

Report of The High Powered Committee on Fertiliser Consumer Prices



**THE FERTILISER ASSOCIATION OF INDIA
NEW DELHI**

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THE FERTILISER ASSOCIATION OF INDIA

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New Delhi 110 067**

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27th May 1987

My dear Sri.Dhillon,

The Government of India, in the Ministry of Agriculture, constituted a Committee to look into the policies which should determine the prices of fertilizers for consumption to ensure proper development of Agriculture. I was requested to be the Chairman. The Committee held ten meetings in which it deliberated, amongst others, with the Agricultural Production Commissioners of the States, Vice-Chancellors of the Agricultural Universities, Chief Executives of the Fertilizer Production Units, as also the representatives of the Bharat Kri-shak Samaj. Questionnaires were sent to various people including the State Governments. A workshop was held in which a number of senior Agricultural Economists participated and their considered views were available to the Committee.

2. Taking into account these discussions and considering all the factors involved, the Committee has now finalized its Report. I have great pleasure in submitting a copy to you for consideration by the Government of India.

3. The development strategy followed by India in the area of Agricultural Production during the last two decades has been quite successful. The production of foodgrains has reached a level of a little more than 150 million tonnes and fairly large stocks of food grains, more than about 25 million tonnes, are available as buffer-stock. This has given a well-deserved feeling of satisfaction and also a large degree of independence from outside pressures.

4. This success in agriculture has been the result of a number of factors, one of them being increased consumption of fertilizers. There are also other factors like expansion of the area under irrigation and increase in the availability of agricultural credit. Very good work has been done by the Agricultural Scientists in research and the associated efforts to extend the technology to the farmers. Above all, the efforts by the farmers themselves and also various supporting factors like the policies of the Government of India in price stabilization and providing suitable incentives to farmers for marketing etc., have helped.

5. The progress achieved is something which all of us can be legitimately proud of. But there are also other factors which are somewhat disturbing. Firstly, agricultural production appears to have reached a plateau and the increase during the last three or four years has not been significant. The consumption of fertilizers went up from about 69,000 tonnes in 1950-51 to 9 million tonnes in 1986-87. The progress during the last ten years is most significant; it went up from 2.5 million to nearly 9 million tonnes. The Planning Commission had indicated that the consumption during the VII Plan should reach a level of 13.5 to 14 million tonnes in 1989-90. There appears to be some difficulty in reaching this target.

6. The National Commission on Agriculture had indicated that food production level of 225 million tonnes should be reached by the turn of the Century. The Seventh Plan Document, however, has projected a level of 235-240 million tonnes by the year 2000 A.D. These are targets which have been based on detailed and sophisticated calculations. It is essential to reach them if the country should have balanced economic growth.

7. One of the most important factors in getting an increase of production in agriculture is increased consumption of fertilizers. While other factors are also relevant, fertilizer use

would/be the most important factor in determining the rate of progress.

8. It is desirable to note in this context that fertilizer consumption in China, whose cultivated area is less than that of India, is about 20 million tonnes per year, i.e. double that of India. Their agricultural production is also more than 300 million tonnes per year.

9. The consumption of fertilizers in India is an average of only about 50 Kg. per hectare, far less than that in South Korea, Japan, Taiwan, the U.A.R. and other countries, not to speak of developed countries in the west.

10. The consumption of fertilizers is not uniform in this country. It is high in the irrigated areas and for commercial crops. More than 75% of the consumption of fertilizers is in less than 100 districts. This imbalance is also reflected in the uneven development of agriculture in different parts of India. It is particularly low in Eastern India and also in dryland areas. This difference in development is reflected in socio-economic development of these areas as well, while the Plan emphasizes balanced economic development in different areas and amongst different sectors of society.

11. The committee has considered different steps to be taken to ensure the proper development of fertilizer consumption in the country.

12. The fertilizer industry has developed very well in the country during the last two decades. Outstanding technical and technological work has been done and India is the fourth largest producer and consumer of fertilizers in the world.

13. Pricing of fertilizers is an extremely complicated subject and it should be handled in the most competent manner possible. The cost of raw material, the licensing and locational policies and other factors which go into the production of fertilizers should be carefully controlled by the Government.

14. It has been stated that considerable amounts are being spent to subsidise fertilizers. This is partially true and it has to be examined in a careful manner. Prices of inputs like naphtha or gas are controlled by the Government. The cost of one unit of naphtha/gas in the U.A.E./Saudi Arabia is about 30 cents per unit. It is \$ 1.00 in the U.S.A. and about \$ 4.00 per unit in India. If the inputs are priced in the same manner as in other countries, it is not unlikely that the prices of fertilizers would also be priced differently. The higher price of raw materials enables the O.N.G.C. to show a profit of about Rs. 1,600 crores while about Rs. 1,800 crores is shown as subsidies given to farmers for the supply of fertilizers. This is only a book-keeping exercise.

15. Subsidies to agriculture are not uncommon. It is quite high among the developed countries. The USA gives a subsidy of nearly 50 billion dollars to its farmers; the E.E.C. countries give a subsidy of about 25 billion dollars and Japan gave a subsidy of 15 billion dollars to its farmers last year. This has been done for sound economy and other reasons. The incentive is not only to increase agricultural production but also to keep the farmer community, which is the backbone of any society, contented and happy.

16. Thus, while discussing subsidy to farmers, it is desirable to bear in mind what the developing countries have done and draw appropriate lessons from it.

17. If the prices of fertilizers are increased unreasonably, it is likely to have a number of effects. The areas which are well developed and the farmers who are more progressive may continue to use the fertilizers. But the areas, particularly in Eastern India and the small and marginal farmers and the dryland farmers will not increase their consumption of fertilizers. This is likely to widen the differences between the rich and the poor, creating unrest and damaging agricultural production in the country. I am therefore convinced that

it is desirable to be extremely careful before increasing the prices of fertilizers, in the name of policy, or abolishing subsidies to farmers.

18. The Committee has felt that price is not the only factor that affects the consumption of fertilizers. There are a number of non-price factors. Distribution of fertilizers in different parts of the country has to be made more efficient. The extension efforts both by the Departments of Agriculture and fertilizer industry have to improve. The Committee has made various suggestions to improve the non-price factors as well.

19. If the prices of fertilizers go up, the cost of production of agricultural produce will also go up, and so also the support prices to be declared by the Government. This will lead to undesirable inflationary pressures. Thus the pricing of fertilizers is a difficult and complicated exercise and efforts should always be made to keep prices of fertilizers and agricultural produce at reasonable levels. It is essential to keep the farmer community contented which has done very great work during the last two decades to make the country self sufficient in foodgrains and stimulate them to produce more not only in the area of cereals but also of oil-seeds, pulses and fibres.

20. It should not also be forgotten that the greatest number of people employed is in the area of agriculture. The investment needed to create jobs in the field of agriculture is small compared to the cost of creating jobs in the organised industry. Organised industry has also become more and more sophisticated and the capital needed for producing jobs is going up. Balanced development of both agriculture and industry is needed but for a long time to come more jobs will have to be created in the field of agriculture than in the field of industry.

21. Nearly seven million people come to the employment market every year. The number of new jobs in the organised industry in India does not exceed nearly 500,000 per year. These figures speak for themselves.

22. I, therefore, feel strongly that the bulk of growth of employment will only be in Indian agriculture and it will have to be stimulated. One of the most important job creating factors is to increase agricultural production through increased consumption of fertilizers and everything possible should be done which will increase fertilizer use to a level of 20 million tonnes per year well before the end of this century.

23. Every country has to follow a pricing policy, including a taxation and subsidy policy, suited to its socio-economic policy. In India's planned development, equity objectives like creation of jobs and reasonable food prices, are as important as efficiency objectives like cost-effective increase in production. Fertilizer being a fundamental instrument for increasing crop-yields and increased crop-yields being of fundamental importance to ensure food security, fertilizer pricing policy needs to be evolved with great care. It should not be a prisoner of any doctrine which is unrelated to the philosophy of planning under Indian conditions.

24. The recommendations of the Committee are made to achieve this end. I do hope that the Government of India will give careful consideration to our recommendations.

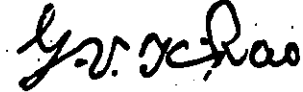
25. The Committee received assistance from the Government of India, ICAR and all the State Governments and gratefully acknowledges their contribution.

26. I would like to place on record our sincere appreciation of the very good work done by Dr.P.V.Shenoi who functioned as Member-Secretary of the Committee and Dr.B.K.Dhar who was the Joint Secretary of the Committee. Both of them gave considerable assistance in its work by collecting valuable data and assisted the Committee in a number of ways, for which the Committee is grateful.

27. I am indeed grateful to the Government of India for having given me the privilege of being associated with a study which is extremely crucial for the proper development of Indian agriculture.

With warm personal regards,

Yours sincerely,



(G.V.K.Rao)

Encl.: Report

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SUMMARY OF FINDINGS AND RECOMMENDATIONS

Phenomenal increase in fertiliser use

Fertiliser consumption in the country has increased from 69,000 tonnes in 1950-51 to 9.0 million tonnes in 1986-87. The progress during the last 10 years has been most significant as it went up from 2.9 million tonnes in 1975-76 to 8.7 million tonnes in 1985-86. The increase in fertiliser consumption is reflected in the increase in the production of food grains, and fertiliser has been recognised as the key input for increasing the agricultural production.

(paragraph 3.09)

Uneven progress in fertiliser use

2. During the last 36 years, the fertiliser consumption in the country has increased from a level of 0.5 kg per ha (1950-51) to 50 kg per hectare (1986-87). Notwithstanding this progress, there are still 24 districts where fertiliser consumption is yet less than 5 kilograms per hectare. The progress in the Eastern States is particularly slow. The extent of inter-district variations could be visualised from the fact that fertiliser consumption in a single district like Faridkot in Punjab (at 145031 tonnes) is comparable or even higher than total fertiliser consumption in some of the states, e.g. Orissa (114012 tonnes), Kerala (127645 tonnes), Himachal Pradesh (21750 tonnes), Assam (13798 tonnes) and J & K (29068 tonnes) in 1984-85. Even the national average of fertiliser consumption of 50 kg per hectare in India is far less than that in some of the developing countries, such as, China, South Korea, Sri Lanka, Malaysia and Pakistan. The fertiliser consumption has, therefore, to increase further. The Planning Commission has fixed a consumption target of 13.5 to 14.0 million tonnes by 1989-90 and a level of 20 million tonnes by 2000 A.D. Concerted efforts will be required not only to increase the consumption but also to narrow the inter-regional and inter-district variations in consumption.

(paragraphs 3.13 to 3.35)

Tapping unexploited potential

3. The task ahead, though feasible, is not easy. It calls for tapping the relatively more difficult and unexploited potential of fertiliser use in regions and on crops which have largely remained outside the mainstream of past growth in fertiliser use.

(paragraph 2.48)

Soil fertility to be monitored

4. Cultivation of high yielding varieties and multiple cropping will result in heavy nutrient removal likely to bring serious imbalances in the soil fertility. At present, there is no programme to monitor the soil fertility status in a continuous manner under various cropping systems, in different agro-climatic zones. The Committee recommends that such a programme should be taken up at the national level, which will make available data in regard to the changing pattern of soil fertility levels so as to formulate necessary policy decisions to ensure that proper soil fertility is sustained to ensure maximum response to fertiliser application.

(paragraphs 4.07 to 4.09)

Regional Soil Testing Laboratories as nodal points

5. Soil testing is considered to be an important tool in ensuring the efficient use of fertilisers. There is, however, need to improve the working of the soil testing laboratories in the country. The Committee recommends that Regional Soil Testing Laboratories should be established which will regularly monitor the functioning of the existing soil testing laboratories, help in repairing the equipment, train the staff at regular intervals to upgrade their skills and provide necessary technology for prescribing the recommendations based on the investment capacity and the size of the holdings of the farmers. This will create confidence in the farmers in adopting the soil testing service for increasing the efficiency of fertility use.

