the extent of balancing its budget otherwise it would, by and large, operate as an advisory and promotional body.

### **Supply of Rock Phosphate**

7.30 Rock phosphate is at present imported by M.M.T.C. for supplying to the fertiliser manufacturers for manufacturing phosphoric acid and superphosphates. Granular units also need this raw material to the extent of about 3000 tonnes per annum per unit. Presently, bulk of their requirements are being met from the indigenous Udaipur rock. It is suggested that while allocating imported rock phosphate among the manufacturers of fertiliser, demands of granular units should also get equal consideration. The Udaipur rock phosphate is expected to be in much larger a demand from about 10 big fertiliser manufacturing factories which fall within 1000 Kms. range. Apprehending that the small cooperative granular fertiliser units who have already been registered with the Director of Geology and Mines, Government of Rajasthan, Udaipur for the supply of rock phosphate may be ignored in competition with bigger consumers, we suggest that demand for these small units should continue to get due priority in allotments. We would, however, emphasize that a proper national balance may be struck by which indigenous and imported rocks are distributed judiciously among all contenders including granular units.

### **Supply of Dolomite**

7.31 Dolomite is an important raw material used as filler in the granulation process. It is available at four places in India (i) Udaipur near Baroda, (ii) Salem, (iii) Jodhpur and (iv) in Orissa and West Bengal. In order to save on transport cost it is

desirable that the granular units in Punjab & Haryana make their purchases from Jodhpur and Baroda, those in Maharashtra from Jodhpur and Salem, those in Mysore and Tamil Nadu from Salem and the units in Bihar and Orissa may make use of the deposits in Orissa and West Bengal.

### **Supply of Liquid Ammonium and Phosphoric Acid**

7.32 The technological progress of granulation in advanced countries is being very quickly adopted in India. Units are thinking in terms of using liquid ammonia and phosphoric acid in the manufacturing of N.P.K. products. This may need certain modifications in their plants. But before this is contemplated they may see to the problems in the transport of liquid ammonia from the ports to the interior. Special rolling stock and tankers would be required for this. It may, therefore, be advisable to make a planned programme in this regard in consultation with all concerned.

### **Procurement of Bags**

7.33 Fertilisers are generally packed in 50 and 100 Kg. bags. A granular unit in full production requires about 4.5 lakh 100 Kgs. bags or 9 lakh 50 Kgs. bags. Procurement of bags, therefore, is one of the important tasks for the management. To save the fertilisers from spilling and caking and to check against absorption of moisture, either polythene liners are used inside the jute bags or fertilisers are packed in laminated bags in which jute is laminated with a petro-chemical product. The incidence of cost of bags on the production costs is considerable. Out of the total estimated production cost of Rs. 135/- per tonne, bags alone cost about Rs. 50/- per tonne. This calls for developing a prudent system of purchasing gunnies and the lining material. Since the requirements for bags of all the 18 granular fertiliser units in the cooperative sector will be tremendous, it was suggested at the Aurangabad conference that a common agency like National Federation should be entrusted the task of procuring them as it will have a better bargaining power. This was opposed by a certain sector on the ground that this single agency may not be successful in realising the objective. In their view the single large buyer will have to make purchases from a large number of gunny manufacturers. It will, therefore, lose the advantage of securing the lowest tender for large quantities. They also feel that any delay in supply by the agency will completely upset the programmes of the fertiliser units. These arguments are no doubt weighty, but the advantage still lies in purchasing through a single agency. It is not necessary that this agency will place one order for supply in the year. The demands can be broken up quarterwise or half yearly to attract a larger number of suppliers in the competition.

7.34 Manufacture of laminated bags is a recent development. Only a few units have so far been established. In view of the increasing demand for laminated bags, we consider there is a bright future for this industry. Since cooperative granular units have themselves a large demand of such packing material, it is suggested that a unit for production of laminated bags may itself be set up in the cooperative sector. Each unit is estimated to cost about Rs. 7 lakhs including civil works. The National Federation can also take up this project with financial assistance from the NCDC on the pattern suggested for granular fertiliser units.

### Phosphate Manufacturer's Interest in Mixed Granular Fertilisers

7.35 There are 28 manufacturers of single super phosphates in the country. Their statewide distribution is given below :—

(1) Andhra Pradesh	=4	(7) Maharashtra	=5
(2) Kerala	=1	(8) Rajasthan	=1
(3) Mysore	=2	(9) U.P.	=1
(4) Tamilnadu	=5	(10) Delhi	=1
(5) Gujarat	=3	(11) Assam	=1
(6) Madhya Pradesh	=1	(12) Bihar	=1
		(13) W. Bengal	=2

( The production from these units had progressively increased to 8.68 lakh tonnes in 1967-68 but declined in the subsequent two years to 6.16 lakh tonnes. This was deliberately done by the industry because of poor off-take and huge accumulation of stocks.) According to the recorded statistics distribution of the single superphosphate declined from 7.72 lakhs to 6.47 lakh tonnes in 1968-69 and slightly higher at 6.75 lakh tonnes in 1969-70. This decline is reported to be due to increasing demand for complex and mixed granular fertilisers compared to straight phosphatic fertilisers. With a view to increasing the utilisation of phosphatic capacity they are now contemplating to set up granulation plants as ancillary to their units so that they may be able to convert their straight superphosphate into mixed granular fertilisers. They have approached the Government of India through the F.A.I. for certain concessions to rehabilitate the industry.

7.36 While the idea for setting up granulated units by the phosphate industry is a good one from the point of view of supply of balanced fertilisers, on a deep thinking such an approach could be a matter of concern for the existing granular fertiliser units. They are at present dependent upon the phosphate

units for the procurement of single superphosphate raw material. When the superphosphate units set up their own granular plants, they will become competitors of the existing granular units in the marketing of products. It is apprehended that in a business rivalry, the phosphate units may offer different terms and may often default in supplies according to schedule. It is, therefore, suggested that either the phosphate industry is not encouraged to install granular units but if it is not possible, the Government may take positive steps to ensure regular supplies of superphosphate to the cooperative granular fertiliser units by exercising its right of procuring upto 30% of the indigenous products at negotiated prices.

## ANNEXURE 7.1

(Chapter—VII)

Raw Material used in various grades of Granulated  
Fertiliser Mixtures

15:5:5

(Quantity in tonnes)

Raw Material	Vidarbha	(S.S.S. Kolhapur)	D.G.F.C.F. Kolhapur	Bharat Bombay	Kolhapur S.S. Sangh 1% organic	Kolhapur S.S. Sangh	Deccan Sales Corpn.
	1	2	3	4	5	6	7
1. Ammonium Sulphate	334	360	384	510.0	272	353	—
2. Urea	179	143	150	94.5	142	147	305
3. D.A.P.	—	28	—	—	43	57	—
4. M.O.P.	83	83	84	83.5	75	85	83
5. Superphose	250	150	312	280.0	117	145	313
6. Triple Super-phosphate	—	2	—	—	—	—	—
7. De-oiled Cake	—	130	54	—	125	—	125
8. Suphala	—	4	—	—	—	—	—
9. Rock Phosphate	—	41	—	—	—	—	—
10. Dolomite	154	59	16	32.0	173	213	174
11. Complex	—	—	—	—	48	—	—
(18:18:10)							
Total :	1000	1000	1000	1000	1000	1000	1000
Cost per tonne:	456	530	568	N.A.	528	487	468

Continued

## ANNEXURE 7.1

(Chapter VII)

15:15:7.5

8:8:8 20:10:10

Raw Material	Vidarbha	Punjab Ferts.	F.A.I. Report	Punjab Ferts.	Punjab Ferts.	Punjab Ferts.	Vidarbha	F.A.I. Report
	9	10	11	12	13	14	15	16
1. Ammn. Sulphate	—	120	—	120	212	212	140	—
2. Urea	280	176	259	176	154	174	113	396
3. D.A.P.	117	250	171	250	150	100	—	101
4. M.O.P.	125	125	125	125	125	125	133	167
5. Superphose.	100	218	445	218	—	—	200	330
6. De-oiled Cake	—	—	—	—	—	—	—	—
7. Triple Super-phosphate	—	—	—	—	180	231	—	—
8. Suphala	—	—	—	—	—	—	—	—
9. Rock Phosphate	234	—	—	—	—	—	125	—
10. Dolomite	144	111	—	111	170	158	289	—
11. Complex	—	—	—	—	—	—	—	—
Total :	1000	1000	1000	1000	1000	1000	1000	1000
Cost per tonne :	557	655	619	652	679	700	371	645

Continued

Raw Material	18:18:10				18:18:9		
	Vidarbha	Bharat Ferts.	Vidarbha	Kolhapur S.S. Sangh	Vidarbha	Deccan Sales Corpn.	F.A.I. Report
	17	18	19	20	21	22	23
1. Amm. Sulphate	—	—	—	225	—	—	—
2. Urea	283	250	251	138	332	274	294
3. D.A.P.	278	362	350	354	150	300	276
4. M.O.P	166	168	166	166	150	150	150
5. Superphos.	250	90	105	54	100	263	280
6. De-oiled cake	—	—	25	9	—	—	—
7. Triple Superphos	—	—	—	—	—	—	—
8. Suphala	—	—	—	—	—	—	—
9. Rock Phosphate	—	—	—	—	268	—	—
10. Dolomite	23	130	103	24	—	13	—
11. Complex	—	—	—	—	—	—	—
<b>Total :</b>	1000	1000	1000	1000	1000	1000	1000
<b>Cost per tonne :</b>	735	N.A.	799	755	646	468	733

Continued



Raw Material	15:15:15			10:20:10			20:20:0	
	Vidarbha	Deccan Sales	F.A.I.	Deccan Sales	Deccan Sales	F.A.I.	Deccan Sales	F.A.I.
	Corpn.	Report	Corpn.	Corpn.	Report	Corpn.	Report	
	24	25	26	27	28	29	30	31
1. Amm. Sulphate	—	—	—	—	—	—	108	—
2. Urea	280	234	237	230	100	108	250	316
3. D.A.P.	117	225	227	250	300	280	350	303
4. M.O.P.	250	250	250	250	166	167	—	—
5. Superphosphate	100	291	286	218	388	445	244	301
6. De-oiled cake	—	—	—	—	—	—	—	—
7. Triple Superphos	—	—	—	—	—	—	—	—
8. Suphala.	—	—	—	—	—	—	—	—
9. Rock Phosphate	234	—	—	—	—	—	—	—
10. Dolomite	19	—	—	52	46	—	448	80
11. Complex	—	—	—	—	—	—	—	—
<b>Total :</b>	1000	1000	1000	1000	1000	1000	1000	1000
<b>Cost per tonne :</b>	607	641	677	646	605	634	708	717

## ANNEXURE 7.2

(Chapter—VII)

**Cost of Raw Material per tonne as used by Various  
Granular Fertiliser Units.**

Type of Fertiliser	1968-69				1969-70		
	S.S. (Kolhapur)	DGFC (Kolhapur)	Bharat Bombay	Vidarbha	S.S. (Kolhapur)	DGFC (Kolhapur)	Bharat Bombay
1.	2	3	4	5	6	7	8
1. Ammonium Sulphate	474	523	478	450	492	520	515
2. Urea	813	1000	820	873	857	893	903
3. D.A.P.	1089	—	1055	1135	1230	—	1055
4. Muriate of Potash	477	493	480	500	482	523	480
5. Supor Phosphate	335	335	315	2209	350	303	315
6. Do-oiled-cake	517	513	501	504	557	532	500
7. Triple Super Phosphate	933	—	—	1014	—	—	—
8. Suphala	805	—	—	—	—	—	—
9. Rock Phosphate	256	—	—	233	—	—	—
10. Dolomite	105	115	—	100	92	99	—

Continued

Type of Fertilisers	Punjab Fert.	1970-71 Vidarbha	S.S.S. (Kolha- pur)	D.G.F.C (Kolha- pur)
1	2	3	4	5
1. Ammonium Sulphate	484	451	400	447
2. Urea	864	849	876	909
3. D.A.P.	1123	1096	1205	—
4. Muriate of Potash	539	500	500	524
5. Super Phosphate	393	380	359	366
6. De-oiled-cake	—	—	542	513
7. Triple Super Phosphate	—	—	—	—
8. Suphala	—	—	—	—
9. Rock Phosphate	—	233	—	—
10. Dolomite	98	100	99	108

## CHAPTER—VIII

# ECONOMIC OF PRODUCTION

### Limitations

8.1 For a study of the economics of production, operational details were obtained from the Cooperative Granular Fertiliser Units in production as also from two of the units in the private sector. For eliciting precise information in a classified form to enable thorough processing under different items of costs, a detailed questionnaire was issued to the concerned units. A copy of the questionnaire is placed at Annexure 8.1. Happily, most of the units furnished the requisite data which, although satisfactory for drawing a broad consensus, lacks here and there in certain details which could have afforded a more precise calculation of the cost of production and net returns to the enterprises from the fertiliser granulation business. Under these limitations, an attempt has been made in the following paragraphs to present the capital cost including construction cost, construction period, initial costs not associated with the construction of the project and the working capital. Estimates have been worked out later in this chapter for the operating costs including direct costs and overheads or indirect costs. Based on these, cost of production has been worked out which has been compared with the ex-factory price to determine the net profit in the manufacturing business.

### Estimates of Capital Cost

8.2 Details of the construction costs of the units have been given in Chapter V. The cost of plant and machinery per units including spare and their installation has varied between Rs. 12 lakhs and Rs. 13.20 lakhs. This also covers freight upto site and taxes as also payment for technical know-how. Due to escalation in costs the corresponding outlay is now estimated at Rs. 14.70 lakhs. For purposes of calculating the interest and depreciation on capital investment a cost estimate of Rs. 14.70 lakhs may be assured as the base. Similarly, the expenditure incurred on civil works ranged between Rs. 7.38 lakhs and Rs. 16.67 lakhs. In some of the units, a few of the essential civil works were yet to be completed. It is, therefore, considered not desirable to strike out an average cost for the civil works based on these actuals. Instead, taking into account the dimensions of each item of civil works and the average cost per unit (area), broad estimates as framed in

Chapter V may be adopted. These estimates put the outlay on civil works at Rs. 14.57 lakhs including factory utilities like water supply, supply of electricity, roads and all taxes. Adding to these an element of escalation at 5% and the cost of land taken at Rs. 50,000 the cost of civil works and land will be raised to Rs. 15.80 lakhs per unit. The plant and machinery and land and the civil works together cost about Rs. 30.50 lakhs per unit. This may be compared with the corresponding capital cost of Rs. 33.01 lakhs estimated by the Study Team of the FAI, for assessing the capital needs of the phosphate industry for setting up granular Fertiliser units as ancillaries.