(paragraphs 4.10 to 4.14)

Two thirds increase in soil testing capacity

6. As against 89 million holdings, the existing soil testing capacity is about 6 million samples per annum. It would take 15 years to analyse each holding. The soil testing

capacity in the country is, therefore, inadequate and should be raised at least to a level of 10 million samples per annum in five year's time.

(paragraph 4.15)

Fertiliser recommendation according to farmers' financial capacity

7. The acceptability of soil testing is weak because of research gap in making recommendations according to the resource capability of the farmers. Research needs to be strengthened and reoriented to develop technology which can help tailor fertiliser recommendation to the investment capacity of the farmer.

(paragraphs 4.16 to 4.19)

Micronutrients to be promoted

8. Due to introduction of high yielding varieties and intensive cropping, the secondary and micronutrient deficiencies have occurred. Among the secondary nutrients, sulphur deficiency has been noted in a large number of districts. Similarly, wide-spread deficiency of zinc has also been noted. State Governments should take up special promotion programmes to promote use of gypsum/pyrites which are cheaper sources of sulphur in sulphur-deficient soils. According to the available evidence, supply of quality micro-nutrient fertilisers is a problem. The institutional agencies should be encouraged to take up the production and distribution of micro-nutrient fertilisers.

(paragraphs 4.22, 4.23 and 4.29)

Fertiliser promotion in rainfed areas

9. Looking to the large potential of rainfed areas for increasing agriculture production with the use of fertilisers, the Committee felt that a massive national project should be launched for promotion of fertiliser use in rainfed areas. This project should provide facilities of advance stocking of fertiliser at remote areas by opening additional retail points, organise field demonstrations for transfer of technology and strengthen soil testing programmes to render advice to the farmers on optimum and efficient use of fertilisers.

(paragraphs 4.30 and 4.31)

Deep placement of fertiliser in wetland rice

10. Maximum nitrogen losses have been reported under wetland rice cultivation. The Committee noted that the efficiency of nitrogen application in wetland rice could be improved through deep placement of nitrogen by a suitable applicator. Research efforts should be strengthened to develop suitable applicators for deep placement of nitrogenous fertiliser in wetland rice.

(paragraph 4.32)

Organic manures to be promoted

11. The Committee recognised the role of recycling of organic waste to build up the humus content of the soil which improves the soil physical properties. The role of bio-fertilisers is also recognised in supplementing the nitrogen requirements of some specific crops. The Committee recommends that these programmes should be strengthened. Efforts should be made to popularise the technology for quick decomposition of organic waste, which has been developed in Philippines.

(paragraphs 4.39 to 4.49)

Agency for monitoring fertiliser use efficiency

12. The Committee noted that there is no machinery which can ensure the flow of research findings of fertiliser use to the extension system and also monitor the efficiency of fertiliser use in different States. The Committee recommends that a separate agency should be set up for assessing the current status of agronomic research, particularly related to the adoption of improved practices in fertiliser use. This agency should also be entrusted with the task of collecting, collating, disseminating and interpretation of fertiliser response data for policy planning.

(paragraph 4.50)

Future product pattern.

13. In regard to the future product pattern, the Committee recommends that it should be in the form of Urea for nitrogenous fertilisers, DAP as a source of P_2O_5 and MOP should be made available to meet the requirements of K_2O . No future capacity should be sanctioned for NPK complex fertilisers and granulated mixtures. However, the existing NPK fertiliser capacity could continue while attempts should be made to minimise the number of grades for the same nutrient ratio.

(paragraphs 4.51 to 4.57)

- Fertiliser industry to undertake promotion** 14. The Committee appreciated the efforts of the fertiliser industry in taking up various programmes of extension and fertiliser promotion. It was, however, noted that there are no uniform standards for extension and promotion activities carried out by fertiliser industry. The fertiliser industry which has large technical manpower should take up fertiliser promotion programmes including field demonstrations, training of farmers and dealers and opening of additional retail points in consultation with the State Departments of Agriculture. These programmes should be drawn up at the district level jointly by the Department of Agriculture and lead fertiliser suppliers.
(paragraphs 5.28 & 5.29)
- Subject matter specialists to be trained** 15. The subject matter specialists under the Training and Visit System should be put through a special orientation programme regarding fertiliser use.
(paragraphs 5.08 & 5.09)
- Allowance for fertiliser promotion** 16. At present, the Retention Price System implemented by the Department of Fertilisers does not include any provision for fertiliser promotion activities, with the result that manufacturers do not find any incentive for investing on fertiliser promotion. The Committee formally recommends that a provision of at least Rs. 20/- per tonne of nutrient produced should be allowed for promotion activities under the Retention Price System, provided the expenditure has been actually incurred for the purpose.
(paragraph 5.32)
- Role of co-operatives in promoting fertiliser in rainfed areas** 17. The Committee feels that since co-operatives also function in interior and rainfed areas, this institution can promote fertiliser use in the rainfed areas in a big way. The Committee recommends that the 'B' component loan in kind may be provided at a lower rate of interest as an incentive.
(paragraph 6.11)
18. On account of overdues, many cooperative societies are not able to get credit accommodation from the District Cooperative Bank. This completely chokes the flow of credit to the members of society. Under such circumstances, it is recommended that special arrangement should be made for providing 'B' component loan in kind to new and non-defaulting members.
(paragraph 6.12)
- Credit facilities to farmers** 19. Credit to the farmers should be sanctioned well before the time of application of fertiliser. Delays in sanctioning of crop loan should be avoided; credit limits should be set for a three-year period and passbooks and cheque books issued to the farmers as in the case of Punjab.
(paragraph 6.13)
- Action against defaulters** 20. Analysis of credit delinquency shows that it is neutral to the size of holdings or stage of development of the area. Strong administrative measures should be taken against defaulters who not only deny future credit facilities to themselves but also to other fellow-members.
(paragraph 6.14)
- Advance stocking by cooperatives** 21. Primary cooperatives which have direct links with the farmers should be strengthened and should be encouraged to stock fertiliser in advance and also to sell for cash. They should be provided with special credit limits to achieve this objective. There should also be regular training programme of the personnel handling fertiliser sales so that they can give sound advice to farmers.
(paragraph 6.15)
- Financing cooperative fertiliser distribution** 22. In the context of expanding role of cooperatives in the distribution of fertilisers, there would be a continuous expansion in the requirement of working capital for their federations. Unless adequate and also smooth arrangements for such credit are made,

the expansion of fertiliser distribution activity by the cooperatives would be hampered. It is in this context that the Committee would suggest that the existing system of credit authorisation needs to be reconsidered, both in terms of the principle underlying the system of credit authorisation and the procedural delays that the credit authorisation scheme entails. As no speculative element is involved in cooperative fertiliser trade and as this is a service that the cooperative system is providing to the farmers, the Committee strongly urges that the credit for fertiliser marketing may be taken outside the purview of the present credit authorisation scheme. The cooperative federations should be able to have easy access to working capital funds from the State Cooperative Banks which in turn should be able to obtain refinance facilities from the NABARD.

(paragraph 6.19)

Reduction of interest recommended

23. Bank credit for procurement and distribution of fertiliser is treated by the RBI as a priority activity. Advances made by the commercial or cooperative banks to state cooperative marketing federations and other apex agencies handling wholesale distribution of fertilisers since June, 1987, are charged interest at the rate of 15.5 per cent, a rate considered by RBI as concessional as compared to 17.5 per cent applicable to wholesalers in the private sector. The Committee discussed this issue with the NABARD and the RBI representatives. The Committee finds that the rate of interest of this magnitude is affecting the sound working of the marketing federations. The Committee, therefore, recommends that the interest burden of the marketing federations needs to be reduced from the existing interest rate of 15.5 per cent to 14 per cent.

(paragraph 6.20)

24. A lower rate of interest on fertiliser would be desirable considering that large areas of the country are mono-cropped, rainfed and involve high risk and in these areas PACS/PCMS are required to maintain stocks for longer period in the interior areas. NABARD refinance should also be available to the State Cooperative Banks for financing fertiliser distribution activities of retail cooperatives at 3 per cent below the bank rate instead of 1 per cent above the bank rate; it should be at par with the short-term agriculture credit accommodation provided by NABARD for financing the agricultural operations so that the State Cooperative Bank/District Cooperative Banks would be in a position to charge a lower rate of interest on fertiliser supply credit at the retail level.

(paragraph 6.21)

Period of fertiliser marketing credit to be extended

25. The present period of 120 days for fertiliser credit does not cover the fertiliser stocking requirement of cooperatives, particularly in dryland areas and mono-cropped areas. The period of credit, therefore, should be increased to 180 days from the date of drawal instead of 120 days as at present.

(paragraph 6.22)

Proper utilisation of Central loan support urged

26. To help the state institutional agencies for advance stocking of fertilisers, Government of India has been providing short-term loan to the State Governments on a very low rate of interest i.e. 6.5 per cent. The volume of short-term loan has increased from Rs. 156 crores in 1979-80 to Rs. 260 crores in 1986-87. It has been observed that some of the States divert this soft loan for activities other than fertiliser distribution. The Committee, therefore, recommends that the Government of India should issue guidelines to ensure that this credit made available to the State Government is strictly used for distribution of fertilisers and is extended in full to the cooperative marketing federations.

(paragraph 6.24)

Credit support to private fertiliser distributors

27. It is private trade having nearly 55 per cent of the total quantum of fertiliser distribution in the country which does not have access to the cooperative credit network. This, therefore, points to the need for examining the sources of funds and their related terms and conditions so that credit does not become a constraint to efficient fertiliser distribution.

(paragraph 6.25)

Assessment of fertiliser demand

28. The Committee examined the system of fertiliser distribution in the country and recommends that the existing system of demand assessment and allocations under the

Essential Commodities Act should be continued. However, the quality of demand assessment needs to be improved. This should be done through joint assessment at the district level between the Department of Agriculture and the fertiliser lead suppliers.
(paragraphs 7.10 to 7.13)

Higher distribution margin for cooperatives

29. The cooperatives have a very important role to play in the marketing of fertilisers in the country. In most of the States, they have a fairly large network and in some of the States, they also command sizeable share. They are also expected to carry adequate stocks of fertilisers at all times and also maintain advance stocks of fertilisers at the village level. Recognising this, the Committee recommends that the cooperatives should be given higher distribution margin by about Rs. 50 per tonne as compared to private trade.

(paragraph 7.14)

Incentive to new retailers

30. To encourage the opening of retail points in the interior rainfed areas, the Committee recommends that all dealers who open new outlets in these areas should get an incentive of Rs. 10/-per tonne during the first three years of their operation.

(paragraph 7.14)

Differential pricing of fertiliser not feasible

31. The Committee examined the various alternatives of fertiliser distribution including the differential pricing system and complete freedom of marketing. It was felt that these were not administratively possible and recommended that the existing system of distribution of fertilisers at uniform prices throughout the country should continue.

(paragraphs 7.15 to 7.20)

Zoning of markets for fertiliser producers

32. In order to bring stability into the marketing system, the Committee recommends that the marketing territory of each fertiliser unit should be decided on a long term basis and frequent changes should not be brought about in the system. Adequate provision should be made for the entry of the new fertiliser units which are likely to come up in the future.

(paragraphs 7.20, 7.21)

Smaller fertiliser bags

33. The requirement of fertilisers in hilly and rainfed areas is not very substantial, particularly in the case of small and marginal farmers. The present size of packing of 50 kilograms not only poses the problem of resources for the small and marginal farmers but also is found inconvenient for transportation in hilly areas. The Committee, therefore, recommends that smaller packages of the size of 15 to 20 kilograms should be introduced by the industry and they should be permitted to charge extra cost involved in such packaging, which could also be statutorily notified.

(paragraph 7.25)

Exemption from registration for small dealers

34. At present every fertiliser dealer who sells any quantity is required to register himself with the registration authority which is generally at the district level. This inhibits a large number of small traders who are otherwise catering to various needs of the farmers in the villages, from dealing in fertilisers. The Committee is of the view that small traders should be encouraged, particularly in the villages, to take to fertiliser dealership in small quantities to reach a large number of farmers in the remote and difficult areas. This may be possible if restrictions of registration are removed from such small dealers. The Committee recommends that it should be adequate if these dealers are only required to maintain a record of the source from where supplies are obtained so long as the stock at any time does not exceed a certain upper limit, say about half tonne of all types of fertiliser material at any point of time.