8.3 There has been no uniformity in the cooperative units in so far as the time taken for completion is concerned. Some units have taken only 15 months from the date of sanction of the project while some others, as much as three years. The main reasons for the delay in the later cases were frequent changes in sites selected and acquisition, labour problems, delay in calling tenders and award of contracts. In one case, financial problems held up the progress of work while in another the foundation work was delayed because of rocky strata. It is not intended to go into details of these here. The idea is to make an estimate of the period during which the administrative and supervisory personnel have remained on the site so that the expenditure incurred on them is debited to the overheads under capital cost. Similarly, some costs like (i) setting up of a marketing and distribution system, (ii) initial advertising expenses, (iii) training of staff, (iv) testing and trial runs, (v) consulting services, etc. may have been incurred which are not associated with the construction of the project. They are in the nature of deferred revenue expenses but they are not treated as operating expenses, unless they are spread over several years. They have, therefore to be capitalized. There is a lot of variation among the units in regard to the expenditure on these items. The minimum reported was Rs. 30,107 and the maximum Rs. 2.55 lakhs. Both of these, however, do not depict the true picture. Taking individual items, an estimate is made below, following the consensus approach :

	Rs.
i) Administrative & Supervisory (including travelling).	50,000
ii) Marketing and distribution system.	Nil
iii) Initial advertising.	1,000
iv) Training of staff.	Nil
v) Testing and Trial runs.	5,000
vi) Consulting service, Architects' fee.	<u>24,000</u>
Total :	<u>80,000</u>

8.4 The total capital cost on block investment for purposes of calculating interest thus works out to as under:—

(Rs. in lakhs)	
i) Plant—Machinery.	14.70
ii) Civil Works.	15.80
iii) Pre-operative expenses to be capitalized	<u>0.80</u>
Total :	<u>31.30</u>

The interest on the above investments will also have to be capitalized. Assuming that the unit takes about 2 years for complete installation and commissioning and, further assuming that the capital raised both from equity and borrowings has been fairly spread during these two years, the interest for one year @ 12% per annum which works out to Rs. 3.13 lakhs has to be added to the capital cost which makes a total of 34.43 lakhs on block capital invested in the unit.

### Working Capital

8.5 Working capital is required by the granular fertiliser units for the purchase of raw material and other inventories, stocking of finished products and for advancing interest-free credit to the marketing/distributing agencies. While working out the requirements of godown accommodation in Chapter V it has been assumed that raw material for a period of 1½ months and finished products for one month may always remain in stock. In addition, gunnies and their lining material may also have to be kept in stock upto 2 months' requirements. On this basis, capital necessary to run the plant on three shifts, two shifts and only shift is indicated in the following table :

Particulars	(Rs. lakhs)		
	On the basis of		
	3 shifts (45,000 tonnes)	2 shifts 30,000 tonnes)	1 shift (15,000 tonnes)
1) Raw material for 1½ months @ Rs. 650 per tonne.	36.56	24.37	12.19
2) Finished products for one month @ Rs. 800 per tonne.	30.00	20.00	10.00
3) For stocking consumable and other laboratory articles.	2.25	1.50	0.75

4) For stocking gunnies and their lining @ Rs. 40 per tonne of fertilisers (excluding Rs. 0.50 per bag for used old bags) purchased with raw material.	3.00	2.00	1.00
5) For salaries and other administrative and revenue expenditure for 6 months	1.19	1.13	1.06
Total working capital :	73.00	49.00	25.00

8.6 The above figures of working capital do not take into account the interest free credit available to the granular units on purchase of fertilisers from the pool and the indigenous manufacturers, nor do they cover the interest free credit allowed by the units to the distributing agencies. The pool allows interest free credit for 2 months and a similar concession is allowed by fertiliser manufacturers on some of the fertilisers like superphosphates, urea, etc. But on scarce material like ammonium sulphate, the manufacturers allow only 15 days to a month as interest free credit period. The granular units also likewise, extend the facility to their customers on different scales. For purposes of calculation, it is assumed that for purchase of raw material the granular units get an interest free credit period for 1½ months of which 15 days are absorbed by the consignment in transit and a net credit of one month is taken account of. On the other hand, in a competitive field, the cooperative granular units like that of Punjab, have been supplying fertilisers to the distributors on consignment basis and some others on cash-cum-consignment basis. They have been allowing rebates on a graded scale for repayments within 3 months. There are, however, units which, on account of paucity of working capital funds, have been insisting on cash sales. Taking all these systems into consideration, it is assumed that the granular units may be offering an interest free period for 2 months. Thus, the bills payable by the units for 1½ months procurement amount to Rs. 36.56 lakhs for a 3 shift operation, Rs. 24.37 lakhs for 2 shifts and Rs. 12.19 lakhs for one shift operation. As against this, the corresponding bills receivable for 2 months on these shifts work out to Rs. 60 lakhs, Rs. 40 lakhs and Rs. 20 lakhs respectively. Adding the difference in bills payable from the bills receivable to the figures of working capital arrived at earlier, net requirements of working capital finance work out to as under:—

	(Rs. lakhs)
	<i>Working capital requirements</i>
i) On 3 shift basis	98.00
ii) On 2 shift basis	65.00
iii) On 1 shift basis	33.00

8.7 The NCDC had earlier calculated the working capital requirements at Rs. 80 lakhs on three shifts and Rs. 54.6 lakhs on two shifts on the consideration that the rated capacity of the unit is 56,000 tonnes on three shifts. On the basis of experience, however, it is felt that allowing for public holidays, stoppage of plant for periodic check up and maintenance, cleaning the machines in the event of changing the grade etc., effective utilisation capacity of the plant may not exceed 45,000 tonnes on three shifts, 30,000 tonnes on two shifts and 15,000 tonnes on one shift. The above calculations of working capital have, therefore, been based on this capacity of 45,000 tonnes. Again, the earlier estimates for working capital were worked out taking raw material at Rs. 600 per tonne and finished products at Rs. 700 per tonne. In view of the high average costs with the use of larger quantities of urea and DAP, the raw material in the above estimation has been taken at Rs. 650 per tonne and finished product at Rs. 800 per tonne.

8.8 It is not necessary that a granular unit should have with it all the funds required for working capital. It is able to raise short term loans from the banking institutions by providing a certain percentage of borrowings as margin. Normally, finances are raised by the unit providing 20 to 25% margin on pledge and 30 to 40 per cent margin on hypothecation of stocks. It is understood that for the normal business in fertiliser distribution, the cooperative wholesalers are able to raise working capital from cooperative and other banks against 10% margin on hypothecation against Government guarantee. It is suggested that the same facility should be offered to the cooperative granular fertiliser units for purchase of raw material and for stocking finished products. This will greatly help them in reducing their capital needs and lowering interest burden. If the proposal is accepted and Government guarantee is available, the units will have to provide margin of about Rs. 9.8 lakhs for 3 shifts and Rs. 6.5 lakhs and Rs. 3.3 lakhs for 2 shifts and one shift respectively. Under the current arrangements, margin would be four times the above figures on hypothecation of stocks without Government guarantee.

8.9 There should be no difficulty for the State Governments to guarantee advances as they have a large stake in the units, having invested about Rs. 15.25 lakhs in their share capital towards block assets and margin money and another Rs. 10 lakhs as long term loan. In fact, it is felt that the granular units established by cooperative wholesales of fertilisers (state level) could even otherwise get Government guarantee as the procurement of raw material and stocking of finished products would be a part of the business covered under Government guarantee. The problem will be for the units established by separate societies or Taluka Marketing Societies. The viability of these units



will be greatly improved if they are also treated as cooperative wholesalers of fertilisers for purposes of fertiliser distribution finance by the RBI and are offered Government guarantee for raising working capital finance.

8.10 Under the scheme of the NCDC for financing of cooperative granular fertiliser units as extended in November, 1970 to provide also assistance for margin money for raising working capital finance, the Corporation provides a long term loan up to a maximum of Rs. 7 lakhs to a State Government to enable it to provide this amount to a cooperative granular fertiliser unit by way of share capital to be used as margin money. This assistance is subject to the condition that the cooperative unit concerned raises an equal amount as additional share capital from its constituents and/or from its own resources before the Corporation's loan is released to the State Government. This additional assistance was based on estimation that, in the initial stages, the granular fertiliser unit may work only in 2 shifts for which a margin of Rs. 14 lakhs would be required to raise adequate working capital. The Corporation also agreed to release this assistance in two instalments of Rs. 3.5 lakhs each provided the unit raised its share of margin from its own resources atleast to the extent of the amount of instalment required to be released by the Corporation. The estimation of Rs. 14 lakhs as margin money was based on the assumption that the granular fertiliser units would be required to provide margin at 25% of the borrowings against pledge of fertiliser/raw material stocks.

8.11 According to the revised estimates made by us in the foregoing paragraphs, the working capital requirements for a two-shift operation work out to Rs. 65 lakhs. Calculating margin at 20 to 25% of working capital, each unit would, on an average, need margin money amounting to about Rs. 15 lakhs. This amount will form a part of the total investment of Rs. 49.43 lakhs estimated in paragraph 5.19 for purposes of determining the pattern of assistance from the NCDC.

#### **Estimates of Operational Costs**

8.12 The operational cost have been estimated under two heads, namely, direct or variable costs and indirect or fixed costs. All costs associated with the preparation of granular fertiliser mixtures such as direct labour and material and utilities have been estimated under the category of 'direct' costs while the overhead costs which are associated with the project as a whole and cannot be directly charged to one end-product have been termed as indirect costs. These include expenditure on supervisory staff, accounting staff, stores operation, technical staff, rent on buildings, utility costs which cannot be apportioned among different products; sales promotion expenses and advertising, consultation fee, if not capitalized, maintenance and repairs to plant and machinery,

interest on fixed investments and depreciation on plant and machinery and civil works. The overheads or indirect costs have been estimated on yearly basis and pro-rated over the production quantity for that year.

(i) *Fixed or Direct Costs*

8.13 As regards fixed costs, a statement of expenditure incurred by various granular fertiliser units during 1968-69 to 1970-71 on various items has been given at Annexure 8.2. Even though all the units, except that of the Kolhapur Shetkari Sahakari Sangh, have the same production capacity, there is wide variation in the total fixed cost from unit to unit as also under each component of cost. Even the same unit has behaved differently in different years in this regard. The total fixed costs in various units ranged between Rs. 1.68 lakhs and Rs. 17.61 lakhs in 1968-69, between Rs. 3.23 lakhs and Rs. 9.15 lakhs in 1969-70 and between Rs. 2.29 lakhs and Rs. 5.99 lakhs in 1970-71. One of the main reasons for this erratic behaviour was that the stability in the operations of the units had not been fully achieved. Civil works were continued to be added in some of the units in subsequent years. There has also not been any uniformity in the maintenance of accounts and the classification of items under different heads of accounts. For instance, in the case of Shetkari Sahakari Sangh, Kolhapur, the factory overheads were clubbed with direct labour costs. Similarly, in Vidarbha, a part of the factory overheads in 1969-70 have been shown under office overheads which also include some element of administrative expenditure like pay of General Manager which was earlier borne by the society from its normal business in agricultural marketing and distribution of agricultural inputs and consumer goods. It was not therefore, considered appropriate to utilise these data for purposes of determining fixed costs and their share in the cost of production.

8.14 As an alternative, in so far as office overheads and factory overheads are concerned, a fresh classification was attempted on the basis of the types and number of staff maintained and their monthly emoluments. The unitwise details are given in Annexure 8.3. All these personnel are expected to continue even if the plant runs in one shift. Depending upon the number of persons employed and their scale of pay and allowances, there has been a very wide variation in the monthly/annual expenditure incurred by different units. The range of monthly bill in the case of office overheads extends from Rs. 487 in Punjab Fertilisers to Rs. 14,200 in Bharat Fertilisers. Similarly, factory overheads ranged between Rs. 674 per month in Shetkari Sahakari Sangh Ltd., Kolhapur and Rs. 3065 per month of Punjab Fertilisers. The averages in both the cases work out to Rs. 8,683 and Rs. 1,366 per month or Rs. 1,04,196 and Rs. 16,416 per year. To these costs may be added the expenditure on consumer stores, travelling

expenditure and postage and stationery. These are estimated at Rs. 2,500 per unit per month or Rs. 30,000 per unit per annum. The total overheads or fixed costs on administrative and factory staff, therefore, work out to Rs. 1,40,612 per annum.

8.15 The next important item of fixed costs is depreciation on plant and machinery and civil works. The industry is assuming the economic life of plant and machinery between 6 and 7 years and that of civil works at 20 years. While, this estimation of life seems to be on the lower side, we accept these for purposes of studying economics of production. Any increase in life will increase profits at some distant stage. For determining the cost on this item the straight line method of depreciation has been adopted which is commonly applied. In this chapter, we have earlier accepted the investments in plant and machinery at Rs. 14.70 lakhs and that in civil works at Rs. 15.30 lakhs. On the basis of the economic life given above the amount of depreciation on plant and machinery and civil works will work out to Rs. 2.21 lakhs and Rs. 0.77 lakhs respectively.

8.16 Almost all the granular fertiliser units have been established, to some extent, with borrowed money. The lending agency always insists on getting the capital assets insured on factory's expense. The incidence of insurance works out to Rs. 10 per thousand per annum. On this basis, the total cost on insuring plant and machinery and civil works costing about Rs. 30 lakhs works out to Rs. 0.30 lakhs per annum. This does not include insurance of raw material and finished products which will be dealt with under variable costs.

8.17 Borrowings for block capital, according to the pattern of raising resources as given in paragraph 5.20, will be about 50% of the total investment. For a capital cost of Rs. 30 lakhs, the borrowings of long-term loans will be Rs. 15 lakhs. Usually the cooperative units raise this loan from the State Governments which in turn borrows from the NCDC at  $7\frac{1}{2}\%$  per annum. But for purposes of assessing the economics of the unit, it is prudent to assume the normal commercial rate of interest @ 9% per annum for such long term loans. At this rate the total amount of interest payable is calculated at Rs. 1.35 lakhs per annum.

8.18 The details of fixed costs as given above are summarised below:

	(Rs. in lakhs)	
Item of Cost		Cost per annum
1) Administrative & factory overheads:		1.41

2) Depreciation:	
i) Plant and machinery	2.21
ii) Civil works	0.77
3) Insurance of block assets	0.30
4) Interest on long term borrowings for block capital.	1.35
	<hr/>
Total:	6.04
	<hr/>

This expenditure is by no means actual or even depicting the average position as at present. It is a norm imputed in very broad terms and would hold good even for normal escalation of costs in the next few years. We also feel that averages based on the actuals, if given, would serve no useful purpose because of a lot of disparity in the investments in block assets and administrative personnel engaged by the individual units. The idea for giving these norms is to present a pen picture of the costs that could be expected in an enterprise whose efficiency has to be tested on business lines. Any investment lesser than the estimates but without impairing efficiency will lead to lower production costs and higher net returns.

(ii) *Variable or Indirect Costs*

8.19 These costs include, besides technical, skilled and unskilled labour engaged in the manufacturing process, expenditure on utilities like power, water, lubricants and furnace oil, repairs and maintenance, insurance on raw material and finished products, interest on borrowed working capital, taxes, processing losses, packing of fertilisers, etc. A statement showing the expenditure reported to have been actually incurred by various cooperative and private sector granular fertiliser units in the years 1968-69 to 1970-71 is given at Annexure 8 4. Just like the fixed costs, the variable costs given in this statement are also not free from misclassification. In certain units, the interest on working capital has been compiled under fixed costs while a part of the labour chargeable to fixed costs has been presented in this statement. Since it was very difficult to sort out individual's accounts for a proper re-grouping, we have no option but to resort to the consensus approach for presenting general norms for variable costs. For this purpose, besides using the available data to the extent possible, information collected by survey method has been used to compute the figures under various items of cost.

8.20 Taking the cost of personnel, the granular units have been engaging drivers, foremen, fitters, helpers and store clerks according to the number of shifts operated. The Deccan Sales Corporation, all such personnel are reported to be on the permanent

strength of the unit but in other cases they are temporary hands to be engaged when they are needed. For a three shift operations it is felt that a unit would essentially need to have the services of 4 shift assistants, 6 fitters or operators and 6 store clerks. The wages of these would work out to about Rs. 3255 per month or Rs. 39,060 per annum. In addition to this skilled labour, work charged unskilled labour is engaged either on monthly basis or on contract. The expenditure on this account as incurred by various units is given below:

Type of labour	Punjab Ferti- lisers	Vidarbha		S.S.S. Kolhapur		D.G.F.C. Kolhapur		Deccan Sales corpn.		
		No.	Total monthly wages	No.	Total monthly wages	No.	Total monthly wages	No.	Total monthly wages	
<b>1. Monthly basis</b>										
(a) For feeding Raw material.	—	24	2520	—	—	4	480	8	1525	
(b) For processing Section	—	51	5355	36	3923	11	1320	5	980	
(c) For curing Section	—	3	360	—	—	14	1440	4	800	
(d) For printing of bags, putting polythene liners.	—	—	—	—	—	—	—	—	—	
(e) Filling & weighing	—	—	—	—	—	—	—	—	—	
(f) Stitching	—	—	—	—	—	—	—	—	—	
(g) Stacking	—	—	—	—	—	—	—	—	—	

## 2. Contract basis

(a) For feeding raw material	) Rs. 420	—	) Rs. 3 per	—	—
	) per		) tonne	—	—
(b) For processing section	) tonne		)		
	)		)		
(c) For curing sec.	)		)		
(d) For printing of bags, putting polythene liners	)	) Rs. 3/-	)	) Rs. 5/-	) Rs. 7.50
	) Rs. 1/-	) per 100	) Rs. 2.50 per	) per tonne	) per tonne
	) per tonne	) bags	) tonne	)	)
(e) Filling & weighing	)	) Rs. 8/-	)	)	)
	)	) per tonne	)	)	)
(f) Stitching	)	)	)	)	)
	)	)	)	)	)
(g) Stacking	)	)	)	)	)

It is very difficult to compare from the above figures the expenditure incurred by various units on technical, skilled and unskilled labour engaged in the operation of the unit, including feeding of raw material, processing & curing the product and its packing in bags together with their stitching and stacking, as different systems of labour employment have been applied for different items by the units. For instance, Punjab Fertilisers engaged besides foremen, fitters and stores clerks, about 45 helpers in all these processes in addition to contract labour at Rs. 5.20 per tonne for feeding, processing, curing and packing of fertilisers. For the same job, M/s. Deccan Sales Corporation engaged 26 monthly paid persons in addition to contract labour at Rs. 7.50 per tonne for bagging, stitching and stacking. The DGFC, Kolhapur employed 43 monthly paid persons besides contract labour at Rs. 5.00 per tonne for bagging, etc. With a view to arriving at fairly good norms, discussions were held by the Team with the managements of the granular units during the course of their field visits. It was revealed that feeding of raw material may cost about Rs. 2 per tonne, that of packing, stitching and stacking Rs. 6.50 per tonne and other labour for processing etc. about Re. 1.00 per tonne. The variable cost on factory labour has, therefore, been taken at Rs. 9.50 per tonne of finished product in calculating the production costs.

8.21 For purposes of calculating the cost of power, water, lubricants and furnace oil, one is apt to assume that the cost per tonne of products would not widely vary from unit to unit. This however, is not so. What to say of inter-unit differences, there has been a significant variation in the same unit for different years. This is illustrated by the fact that M/s. Deccan Sales Corporation spent in 1968-69 Rs. 0.69 lakhs on utilities to produce 23,240 tonnes of granular mixtures. This worked out to Rs. 2.98 per tonne. In 1969-70, their expenditure on the preparation of 16,871 tonnes of fertilisers came to Rs. 0.58 lakhs with per tonne cost at Rs. 3.44. In the subsequent year, an expenditure of Rs. 0.56 lakhs has been reported on 10,552 tonnes of granular mixtures. Per tonne cost in the year worked out to Rs. 5.31. The same is true of other units. While a part of the upward fluctuation in the two years following 1968-69 can be explained due to rising prices of the material, the other reasons may be the economic use or efficiency in utilisation of the material. However, on the basis of overall costs incurred by various reporting units in three years and keeping in view the upward trend in prices, we feel that it may be in order to assume the cost of utilities at Rs. 6/- per tonne.

8.22 Repairs and maintenance, including spares as given in Annexure 8.3 form another significant item of variable costs. Expenditure on these varied from Rs. 0.02 lakhs to Rs. 1.56 lakhs depending upon the age of the plant. The oldest plant of



M/s. Deccan Sales Corporation cost the maximum each year. The average works out to about Rs. 5 per tonne of the finished product.

8.23 Insurance, as earlier stated under fixed costs, is charged at Rs. 10 per thousand per annum. For variable costs, insurance has to be calculated on raw material and finished products in stock at any point of time. In paragraph 8.5, the value of raw materials, finished products, gunnies and other consumable articles in stock at any point of time has been estimated at Rs. 71.81 lakhs on 3 shifts, Rs. 47.87 lakhs on two shifts and Rs. 23.94 lakhs on one shift. The insurance charges for these stocks work out to Rs. 0.72 lakhs, Rs. 0.48 lakhs and Rs. 0.24 lakhs respectively per annum. For each tonne of the product, these costs are calculated at Rs. 1.60 irrespective of the number of shift.

8.24 As regards interest on borrowings for working capital, the cooperatives are being charged at about 10% per annum by various banking institutions. Out of the total working capital needs of Rs. 98 lakhs, Rs. 65 lakhs and Rs. 33 lakhs for three, two and one shift respectively, as given in paragraph 8.6, a co-operative granular unit would be providing margin money of about 20-25% from its own resources. The units will, therefore, be raising loans of the order of Rs. 75 lakhs, Rs. 50 lakhs and Rs. 25 lakhs to work the plants on various shifts respectively. The interest at 10% is calculated at Rs. 7.5 lakhs, Rs. 5.0 lakhs and Rs. 2.5 lakhs per annum on these shifts and Rs. 16.6 per tonne irrespective of the shift.

8.25 Sales tax is charged on the granular mixtures in certain States. We do not, however, propose to add it to production expenditure as it is subsequently passed on to the distribution system.

8.26 The price of gunnies, polythene liners and sutli as reported by various units ranged between Rs. 35 per tonne and Rs. 48 per tonne. The lowest was that of DGFC Kolhapur and highest that of Vidarbha. The S.S.S. Kolhapur and M/s Deccan Sales Corporation have reported these costs at Rs. 38 and Rs. 41 per tonne respectively. According to the latest information, the cost works out to about Rs. 43 per tonne. This norm has been taken for purposes of calculating production costs.

8.27 Almost all the granular units have reported losses during the course of processing but no reliable estimates are available of these losses. They have not been able to apportion losses arising from (a) processing operations and (b) shortages arising in rail transit and storage of raw material procured from pool and other sources. Some of the units have put the losses at a total figure of 2.5% of raw material while some others at 3

to 4% and even higher. The machinery suppliers have, however, been guaranteeing processing losses to be within 1%. In the absence of any dependable estimates, we propose to assume 1.5% of the cost of raw material towards processing losses. This works out to Rs. 9.75 per tonne on raw material. As regards losses in transit and storage of raw material according to the experience of cooperative wholesalers so far, the shortages ranging from 3 to 10% have been accruing in individual consignments. However, the Union Department of agriculture, which has recently conducted a random survey, has come to the conclusion that such shortages in rail transit would be of the order of  $\frac{1}{2}$ %. We consider that the result of this random survey does not depict the true picture. An earlier Team of the National Cooperative Development Corporation, which studied the fertiliser distribution margins, had observed shortages ranging from 3 to 5% in almost every State. It is, therefore, reasonable to assume losses on account of shortages in raw material both in transit and storage at 3% of the cost of raw material. This works out to Rs. 19.50 per tonne, on an average, bringing the total losses to Rs. 29.25 per tonne.

8.28 On the basis of the expenditure figures given in paragraphs 8.12 to 8.27, the indirect or fixed costs and direct or variable costs per tonne of the finished product on one, two and three shifts operations are summed up in the following table:

Item of Cost	Cost per tonne			Total annual Expenditure (Rs. lakhs)
	One shift (Rs.)	two shifts (Rs.)	three shifts (Rs.)	
<b>A. Fixed Costs or Indirect Costs</b>				
1. Administrative & factory overheads	9.37	4.68	3.13	1.41
2. Depreciation :				
(i) Plant & machinery	14.74	7.37	4.91	2.21
(ii) Civil works	5.12	2.56	1.71	0.77
3. Insurance on block assets	2.00	1.00	0.67	0.30
4. Interest on borrowings for block investment	9.00	4.50	3.00	1.35
<b>Total fixed costs,</b>	<b>40.23</b>	<b>20.11</b>	<b>13.42</b>	<b>6.04</b>

**B: Variable or Direct Costs**

1. Factory labour (Technical, skilled & unskilled including work charged)	9.50	9.50	9.50
2. Utilities	6.00	6.00	6.00
3. Repairs & Maintenance	5.00	5.00	5.00
4 Insurance of raw material, finished products, gunnies & other consumable articles.	1.60	1.60	1.60
5. Interest on borrowings for working capital.	16.60	16.60	16.60
6. Sales Tax	—	—	—
7. Processing losses & shortages in transit and storage of raw material	29.25	29.25	29.25
8. Cost of Gummies, polythene liners & sutli.	43.00	43.00	43.00
<b>Total variable costs:</b>	<b>110.95</b>	<b>110.95</b>	<b>110.95</b>
<b>Total Fixed and Variable Costs per tonne.</b>	<b>151.18</b>	<b>131.06</b>	<b>124.37</b>

The total fixed cost per tonne for one, two and three shifts running work out to Rs. 40.23, Rs. 20.11 and Rs.13.42 and variable cost to Rs. 110.95 per tonne irrespective of the number of shifts. For preparing a tonne of granular fertilisers, therefore, a unit would be spending Rs. 151.18 if run on one shift. This will be Rs. 131.06 per tonne on two shifts operation and Rs. 124.37 on three shifts working.

8.29 These costs compare favourably with the cost per tonne recently estimated by the Study Team of the FAI in connection with a proposal for rehabilitation of the Phosphate Industry by adding granular plants as ancillaries to their phosphate factories. According to the FAI estimates, the cost of production

including cost of gunnies and packing and shortages of raw material but excluding return on equity works out to Rs. 132.08 per tonne for running the plant to 75% of its production capacity of 45,000 tonnes and to Rs. 125.44 per tonne for running on full scale. The nature of differences under various groups of items is explained as under:

	(Amount in Rs. per tonne)	
	F.AI.'s Study Team. (100% capacity)	NCC's Study Team (100% capacity)
1. Utilities	13.56	6.00
2. Repairs and maintenance	6.35	5.00
3. Insurance	2.01	2.27
4. Interest on borrowings	21.56	19.60
5. Depreciation	7.34	6.62
6. Processing losses	8.00	9.75
7. Losses on account of shortages in transit and storage of raw material.	10.00	19.50
8. Administrative costs and factory labour including sales promotion.	13.62	12.63

FAI's estimates are higher than the NCDC's except under the items of insurance and processing losses and shortages. However, the major difference is in the case of shortages. The FAI has taken these shortages at 1.75% of the cost of raw material while we have assumed these shortages at 3%. Secondly, FAI's estimates have not provided for shortages on superphosphates which were expected to be obtained from the same premises. We have, however, included shortages on this material also in our calculations.