(paragraph 7.24)

Nodal fertiliser handling points

35. The Committee noted the efforts of the Ministry for development of nodal points through the introduction of rake handling points. It was, however, felt that the development of facilities to meet effectively the transportation needs for each rake handling point will involve enormous investment. It was felt that a limited number of major fertiliser handling points located in high-consuming areas and the existing rail routes be developed fully as nodal points for fertiliser distribution. While planning the various facilities at the nodal points, exclusive warehousing facility should be developed

for transit storage pending distribution to the consumption centres. Mechanical handling arrangement to transfer the products from the wagon to the warehouse should also be introduced for speedy handling.

(paragraph 7.27)

States not to impose sales tax

36. It was brought to the notice of the Committee that some of the States levy sales tax on the sale of fertilisers. Fertilisers are heavily subsidised by the Government of India; any imposition of sales tax or other levies by the State will defeat the purpose for which such a heavy subsidy is given for fertilisers. The Committee, therefore, recommends that the States should be persuaded to exempt chemical fertilisers from all kinds of levies including sales tax.

(paragraph 7.30)

FICC to fix distribution margin

37. The Committee recognised the importance of adequate distribution margin necessary for efficient distribution system. In order to avoid the overlapping of certain components of distribution margin and the transport subsidy, the Committee recommends that Fertiliser Industry Coordination Committee (FICC) should fix the distribution margin for the dealers which are at present being fixed by the Department of Agriculture and Cooperation. The distribution margin should be fixed alongwith FICC retention prices and should be fixed for the same period for which the retention prices are fixed by the FICC.

(paragraph 7.32)

Cost benefit ratio for fertiliser use

38. The cost benefit ratio of fertiliser use in the irrigated areas at present is 1:2.3 for wheat and 1:2.5 for rice. The farmers in the rainfed areas have the added risk if they have to use fertiliser. This risk should be adequately covered. For this, they should have a cost benefit ratio in the region of 1:3 to 1:3.5.

(paragraphs 8.13, 8.14)

Input-out price ratio should not worsen

39. Among South East Asian countries, the Indian farmer is perhaps in a most disadvantageous position, as far as fertiliser nutrient (Nitrogen) paddy price ratio is concerned. During 1984-85, the Indian farmer had to sell 3.4 kilograms of paddy to buy 1 kilogram of nitrogen, as compared to Bangladesh (2.01), Burma (0.69), Indonesia (1.24), Malaysia (1.26), Nepal (2.87), Pakistan (2.47), Republic of Korea (0.99) and Sri Lanka (1.63). This input-output ratio should not become more unfavourable for the Indian farmer.

(paragraphs 9.18, 9.19)

Fertiliser pricing

40. A growth rate of fertiliser use of 10 per cent per annum is sought to be achieved during the VII Plan period. This is the pre-requisite for increasing food grains output to meet the nutritional requirement of our population. The consumer prices of fertilisers should be so designed that this growth rate is made possible to be achieved.

(paragraphs 10.31, 10.32)

41. Prices could be increased by 5 to 7 per cent provided the country has achieved a cumulative increase of 30 per cent in the consumption of fertilisers during any preceding 3 years.

(paragraph 10.32)

Fertiliser pricing an integral part of macro-economic policy

42. Every country has to follow a pricing policy, including a taxation and subsidy policy, suited to its socio-economic policy. In India's planned development, equity objectives like creation of jobs and reasonable food prices, are as important as efficiency objectives like cost-effective increase in production. Fertiliser being a fundamental instrument for increasing crop-yields and increased crop-yields being of fundamental importance to ensure food security, fertiliser pricing policy needs to be evolved with great care. It should not be a prisoner of any doctrine which is unrelated to the philosophy of planning under Indian conditions.

(paragraph 10.35)

CHAPTER I

INTRODUCTION

The success of the crop development strategy in India has been acclaimed all over the world. Food production rose from a level of 51 million tonnes in 1950-51 to a level of 152.4 million tonnes in a favourable year like 1983-84; despite unfavourable weather in 1986-87, this level of production has been sustained. All this was possible due to the introduction of modern crop technology which depended upon the use of fertilisers under certain agronomic conditions.

1.02 The consumption of fertilisers has risen from a level of 69,000 tonnes in 1950-51 to 9 million tonnes in 1986-87. Despite such significant growth, fertiliser consumption in India is still only about 50 kg. per hectare. The average yields for the country as a whole are well below the potential established by technology, though in States like Punjab, the yields of wheat and rice as well as per hectare use of fertilisers are nearly three times the national average. The achievement of the agriculture production targets during the 7th Plan as well as succeeding plans will depend upon an annual growth in fertiliser use of the order of 10 per cent.

1.03 Government have subsidised the use of fertilisers as an incentive measure to the Indian farmers. However, with the rise in the cost of both domestically produced and imported fertilisers, volume of subsidy has risen from around Rs. 600 crores in 1982-83 to about Rs. 2000 crores in the year 1986-87. In view of the critical importance of fertiliser pricing policy for the development of agriculture, the Government have appointed a High Powered Committee under the Chairmanship of Dr. G.V.K. Rao, former Member of the Planning Commission, to study the socio-economic and agronomic factors which influence fertiliser use and to make recommendations for evolving the future fertiliser pricing policy.

COMPOSITION AND TERMS OF REFERENCE:

1.04 The composition of the Committee is as follows:

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|---|------------------|
| 1. Dr. G.V.K. Rao,
Formerly Member,
Planning Commission. | Chairman |
| 2. Dr. Y.K. Alagh,
Member, Planning Commission,
Yojana Bhawan, New Delhi. | Member |
| 3. Dr. N.S. Randhawa,
Director-General,
Indian Council of Agril.
Research and Secretary,
Department of Agricultural Research and
Education, New Delhi. | Member |
| 4. Dr. P.V. Shenoi,
Additional Secretary,
Department of Agri. & Coop., New Delhi. | Member-Secretary |
| 5. Prof. Gunvant M. Desai,
Indian Institute of Management, Ahmedabad.
(Till 1st May, 1986) | Member |
| 6. Addl. Secretary (Expenditure),
Ministry of Finance,
Department of Expenditure, New Delhi. | Member |

7.	Dr. I.Z. Bhatta, Director General, National Council of Applied Economic Research, New Delhi.	Member
8.	Dr. G.S. Bhalla, Former Chairman, Commission for Agricultural Costs & Prices, New Delhi.	Member
9.	Adviser (Agriculture), Planning Commission, New Delhi.	Member
10.	Executive Director, Fertiliser Industry Coordination Committee, Ministry of Chemicals & Fertilisers, New Delhi.	Member
11.	Sh. K.S. Bains, Joint Secretary, Department of Heavy Industries, New Delhi.	Member
12.	Sh. J.K. Arora, Joint Secretary (Fert.), Department of Agril. & Coop., New Delhi.	Member
13.	Dr. G.R. Saini, Economic & Statistical Adviser, Department of Agri. & Cooperation, New Delhi.	Member
14.	Dr. B.K. Dhar, Joint Commissioner (Fert. Tech), Department of Agriculture and Cooperation, New Delhi.	Member- Joint Secretary

1.05 The terms of reference of the Committee are as follows:-

1. To ascertain socio-economic and agronomic factors which influence crop production through use of fertilisers and to suggest various parameters which should govern the fertiliser pricing policy. These parameters should include cost benefit ratio both for irrigated and non-irrigated crops, level of consumption reached in particular region and extent of irrigation.
2. To suggest a minimum cost benefit ratio which will induce the farmers to increase the use of fertilisers for achieving the targetted levels of agricultural production through increased use of fertilisers.
3. To suggest a system for fixing nutrient prices of N, P₂O₅ & K₂O in complex fertilisers.
4. To suggest policy measures which could result in increasing the efficiency of fertiliser use and thus improve the cost benefit ratio.
5. To make recommendations for evolving a suitable product pattern keeping in view appropriate use of nutrients based on soil and crop requirements.
6. To ascertain the distribution margin for fertilisers for its adequacy or otherwise and other allied issues.

The notification issued on the constitution of the Committee is given at Annexure-I.

1.06 The Committee held ten meetings, eight of them at Delhi and two at Bangalore. Meetings were held at Delhi with the State Agricultural Production Commissioners, Vice

Chancellors of Agricultural Universities and Chief Executives of the Fertiliser Production Units of the Northern, Western and Eastern regions of the country; a similar meeting was held with those of the Southern region at Bangalore. The Bharat Krishak Samaj authorities met the Committee to project the views of the farming community. Their evidence and recommendations have been carefully considered and incorporated in this report.

1.07 National Workshop of Agricultural Economists was sponsored by the Committee at the Institute of Social and Economic Change, Bangalore on the 25th and 26th April, 1986. About fifty distinguished economists from various universities, State Governments and other organisations attended the workshop. The workshop was inaugurated by Dr. V.K.R.V. Rao, an eminent economist, formerly Member of the Planning Commission and Union Minister. The recommendations of the workshop are given at Annexure-II.

1.08 The Committee issued separate questionnaires to the State Governments, State Agricultural Universities and fertiliser manufacturers with a view to elicit their views and also relevant data. The texts of the questionnaires are set out in Annexures III, IV and V.

1.09 The Committee had occasion to discuss various issues relating to fertiliser use and pricing policy with a large number of distinguished scientists, fertiliser industrialists, economists and others; prominent amongst them have been included in Annexure-VI. The Chairman of the Committee had the privilege of calling on and discussing with the then Minister of State for Fertilisers, Hon'ble Shri Natwar Singh.

1.10 The present report is divided into the following ten chapters:-

- I. Introduction.
- II. Fertiliser use in India- an overview.
- III. History and analysis of fertiliser use in India.
- IV. Agronomic factors in profitable fertiliser use.
- V. Extension efforts for fertiliser promotion in crop production.
- VI. Credit for fertiliser use.
- VII. Fertiliser marketing and distribution margin.
- VIII. Economics of fertiliser use in crop production.
- IX. Fertiliser prices in India and abroad.
- X. Fertiliser consumer prices.

The letter of the Chairman submitting the report to the Minister of Agriculture and a summary of recommendations precede the text of the Report.

1.11 The Committee has recognised the critical importance of scientific fertiliser use for a long-term increase in crop-yields and has analysed the various socio-economic and agronomic factors involved. While the past record of fertiliser consumption has been encouraging, the task for the future is not easy, particularly in the context of the growing burden of fertiliser subsidies on budgetary resources and the need to tap the relatively more difficult and unexplored potential of fertiliser use in new areas. A large number of steps in the sphere of research, extension, credit, distribution and economic policy have been recommended to secure a long-term annual growth of 10 per cent in fertiliser use. Various factors mentioned in the report clearly underline the fact that fertiliser prices cannot be reduced. On the other hand, fertiliser subsidies need to be contained as far as possible within the limits indicated in the long-term price policy presented by the Finance Minister to the Parliament. A number of non-price factors assume great importance in stepping up the profitability of fertiliser used by the farmers. Fertiliser prices can be revised and subsidies reduced only to the extent these factors succeed in increasing the yields and profits of the farmers and thus contributing to the achievement of the agricultural production targets in our Five Year Plans.

CHAPTER II

FERTILISER USE IN INDIA : AN OVERVIEW

Achievement

India used 9.0 million tonnes of nutrients in the form of chemical fertilisers in 1986-87. The Seventh Five Year Plan aims at raising it to 13.5 to 14.0 million tonnes by 1989-90. The consumption should reach about 20 million tonnes by the year 2000 to achieve the need-based targets of agricultural production.

2.02 The past growth in fertiliser use is indeed impressive. India now ranks fourth in total fertiliser consumption after USA, USSR and China. Its record in raising fertiliser use to about 50 kilograms per cultivated hectare in about four decades also compares quite favourably with that in many other countries.