### Break-even Point

8.30 After determining the cost of production the question arises whether fertiliser granulation is a paying proposition and if so, whether it is profitable to run the plant even on one shift. While the overall position of profit or loss in this business can be located from the balance sheets, this system does not help to find out whether it is possible to improve the economics of the unit with enlarged production. For an analysis of this aspect of the working results we have chosen to make use of the figures of cost of production per tonne as worked out in the foregoing paragraphs. If this cost is added to the cost of raw material per tonne it will give the cost of preparing a tonne of granular fertiliser.

This figure, when compared with the ex-factory price of the fertiliser will indicate the profitability.

8.31 We have been so far attempting in the direction of working out general norms, whether for capital cost, working capital or cost of production. In this case also we propose to proceed on the same lines. We had given in Chapter VII the cost of raw material used to prepare different grades of fertilisers applying different formulae. It was observed that depending upon the type of raw material used, there was a very wide variation in the cost of raw material used per tonne of the finished product of the same grade. For instance, in the preparation of 15:15:7.5 grade the range in the cost per tonne extends from Rs. 557 to Rs. 700. Since the marketability of the grade is the same whether processed with 'A' formula or with 'B' formula, an average of the cost of raw material per tonne for each grade has been worked out below. To each is added the cost of production per tonne as calculated for one shift, two shifts and three shifts. The totals are compared with the corresponding ex-factory costs to see the extent of profitability, if any :

(In Rs.)

Fertiliser Grade :	Average cost of raw material per tonne. (Rs.)	Cost of processing per tonne on—			Total costs of production per tonne on—			Ex-Factory price per tonne.	Net Profit or Loss per tonne of finished product		
		One shift.	Two shifts.	Three shifts.	One shift.	Two shifts.	Three shifts.		One shift.	Two shifts.	Three shifts.
15:5:5	496	151	131	124	647	627	620	626	(—)21	(—) 1	6
15:15:7.5	644	151	131	124	795	776	700	775	(—)20	(—)	75
8:8:8	371	151	131	124	522	502	495	507	(—)15	5	12
20:10:10	645	151	131	124	796	776	769	712	(—)84	(—)64	(—) 57
18:18:10	763	151	131	124	914	894	787	946	32	52	159
18:18:9	682	151	131	124	833	813	806	800	(—)33	(—)13	(—) 6
15:15:15	643	151	131	124	794	774	767	823	29	49	56

It is revealed from the above that the preparation of grade 18:18:10 returned a net profit even on one shift production, preparing a few other grades was economical when the plants are run on two shifts and the preparation of two grades viz. 20:10:10 and 18:18:9 was not economical even on three shifts.

8.32 This should not be taken to mean that preparation of the above three grades should be stopped, nor it may be assumed that preparation of grade 18:18:10 would always be economical even on one shift. According to certain formulae the production of each grade may prove economical even on one shift. This is depicted for some of the above grades :

(Rs.)					
Fertiliser Grade	Minimum cost of raw material per tonne.	Cost of processing on one shift per tonne.	Total cost of production per tonne.	Ex-factory per tonne.	Net profit on one shift per tonne.
15:5:5	456	151	607	626	+ 19
15:15:7.5	557	151	608	775	+ 167
18:18:10	735	151	886	946	+ 60
18:18:9	646	151	797	800	+ 3
15:15:15	607	151	758	823	+ 65

The secret of the above lies only in the selection of raw material for mixing and granulation. A grade prepared with the use of urea, DAP and triple superphosphate is very cheap compared to the one prepared with ammonium sulphate, superphosphate, de-oiled cake, etc. It is, therefore, inferred that a granular unit can be viable even on one shift production provided the management finds its way to procure the cheaper raw material at the ex-factory price or pool-issue price. This has, however, not been possible in the past. The granular units excepting those set up by cooperative wholesalers have often been making purchases from the open market at retailer's price. They could not also get the much needed DAP and triple superphosphate because of their non-availability due to limited imports. Even ammonium sulphate was purchased by some of the units at very exorbitant prices.

8.33 The Central & State Governments have to play an important role if the success of the granular fertiliser units as suppliers of much needed balanced fertilisers has to be ensured. As already suggested in Chapter VII, the cooperative granular units should be treated on priority basis for supply of pool fertilisers. The needs of these units for DAP and triple superphosphate should first be met before these fertilisers are allotted to the

wholesale distributors. Similarly, the indigenous manufacturers of DAP, triple superphosphate and ammonium sulphate should be advised to make a special registration of the demand of granular units for supply of fertilisers on ex-factory rate allowing also quantity rebates as offered to other wholesalers. This will greatly encourage the granular units and help them in improving the economics of units.

8.34 Even as it is, there seems no room for disappointment. Based on the actuals of the raw material cost in the three years 1968-69 to 1970-71 and the corresponding value of ex-factory finished product, the units show a promise of profitable production on two and three shifts. This will be clear from the following table :



(Amount in Rs.)

Name of the Units	Value of Raw material per tonne of mixture at cost price (1968-69 to 1970-71)	Cost of processing per tonne			Total cost of production per tonne			Average Ex-factory price per tonne (1968-69 to 1970-71)	Net Profit or Loss per tonne of finished product		
		One shift.	Two shifts.	Three shifts.	One shift.	Two shifts.	Three shifts.		One shift.	Two shifts.	Three shifts.
1. S.S.S Kolhapur	508	151	131	124	659	639	632	645	(—)14	+ 6	+13
2. DGFC, Kolhapur	507	151	131	124	658	638	631	633	(—)25	(—) 5	+ 2
3. Deccan Sales Corporation	586	151	131	124	717	697	690	713	(—) 4	+ 16	+23
4. Vidarbha (2 yrs.)	687	151	131	124	838	818	801	815	(—)23	(—) 3	+ 4
5. Punjab Fertilisers (1 year)	653	151	131	124	804	784	777	778	(—)26	(—) 6	+ 1

All the units according to the imputed costs showed losses on one shift operation. Three of them continued to operate on loss even on two shifts while the other two recovered enough to produce a positive margin. On three shifts all the units, on these basis, would show profit ranging from Re. 1 to Rs. 23 per tonne.

8.35 Calculated on these lines, the average net loss on one shift works out to Rs. 18 per tonne or Rs. 2.70 lakhs per annum on processing 15,000 tonnes. With operations on two shifts the units, on an average earn a profit of Rs. 2 per tonne or Rs. 0.60 lakhs per annum for a production of 30,000 tonnes. On three shift operations the profit margin goes up to Rs. 11 per tonne yielding a net return of Rs. 5.95 lakhs to a unit on an average per annum. Considered against the estimated equity of Rs. 22.5 lakhs, the profits on two and three shifts will return a dividend of 2.7% and 26.5% respectively.

8.36 The above is a hypothetical estimation of the economics of granulation where the cost of raw material per tonne is the actual incurred by the units under study but where the ex-factory price quoted by the units concerned has been reduced to the extent of wholesaler's margin and to the extent of difference of excise duty paid on finished products and rebate allowed on raw material. In the Punjab unit, however, the ex-factory price indicated by the unit has been taken into account. It would be interesting to know that all these five units, according to their own calculations of costs of raw material and fixed and variable costs as also ex-factory sale price, have shown net returns. A summary of these results is presented below :

(In Rs.)

Item of Cost	Average per tonne of finished product				
	Punjab Fertilisers (1970-71)	Vidarbha (Average 1969-70 to 1970-71)	Deccan Sales Corpn. (Average 1968-69 to 1970-71)	D.G.F.C. Kolhapur (Average 1968-69 to 1970-71)	S.S.S. Kolhapur (Average 1968-69 to 1970-71)
1. Total Fixed & Variable Costs	124	177	142	166	96
2. Value of Raw material	653	687	586	507	508

3. Value of Finished Product (Ex-factory price)	778	900	778	688	717
4. Cost of preparing Granular fertilizers (1+2)	777	864	728	673	604
5. Profit or loss per tonne (3-4)	1	36	50	15	113

The profit ranged from Re. 1 per tonne in Punjab Fertilisers to Rs. 113 per tonne in S.S.S. Kolhapur. The quantities of raw material processed by these five units in different years is given below :

	(Qty. in tonnes)		
	1968-69	1969-70	1970-71
1. Punjab Fertilisers	—	—	9,011
2. Vidarbha	—	6,329	11,867
3. Deccan Sales Corporation	23,414	16,933	10,552
4. DGFC, Kolhapur	1,700	6,381	4,300
5. S.S.S. Kolhapur	16,963	13,048	10,212

From the above figures, it is revealed that even on one shift the units have been running on profit.

**COOPERATIVE GRANULAR FERTILIZER PLANT**  
of

**Proforma 'A'**

**(i) Block Capital Cost**

S. No.	Item	Unit	Description	Cost (Rs.)	
				Actually incurred.	Yet to be incurred.
1	2	3	4	5	6

**(a) Plant & Machinery :**

1. Plant & Machinery.
2. Transport of plant & machinery to site.
3. Installation charges.
4. Any other item.

Total :

**(b) Land & Buildings :**

1. Land. Area in acres.
2. Site development.
3. Main factory building. Plinth area in sq. ft.
4. Machinery Foundation.
5. Raw material godowns. Capacity in tonnes.  
Area in sq. ft.
6. Finished product godowns. -do-
7. Empty bardana godowns. -do-

1	2	3	4	5	6
8.	Any other godown.	-do-			
9.	Administrative office.	Plinth area in sq. ft.			
10.	Laboratory.	-do-			
11.	Rest Room.	-do-			
12.	Canteen.	-do-			
13.	Sanitary Block.	-do-			
14.	Compound wall.	In running feet.			
15.	Roads.	Length in meters.			
16.	Time Office bldg.	Plinth area in sq. ft.			
17.	Furnace oil tank.	Capacity in litres.			
18.	Any other civil works.				
	Total :				

**(c) Water Supply System :**

1. Installation of a tube well/well/pumping set incldg. elect. connection.
  2. Overhead tank. Capacity in litres.
  3. Pipe lines. Length in meters.
  4. Any other item.
- Total :

**(d) Electricity Installations :**

1. Electricity installations.

**Proforma 'A' contd.**

1	2	3	4	5	6
	2. Transformer.	KVA			
	3. Power cabins.				
	4. Yard lighting.				
	5. Any other investment.				
	Total :				
	<b>(e) Preoperative expenses during the period of installation to be Capitalised :</b>				
	1. Wages and salaries.				
	2. Architect's fee.				
	3. Other consultancy services.				
	4. Rent, rates and taxes.				
	5. Interest on borrowings.				
	6. Any other expense.				
	Total :				
	<b>(f) Other items of block capital cost (pl. specify).</b>				
	<b>(g) Grand Total :</b>				

**(ii) Sources of capital Block investment**

(Amount in Rs.)	
In respect of exp. actually incurred.	In respect of exp. yet to be incurred.

(a) Share capital from State Govt.

1	2	3	4	5	6
<p>(b) Long-term loan from State Govt. Payable in.....yearly instalments @.....% per annum interest.</p>					
<p>(c) Loans raised from cooperative/commercial banks :</p> <p>—Longterm loan for.....years @.....% int.</p> <p>—Medium-term loan for..... years @.....% int.</p> <p>—Short-term loan for.....years @.....% interest.</p>					
<p>(d) Owned funds of the society :</p> <p>—by raising addl. share capital.</p> <p>—from existing owned funds :</p>					
<p>(e) Any other sources (pl. specify) : _____</p>					
<p>Total : _____</p>					

**Instructions for filling proforma 'A'**

**(ii) Block Capital Cost**

1. The unit may still have to incur some expenditure on plant and machinery or on any other item of civil works. The same may be given under the column 6.
2. All expenditure on plant and machinery including freight upto factory site and installation charges may be given in S. No. (a).
3. If there is any item of construction/installation which is not covered under the above classification, it may be added to the list. Care may be taken that no item of capital cost is left out.
4. Under S. No. (e) such items of current revenue expenditure have to be given which were/are being incurred during the process of installation. After the units goes into production, these costs will be debited to production or variable costs.

## **(ii) Sources of Capital for Block Investment**

1. Only such share capital or borrowings have to be given in this proforma which was used/is meant for purchase of plant and machinery and its installation or for construction of civil works, electric installation, water supply system, etc. Borrowings for margin money or advances for working capital for purchase of raw material or for stocking of finished products should not be included under this.
2. In certain cases short-term loans may have been borrowed from banks for capital expenditure to cover any gap. This may be shown in (c) under short-term loans.



## Proforma 'B'

### Administrative Staff, other Employees & Labour engaged

S: No.	Category of Staff	No. of posts		Pay scale	Total mon- thly emolu- ments of those in position
		Sanc- tioned	In posi- tion		
1	2	3	4	5	6

**(a) Administrative Staff**

1. Factory Manager.
2. Secretary
3. Asstt. Manager
4. Sales Manager
5. Purchase Manager
6. Production Engineer
7. Asstt. Engineer
8. Chemists
9. Lab. Attendants
10. Overseers :
  - Electrical
  - Mechanical
  - Civil
11. Accountant
12. Store Keeper
13. Sales Representative
14. Other clerks
15. Watch & Ward :
  - Supervisors
  - Watchmen or  
Security Personnel
16. Gardners
17. Peons

1	2	3	4	5	6
18	Foreman				
19	Shift Incharge				
20	Welder, cutter, marker				
21	Driver				
22	Any other employee on regular establish- ment (Please specify)				
23.	Total :				
	<b>(b) Work charged staff (engaged only when factory is in operation)</b>				
1.	For feeding raw material :				
	—Skilled personnel (categorywise) :				
	—unskilled labourers				
2.	To attend Processing Plant :				
	—skilled personnel (categorywise) :				
	—unskilled labourers				
3.	In the Curing Section :				
	—skilled (category- wise) :				
	—unskilled labourers				
4.	Printing & Packing of Bags :				
	—For printing of bags				
	—For putting poly- thene liners				
	—For filling & weighing				
	—For stitching				
	—For stacking				
5.	Total :				

### **Instructions for filling Proforma 'B'**

1. The idea in classifying staff under 'Administrative' & Work-Charged staff is to differentiate from the permanent staff working all the year round irrespective of the closure of the factory or number of shifts from the staff which is engaged only when the factory is running and which is increased or decreased with the number of shifts worked. While giving details under staff of each category, you may feel free to re-classify each type of staff keeping in view the above objective.
2. The designation for a particular post in a unit may be different from that listed above. The persons in position in the unit may be shown against the most appropriate post in the list. If there is any difficulty to do so, the unit is free to show such a post separately.
3. Under column (6) all the pay and allowances paid to particular category in a month may be given. For example, if there are 5 watchmen each getting Rs. 100/- per month, total emoluments amounting to Rs. 500/- may be given in col. 6 against Watchmen.
4. If labour on any of the above items is engaged on contract basis, an asterisk may be put on that item and contract rates indicated against it.

## Proforma 'C'

### (i) Raw materials used for granulation of all types of mixtures

Q : Quantity in tonnes of material.  
V : Value in rupees.

S. No	Constituent raw material	1968-69		1969-70		1970-71	
		<u>July-June</u>		<u>July-June</u>		<u>July-Feb.</u>	
		Q	V	Q	V	Q	V
1	2	3	4	5	6	7	8
	1. Ammonium sulphate						
	2. Urea						
	3. DAP						
	4. Muriate of Potash						
	5. Super Phosphate						
	6. De-oiled cake						
	7. Triple super phosphate						
	8. Suphala						
	9. Rock Phosphate						
	10. Dolomite						
	11. Complex Fertilizers (give composition)						
	12. Any other fertilizer used (specify)						
	<b>Total :</b>						

(ii) Types of Granular Mixtures Prepared

S. No.	Granular Mixtures	Quantities prepared in the year ending 30th June.			Sale rate per tonne (Ex-Factory.			Retail price fixed per tonne by Govt.		
		1968-69	69-70	70-71	68-69	69-70	70-71	68-69	69-70	70-71
1	2	3	4	5	6	7	8	9	10	11
				(up to 28/2)	(Rs.)			(Rs.)		

1. 15:15:7.5

2. 15:5:5

3. 8:8:8

4. 18:18:10

5.

6.

7.

8. Total :

(iii) Raw material used in different types of granular mixtures

Q : Quantity in tonnes.

V : Value in rupees at current wholesale price for factory.

S. No.	Constituent raw material	Granular Mixtures (Quantities used per 1000 tonnes of finished product)																		
		15:5:5: (1% organic)						15:5:5: (all organic)						18:18:10						& so on
		I		II		III		I		II		III		I		II		III		
Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
	1. Ammonium sulphate																			
	2. Urea																			
	3. DAP																			
	4. Muriate of Potash																			
	5. Super Phosphate																			
	6. De-oiled cake																			
	7. Triple super phos																			
	8. Suphala																			
	9. Rock phosphate																			
	10. Dolomite																			
	11. Complex Fertilizer (give composition)																			
	12. Any other fertilizer used (specify)																			
	Total :	1000						1000						1000						

### Instructions for filling proforma 'C'

#### (i) Types of Granular Mixtures Prepared

1. The rate at which sales are effected to wholesalers or marketing department of the unit (ex-factory) may only be given in col. 6, 7 & 8.
2. In col. 9 to 11 the rate fixed by the State Govt. for sale of each granular mixture to farmers may be given.

#### (iii) Raw Material used in Different Types of Granular Fertilisers

1. Each granular mixture may be prepared by using different components at different types depending upon the availability of raw material. Under cols. 3 to 8 and 9 to 14 and 15 to 20 space has been provided to show quantity and value of 3 different combinations of each granular mixture. Addl. columns may be made if more than three combinations are prepared for any of the granular mixtures.
2. The quantity and value has to be given for a total mixture of 1000 tonnes of raw material for each combination.
3. Additional sheets may be used for other granular mixtures prepared by the unit.

Proforma 'D'

(i) Stocks of Raw Material & Finished Products

(ii) Raw material (fertilizer & filling material) Purchased & month and stock

Q : Quantity in tonnes of material.

V : Value in rupees.

(Amount in Rs.)

Month	1968-69						1969-70						1970-71					
	Purchases during the month.		Used during the month.		Stocks at the end of the month.		Purchases during the month.		Used during the month.		Stocks at the end of the month.		Purchases during the month.		Used during the month.		Stock at the end of the month.	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1																		
July																		
August																		
September																		
October																		
November																		
December																		
January																		
February																		
March																		
April																		
May																		
June																		
Total during the year.																		



## (ii) Value of Granular Mixtures Produced, Sold and month-end Stocks

Q : Quantity in tonnes of material.

V : Value in rupees.

Month	1968-69						1969-70						1970-71						
	Produced during the month.		Sales during the month.		Closing stock.		Produced during the month.		Sales during the month.		Closing stock.		Produced during the month.		Sales during the month.		Closing stock.		
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
July																			
August																			
September																			
October																			
November																			
December																			
January																			
February																			
March																			
April																			
May																			
June																			
Total	(a)	Value						(a)	Value						(a)	Value			
	(b)	Quantity in tonnes.						(b)	Quantity in tonnes.						(b)	Quantity in tonnes.			

(iii) Value of Gunny bags purchased, used and in stock at the year end. (Amount in Rs.)

	1968-69 (July-June)	1969-70 (July-June)	1970-71 (July-Feb.)
(a) Value of gunny bags & lining and sutli purchased.			
(b) Value of gunny bags & lining and sutli used in packing during the year.			
(c) Value of gunny bags and lining and sutli in stock at the end of the year.			

**Proforma 'E'**

**Sources of Working Capital Finance  
(i) Borrowings from Banking Institutions**

Year	Type of limit according to security	% margin required	Credit limit obtained	Credit limit drawn during the year		Amount outstanding at the end of the year	Rate of interest	Amount of interest paid/payable
1	2	3	4	5	6	7	8	9

(a) From Cooperative Banks

- 1968-69 Clean credit  
Hypothecation  
Pledge  
Any other (specify)
- 1969-70 Clean credit  
Hypothecation  
Pledge  
Any other (specify)
- 1970-71 Clean Credit  
Hypothecation  
Pledge  
Any other (specify)

(b) From \_\_\_\_\_ Bank

- 1968-69 Clean credit  
Hypothecation  
Pledge  
Any other (specify)

1	2	3	4	5	6	7	8	9
1969-70	Clean credit Hypothecation Pledge Any other (specify)							
1970-71	Clean credit Hypothecation Pledge Any other (specify)							
	(c) From _____							Bank
1968-69	Clean credit Hypothecation Pledge Any other (specify)							
1969-70	Clean credit Hypothecation Pledge Any other (specify)							
1970-71	Clean credit Hypothecation Pledge Any other (specify)							

Proforma 'E' contd.

(ii) Drawn from owned funds

Year	Investment in working capital during a year		
	Maximum	Minimum	Outstanding at the end of the year
1	2	3	4
1968-69			
1969-70			
1970-71			

Instructions for filling Proforma 'E'

1. Borrowings made from Banking Institutions and State Government for *block investment* as given in Proforma 'A' [ii] are not be given here.
2. In case any medium-term loans are being used for working capital it may also be given in the proforma for the year and the lending bank.

### Proforma 'F'

Item of cost	Total Expenditure on Production of Granular Fertilizers during the year ending 30th June.		
	1968-69	1969-70	1970-71 (upto 28-2-71)
1	2	3	4

#### A. Fixed costs

1. Office overheads
2. Factory overheads
3. Depreciation :
  - @ 15% on plant and machinery.
  - @ 5% on civil works.
4. Insurance :
  - For plant and machinery.
  - For civil works.
5. Interest on :
  - Long-term loans for block assets from state govt. paid/payable @ Rs.....% per annum.
  - Long/Medium-term loans from banks for Block assets paid/Payable @ Rs.....% per annum.
6. Total fixed costs.

#### B. Prime or Variable Costs :

1. Utilities;
  - Power
  - Water
  - lubricants
  - furnace oil
  - others, if any.

1	2	3	4
Labour (work charged)			
—contract labour			
—wage bill			
—others, if any			
3. Repairs and Maintenance;			
4. Insurance;			
—Raw material stocks			
—Finished Product stocks			
—Other goods, if any.			
5. Taxes, if any.			
6. Interest on working capital borrowings (from proforma 'E'-Col. 9)			
—Paid			
—Still to be paid.			
7. Packing of fertilizer.			
—Gunny bags.			
—Polythene liners.			
—Printing of bags.			
—Sutli.			
8. Processing losses.			
9. Other variable costs, if any;			
10. Total variable costs.			
<b>C. Total :</b>			
(a) fixed costs;			
(b) variable costs;			
(c) Grand total			

**D. Raw material used :**

- (a) Quantity in tonnes;
- (b) Value in Rupees (at cost prices)

**E. Finished Product :**

- (a) Quantity in tonnes.
- [b] Value in rupees [at ex-factory rate]

**F. Cost per tonne of finished product :**

$$C (c) \div E (a)$$

**Instructions for filling Proforma 'F'**

1. Office overheads will include expenditure on general administration, accounts department, watch and ward, gardeners, etc. The total expenditure on these should be apportioned between factory costs and marketing costs equally or in other ratios as per the activities of the unit.
2. Under factory overheads consider the monthly salary bills of the factory personnel at actuals. The bonus paid/payable as also contributions to C.P.F., ESI, etc. for these staff may also be added. Office expenses *have not* to be added under this.
3. Depreciation has to be given for all the capital investment as given in proforma 'A'.
4. Insurance charges actually paid or payable for plant and machinery and the civil works may be given.
5. Interest on long-term and medium term loans shown in proforma A(ii)(b)&(c) may be given in this proforma.
6. Under prime or variable costs, work charged labour includes that part of labour which is directly linked with the rate of production in any reduction in the number of shifts or reduction in production per day will correspondingly reflect in reduction in the use of work charged labour.
7. Insurance actually paid/payable if any is to be given separately for raw material, finished products, other goods, etc.



8. Taxes will include property tax, other municipal taxes, income tax, etc.
9. Interest on working capital should include the total interest paid/payable to banking institutions as per proforma 'E' (Col. 9).
10. Under packing of fertilisers, gunny bags, polythene lining and sutli actually used during the year as given in Proforma D (iii) (b) has to be given here.
11. Processing losses in the value of difference between the raw material fed in the processing plant and the value of finished product calculated at the average rate of raw material was per tonne.
12. Raw material against item 'D' (a) & (b) will be the same as given at the total of value and quantity in Proforma 'D' (i).
13. Finished Product against item 'E' (a) and (b) will be the same as given at the total of value & quantity in Proforma 'D' (ii).

## ANNEXURE 8.2.

STATEMENT OF FIXED COSTS INCURRED BY VARIOUS  
GRANULAR FERTILISER UNITS

(Rs. in lakhs)

	1968-69.			
	Deccan Sales Corpn.	Bharat Ferti-lisers.	S.S.S. Kolha-pur.	D.G.F.C. Kolha-pur.
<b>A. Fixed Cost :</b>				
1. Office overheads.	3.25	8.40	1.22	0.23
2. Factory overheads.	0.75	4.54	given under variable cost.	0.21
<b>3. Depreciation :</b>				
i) Plant & Machinery.	1.27	2.23	1.79	0.58
ii) Civil Work 5%	0.35	1.06	—	0.27
<b>4. Insurance :</b>				
i) Plant.	0.09	0.08	0.21	0.01
ii) Civil Work.	—	0.01	—	—
5. Interest on long term loan.	0.31	1.29	—	0.38
6. Rent on buildings.	—	—	—	—
7. Sale Organisation.	—	—	—	—
<b>Total Fixed Cost.</b>	<b>6.02</b>	<b>17.61</b>	<b>3.22</b>	<b>1.68</b>
<b>Finished product :</b>				
i) Qnty. (In tonnes).	23,240	20,186	16,612	1,656
ii) Value (Ex-factory).	176.85	117.30	107.63	10.27
<b>Fixed cost per tonne (Rs.)</b>	<b>25.9</b>	<b>87.2</b>	<b>19.4</b>	<b>10.1</b>

## (ANNEXURE 8.2.) Contd...

(Rs. in lakhs).