Hard tasks ahead

2.03 There is, however, no room for complacency. Raising fertiliser consumption from 9 million tonnes in 1986-87 to about 14 million tonnes by 1989-90 implies an annual increment of more than one million tonnes in three consecutive years. Against this, annual growth in consumption has exceeded one million tonnes only once so far. Similarly, the target of 20 million tonnes by the year 2000 implies an average increment of 733,000 tonnes every year for a decade and a half against the past record of growth exceeding 700,000 tonnes in only four years. Thus, by any standard, the task ahead is formidable.

2.04 The task ahead is all the harder because the two major forces propelling past growth in fertiliser consumption have weakened and there is hardly any scope to lower the real price of fertiliser through budgetary subsidies. Bulk of the past growth in fertiliser use was an outcome of diffusion of fertiliser use on irrigated land and upward movements in rates of applications due to replacement of local varieties by HYVs. The latter was facilitated by holding fertiliser prices through budgetary subsidies. There is evidence to suggest that both fertiliser use and HYVs have spread to virtually all irrigated land and at least on a subset of this land, rates of application have also reached fairly high levels. In the meanwhile, the burden of food and fertiliser subsidies has grown reaching Rs. 4000 crores in 1986-87. Chapter X will explain the real nature of this subsidy.

2.05 Thus, there is need for a dispassionate discussion on three important issues. The first issue is whether there is a need for substantial further growth in fertiliser use; this has been considered in paragraphs 2.06 to 2.12. The second issue is the strategy for achieving further rapid growth in fertiliser use; paragraphs 2.13 to 2.29 deal with this question. The third issue centering on the policies required to implement the strategy is treated in paragraphs 2.30 to 2.48.

Need for further growth in fertiliser use

2.06 Although the considerations behind raising fertiliser use are generally known and seldom disputed, yet a brief background seems useful to discuss the above questions.

Rationale

2.07 Substantial additional growth in agricultural production is needed to meet the basic necessities of a large and growing population. It is also needed to generate agricultural surpluses required for economic development with emphasis on employment and equity. Bulk of the growth in agricultural production will have to come from continuous increase in productivity of land. Yield-based growth cannot be sustained without removing soil fertility constraints and promoting technological change. For both these purposes, substantial growth in fertiliser use is necessary.

Soil deficiencies

2.08 The wide-spread deficiency of nitrogen in Indian soils is known since long. Availability of phosphorus and potash is also low. Furthermore, evidence is accumulating on deficiencies of sulphur and micronutrients at a growing number of locations.

Why not organic manures? 2.09 Surely, chemical fertilisers are only one of the sources of plant nutrients. Similarly, productivity of land depends on many factors besides availability of plant nutrients. But, as the experience world over suggests, chemical fertilisers have become increasingly important in removing soil fertility constraints and continuously raising land productivity through technological change. Even China, with its exemplary performance in mobilising organic sources of plant nutrients, is no exception. Incidentally, China's fertiliser consumption has reached 18 million tonnes against India's 9 million tonnes. Both were using less than 100,000 tonnes in the early 1950s.

Importance of HYV technology 2.10 The need for further growth in fertiliser use is also underscored by the dependence of proven yield-increasing technologies on fertilisers. This is obvious from the experience of high yielding varieties (HYVs) on irrigated land. Even on unirrigated land, the complementarity between HYVs and fertilisers is clear, wherever suitable varieties are available. This is not surprising. Low fertility of soils is as severe a constraint as any other in promoting technological change on unirrigated land. Unless efforts are made to raise fertility of unirrigated land through judicious use of fertilisers, farmers would have little incentive to invest in dryland technologies irrespective of their form and content.

2.11 When the above arguments are considered together with the fact that more than half of the cultivated land is yet to come under fertiliser use, it becomes clear that the pertinent question concerning the future is not whether but how to raise fertiliser consumption.

Importance of growth in agriculture to alleviate poverty 2.12 In discussing this question, it is important to recognise that growth in fertiliser use is not an end in itself; the end is growth in agricultural production. More importantly, further growth in agricultural production must facilitate growth in employment and alleviate the incidence of poverty. In the present context, what this really means is that growth in fertiliser consumption, although indispensable, must occur with maximum economic efficiency. Without this perspective, discussion on how to raise fertiliser consumption seems to generate fruitless controversies, especially on policy issues concerning agricultural prices and fertiliser subsidies.

Conventional approach 2.13 Growth in fertiliser use is influenced by variables like level of irrigation, area sown with HYVs, cropping pattern and prices of crops as well as fertilisers; these are the precise variables which determine farmers' returns on and hence their demand for fertilisers. Policies governing these variables, therefore, influence the future growth in fertiliser use.

2.14 Growth in fertiliser use has been influenced by variables both on the demand and supply side. On the demand side, the concerned variables are level of irrigation, area sown with HYVs, cropping pattern and prices of crops as well as fertilisers. But the actual use of fertilisers would not occur unless the distribution system responded to the demand for fertilisers. The variables influencing supply and distribution are an efficient distribution network, including storage, transport, credit and incentive for dealers as well as credit facilities for farmers. A strategy for rapid growth in fertiliser use has to be built on policies influencing these variables.

Understanding growth in fertiliser use - analytical approach

Agronomic and economic potential 2.15 The agronomic potential of fertiliser use in a country is determined by factors like soil fertility level, extent of availability of optimum moisture and other climatic environment, cropping pattern, genetic characteristics of crops and use of inputs other than fertilisers. In any given year in India, even agronomic potential depends upon the monsoon rains not only in 70 per cent of the area which is unirrigated but to some extent even in the 30 per cent of the area which is irrigated. Together, these factors determine physical responses of crops to fertiliser use and thus, the maximum amount of fertiliser which could be used to increase agricultural production. The economic viability of fertiliser use is determined by factors not only behind fertiliser response functions but also prices of crops and fertilisers.

2.16 Actual fertiliser use is an outcome of not only conversion of the economic potential into farmers' effective demand for fertilisers but also the fulfillment of this demand by fertiliser supply and distribution systems. Besides agro-economic variables, three "processes" and their interactions influence the level of actual fertiliser use. First is the process which converts the economic potential into farmers' effective demand for fertilisers. This involves generation of knowledge about fertiliser response function, its spread among farmers and provision of credit to them. Agricultural research, extension, and credit systems are involved in this process. The second process relates to the flow of fertilisers from factories and ports to geographically dispersed locations. Fertiliser distribution system is behind this process. The third process determines aggregate supply of fertilisers. Domestic fertiliser factories and institutions importing fertilisers are involved in this process.

2.17 Examining questions related to growth in fertiliser use by distinguishing between agro-economic variables and the three indispensable processes as well as a number of systems behind them, drives home a simple point. Growth in fertiliser use is determined not only by changes in agro-economic variables behind the economic potential of and farmers' demand for fertilisers but also by factors which influence development and operations of the various systems which convert the potential into actual fertiliser use. This simple point is the crux of the matter in understanding the dynamics of growth in fertiliser consumption because use begins way below the economic potential.

2.18 Empirical evidence from several countries consistently reveals that fertiliser use begins with a few farmers using it on selected crops at limited locations. There is less than complete diffusion of fertiliser use on land where the use is potentially profitable; even on fertilised land, the rates are suboptimal. Thus, when the use begins, there is a vast untapped potential of use under the prevailing response functions and price environment. Actual fertiliser consumption grows over time as a consequence of the tapping of the unexploited potential through diffusion of use on unfertilised land (where the use is potentially profitable) and increases in rates of application on fertilised land towards the optimum levels.

2.19 The pace and geographical-cum-cropwise pattern of growth in fertiliser use are influenced by initial conditions with respect to agro-economic variables, subsequent changes in them and the developments of the various systems involved in the three processes which convert the viable potential into actual use. Until the economic potential is substantially tapped, growth in fertiliser use is influenced more decisively by the pace of developments of the systems behind the three processes than by marginal change in agro-economic variables. This is not surprising because farmers, though rational, are not omniscient. They need location specific information on the responses of crops to fertiliser use to judge which of the crops could be profitably fertilised and to work out details of fertiliser practices. Agricultural research system which generates such information and the extension system which delivers it to farmers, influence these decisions of farmers. Similarly, sufficient credit is often necessary to convert farmers' perceptions of profitability on fertiliser use into their effective demand for fertilisers. But even this is not enough. Actual use of fertilisers would still depend on whether adequate fertilisers are available at the right place and time. This depends on the level of development and operational efficiency in the fertiliser distribution, production and import systems. All these systems are seldom adequately developed until fertiliser consumption reaches fairly high level. It is, therefore, easy to see why their development and operation exert greater influence on the pace and pattern of growth in fertiliser use than marginal changes in agro-economic variables.

2.20 Development of the above systems influence growth in fertiliser consumption not only by tapping the unexploited potential but also by raising the profitability and economic potential of fertiliser use. Historical experience of countries, with high levels

of fertiliser use, show that agricultural research and extension systems have been behind upward shifts in response functions. Similarly, reductions in farmers' fertiliser cost have resulted from technological break-throughs and improved operational efficiency in fertiliser production and distribution systems and higher prices of crops have come from expansion in demand for agricultural output due to rapid economic growth.

Advantages of holistic approach

2.21 There are four main advantages in using the above approach to examine the past experience of growth in fertiliser consumption. First, it distinguishes between economic potential and actual use of fertilisers and identifies all essential variables and relationship behind the two. Second, it recognises that fertiliser use begins below the economic potential and differentiates between geographical-cum-cropwise diffusion and upward movements in rates on fertilised land in describing growth in actual fertiliser consumption. Third, without belittling the influence of agro-economic variables like irrigation, HYVs and prices on farmers' demand for fertilisers, it explains why the pace and pattern of growth in fertiliser use also depend on many more factors and this it does by drawing attention to the three indispensable processes behind growth in fertiliser consumption, namely, conversion of economic potential into farmers' effective demand for fertilisers, timely supply of fertilisers at geographically dispersed locations and enlargement of aggregate fertiliser supply. Fourth, by viewing growth in fertiliser consumption in such logical terms, the approach covers the entire gamut of relevant policies.

Past growth in fertiliser use

2.22 The focus is on three questions. What were the main factors behind the past growth in consumption? What role did the Government policy play? With the benefit of hindsight, what can be said about the main strengths and weaknesses of the past policies?

Main factors

2.23 The use of chemical fertilisers began in India on tea plantations during the first quarter of the century. It spread little outside the plantation sector until the mid-1940s when the Government launched the "Grow More Food Campaign" in the wake of the Japanese occupation of Burma (from where rice was imported) and the Bengal famine. In the subsequent four decades, annual fertiliser consumption grew from less than 50,000 tonnes to 9 million tonnes.

2.24 A review of the accumulated research in the analytical framework leads to three unmistakable conclusions. First, Government policies to accelerate food production have exerted far greater influence on growth in fertiliser consumption than generally recognised. Secondly, non-price factors have been as important as price factors in determining the pace and pattern (cropwise as well as geographical) of growth in fertiliser use. Thirdly, under the prevailing environment with respect to fertiliser response functions and prices, growth in fertiliser consumption could have been faster but for the deficiencies in the three processes which convert the economic potential into actual use.

2.25 As mentioned above, until the Government launched the Grow More Food Campaign, fertiliser use was largely confined to the plantation sector. With the impact of the partition on the food problem, efforts to raise food production gathered momentum. The importance of accelerating food production was further underscored by factors like increased growth rate of population, need to conserve foreign exchange, difficulties in getting food aid, droughts of the mid-1960s and the concern to alleviate poverty. Surely, raising fertiliser use was only one element in the policies followed to increase food production. But these policies had far-reaching impact on the growth in fertiliser use in the non-plantation sector. This can best be seen in terms of their impact on the economic potential on fertiliser use as well as on the three processes converting the potential into actual fertiliser use. Thus, for instance, development of irrigation facilities and policies pursued to propagate HYVs substantially raised the potential of

fertiliser use. They also facilitated conversion of the potential into farmers' demand for fertilisers by making the use more profitable. Similarly, establishment of nation-wide agricultural extension system thousands of fertiliser trials on farmers' fields and the development of cooperatives and other institutions to supply increasing amount of credit to farmers, contributed to generating growth in demand for fertilisers. In meeting this demand, policies pursued to establish and expand the fertiliser distribution system, enlarge availability of fertilisers through domestic production and imports and control regional allocation of supplies, have played a key role in determining the past pace and pattern of growth in fertiliser use. Thus, forces behind the past growth in fertiliser consumption cannot be correctly deciphered without taking into account the whole set of policies pursued to combat the food problem. More so, because the processes generating growth in either demand for or supply of fertilisers (at micro or macro level) in the country have neither originated from nor operated under free market conditions.