	1969-70			
	Deccan Sales Corpn.	Vidar-bha.	S.S.S. Kolha-pur.	D.G.F.C. Kolha-pur.
<b>A. Fixed Cost :</b>				
1. Office overheads.	3.69	4.52	1.29	0.69
2. Factory overheads.	0.92	0.35	given under variable cost.	0.79
<b>3. Depreciation :</b>				
i) Plant & Machinery. 15%.	1.39	2.13	1.80	2.34
i) Civil Work 5%	0.35	1.02	—	0.40
<b>4. Insurance :</b>				
i) Plant.	0.09	0.11	0.14	0.09
ii) Civil Work-	—	—	—	—
5. Interest on long term loans.	0.39	0.37	—	0.87
6. Rent on Buildings.	—	—	—	—
7. Sale Organisation.				
Total fixed cost : Finished product :	6.83	9.15	3.23	5.18
i) Qnty. (in tonnes).	6,933	6,329	12,424	6,380
ii) Value (ex-factory).	146.45	45.73	91.87	47.92
Fixed cost per tonne (Rs.)	40.3	144.6	26.0	81.2

Continued

## (ANNEXURE 8.2) Contd...

(Rs. in lakhs)

	1970-71					
	Deccan Sales Corpn.	Punjab Ferts. Upto 28.2.71	Vidarbha.	S.S.S. Kolhapur.	D.G.F.C. Kolhapur.	Average.
<b>Fixed Cost :</b>						
Office overheads	3.00	0.52	1.73	0.73	0.32	2.28
Factory overheads.	0.72	0.48	0.41	Given under variable cost.	0.28	0.95
<b>3. Depreciation :</b>						
i) Plant & Machinery. 15%	1.44	1.37	1.40	1.45	1.56	1.52
ii) Civil Work 5%	0.35	—	0.72	—	0.29	0.53
<b>4. Insurance :</b>						
i) Plant.	0.09	0.03	0.07	0.11	0.02	0.09
ii) Civil Work.	—	—	—	—	0.03	0.02
<b>5. Interest on Long Term Loans.</b>						
	0.39	—	—	—	0.47	0.56
<b>6. Rent on Buildings.</b>						
	—	0.30	—	—	—	0.30
<b>7. Sale Organisation.</b>						
Total fixed cost.	5.99	2.70	4.81	2.29	2.97	6.81
<b>Finished product :</b>						
i) Qnty. (In tonnes).	10,552	8,772	5,538	9,805	4,342	10,982
ii) Value (ex-factory)	70.68	71.82	35.80	79.09	26.98	
Fixed cost per tonne (Rs.)	56.8	30.8	86.9	23.4	68.4	62.0

## ANNEXURE 8.2 (Continued)

Staff/Personnel	Punjab Fert.		Vidarbha.		S.S.S. Kolhapur.	
	No.	Total Monthly emoluments.	No.	Total Monthly emoluments.	No.	Total Monthly emoluments.
<b>2. Factory Establishment :</b>						
<b>1. Overseers :</b>						
a) Electrical.	—	—	1	305	—	—
b) Mechanical.	—	—	—	—	—	—
c) Civil.	—	—	—	—	1	214
2. Wireman.	—	—	—	—	2	346
3. Helpers.	—	—	—	—	1	114
4. Foreman.	1	500	1	245	—	—
5. Shift Incharge.	—	—	—	—	—	—
6. Driver.	1	290	—	—	—	—
7. Asstt. Foreman.	—	—	—	—	—	—
8. Time Keeper.	1	300	—	—	—	—
9. Head Mistry.	1	250	—	—	—	—
10. Senior Fitter.	1	250	—	—	—	—
11. Fitters.	—	—	—	—	—	—
12. Welder Fitter.	1	175	—	—	—	—
13. Electrical Supervisor.	1	200	—	—	—	—
14. Asstt. Electricians.	2	300	—	—	—	—
15. Time Office Clerk.	2	400	—	—	—	—
16. Store Clerk.	—	—	—	—	—	—
17. Store keeper enquiry.	1	200	—	—	—	—
18. Cleaners.	2	200	—	—	—	—
19. Others.	—	—	3	450	—	—
<b>Total per month :</b>	<b>14</b>	<b>3065</b>	<b>5</b>	<b>1000</b>	<b>4</b>	<b>674</b>
<b>Total per annum :</b>	<b>14</b>	<b>36780</b>	<b>5</b>	<b>12000</b>	<b>4</b>	<b>8088</b>

## ANNEXURE 8.2 (Continued)

Staff/Personnel	D.G.F.C. Kolhapur.		Bharat Ferts.		Deccan Sales Corporation.	
	No.	Total monthly emolu- ment.	No.	Total monthly emolu- ment.	No.	Total monthly emolu- ment.

## 2. Factory Establishment :

## 1. Overseers.

a) Electrical.	—	—	1	500	—	—
b) Mechanical.	—	—	1	500	—	—
c) Civil.	1	350	—	—	—	—
2. Wireman.	—	—	—	—	—	—
3. Helpers.	—	—	—	—	—	—
4. Foreman.	1	300	—	—	1	600
5. Shift Incharge.	1	250	—	—	1	970
6. Driver.	—	—	—	—	—	—
7. Asstt. Foreman.	—	—	—	—	—	—
8. Time Keeper.	—	—	—	—	—	—
9. Head Mistry.	—	—	—	—	—	—
10. Senior Fitter.	—	—	—	—	—	—
11. Fitter.	—	—	—	—	—	—
12. Welder Fitter.	—	—	—	—	—	—
13. Electrical Supervisor.	—	—	—	—	—	—
14. Asstt. Electricians.	—	—	—	—	—	—
15. Time Office Clerk.	—	—	—	—	—	—
16. Store Clerk.	—	—	—	—	—	—
17. Store Keeper enquiry.	—	—	—	—	—	—
18. Cleaners.	—	—	—	—	—	—
19. Others.	—	—	—	—	—	—

Total per month.	3	900	2	1000	2H	1570
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Total per annum.	3	10800	2	12000	2H	18840
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## ANNEXURE 8.3

**STATEMENT SHOWING NUMBER OF DIFFERENT TYPES  
OF PERSONNEL EMPLOYED AND THEIR TOTAL  
MONTHLY EMOLUMENTS IN GRANULAR  
FERTILISER UNITS**

Staff/Personnel	Punjab Ferts.		Vidarbha S.S.S.		D.G.F.C Kolhapur		D.G.F.C Kolhapur	
	No.	Total month- ly emo- lument.	No.	Total month- ly emo- lument.	No.	Total month- ly emo- lument.	No.	Total month- ly emo- lument.
<b>1. Administrative :</b>								
<b>(office overhead)</b>								
1. Factory Manager.	1	771	1	404	1	397	—	—
2. Secretary.	—	—	—	—	—	—	1	549
3. Asstt. Manager.	1	550	—	—	1	309	—	—
4. Sales Manager.	—	—	1	876	—	—	1	350
5. Purchase Manager.	—	—	1	590	—	—	1	250
6. Chemists.	1	450	1	350	1	291	1	300
7. Lab. Attendants.	1	250	—	—	2	510	—	—
8. Accountant.	1	442	1	482	1	239	1	525
9. Store Keeper.	1	398	2	300	1	209	1	150
10. Clerks.	3	600	—	—	1	165	2	440
11. Sales Representa- tive.	—	—	8	2560	—	—	2	300
12. Other clerks, stenos.	2	569	7	1750	13	2000	22	3525
13. Watch & Ward :								
a) Supervisor.	—	—	—	—	1	193	1	225
b) Chowkidars.	4	480	4	600	6	834	7	875
14. Gardeners.	1	120	1	135	—	—	2	240
15. Peons.	2	240	3	540	—	—	6	630
16. Finance Officer.	—	—	—	—	—	—	1	270
17. Excise Officer.	—	—	—	—	—	—	1	270
18. Cashier.	—	—	—	—	—	—	1	270
19. Electrician.	—	—	—	—	—	—	1	250
20. Sweepers.	—	—	—	—	—	—	—	—
<b>Total per month :</b>	<b>18</b>	<b>4870</b>	<b>30</b>	<b>8587</b>	<b>28</b>	<b>5147</b>	<b>52</b>	<b>9419</b>
<b>Total per annum :</b>	<b>18</b>	<b>58440</b>	<b>30</b>	<b>103044</b>	<b>28</b>	<b>61764</b>	<b>52</b>	<b>113028</b>

## ANNEXURE 8.3 Cont.

Staff/Personnel.	Bharat Bombay.		Deccan Sales Corpn.	
	No.	Total monthly emoluments.	No.	Total monthly emoluments.
<b>I. Administrative :</b>				
<b>(Office overheads).</b>				
1. Factory Manager.	1	1500	1	1200
2. Secretary.	1	1500	1	600
3. Assistant Manager.	—	—	—	—
4. Sales Manager.	1	1000	—	—
5. Purchase Manager.	—	—	—	—
6. Chemists.	1	1000	1	470
7. Lab. Attendants.	1	500	—	—
8. Accountant.	1	1000	2	600
9. Store Keeper.	2	1000	1	550
10. Clerks.	—	—	—	—
11. Sales Representatives.	—	—	—	—
12. Other Clerks, Stenos.	7	3000	14	140
13. Watch & Ward :				
a) Supervisor.	1	500	—	—
b) Chowkidars.	8	1600	3	530
14. Gardeners.	5	1600	1	225
15. Peons.	—	—	3	560
16. Finance Officer.	—	—	—	—
17. Excise Officer.	—	—	—	—
18. Cashier.	—	—	—	—
19. Electrician.	—	—	—	—
20. Sweepers.	—	—	—	—
<b>Total per month :</b>	<b>29</b>	<b>14200</b>	<b>27</b>	<b>9875</b>
<b>Total per annum :</b>	<b>29</b>	<b>170400</b>	<b>27</b>	<b>118520</b>



**TOTAL EXPENDITURE ON PRODUCTION OF GRANULAR  
FERTILISERS DURING THE YEAR ENDING 30.6.71.**

(Rs. in Lakhs)

S.No.	Prime or Variable costs.	1969-70			
		Deccan Sales Corpn.,	Vid- arbha.	S.S.S. Kolha- pur.	D.G.F.C. Kolapur.
1	2	3	4	5	6
<b>1. Utilities :</b>					
	—Power	0.34	0.32	0.49	0.45
	—Water.	} 0.24	—	0.05	—
	—Lubricants.		} 0.22	0.33	—
	—Furnace Oil.			—	0.22
	—Others if any.			0.04	
<b>2. Labour (Work Charge):</b>					
	—Contract Labour.	} 1.95	1.05	0.88	0.51
	—Wage Bill.		1.44	0.18	1.21
	—Other if any.				
3.	Repairs and maintenance.	0.75	—	0.41	0.38
<b>4. Insurance :</b>					
	—Raw material stocks	} 0.17	0.09	included in fixed cost item No. 4	0.07
	—Finished products stock.		0.04		—
	—Other goods, if any.				
5.	Taxes if any.	4.19	—	0.04	—

6. Interest on working capital borrowing (from proforma 'E' column 9).	2.05	—	2.40	1.53
—Paid.				
—Still to be paid.				
7. Packing of fertilisers.	} 9.22			
—Gunny Bags.		2.14	3.68	1.98
—Polythene liners.		0.39	0.87	0.45
—Printing of bags.		0.04	—	—
—Sutli		0.04	—	—
8. Processing losses.		@2½%	—	0.40
Total:	20.35	4.51	10.33	6.03
9. Finished Product :				
a) Quantity in tonnes.	16871	6139	12424	6380
b) Value in rupees. (at ex-factory rate).	146.45	55.25	91.87	17.92
10. Variable costs per tonne of finished Product.	120.60	73.49	83.2	94.5

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## ANNEXURE 8.4

## TOTAL EXPENDITURE ON PRODUCTION OF GRANULAR FERTILISERS DURING THE YEAR ENDING 30.6.1971.

(Rs. in lakhs)

1970-71

S.No.	Prime or variable costs.	Deccan Sales Corpn.	(upto 28.2.1971)		
			Vidar-bha.	S.S.S. Kolha-pur.	D.G.F.C Kolha-pur.
1	2	3	4	5	6
<b>1. Utilities :</b>					
	—Power	0.28	0.19	0.40	0.21
	—Water	} 0.28	} 0.15	0.08	—
	—Lubricants.			0.35	—
	—Furnace Oil			0.12	—
	—Others if any.			0.12	—
<b>2. Labour (work charge)</b>					
	—Contract labour	} 0.99	0.70	0.97	0.21
	—Wage bill.			0.86	—
	—Others if any.	1.20	0.23	—	—
<b>3. Repairs and Maintenance.</b>					
		0.83		0.53	0.28
<b>4. Insurance :</b>					
	—Raw Material stocks.	0.18	0.20	Included in fixed cost item No. 4.	0.14
	—Finished products stocks.	—	0.07		—
	—Other goods, if any.	—	—		—
<b>5. Taxes if any.</b>					
		—	—	0.05	—

6. Interest on working capital borrowing (from proforma 'E' Column 9.)	2.27		—	0.75
—Paid.				
—Still to be paid.				
7. Packing of fertiliser.	} 6.41			
—Gunny Bags.		2.07	4.21	1.14
—Polythene liners.		0.67	1.19	0.24
—Printing of bags.		0.05		
—Sutli.		0.02		0.07
8. Processing losses.		@ 3%	—	—
Total :	2.44	4.35	8.64	3.18
9. Finished Product :				
a) Quantity in tonnes.	10552	5379	9805	4342
b) Value in rupees (at ex-factory rate).	70.68	48.41	79.09	26.92
10. Variable costs per tonne of finished Product.	118.00	80.9	88.1	73.3

## CHAPTER IX

# COOPERATIVE MARKETING OF GRANULAR FERTILISERS

### Place of marketing in Fertiliser Granulation Business

9.1 We have dealt with the production aspects of granulated mixed fertilisers in the earlier chapters. Production is however, not the end. The objective is not achieved unless the products are successfully marketed. In fact, marketing and distribution are the two vitally important links in the chain of supplies of fertilisers to the farmers. Any weakness in the arrangements for marketing and distribution has its immediate impact felt on production which has to be slowed down on account of accumulation of stocks in the factory and in the distribution channels as also due to choking of the essential line of finance. While formulating a project for the granulation of mixed fertilisers, therefore, the detailed feasibility study, as already mentioned in Chapter IV, has to spell out clearly the arrangements envisaged for marketing and distribution of the products. The important aspects to be kept in view in this regard are the potential need of the farmers for the particular grades, the effective current demand, prospects for increasing the demand in the foreseeable future and the capacity of the unit to organise an effective sales net work, advertising, sales promotion and sales personnel. The agency or channel through which the fertilisers are intended to reach the farmers has also to be indicated together with the experience of the agency in this field and its performance in the past few years along-with the much needed credit facility this agency can offer to the farmers. It is in the light of these requirements that the approach adopted in the cooperative granular fertiliser units is proposed to be examined in the following paragraphs.

### Preparatory Marketing Work

9.2 The granulation of fertiliser mixtures is a new business in our Country. Before the cooperatives entered this field, hardly three to four private parties were doing this work. There was, therefore, not much experience available in the marketing of these fertilisers especially in competition with the complex fertilisers which were also introduced almost simultaneously in the

Country alongwith granular mixtures. The only experience available was that of hand mixed balanced fertilisers which made a quick impact on the farmers in certain areas but were getting into disrepute because of the rampant adulteration and mis-grading adopted by certain unscrupulous persons in the otherwise lucrative trade. The Granular Units, therefore, stretched their imagination towards demand for balanced fertilisers partly on the basis of the earlier popularity of hand-mixed fertilisers but more so in the light of active policy adopted by the Planners and Agricultural Departments in the Centre and States in favour of applying balanced fertilisers for achieving potential returns in agriculture. Selling a policy is, however, different from selling fertilisers which requires protracted efforts at sales promotion by a unit before it can expect to build up a market for its products. When a large scale fertiliser factory is conceived for establishment, the first task it takes up on marketing side is the seeding programme. It imports the types of fertilisers intended to be produced and distributes them in its marketing zone. This is continued till the factory goes into production. This helps in having a ready market for its products as soon as they are produced. In the case of granular fertiliser units, this is not done. A granular unit has, therefore to concentrate on marketing only after the factory is commissioned. This essentially means a comparatively longer period taken for stabilization and full scale operation to the rated capacity.