Price vs non-price factors

2.26 Between price and non-price factors behind the growth in fertiliser use, the latter have played an important role. Several features of the pace and pattern of growth clearly reveal this. Bulk of the growth in fertiliser consumption has occurred after the introduction of HYVs. Diffusion of fertiliser use on the same crops has been faster under irrigated than under unirrigated conditions. The use on oilseeds and pulses began in 1950s but growth has been much slower than on rice and wheat. Although fertiliser prices have been uniform throughout the country, yet the pace of growth in consumption has varied widely among States, districts and talukas (or blocks) due to variations in irrigation, cropping pattern, spread of HYVs and the level of development of fertiliser distribution and agricultural credit system.

2.27 The importance of non-price factors is also brought out by the experience of the Sixth Plan period. Between 1979-80 and 1984-85, fertiliser consumption grew by 3 million tonnes. The acceleration in consumption was not only due to the favourable price environment but also due to further expansion of irrigation and area sown with HYVs, adequate availability of fertilisers, leading to greater promotional efforts and expansion of the distribution system, increased flow of credit to farmers and more than seven-fold increase in the supply of quality seeds.

Potential not fully tapped

2.28 Although the past growth in total fertiliser consumption was impressive, it could have been faster under the prevailing environment with respect to fertiliser response functions and prices. For instance, fertiliser diffusion was not complete on any crop, even under irrigated conditions, until at least the mid-1970s. More importantly, the use on even traditional varieties sown on unirrigated areas grow over time, *albeit* slowly. Nor was the use confined to large and medium size farms or to only owner cultivators. All this suggests existence of viable potential of fertiliser use and farmers' willingness to tap it. Thus, it is just as necessary to ask why the past growth in fertiliser use was not faster, as to figure out the forces behind the observed pace and pattern of growth.

Weaknesses

2.29 The answer lies in certain weaknesses of the processes which converted the viable fertiliser potential into actual use. Among these, the following stand out: inadequate efforts to convince farmers about returns on fertiliser use under unirrigated conditions, irrigation and HYV bias in the supply of production credit, slow expansion of and various inefficiencies in fertiliser distribution systems, repeated shortfalls in planned domestic fertiliser production and wide annual fluctuations in fertiliser imports. Wherever the systems behind the processes which generate growth in actual fertiliser consumption were relatively strong growth in consumption has been faster despite not-so-favourable environment with respect to response function. The experience of Gujarat clearly reveals this. Despite having less than 20 percent of its area under irrigation and despite poor rainfall environment, Gujarat had higher level of fertiliser consumption per hectare than many States with more irrigation and superior

rainfall environment. This was mainly due to faster diffusion of fertiliser use under not only irrigated but also unirrigated conditions. A fairly wide-spread network of fertiliser distribution system, its efficient working and the pressure from the supply side, especially fertiliser factories located in the State, were the main reasons behind Gujarat's superior performance in raising its fertiliser use.

Strategy and policies for future growth in use

2.30 To discuss strategy and policies for future growth in fertiliser use meaningfully, it is not enough to understand how and why of the past growth. It is just important to consider the nature and area of challenges.

Nature of challenges

2.31 First, the nature of the challenge in increasing agricultural production has changed. It is no more a question of substituting imports of cereals through rapid growth in their domestic production. More production of cereals is of course needed. But it is needed to alleviate hunger of the poor whose main source of income is employment and whose main item of expenditure is food. Therefore, additional production of cereals has to be in most cost-effective manner to facilitate employment-oriented economic growth. Obviously, the price policy implications of this are quite different from that of increasing production to substitute imports. In terms of import-substitution, the focus has to be on oilseeds and pulses. And here, price incentives alone are not sufficient as the past experience clearly shows.

Area of challenge

2.32 Second, the bulk of the past growth in fertiliser consumption has remained concentrated in less than one-fourth of all districts. Furthermore, most of these districts are located in about one-third of the States. Both diffusion and rates have reached fairly high levels in these regions. Consequently, continued dependence on these regions for further growth in fertiliser consumption would lead to greater pressures for higher prices of crops and lower prices for fertilisers. This is natural because of diminishing marginal production from additional fertiliser use. Fertiliser industry and trade have been generally sympathetic to such pressures because these are the markets they have developed and catered to.

2.33 These two considerations taken together with the discussion in the previous sections suggest that the strategy for further growth in fertiliser consumption should simultaneously aim at exploiting the remaining untapped potential and raising economic potential of fertiliser use through improving the response function environment. The Seventh Plan implies considerable expansion in fertiliser use even in States with low irrigation. Such expansion, however, cannot be achieved successfully by a fragmented ad-hoc approach to fertiliser policy issues. What is needed is a new orientation in which complementarities between different aspects of fertiliser policies are fully understood. Similarly, policy matters in the domain of the State Governments are considered as crucial as the policies of the Central Government. The following paragraphs elaborate these points.

Promoting fertiliser use in rainfed areas

2.34 Most of the unexploited potential is on about 70 per cent of cultivated land which is unirrigated. This land accounts for more than 80 percent of the production of jowar, bajra, pulses and oilseeds, about 67 percent of cotton production and 30 to 40 percent of the production of rice and wheat. Therefore, raising productivity of unirrigated areas through judicious fertiliser use is crucial to sustain yield based growth in aggregate agricultural production. It is also important to increase production of those commodities which are in short supply. For this location-specific knowledge of fertiliser response functions, fertiliser practices and other agronomic operations (like sowing time, choice of variety and plant population) need to be generated through stronger and decentralised research. Improved coordination between agricultural research and extension systems is also needed to effectively spread the knowledge among farmers. What makes these considerations critical in rainfed areas is that without appropriate fertiliser and agronomic practices, returns on fertiliser use are lower and more uncertain than on irrigated areas. On the other hand, available research clearly indicates that with

appropriate practices, returns on fertiliser use on rainfed areas could be considerably enhanced. Therefore, strengthening research and extension activities is crucial in efforts to tap the potential of fertiliser use on unirrigated areas and to continuously raise it through technological change.

Credit supply in rainfed areas

2.35 The above efforts should be simultaneously supplemented by adequate and timely flow of credit to farmers and development of efficient fertiliser distribution system. Small increases in distribution margins may not suffice to accelerate expansion of fertiliser distribution system in rainfed areas especially if vigorous efforts to promote fertiliser use are absent and fertiliser turnover remains low. The working capital requirements of the input distribution systems also need special attention since timely availability of seeds and fertilisers is more critical under unirrigated conditions.

Need to ensure adequate supply of fertilisers

2.36 Neither promotional efforts nor expansion of distribution system in unirrigated regions can be sustained unless aggregate fertiliser supply stays ahead of growth in fertiliser demand in current and newly irrigated areas. This would depend on fertiliser import policy during the Seventh Plan period and perhaps for a decade more. Despite planned dependence on imports, more often than not, this policy has been governed by such short-term considerations as clearing inventories, savings in foreign exchange and various institutional and infrastructural constraints in distribution of imported fertilisers. Consequently, imports have fluctuated widely. Given the dependence of fertiliser supplies on imports, the policy should be based on an understanding of the role of the supply side in accelerating growth of fertiliser use through sustained pressures on various systems. A policy of "liberal" imports of fertilisers will most likely be resented by the domestic fertiliser industry. It may lead to an increase in inventories in short-run because of many deficiencies in systems handling distribution of imported fertilisers. But this calls for developing effective mechanisms to tackle problem areas rather than rejecting a policy which would accelerate diffusion of fertiliser on unirrigated areas.

Steps needed to optimise fertiliser use

2.37 Raising rates of application on fertilised land to optimum levels is another way to tap the unexploited potential. It must, however, be recognised that low rates are often due to sub-optimal fertiliser practices which in turn are due to farmers' lack of knowledge. There is ample evidence of deficiencies in these practices, even in States and districts with high level of fertiliser use. Efforts in this direction should, therefore, concentrate on educating farmers in efficient practices such as balanced use of fertilisers and wherever necessary, use of micronutrients and soil amendments. Adoption of correct practices would increase the efficiency of fertiliser use and thus raise returns on it. Without such efforts, the strategy to increase fertiliser use on land which is already fertilised at fairly high rates (especially of nitrogen) would aggravate the pressure for lower fertiliser prices and higher support of crops.

2.38 To increase the economic potential of fertiliser use, accelerated development of irrigation potential and its full utilisation are a must. In addition, the agricultural research system needs to be strengthened to improve the response functions on both irrigated and unirrigated areas. The importance of these policies is well recognised and needs no elaboration. In order to exploit the economic potential of these policies, however, deficiencies in agricultural extension (especially with respect to its interface with the research system) and credit as well as fertiliser supply and distribution system must be removed. Past experience indicates that inadequate appreciation of the complementarity between policies which increase fertiliser potential and those which rapidly convert it into actual use through developing various systems, eventually results into long time lags in full exploitation of the potential.

Rationale for focussing on non-price factors

2.39 The discussion thus far has focussed on non-price policies for three reasons. First, past growth in fertiliser consumption was determined as much by the non-price factors and policies behind the processes which converted the potential into actual

consumption as by changes in prices of either crops or fertilisers. Secondly, future growth in consumption crucially depends on further development of these systems and on technological changes which improve the response function environment. Thirdly, the scope to raise profitability of fertiliser use through price policy alone seems limited, at least in the short run.

History of price control

2.40 Since 1943, the Government has controlled fertiliser prices at factory, port and farm-gate levels. Major features of fertiliser price policy have been insulation of domestic farmgate prices from fluctuations in the world market, equalisation of the cost of domestic and imported fertilisers for farmers and uniformity in prices all over the country. Until the early 1970s, there was no major budgetary subsidy on fertilisers. In fact, there was a surplus in all but a few years.

2.41 The situation has changed since 1973-74 with fertiliser subsidies in the 1986-87 budget of the Central Government reaching about Rs. 2,000 crores. Initially, subsidies were necessitated by the dramatic impact of the oil crisis on the cost of imported fertilisers. After 1975-76, however, both imported and domestic fertilisers were subsidised. The subsidies on domestic fertiliser have risen rapidly since 1977.

Retention Price Scheme

2.42 The Retention Price Scheme originated in the enhancement of cost of fertiliser production after the oil crisis of the early 1970s and the strategy to meet fertiliser requirement through encouraging growth of domestic fertiliser industry. The scheme assures a manufacturer 12 percent post-tax return on net worth provided certain norms with respect to capacity utilisation and consumption of raw materials are achieved. The average cost of production of domestic fertilisers has been higher than prices fixed for farmers. The difference between the two has also grown over time due to (i) high investment cost of new fertiliser factories, (ii) escalation in the administered prices of virtually everything which goes into fertiliser production and (iii) increased cost of fertiliser distribution. This plus nearly four-fold growth in fertiliser production has resulted in the large burden of subsidies.

Subsidy on imported fertilisers

2.43 The subsidy on imported fertilisers during the mid 1970s was mainly due to the high cost of fertilisers in the world market. In recent years, it has been mainly due to significantly higher cost of distributing imported as compared to domestic fertilisers. Because of fluctuations in both volume of imports and world market prices of fertilisers, subsidies on imported fertilisers fluctuated between Rs.46 crores and Rs. 727 crores during the last decade. In 1986-87, it amounted to Rs. 193 crores (estimated).

Future subsidy burden

2.44 The targetted growth in fertiliser consumption is expected at the current rate to cause annual fertiliser subsidy to rise substantially by 1990, perhaps to as high a level as Rs. 3000 crores. It must, however, be noted that all these estimates do not represent economic subsidy on fertilisers. As stated above, the cost of production of domestic fertilisers is very largely governed by administered prices and some of these prices are much higher than in other countries. For the same reason, there is scope to contain the growth in the budgetary burden of fertiliser subsidies through rationalisation in the pricing and fiscal policies for fertiliser raw materials, feedstocks and capital equipments. But even with concerted efforts in these directions, the average real cost of fertilisers supplied by the domestic industry is likely to rise over time because the investment cost of newer plants is higher.

2.45 The relative merit of domestic production vis-a-vis imports of fertilisers is a complex issue involving the technology capability and experience gained in fertiliser production, the place of fertiliser industry in the development strategy and foreign exchange requirements of large scale imports every year. At present, India ranks either first or second to China in net imports of fertilisers among all countries. Thus, India's presence in the world fertiliser market influences the prices. Moreover, these prices do not always reflect the real cost of production in the countries exporting fertilisers; nor

can they be directly compared with the cost of domestic production because the latter is governed by administered prices of fuel and feedstocks which are higher than in other countries. One thing, however, seems clear, given the strategy of meeting fertiliser requirements through growth in domestic production, the growing burden of fertiliser subsidies on the budgetary resources clearly suggests that there is hardly any scope to lower the prices of fertilisers charged to farmers and thus raise profitability of its use. This conclusion is also supported by the Long Term Policy Paper of the Government.

Role of price support policy for crops

2.46 In the last two decades, the price support policy for crops has played a key role in generating growth of fertiliser use through accelerating the spread of HYVs. Due to the superior response functions, fertiliser use is more profitable in HYVs than on traditional varieties. In the absence of public procurement operations, large marketable surplus might have lowered the prices of wheat, rice, etc. and slowed down diffusion of HYVs with consequent adverse impact on growth of fertiliser use. Some economists hold that such impact of agricultural price policy on growth of fertiliser use is virtually over. Currently available HYVs are widely diffused. While there is scope to raise rates of fertiliser application on land sown with HYVs, what is needed to exploit this potential are various non-price measures because the "low" rates are due to deficiencies in fertiliser and agronomic practices. Another constraint on the policy of supporting prices of crops at progressively higher levels is the relatively slow growth in effective demand for foodgrains and inability of the surplus production to compete in the world markets without export subsidies. This has resulted in large procurement and stock-holding by the Government and growing burden of food subsidies. Removal of the domestic demand constraints depends on rapid growth in employment and this calls for containing upward pressure on agricultural prices.

2.47 Because of these constraints, non-price policies will continue to be as important as before in determining the pace of future growth in India's fertiliser consumption. This, however, is no ground for pessimism about future growth of fertiliser consumption or defeatist attitude in evolving policies required for this purpose.

Contours of future policy

2.48 The task ahead, though feasible, is not easy. It calls for tapping the relatively more difficult and unexploited potential of fertiliser use in regions and on crops which have largely remained outside the mainstream of the past growth in use. Similarly, it calls for raising the rate of application on fertilised land through relatively more difficult task of farmers' education in location-specific optimal fertiliser practices. Therefore, policies to tap the unexploited potential will have to be based on correct understanding of the deficiencies in various systems and the complementarities between different aspects of fertiliser policies. Also, far more coordination between efforts of the Central and State Governments will be needed than in the past because many aspects of the processes affecting further growth in fertiliser use are in the policy domain of the State Governments. More importantly still, to raise fertiliser consumption to the targets set for 1990 (or for the year 2000), in ways which are consistent with the ultimate objective of growth in agricultural production, the economic potential of fertiliser use needs to be increased through continuous technological change. The urgency of recognising all this is clear from the implications of the growing fiscal burden of food and fertiliser subsidies for sound economic development.

CHAPTER III

HISTORY AND ANALYSIS OF FERTILISER USE IN INDIA

This chapter sets out the introduction and growth of fertiliser use over successive decades and underlines the critical role played by fertilisers in agricultural development. It then proceeds to compare the progress in fertiliser use in India vis-a-vis other countries and analyses the use of fertilisers Statewise, cropwise and holdingwise. It then analyses the findings and recommendations by three expert bodies, namely, The Sivaraman Committee (1965), The National Commission on Agriculture (1972) and National Council of Applied Economic Research (1978). The targets of fertiliser consumption by 1989-90 as well as by 2000 AD are also set out. This information would provide a useful framework for promoting fertiliser use and evolving a rational price policy.

Introduction and growth of fertiliser use in India

Early History

3.02 The history of fertiliser use is indeed interesting though short. It is only at the beginning of the 19th century that the significance of crushed bones as fertiliser was realised in England and other parts of Europe. Von Liebig, a German scientist, was provoked to accuse England for extracting from the battlefields and ancient burial grounds bones of three and a half million men for production of manure. In India, chemical fertilisers were introduced in the early part of the 20th century. During 1906, Single Superphosphate was produced in Ranipet, followed by the production of Ammonium Sulphate by Tata Iron and Steel Company at Jamshedpur in 1919. Only about 10 per cent of the total production of 4436 tonnes of Ammonium Sulphate was used in India and the rest exported; the proportion rose to 40 per cent in 1925. Subsequently, with the rising demand, Ammonium Sulphate had to be imported.

Recommendation of Royal Commission on Agriculture

3.03 In 1928, the Royal Commission on Agriculture recognised that the soils of India were deficient in nitrogen and strongly recommended the use of chemical fertilisers. The Bengal famine of 1942 further gave a fillip to the efforts for increasing farm production.

Intensive Agricultural District Programme

3.04 The introduction of Intensive Agricultural District Programme in 12 districts in 1960-61 was the first serious attempt for intensive cultivation based on fertilisers. In mid-1960s, dwarf varieties of wheat and paddy as well as hybrids of maize, jowar and bajra dramatically appeared on the scene. These were all fertiliser-responsive varieties which caused a spurt in demand for fertilisers. Government responded with various measures including establishment of a High Level Committee headed by Shri B. Sivaraman, the then Chief Secretary, Government of Orissa, to promote both the production and consumption of fertilisers. Since then, there has been a steady and even spectacular growth in consumption which reached 9.0 million tonnes of nutrients in 1986-87.

Fertiliser use in India compared to other countries in the world

Low level of fertiliser use in India compared to developed and developing countries

3.05 Though India is the fourth largest consumer of fertiliser in the world in aggregate terms, she ranks only 9th in terms of kilograms of fertiliser per hectare of land even amongst the developing countries of Asia and Pacific. The latest comparable figures are available for 1983-84. Amongst economically advanced countries, the situation varies according to the supply of land. These countries which have relatively limited supply of land, use high doses of fertilisers, for example, 437.0 kilograms per hectare in Japan and 786.8 kilograms per hectare in Netherlands. On the other hand, those with relatively larger tracts of land apply smaller doses, for example, 104.5 kilograms per hectare in USA and 98.7 kilograms per hectare in USSR.

3.06 Coming back to the Asian scene, fertiliser consumption in China in the year 1983-84 was 180.6 kilograms per hectare compared to 39.4 kilograms in India, 74.0 kilograms in Srilanka and 331 kilograms per hectare in Republic of Korea. In the same year, the per capita consumption in China was 17.5 kilograms while it was 9.0 in India and 18.0 in the Republic of Korea.

Rapid increase in fertiliser use in China

3.07 The case of Peoples Republic of China is of great interest for us in India since both the countries started in early 1950s with practically the same level of fertiliser use and since both of them have the problem of limited supply of land. The constraint of land is even greater in China which has 0.10 hectare of arable land per capita as against 0.25 hectare in India. Yet China has been able to increase its fertiliser use to 18.2 million tonnes in 1983-84 compared to 7.7 million tonnes in India in the same year. The leading province in fertiliser use in China, namely Shanghai, used 211 kilograms per hectare in the year 1983 compared to 143 kilograms per hectare (1983-84) in the leading State of Punjab in India. The relatively arid State of Inner Mongolia in China is the lowest user of fertiliser with 31 kilograms per hectare as against Assam which uses only 5 kilograms per hectare.

3.08 The key to successful increase in fertiliser use in China is the effective public distribution system, accompanied by the large-scale use of organic manures. Efficiency of fertiliser use was increased by employing fertiliser applicators and briquetting products like Ammonium Bicarbonate and Urea. The introduction of hybrid rice and wheat as well as high yielding varieties of other crops, together with efficient management of water, have helped the Chinese farmers to reap high profits from fertiliser use which created high demand for fertiliser. Further aspects of Chinese experience will be examined in subsequent parts of this report dealing with fertiliser promotion.

Analysis of fertiliser use in India

Aggregate fertiliser use

3.09 Annual fertiliser consumption since 1950-51 is given below in table 3.1.

Table 3.1: YEARWISE FERTILISER CONSUMPTION IN INDIA

Year	Nutrient consumption N + P + K (million tonnes)	Percentage increase or decrease over previous year
1950-51	0.069	-
1955-56	0.148	-
1960-61	0.306	-
1965-66	0.789	-
1966-67	1.101	+ 39.5
1967-68	1.540	+ 39.9
1968-69	1.760	+ 14.3
1969-70	1.982	+ 12.6
1970-71	2.207	+ 11.4
1971-72	2.656	+ 20.3
1972-73	2.768	+ 4.2
1973-74	2.839	+ 2.5
1974-75	2.573	- 9.3
1975-76	2.894	+ 12.4
1976-77	3.411	+ 17.8
1977-78	4.286	+ 25.6
1978-79	5.117	+ 19.4
1979-80	5.255	+ 2.7
1980-81	5.516	+ 4.9
1981-82	6.064	+ 9.9
1982-83	6.388	+ 5.3
1983-84	7.710	+ 20.7
1984-85	8.210	+ 6.5
1985-86	8.737	+ 6.4
1986-87 (Estt)	9.002	+ 3.0

The total consumption in the country has risen from 69,000 tonnes in 1950-51 to 9.0 million tonnes in 1986-87. From the table, it appears that fertiliser consumption rose from 0.3 million tonnes in 1960-61 to 1.1 million tonnes in 1966-67 which evidenced the introduction of high yielding varieties of cereal seeds. Despite a larger base of 1966-67, there was a three times increase in the 10 years ending 1976-77. In the 10 years ending 1985-86, there has been again a spectacular growth from a level of 2.9 million tonnes to 8.7 million tonnes, three times increase in 10 years again. This rate of growth is amongst the highest in the history of world agriculture. The area covered by high yielding

varieties went up from 15.4 million hectares in 1970-71 to 57 million hectares in 1985-86.

Zonewise analysis

3.10 An analysis of zonewise and Statewise trends in fertiliser consumption for the period 1966-67 to 1986-87 is given in table 3.2.