9.3 We feel that there is need for taking up a seeding programme for fertiliser promotion. This apart, there is an urgent need for the granular units taking up a preparatory work for marketing simultaneously with the commencement of installation of the factory. This preparatory work comprises a comprehensive study of the total market, types of fertilisers being contributed and the scope for grades proposed to be prepared, the distribution system and distribution agency's skill in sales, and its potential and the weaknesses. Such a marketing analysis has to be followed by determining the distribution channels keeping in view the cost of functions and services and the margin that can be afforded between the ex-factory and retail prices. Negotiations may also be entered into with the functionaries in the distribution channels about the terms and conditions and the quantities of fertilisers expected to be lifted by each. In fact, a clear cut scheme for distribution of the products has to be prepared upto the retail level making an assessment of the salesman power, the requirements for fertiliser distribution credit and production credit for farmers, availability of storage accommodation with the proposed distribution agencies at various levels and the modes and cost of transport. Arrangements have also to be worked out with the banking institutions for raising distribution finance and a link up secured with the cooperative credit institutions for the sale of fertilisers in kind against advances to

be made under the crop loan system. All these preliminaries may take anything between six months to one year. In accordance with the needs of such an analysis, steps have also to be taken to recruit staff in the pre-operative period.

9.4 The preliminary arrangements made by the cooperative granular units in the pre-operative period have, however, been far from satisfactory. Hardly any steps were taken to study the market behaviour and contacts were also not developed with the banking institutions including cooperative credit structure. Recruitment of nucleus staff for organising marketing studies and other arrangements was not done either. Position in these directions was, however, slightly better in the case of granular units that were set up by the cooperative wholesalers of fertiliser like Punjab, Markfed and the Tamil Nadu State Cooperative Marketing Federation. They had in existence a well established channel for marketing the products but in their case also the important aspect of prior locating of specific areas for the grades produced was not properly looked into with the result that the product was sent to destinations irrespective of the demand.

#### Distribution Arrangements

9.5 From the point of view of marketing and distribution arrangements, the cooperative granular fertiliser units may be divided into three groups—one comprising granular units established by the State Cooperative Marketing Federations, the second covering units set up by primary/district cooperative marketing societies and the third category consists of units installed by societies organised primarily for granulation of mixed fertilisers. A classification of the existing cooperative granular fertiliser units under these groups is given below :

Type of society which has set up the unit.		No. of units set up/ under installation/ sanctioned.
1. State Cooperative Mktg. Federations of Punjab, Maharashtra, Haryana, Tamil Nadu, Bihar and Orissa.	7	(Two units by Punjab Markfed)
2. Regional Mktg. Federation	1	(Vidarbha)
3. District/Primary Mktg. Societies of Poona, Nasik Kolhapur, Raichur, Chikodi, Belgaum, Kopargoan and Karad.	8	(Two at Poona and Nasik by Dist. Marketing Fedns. & the others by primary/ taluka mktg societies).

- |   |   |                              |
|---|---|------------------------------|
| 4. Independent societies organised for granulation of fertilisers at Kolhapur and Bombay. | 2 | (DGFC Kolhapur and Kisan's). |
|---|---|------------------------------|

Total :	18
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Where the State and Regional Marketing Federations have set up granular fertiliser plants, they have the advantage of established marketing and distribution channels for fertilisers as all these federations are acting as wholesalers of pool and indigenous fertilisers. The channel in these cases comprises State/Regional Marketing Federation as the wholesaler, the district/primary marketing society as the sub-wholesaler and the village society as the retailer. The primary marketing society also acts as the retailer at its headquarters. In the second category, the two district marketing federations of Poona and Nasik were earlier acting as wholesalers of Pool fertilisers on behalf of the Maharashtra Government. This facility has since been withdrawn from all the district marketing federations and the wholesalers' work has now been entrusted to the State Marketing Federation and the Vidarbha Marketing Society, on regional basis. These two district marketing federations have, however, continued to operate as wholesalers for non-pool fertilisers and have thus kept alive their distribution channel and contacts with the retailers and farmers. The primary marketing societies have at their credit the experience of operating as sub-wholesalers. This service is still continued to be performed by them.

9.6 As regards the third category, these two societies have been established only for granulation business and had no earlier experience of fertiliser sales. They had to establish their own distribution channels which comprise again the primary marketing societies acting as wholesalers and the village societies as the retailers. These two societies have a comparatively more difficult task to perform in marketing. The Kolhapur District Cooperative Granular Fertiliser society has its marketing zone almost co-terminus with that of the Kolhapur Shetkari Sahakari Sangh. Since the latter is well entrenched in fertiliser marketing since a very long time through the cooperative infra-structure in the area, the former is finding it very difficult to find new avenues for sale of its products. In competition with other cooperative wholesalers it can build up a clientele only by offering much higher incentives and commissions. The same is true of the Kisan cooperative located near Bombay where there is no local market for its products. It has to incur extra expenditure on transport before it can reach its products in a potential area from the point of view of marketing. It has, in addition, to build up a clientele at much larger expenditure in the marketing zone of



other cooperatives. In view of these problems we feel that establishment of granular units by independent societies should be discouraged.

9.7 We have no comments to offer on the number of tiers involved in the distribution process. In a production unit of the size of a granular fertiliser factory, we are of the opinion, that the unit itself should act as a wholesaler and avoid, for the sake of convenience, appointing any independent wholesale agency. It can even afford to supply fertilisers direct to the retailers eliminating the sub-wholesale marketing societies. It may, however, be desirable, if, in the States like Maharashtra where a large number of granular fertiliser units have come up in the cooperative sector, a common agency for the sales of products is promoted instead of each factory having its own sales organisation. Such an agency, we feel, should be the one which is acting as the wholesaler of pool and non-pool fertilisers in the cooperative sector. The approach of this agency should be to distribute the granular mixed fertilisers, to the extent possible, in the hinterland of the unit concerned and avoid cross movements. The cooperative wholesaler can enter into long term arrangements with the granular units on terms normally contracted with the fertiliser manufacturers. The ex-factory issue prices in this case will have to be carefully determined. The prices should, in a sense, be competitive in comparison with the corresponding prices of the complex fertilisers.

### Distribution Finance

9.8 In Chapter VIII some estimates have been made of the requirement of finance for purchasing raw material and for stocking of finished products. We had also mentioned therein the interest free credit offered by the granular units to the distributors. Repeating, it may be stated that the Central Fertiliser Pool offers 60 days deferred payment facility to the States for fertilisers supplied by it. The State Governments, in turn, extend the same facility to the cooperative granular fertiliser units where the latter are reallocated/reconsigned the pool fertilisers. Similarly, the fertiliser factories also allow some interest free period to the granular fertiliser units on purchase of fertilisers. This period varies from 15 days to 90 days depending upon the relationship between the fertiliser factory and the granular unit, as also on the type of fertiliser sold. For very popular fertilisers which are in short supply, the interest free period allowed is the minimum. In fact, it is not allowed at all by one of the fertiliser manufacturers. We recommended that the Central Fertiliser Pool and the indigenous manufacturers of fertilisers may offer to the cooperative granular units a minimum of 60 days interest free period on the sales of raw material.

9.9 The Reserve Bank of India sanctioned a line of credit for fertiliser marketing to the state cooperative banks at the bank rate on government guarantee. Each drawal from this credit limit is payable within six months. The state cooperative bank uses this credit limit to provide, in turn, accommodation to the state cooperative marketing societies at  $\frac{1}{2}$  % to 1 % above the bank rate subject to certain conditions such as 10% margin from the societies' own funds. This credit facility has been of great help to the cooperative wholesalers of fertilisers in the State. The RBI has, however, been discouraging the cooperative wholesalers to depend on this cheaper finance and have been advising them to approach the commercial banks for fertiliser distribution finance. In many a states, the State Cooperative Marketing Federations and the State Governments have resisted this move of the RBI and have strongly pleaded for continuation of RBI finance for fertiliser distribution. We feel the cooperative granular fertiliser units, facing as they are, a tough competition from the sophisticated factories manufacturing complex fertilisers, need to have a comparatively cheaper source of distribution credit. They are as good cooperative wholesalers as any others in the States. We, therefore, suggest that the facility of RBI finance at bank rate on Government guarantee may also be extended to the cooperative granular fertilisers unit.

9.10 At present most of the granular units (other than those established by State Level Cooperative Wholesalers of fertilisers) have working arrangements for distribution finance with commercial banks which offer them credit at the margin of 20 to 30% against hypothecation of stocks. This high margin has put a great pressure on the already meagre resources of the granular fertiliser units. It is highly desirable that these banking institutions should also ask for a lower margin of 10%. It is, however, necessary for this purpose that the State Governments stand guarantee to the advances. The State Governments have a heavy financial stake in the cooperative granular units having contributed to the extent of about Rs. 8.25 lakhs by way of share capital and Rs. 10.00 as long term loan for block investment besides about Rs. 3.5 lakhs to Rs. 7.00 lakhs as additional share capital towards margin money. It will be in the interest of the State Governments also if they stand guarantee to the advances as otherwise they have to contribute more share capital towards margin money.

9.11 For the distribution of fertilisers, facility of guarantee is available to cooperatives from the Credit Guarantee Corporation of India on borrowings from the approved credit institutions. This guarantee is, however, limited to cooperatives which do not have an annual turnover of more than Rs. 5.00 lakhs. The cooperative granular fertiliser units cannot thus avail of this facility having, as they do, much larger annual turn-

over. We suggest that in the interest of expansion in fertiliser sales, the Corporation may consider waving its limit to cover all the cooperative granular fertiliser units irrespective of their annual sales. This limit of Rs. 5.00 lakhs is even otherwise too low and will exclude even small retailer cooperatives. It is further suggested that the banks should not ask for more than 10% margin on hypothecation of fertilisers stocks when guarantee is available from this Corporation.

### Financing Arrangements

9.12 The channels involved in the distribution of granular fertilisers have already been briefly given in the foregoing paragraphs. The major problem in ensuring satisfactory distribution, however, is in relation to the arrangements of finance between the granular unit and the sub-wholesaler and retailer. There are two systems of financing adopted by different units in production. In Punjab and Tamil Nadu where the State Marketing Federations have set up units, the system of financing already in vogue for fertiliser distribution has been extended to granular fertilisers as they are put into the main stream of distribution as soon as the mixtures are produced in the granular unit. In both these cases, the consignment facility extends upto the retail level. In the two Kolhapur units which are in production, bulk of the fertilisers are sold against cash, but occasionally credit for a few days is also offered, particularly in the off-season.

9.13 There are advantages and disadvantages of both these systems. Under the consignment system, while it is very easy to organise sales net work upto the retail level it is also seen that the salesmen do not take any active interest in sales promotion. Customer sovereignty is not paid due regard. In the current competitive field, such an attitude of the retailers is not conducive to efficiency and to growth in marketing business. It is also the experience that the retailers and sub-wholesalers misused the sale proceeds of fertiliser sales in their own business and did not remit it promptly to the wholesalers (granular unit) choking the pipe line. On the other hand, under cash system of fertiliser supply, while it ensures active interest on the part of the distributor and immediate payment to the granular unit, the lack of purchasing power with the primary marketing societies and the village societies act as a limiting factor in expanding sales. A *via media* has, therefore, to be found which permits sufficient incentive to the cooperative societies for active sales and at the same time, leads to good recovery of the sale proceeds by the granular units.

9.14 Such an arrangement is possible if fertiliser supplies are linked with production credit. The central cooperative bank in the area of operation of the granular unit may, in this case, earmark the amount to be advanced in kind at the time of ad-

vancing the loans. The bank should simultaneously issue a letter of authority asking the granular unit to permit it lifting of fertilisers worth the amount to be advanced in kind. A copy of the letter would also be forwarded to the respective agricultural credit societies. On production of the letter of authority by an agricultural credit society, the unit would release the fertiliser and inform the cooperative central bank accordingly and the latter will credit the cost of fertilisers lifted by the society to the fertiliser account of the granular unit, maintained with it.

9.15 Just as the granular units are expected to get one to the months' interest free credit from the fertiliser manufacturers and the Pool for raw material, the same way it would be desirable for the granular units to offer similar concession to their distributors excepting when consignment facilities are offered. If a village society undertakes to make cash purchases it may be offered rebate on account of interests for one or two months as the case may be. If, however, the sale proceeds are paid to the granular fertiliser units within the interest free period but not cash down, the granular unit may allow rebate on a slab system for payments within 15-30 days, between 30 and 45 days and between 45 and 60 days. This rebate should be equivalent to the interest payable for the period. The Gujarat and Haryana State Cooperative Marketing Federations allow different rebates for different fertilisers. The Haryana Federation offers Rs. 9.46 per tonne for CAN 25% and Ammonium Sulphate on advance payment, Rs. 830 per tonne if payment is received within 15 days, Rs. 6.64 per tonne for payments received after 15 days but within 30 days, Rs. 4.98 per tonne for receipt of payment after 30 days but within 45 days, Rs. 3.32 per tonne where payment is received after 45 days but within 60 days and Rs. 1.66 per tonne if payment is received after 60 days but within 75 days. No rebate is allowed where payment is received after 75 days.

#### **Distribution Margins**

9.16 Although most of the granular fertiliser units are acting as wholesalers of their products, we feel accounts of production should be kept separately from those of marketing. Some of the units are already doing this and are transferring the products at ex-factory prices to their marketing divisions/sections which undertake to deliver the fertilisers to the farmers through the normal marketing channels as given earlier. This marketing section is also responsible for sales publicity and promotion. The distribution margins allowed by the units owned by state marketing federations are in accordance with the margins allowed for fertilisers of the same price per unit. In the case of other factories like those of Kolhapur units, the position is a little different. The Kolhapur Shetkari Saha-kari Sangh has opened its own branches or centres at convenient

points. It has its manure section which purchases the granular fertilisers at ex-factory rate. It adds Rs. 40/- per tonne to the ex-factory price and retaining Rs. 5/- per tonne as its commission passes on the balance Rs. 35/- per tonne to its branch/centre or to the primary marketing society acting as sub-wholesaler. They retain Rs. 20/- per tonne and passes on Rs. 15/- per tonne to the retailer village society. The wholesaler undertakes to transport the fertiliser to the retailer but if the latter can arrange its own transport from the factory to the village, it is allowed Rs. 15/- per tonne for this service. These margins cover the interest and storage charges as also expenditure on handling, storages etc. The expenditure on publicity and promotion is met by the unit from its commission of Rs. 5/- per tonne.

9.17 There is no provision for giving incentive commission to the salesmen in most of these units. Since sale of granular mixed fertilisers is a comparatively difficult task in view of the growing tough competition from complex fertilisers, it would be helpful if the wholesalers allow some incentive commission to salesmen of the marketing cooperatives/village societies and even to V.L.W's to encourage them to offer personalized service to promote sale of these fertilisers. This incentive should be allowed only on increase in sales over the previous year's sales and should be substantial enough to attract good salesmen.

#### **Promotional Measures**

9.18 The cooperative granular units have to develop a new strategy of promotion if they have to succeed in the current buyer's market. This calls for a concerted efforts to be made by each of the units to propagate among the farmers, by intelligent and effective advertisement, the use of balanced fertilisers in general and their own grades of mixtures in particular. In fact, this is an educational process aimed at helping the agriculturists and to convince them in all different ways about the efficiency of the granular products. To achieve this objective, the following measures are recommended for adoption by various cooperative granular units :

- i) Distributing hand bills containing detailed information about the types of fertiliser mixtures and their grades being prepared by them and the varieties of crops for which each is recommended. These pamphlets also give the doses, time of application, etc.
- ii) Issuing advertisements in journals and local dailies and weeklies.
- iii) Publicity through wall posters and hoardings.
- iv) Personal contacts with the staff engaged specifically for extension work in the rural areas.

- v) Provision of soil testing service to the growers.
- vi) Conducting fertiliser demonstrations on factory's farm as also on cultivators' farms.
- vii) Participation in exhibitions connected with any programme of agricultural development, petroleum and chemicals, fertiliser industry, cooperative processing, etc.
- viii) Holding meetings, seminars, conferences, etc.
- ix) Showing cinema slides.
- x) Advertising through commercial service of the All India Radio.

9.19 The units should, however, carefully select the system of communication for different types of audiences, areas or villages and may not fritter away their money and energy by following a blanket communication strategy. For example, skill-oriented message for placement of fertiliser can better be communicated through ocular demonstrations or through film shows or through hand bills. The same may be true of drawing soil sample for analysing nutrient contents. Similarly, the units may see the type of audience for determining the method of communication. In a non-progressive village, farmers attach maximum credibility to demonstrations, whereas in a progressive village, other composite sources of communication (radio, printed word) have greater credibility. In many an area, the attitude of farmers has still a strong positive relation with the adoption and use of nitrogenous fertilisers. Such attitudinal blockade has to be dealt in a planned manner through a mass communication media like radio or through projection of slides at cultural shows.

9.20 Popularisation of products through progressive farmers/village leaders is another important promotional method. The good results obtained at the farms of these progressive growers act as starters for others to follow in the village as also in the neighbourhood. Demonstration plots may, therefore, be laid on the farms of progressive agriculturists. It would pay in the long-run even if all the fertiliser applied in the plot is supplied free.

9.21 In addition to these publicity arrangements through different media, it would be necessary that the salesmen particularly at the level of the retailer and even that of the sub-wholesalers are adequately trained in projecting a correct picture of the properties of the product. These salesmen should have some knowledge of crop growing, agronomic requirements of crops, types of soils and nutrient requirements of various varieties of crops under different sets of soil climate complex. For this purpose, it may be advisable to recruit salesmen with rural background, giving fur-

their preference to persons having some institutional training in agriculture. For the benefit of the cooperatives, the Committee for Cooperative Training is organising short duration ad-hoc courses in fertiliser distribution at its regional training centres. The granular units may take advantage of these by sponsoring their salesmen to attend these courses. Training courses, may also be organised within the state jointly by all the granular units in collaboration with the State Marketing Federations which, as wholesale distributors of fertilisers, may also be interested in such a programme.

9.22 The Committee on Fertilisers (Sivaraman Committee) suggested the institution of incentive awards for the best fertiliser distribution and promotional work done at various levels. Recognising this, a provision of Rs. 2/- per tonne has been made in the notional break-up towards incentive commission for the distribution of fertilisers from the Central Fertiliser Pool. A similar amount may be provided by the granular units to be funded and utilised for giving incentives for fertiliser promotion.

9.23 We have recommended in paragraph 9.17 to offer incentive commission to salesmen and certain other extension workers. Some of the apex cooperative marketing federations have formulated specific schemes for utilising the amounts funded for incentive commission to promote the sales of fertilisers. According to the scheme under operation in Madhya Pradesh, incentive bonus is allowed to employees of the village societies, primary marketing societies and apex marketing federation, gram sewaks, district distribution officers, managers of branches of Central Cooperative Banks, etc. Incentive is given to each employee on selling 10% more fertilisers than in the preceding year. In case the sales go up by 25% over the preceding year the employees are entitled to incentive at a higher rate. The total incentive per tonnes of excess sales works out to Rs. 1.50 if sales register an increase of 10% but it is Rs. 2.45 per tonne on sales going up by 25%. In U.P., the State Marketing Federation, with a view to promoting the sales of its less popular powdered fertiliser mixtures, is giving a commission of Rs. 5/- per tonne to supervisor/salesmen. They are also providing a commission of Rs. 5/- per tonne to wholesalers and Rs. 12/- per tonne to retailers. In Rajasthan, the scheme provides for incentive at Rs. 1.50 per tonne if an increase between 50-74% is achieved over the preceding year and it is double at Rs. 3/- per tonne if the fertiliser sales exceed 75% of the last year's achievement. Following scales of incentive are suggested for adoption by the granular units :

On achieving	On additional sales of granular fertiliser per tonne over previous year's sale.
Upto 5% increase over previous year.	(Rs.) 0.50

From 5% to 10% over previous year.		1.00
„ 11% to 20%	„	2.50
„ 21% to 30%	„	4.50
„ 31% to 40%	„	7.00
„ 41% to 50%	„	10.00
„ 51% and above	„	13.00

9.24 The cooperative granular units can also provide another essential service of soil testing to the growers. Under the current impact of green revolution the farmers are progressively getting oriented to scientific methods of cultivation of which soil testing is one of the important pre-requisites. This service offers an opportunity to the cooperatives to build up direct contacts with the farmers and to help them in the selection of suitable fertilisers for their soils thereby deriving indirect advantage for themselves in the pushing up of their sales. In fact, some of the marketing cooperatives like the Punjab State Cooperative Supply and Marketing Federation have already established eight such soil testing laboratories. The NCDC also, recognizing the need for this service as a measure to popularise use of fertilisers and to increase cooperative sales, have formulated a scheme under which it offers financial assistance amounting to Rs. 1.70 lakhs (Rs. one lakh share capital and Rs. 70,000 loan) through the State Governments for setting up a laboratory by the cooperative wholesaler. The cooperative itself and the State Government are expected to meet the recurring expenditure on chemicals and equipment and staff which works out to Rs. 80,000/-. These laboratories can very economically be made adjuncts to the granular units which will already be having laboratories to test check fertiliser samples. In fact, it is understood that the NCDC is encouraging the cooperative granular units to take advantage of this scheme. We suggest that each granular unit should set up a soil testing laboratory with financial assistance from the NCDC.

9.25 Films are another media through which effective publicity can be made. This is, however, a very costly affair and may not be within the means of an individual unit to undertake. There could be two ways to arrange this; through the good offices of the Government of India and by common arrangement of all the granular units. In the former case, while the cost of the film with sound track in the local languages may be met by the Governments, the arrangements for projectors and their exhibition may be made by the units. In the latter case, each unit may contribute to a common fund for the preparation of the film and its copies and sound track in regional languages and the exhibition may be done by the individual unit or by a common arrangement by one party in a region.



## National Federation of Cooperative Granular Units

9.26 At the seminar of Cooperative Granular Fertiliser Units held at Aurangabad on 29-30th January, 1971, a proposal was made in the agenda notes for the organisation of a national federation of cooperative granular fertiliser units with the following objectives :

- i) to coordinate and facilitate the working of the affiliated cooperative granular units and to assist them in the promotion of new cooperative granular units;
- ii) provide technical advice and other assistance in the selection, purchase, installation and maintenance of plant and machinery and other equipment;
- ii) advise and assist in the selection of technical personnel;
- v) suggest measures for increasing the operational efficiency of cooperative granular units and help in implementing the same;
- v) assist in standardising of accounting and costing methods and practices;
- vi) assist in securing necessary financial accommodation from state and central governments and other financing institutions;
- vii) advise and assist in;
  - a) purchase of raw material, stores, machinery and gunnies; and
  - b) sale of products;
- iii) take up publicity and supply of market information relating to demand, stocks, prices, supplies of granular fertilisers;
- ix) arrange for holding periodical conference of cooperative granular units;
- x) to act as an agency to ventilate grievances of the members and to suggest ways and means for their amelioration.

We have carefully gone into these objectives and, in our opinion, it would be advantageous for the granular units in the cooperative sector to organise themselves into a federation of the type proposed. In the years to come, with the progressive reduction in imports of fertilisers, the granular units will have to increasingly depend upon indigenous raw material. If the present attitude of the indigenous manufacturers can be an indication, some of them because of their monopoly in the production of some popular fertiliser,

have been dictating terms of their own which are not acceptable to the granular units. The proposed federation would be very helpful in negotiating with the indigenous manufacturers of fertilisers for the purchase of raw materials. The other objectives are also, by and large, of promotional nature excepting that given at 7(b) relating to sale of products. It is felt that the responsibility for the sales should continue to vest in the granular units themselves on their centralised organisations as suggested for Maharashtra. The national federation may not be brought into the picture of sales. This federation can, however, locate markets and provide advice and guidance to the member units for expanding their sales.

9.27 At the Aurangabad seminar, some participants objected to the organisation of such a federation on the ground that it would amount to extra expenditure on the granular units to finance this federation. This argument has its significance. Keeping in view the economic position of granular units, it is suggested that the NCDC may provide subsidy towards expenditure on the technical and administrative staff of the federation in full for a period of five years. In the meantime, the granular units may also make a contribution at 25 paise per tonne of the granular mixed fertiliser produced by them. After a period of five years, the contribution from the units would be raised so as to meet the entire expenditure on the staff of the federation. In case, such an organisation is not found acceptable to the units, we would suggest that the NCDC may set up a special cell to watch the interests of the granular fertiliser units and to provide coordination and guidance in different spheres so as to meet the objectives laid down for the national federation.

### **Quality Control**

9.28 The marketing of fertilisers in the country is regulated by the Fertiliser (Control) Order, 1957 (as amended from time to time) issued under the provisions of the Essential Commodities Act 1955. The Fertiliser (Control) Order has, inter-alia, laid down specifications for different types of fertilisers and the permissible variations in the nutrient contents on the lines of specifications laid down by the Indian Standards Institution. This Control Order also regulates packing and labelling requirements. In other words, the quality of the material sold is adequately controlled offering protection to the consumer from the anti-social elements and the manufacturers, from un-scrupulous traders who may not hesitate to sell sub-standard or adulterated material. The Fertiliser (Control) Order defines fertiliser as a substance used or intended to be used as a fertiliser of the soil and such fertilisers are specified in column I of the schedule I to the Order. The cooperative granular fertiliser units are preparing new grades of fertilisers. While some of them have found place in the schedule, others should also be covered in the Order so that the granular units may not find any difficulty in selling their products. It is

**DU** also necessary that the Govt. of India should review the schedule atleast once in three months and bring it upto date. The granular units may also be advised to approach the State Government/Central Government to include the grade they propose to manufacture in case it is not already listed in the schedule.

9.29 The State Governments have been permitted to allow marketing of fertilisers of any type in their states and to look into the quality aspects of the products marketed. We feel much requires to be done in the enforcement of the standards. The cooperative granular fertilisers units are very much concerned with the quality standards of hand mixed fertilisers. It is rather difficult to sample every lot of the products prepared by hand mixers. Taking advantage of the inadequacies in enforcement the unscrupulous hand mixing units are freely distributing sub-standard mixtures. It is suggested that in view of the establishment of large number of granular fertiliser units and with the coming in production of a number of factories manufacturing complex fertilisers, the hand mixing units should either be banned to carry on this activity or they should be subjected to constant supervision to ensure that they market products according to specifications prescribed. On account of misgrading of products by hand mixers, the granular mixed fertilisers also get into disrepute.

#### **Taxes on Fertilisers**

9.30 The fertilisers are charged excise duty on advalorem basis. Granular mixed fertilisers, being prices higher than the combined value of constituent raw material because of addition of manufacturing cost, are assessed at the ex-factory price and are charged for the excess in price over the cost of raw material used. This we consider is not justified. The fertilisers should be assessed on the basis of their total nutrients per unit of weight. If this is accepted, no additional excise levy would be made on granular mixtures. On the other hand, the granular fertiliser units may be entitled to a rebate for the filler material used in mixing.

9.31 Sales tax on fertilisers is another item whose incidence on marketing of granular fertilisers is being acutely felt compared to straight and mixed fertilisers. Sales tax is being paid a number of times on the same material. First, on the purchase of raw material in the state where production was made, then in the state to which the raw material was carried and again on the granular mixtures prepared. Since sales tax is once paid on the raw material, it is suggested that granular mixtures should be exempted from sales tax. In Maharashtra and Punjab, there is no Sales Tax on fertilisers. Other States may also exempt granulated mixed fertilisers prepared in their States from Sales-Tax.

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