Table 3.2: STATEWISE TREND OF FERTILISER CONSUMPTION

State	(In '000 tonnes)								
	1966-67	70-71	75-76	80-81	82-83	83-84	84-85	85-86	86-87 (Estt)
Southern Zone									
Andhra Pradesh	201.1	283.5	412.1	575.5	726.4	908.6	980.3	888.1	866.4
Karnataka	74.4	155.0	218.7	343.9	401.4	487.2	590.7	555.5	552.7
Kerala	54.3	56.6	44.7	97.5	108.2	129.5	127.6	141.3	156.9
Tamil Nadu	148.8	296.0	299.0	491.3	465.4	586.8	690.5	668.3	664.6
Pondicherry	—	—	4.8	12.1	13.0	13.5	14.3	14.8	16.4
Plantation Boards	—	—	—	91.3	110.5	61.7	109.4	80.8	135.7
Total	478.6	791.1	979.3	1611.6	1824.9	2187.3	2512.8	2348.8	2392.7
Western Zone									
Gujarat	65.1	154.8	149.4	356.9	386.4	502.3	504.6	421.3	394.6
Madhya Pradesh	48.1	82.0	108.5	196.8	243.4	315.0	372.6	437.1	492.3
Maharashtra	106.5	199.2	265.2	421.0	505.6	642.0	581.3	668.0	665.0
Rajasthan	18.6	53.8	77.7	135.1	115.5	209.7	206.6	220.9	240.9
Goa & other small States/UTs.	—	—	5.8	4.2	4.6	5.0	5.9	7.7	4.5
Total	238.3	489.8	606.6	1114.0	1255.5	1674.0	1671.0	1755.0	1797.3
Northern Zone									
Haryana	—	70.1	96.9	230.8	263.2	326.1	336.6	372.2	415.6
Punjab	66.8	212.6	311.3	753.6	886.4	991.7	1047.6	1098.2	1108.1
U.P.	104.8	411.0	485.1	1150.6	1427.4	1642.8	1612.9	1972.4	1876.9
H.P.	0.4	7.3	8.8	16.2	18.2	19.1	21.7	23.7	28.3
J & K	3.3	4.7	10.3	20.7	31.9	16.5	29.1	36.1	40.3
Other UTs.	—	—	7.0	7.0	6.9	8.3	8.9	10.2	11.7
Total	175.3	705.7	919.4	2178.9	2634.0	3004.5	3056.8	3512.8	3480.9
Eastern Zone									
Asam	5.5	7.3	5.7	9.3	12.9	17.3	13.8	16.7	17.6
Bihar	64.7	99.0	135.0	204.5	203.5	292.3	381.6	501.5	549.6
Orissa	23.9	27.9	47.7	76.4	85.7	103.0	114.0	140.5	152.9
West Bengal	48.6	69.9	129.7	202.8	261.7	369.1	405.7	408.7	552.2
Other small States/UTs	—	—	3.3	37.4	60.0	62.2	54.6	53.3	58.6
Total	142.7	204.1	321.4	530.4	623.8	843.9	969.7	1120.7	1330.9

Taking 1966-67 as the base year, fertiliser consumption in the succeeding 20 years has gone up 25 times in the Northern Zone. The increase in the Western and Eastern Zones during this period is around 7.5 and 9.3 times respectively and 5 times in the Southern Zone. The zonewise share of nutrient consumption as a proportion of a national consumption varies from 13.6 per cent in the Eastern Zone, 18.2 per cent in the Western Zone, 24.3 per cent in the Southern Zone to 43.9 per cent in the Northern Zone.

Statewise analysis

3.11 The Statewise fertiliser consumption per hectare for the years 1976-77 and thereafter upto 1986-87 is given in table 3.3.

Table 3.3: STATEWISE PER HECTARE CONSUMPTION OF FERTILISERS (N+P+K)

		(Kilograms/Hectare)				
S. No.	State	1976-77	1982-83	1984-85 @ (Estt)	1985-86 @ (Estt)	1986-87 @ (Estt)
1.	Andhra Pradesh	33.84	56.89	73.19	66.31	64.69
2.	Kerala	23.65	37.81	44.62	49.40	54.85
3.	Karnataka	20.91	35.99	51.47	48.41	48.16
4.	Tamil Nadu	38.85	77.18	99.43	96.23	95.70

S. No.	State	1976-77	1982-83	1984-85 @ (Estt)	1985-86 @ (Estt)	1986-87 @ (Estt)
5.	Gujarat	19.46	37.92	48.41	40.42	37.86
6.	Madhya Pradesh	6.55	10.96	16.47	19.32	21.76
7.	Maharashtra	14.70	25.34	27.51	31.61	31.47
8.	Rajasthan	5.83	8.99	10.94	11.70	12.76
9.	Haryana	25.96	49.61	59.18	65.43	73.06
10.	Uttar Pradesh	31.51	57.77	64.34	78.68	74.87
11.	Himachal Pr.	9.67	19.04	22.40	24.37	29.16
12.	Jammu & Kashmir	13.30	31.89	28.75	35.68	39.89
13.	Punjab	59.00	128.19	150.15	157.41	158.51
14.	Assam	1.11	3.62	3.86	4.68	4.93
15.	Bihar	13.76	21.10	37.20	48.88	53.57
16.	West Bengal	20.63	37.35	51.73	52.12	70.41
17.	Manipur	9.51	21.40	20.42	26.04	33.95
18.	Meghalaya	8.34	11.65	13.57	13.98	15.84
19.	Nagaland	0.96	0.78	1.49	1.33	2.35
20.	Tripura	1.95	6.69	8.26	13.59	15.94
21.	Orissa	8.59	10.28	11.92	14.69	15.98
22.	Sikkim	NA	8.69	10.77	10.70	12.23
All India		20.39	37.00	45.53	48.44	49.91

@ Area figures relate to year 1983-84.

It is clear that during the last decade fertiliser consumption has more than doubled in most of the States. The per hectare consumption has increased by more than 200 per cent in the States of Madhya Pradesh, Bihar, Himachal Pradesh, West Bengal, Jammu & Kashmir, Assam and Manipur, it has gone up by 150-200 per cent in Haryana, Punjab, Tamil Nadu. The corresponding increase has been 100-150 per cent in the States of Kerala, Karnataka, Rajasthan, Uttar Pradesh, Nagaland and Maharashtra.

3.12 The highest per hectare fertiliser consumption in 1986-87 was experienced by Punjab (159 kilograms per hectare), followed by Tamil Nadu (96 kilograms per hectare), Uttar Pradesh (75 kilograms per hectare), Haryana (73 kilograms per hectare), West Bengal (70 kilograms per hectare), Andhra Pradesh (65 kilograms per hectare), Kerala (55 kilograms per hectare), Bihar (54 kilograms per hectare). The States of Madhya Pradesh, Maharashtra, Rajasthan, Karnataka, Himachal Pradesh, Jammu & Kashmir, Assam, Orissa and Gujarat are experiencing fertiliser use below the national average level of 50 kilograms per hectare in 1986-87.

Districtwise analysis for 1985-86

3.13 During the last 36 years, the fertiliser consumption in the country has increased from the level of 0.5 kilogram per hectare (1950-51) to 50 kilograms per hectare (1986-87). Notwithstanding this progress, there are still 24 districts where fertiliser consumption is yet less than 5 kilograms per hectare. The progress in the eastern States is particularly slow. For instance, in Assam 8 out of 9 districts are having fertiliser consumption of less than 5 kilograms per hectare; the remaining district has fertiliser consumption of 5 to 10 kilograms per hectare. At the other end of the spectrum, Punjab tops in fertiliser consumption with more than 200 kilograms per hectare in one district and 100-200 kilograms per hectare in 10 districts. There is only one district, namely, Hoshiarpur where fertiliser consumption is less than 100 kilograms per hectare (81.4 kilograms per hectare).

3.14 The data given in table 3.4 reveal that out of 329 districts in 16 States, 24 districts have fertiliser use below 5 kilograms per hectare, 25 districts in the range of 5-10 kilograms per hectare, 68 districts 10-25 kilograms per hectare, 88 districts 25-50 kilograms per hectare and 48 districts 50-75 kilograms per hectare, 28 districts 75-100 kilograms per hectare and 48 above 100 kilograms per hectare.

Table 3.4: INTER-DISTRICT VARIATION IN CONSUMPTION

(Kilograms/Hectare) during 1985-86

State	Above 100	75-100	50-75	25-50	10-25	5-10	Less than 5	Total
1. Andhra Pr.	5	-	2	10	4	-	-	21
2. Karnataka	3	1	8	3	3	1	-	19
3. Kerala	1	1	2	6	1	-	-	11
4. Tamil Nadu	3	5	3	-	2	-	-	13
5. Gujarat	-	2	2	7	4	1	-	16
6. Maharashtra	1	0	3	13	5	1	1	24
7. M.P.	-	-	2	14	20	2	7	45
8. Rajasthan	-	-	-	3	7	7	5	22
9. Assam	-	-	-	-	1	-	8	9
10. Bihar	-	4	8	10	7	2	-	31
11. Orissa	-	-	1	1	5	4	2	13
12. W. Bengal	2	1	4	6	2	-	-	15
13. Haryana	2	2	2	3	-	1	-	10
14. Punjab	11	1	-	-	-	-	-	12
15. U.P.	19	11	11	6	4	4	1	56
16. H.P.	1	-	-	6	3	2	-	12
Total	48	28	48	88	68	25	24	329

The extent of inter-district variation can be visualised from the fact that fertiliser consumption in a single district like Faridkot in Punjab (0.145 million tonnes) is comparable or even higher than total fertiliser consumption in some of the States e.g. Orissa (0.11 million tonnes), Kerala (0.13 million tonnes), Himachal Pradesh (0.02 million tonnes), Assam (0.014 million tonnes) and J & K (0.029 million tonnes) in 1984-85. The States having districts where fertiliser consumption is more than 100 kilograms per hectare are Andhra Pradesh, Karnataka, Tamil Nadu, Kerala, Maharashtra, West Bengal, Haryana, Punjab, U.P. and Himachal Pradesh. The States where fertiliser consumption is less than 5 kilograms per hectare in a majority of the districts, are Assam, Madhya Pradesh and Rajasthan.

Seasonwise analysis

3.15 The seasonwise fertiliser consumption from 1971-72 upto 1986-87 is given in table 3.5.

Table 3.5: SEASONWISE CONSUMPTION OF FERTILISER NUTRIENTS (N + P + K)*
(Million tonnes of nutrients)

Year	Kharif	Rabi	Total	Kharif : Rabi Ratio
1971-72	1.090	1.566	2.656	41:59
1972-73	1.087	1.681	2.768	39:61
1973-74	1.215	1.624	2.839	43:57
1974-75	1.138	1.435	2.573	44:56
1975-76	1.007	1.887	2.894	35:65
1976-77	1.186	2.225	3.411	35:65
1977-78	1.552	2.734	4.286	36:64
1978-79	1.931	3.186	5.117	38:62
1979-80	2.059	3.197	5.256	39:61
1980-81	2.138	3.378	5.516	44:56
1981-82	2.310	3.754	6.064	38:62
1982-83	2.267	4.121	6.388	35:65
1983-84	3.216	4.494	7.710	42:58
1984-85	3.784	4.427	8.211	46:54
1985-86	4.101	4.636	8.737	47:53
1986-87 (Estt)	4.027	4.975	9.002	45:55
Total:	34.108	49.320	83.428	40:60

*Upto 1982-83 Kharif = Feb to July, Rabi = August to January
Onward 1983-84 Kharif = April to Sept., Rabi = October to March

The data indicate that rabi season consumes around 60 percent of total fertiliser use and kharif season about 40 percent. For the last 15 years, the range of fertiliser consumption in the rabi season varied between 53 and 65 percent, the corresponding range in the Kharif season being 35 to 47 percent. Apparently the range is quite narrow and has stabilised over the years.

Cropwise fertiliser consumption

3.16 In India, fertiliser is used on a variety of crops including foodgrains, oilseeds, sugarcane, cotton and other commercial crops. Among them, foodgrain crops like paddy and wheat are the major consumers of fertilisers. The NCAER data are given in table 3.6.

Table No. 3.6: CROPWISE AND STATEWISE FERTILISER CONSUMPTION (1975-76)*
('000 tonnes)

S. No.	State	Paddy (K)	Paddy (R)	Wheat	Sugar cane	Cotton	Ground nut	Maize	Total
1.	A.P.	43.15	75.83	-	15.29	9.67	10.70	-	154.64
2.	Assam	3.57	-	-	-	-	-	-	3.57
3.	Bihar	72.91	-	37.96	2.69	-	-	5.72	119.28
4.	Gujarat	15.07	-	24.89	6.47	31.52	20.56	-	98.51
5.	Haryana	19.32	-	54.14	11.93	4.28	-	3.84	93.51
6.	H.P.	1.24	-	3.89	-	-	-	3.41	8.54
7.	J & K	6.30	-	1.87	-	-	-	1.03	9.20
8.	Karnataka	85.08	24.07	-	21.88	11.57	17.56	-	160.16
9.	Kerala	19.32	40.84	-	-	-	-	-	60.16
10.	M.P.	31.56	-	59.53	4.38	-	-	1.34	96.81
11.	Maharashtra	52.22	-	28.44	50.85	47.82	10.57	-	189.90
12.	Orissa	38.38	7.00	-	-	-	-	-	45.38
13.	Punjab	38.67	-	179.92	5.47	30.75	-	21.33	276.14
14.	Rajasthan	2.02	-	44.28	-	13.61	-	2.82	62.73
15.	Tamilnadu	166.96	44.31	-	18.72	8.41	7.26	-	245.66
16.	U.P.	53.84	-	282.69	94.65	-	-	6.91	438.09
17.	W. Bengal	146.56	21.34	25.25	-	-	-	-	193.15
All India		796.17	213.39	742.86	232.33	157.63	66.65	46.40	2255.43
Percentage		27.51	7.37	25.67	8.03	5.45	2.30	1.60	77.93
K = Kharif				R = Rabi					

*Remaining 22 percent consumption is accounted for other food crops, pulses, potatoes, chillies, bananas, tobacco, jute & plantation crops and other oilseeds.
(Fert. Demand Study by NCAER, 1978).

The table indicates that rice and wheat crops used around 60 percent of total fertiliser consumption. Sugarcane was the next major consumer of fertilisers accounting for 8 percent of the fertiliser consumption; cotton was the third highest using 5.5 percent of total fertiliser consumption followed by groundnut at 2 percent. The remaining oilseed crops and pulses consumed relatively insignificant quantities of fertilisers. Commercial crops like potatoes, chillies, bananas, tobacco, jute, plantation crops, millets and pulses accounted for the remaining 22 percent of fertiliser consumption.

Extent of area under fertiliser use

3.17 As already indicated, fertiliser consumption at the district, State and zone level is highly skewed. At the micro level, there is considerable variation among the farmers of the same area. According to the study undertaken by NCAER (1975-76) (data in table 3.7), even in Punjab which is the top user of fertilisers, no fertiliser is being used in 8 percent of the holdings with 24 percent of area.

Table 3.7: PERCENTAGE OF FARMERS USING FERTILISER AND AREA BEING FERTILISED

State	Cultivators' holdings using fertiliser(%)	Area being fertilised (%)
1. Andhra Pradesh	61.8	41.7
2. Karnataka	49.9	33.4
3. Kerala	65.3	72.6
4. Tamilnadu	69.7	55.4
5. Gujarat	62.3	43.1
6. Madhya Pradesh	15.4	10.6
7. Maharashtra	42.2	27.3
8. Rajasthan	30.8	20.1
9. Haryana	69.2	48.7
10. Punjab	91.9	76.3
11. Uttar Pradesh	44.2	32.1
12. Himachal Pradesh	33.8	27.6
13. J & K	40.5	28.6
14. Assam	6.5	4.9
15. Bihar	42.3	35.3
16. Orissa	21.4	20.7
17. West Bengal	66.0	49.8
Total	45.1	32.9

Source: NCAER Fertiliser Demand Study 1978.

The situation is very discouraging in the case of Assam, Madhya Pradesh, Orissa, Rajasthan and Himachal Pradesh where 93, 85, 79, 69 and 66 percent cultivators' holdings respectively are not using fertilisers. This indicates that even in areas of high fertiliser consumption, there are large number of holdings where fertiliser even now is not being used. The situation is far from satisfactory in low consuming areas like Assam, Madhya Pradesh, Rajasthan, Himachal Pradesh, Orissa where the number of cultivators' holdings not using fertiliser is very large. Much needs to be done to narrow down the variations in fertiliser consumption among the farmers of these States.

Rationale for continuing with fertiliser promotion

Poor calorie intake.

3.18 The rationale for fertiliser use has been widely accepted but still needs to be set out in precise terms. In the first place, the average per capita calorie intake in India is estimated at 2056 for the period 1979-81 but calorie intake by the poorer section of the country is much lower than this average. The annual increase in population at the present pace of 2.26 percent even at the future projections, at a reduced rate, call for an annual increment in food production of the order of 6 million tonnes by the end of the century. The possibility of increasing the area under cultivation is non-existent and indeed much of the area presently under foodgrain will need to be diverted to horticulture, non-food crops and forests. In the circumstances, a sharp increase in per hectare yield is imperative. The available technology and the likely improvements in it call for intensive use of fertilisers.

Need to increase yield per hectare

3.19 For the foreseeable future, increase in per hectare yield can be achieved only through the use of highly fertiliser-responsive high yielding varieties and the use of agronomic practices which increase the response to fertilisers, like timely cultural practices, proper tillage, effective plant protection measures and efficient water management combined with balanced use of fertilisers and micro-nutrients. All these require strong research and extension support to the farmer, development of input and service delivery system and efficient price support mechanism.

in nitrogen, low to medium in phosphorus but medium to high in potash. Intensive cropping has also resulted in depletion of micro-nutrients in many areas. Crop straws, even sticks as well as cattle dung are used as fuel by majority of the farmers, depriving the soil of this important source of organic manure. Therefore, the use of organic waste as a source of plant food has relatively limited relevance under Indian conditions. Moreover, organic manures are extremely bulky; as much as 2,300 kilograms of compost is needed to apply 23 kilograms of nitrogen which is contained in a 50 kilograms bag of Urea. Green manure can be a very valuable source of plant food but it involves use of the scarce land and water resources for a long period. The farmer can reap more production and profit by putting the land under another crop rather than under green manure.

Extent of nutrient removal by intensive cropping

3.21. The use of 8.7 million tonnes of nutrients in 1985-86 has only partially made good the deficiency by an estimated 17.85 million tonnes of nutrient removal. Although the extent of nutrient removal cannot be estimated very accurately for lack of standard methodology to assess the natural recuperation in the soil, none-the-less the magnitude of nutrient removal is indeed considerable. As the yield per unit area and cropping intensity are designed to increase, there will be larger magnitude of nutrient removal calling for yet larger application of nutrients to the soil to maintain soil fertility and productivity. In the circumstances, the supplementation with chemical fertilisers, of organic recycling and biofertilisers, is indispensable in our future agriculture.

3.22 As will be evident in the later part of this report, it is essential to increase the effectiveness of fertilisers applied so that higher yields can be achieved more economically. This will call for concerted extension efforts, particularly soil testing, soil amendments, balanced use of NPK as well as micro-nutrients. In the circumstances, the question is not one of "why fertiliser use" but "how fertiliser use" and "how to promote and price fertilisers efficiently".

Evolution of fertiliser policy

3.23 We have already noted the three important milestones in the evolution of fertiliser policy, namely, the publication of reports of Sivaraman Committee (1965), of the National Commission on Agriculture (1972) and of the National Council of Applied Economic Research (1978). This section sets out the main findings and recommendations of these bodies and the consequent action taken by the Government.

Sivaraman Committee

Findings of Sivaraman Committee

3.24 The report of the Committee on Fertilisers headed by Shri B. Sivaraman, the then Chief Secretary of Government of Orissa and who later adorned the office of Member, Planning Commission and Vice Chairman of National Commission on Agriculture, was the first major document to chart out the course for development of fertiliser use as well as of the fertiliser industry in India. It highlighted the critical importance of the use of fertiliser-responsive varieties and the need for promoting scientific and balanced use of fertilisers. It called for special efforts for promoting scientific use, adequate credit support both for production and distribution of fertilisers, maintenance of reasonable prices, equalisation of price at all rail-heads in the country and a reasonable distribution margin to encourage efficient distribution. The Committee also recommended special measures for encouraging domestic fertiliser production to meet the rising demand. It called for the abolition of the monopoly of the cooperatives and preferred multi-channel distribution in order to reach fertilisers efficiently to all the farmers. A majority of the recommendations of the Committee were accepted by the Government and implemented in the subsequent years. The detailed recommendations of the Committee will be spelt out in the relevant chapters in the later part of this report. It can be said that the policy

foundation relating to fertiliser production, promotion, distribution and consumption was laid by the Sivaraman Committee.

National Commission on Agriculture

Findings of National Commission on Agriculture

3.25 The National Commission on Agriculture submitted to the Government an interim report in 1971 and the final report in 1976; the following are some of their important recommendations:—

- (a) The message of profitable fertiliser use according to technical advice was to be carried across to all farmers. This should bring home the need for balanced use of fertilisers. Government must take the primary responsibility for disseminating the general message of balanced use of fertilisers through an effective extension organisation.
- (b) Retail price control being a continuing need, the wholesale and retail dealers must get a fair margin of profit to cover their costs and earn a fair net profit. The margin must be such as to enthuse the cooperatives to reach the unprofitable interior areas which are often avoided by the private trade.
- (c) The retailers must be given a margin to cover promotional efforts. As they are in close touch with the user, their promotional effort will yield good returns.
- (d) Fertiliser factories must do effective promotional work through demonstration and training.
- (e) Soil testing and advice on balanced use of fertilisers for optimum profit per unit of fertiliser was essential. The soil testing facilities owned by government and fertiliser manufacturers must be increased significantly.
- (f) Suitable intermediate storage points should be maintained both by the "pool" and the factories in their distribution zones and stocks moved evenly from the ports and from the factories to such centres so as to relieve pressure on the railway system just before the cultivation season when there is also pressure on the railways for food movements.

3.26 The Commission had realised the impact of high prices of petroleum products on the cost of producing fertilisers. They recommended re-orientation of promotional programme so that its activities are directed towards more economical and efficient use of fertilisers. They urged the extensive use of fertilisers over large areas instead of intensive use of fertilisers only in irrigated area.

3.27 With the introduction of high yielding varieties, use of high analysis fertilisers and diminishing use of organic manures would accentuate micro-nutrient deficiency in the soil. Steps should be taken to identify such deficiency and to provide to farmers adequate quantities of the needed micro-nutrients.

National Council of Applied Economic Research

Findings of National Council of Applied Economic Research

3.28 The National Council of Applied Economic Research (NCAER) were entrusted by the government with a fertiliser demand study which was carried out during 1975-77. The Council collected elaborate information on the status of fertiliser use as well as on the constraints inhibiting such use. The study revealed that only 45 percent of the farmers in India used fertilisers and that only 33 percent of the total cropped area was fertilised.

3.29 NCAER's Statewise analysis showed that lack of irrigation was the major constraint, followed by lack of credit. The need for pushing up extension work for creating proper awareness amongst the farmers was also emphasised. The study also revealed that majority of non-users were the cultivators with small operational holdings.

3.30 The study revealed that 86 percent of fertiliser use was confined to irrigated areas and areas using High Yielding Varieties and improved seed varieties accounted for 57 percent of fertiliser consumption. Consequently, a big push to fertiliser use could be given through rapid expansion in irrigation facilities and distribution of improved

varieties of seeds. Development of technology of fertiliser use in rainfed areas was also considered to be an important component for boosting fertiliser consumption in the country.

3.31 The study further revealed that among the economic factors, relative price was the most important. The poor resource base of small and marginal farmers and their relative lack of access to credit facilities was a major constraint.

3.32 The study also revealed that those small and marginal farmers who had access to credit and could use fertilisers, did so both extensively and intensively, although a large majority amongst them did not use fertilisers. It was, therefore, recommended that this was an area where fertiliser use could be stepped up by deliberate policy action on agricultural credit.

Assessment of fertiliser demand in 1989-90 and 2000 AD

3.33 The demand for fertilisers in 1989-90, the last year of 7th Five Year Plan, is derived from the targets of agricultural production. The target for foodgrains production in 1989-90 is 178-183 million tonnes reflecting an annual compound growth rate of 3.48 to 4.06 percent. A growth rate of 6.72 percent has been projected for oilseeds, 4.84 percent both for cotton and jute and 3.81 for sugarcane. Taking into account the expansion of irrigation projected during the 7th Plan, productivity of irrigation by itself and a weighted average response ratio of 1:8, the derived demand for fertilisers is found to be in the range of 13.5 to 14 million tonnes in the year 1989-90.

3.34 Creation of fertiliser capacity takes more than 5 years from the planning stage to production and hence it is essential to have an idea of fertiliser demand in 2000 AD also.

3.35 The 7th Plan document published by the Planning Commission in October 1985 assesses the requirement of food-grains by the year 2000 at around 240 million tonnes to feed a population of 972 million. The document also states that the achievement of this target will be made possible by increased use of fertilisers and expansion of irrigated area as well as by improvement in technology. The requirement of fertilisers by 2000 AD has also been estimated at around 20 million tonnes.

Conclusion

3.36 The foregoing facts and figures indicate that while there have been impressive gains in the use of fertilisers and the resultant growth in agricultural production in the last two decades, much remains to be done to step up fertiliser use in the next 15 years and to reach the high yield rates of various crops as obtained in other developing and developed countries. The three important expert bodies which have studied the fertiliser scene, have unanimously called for larger efforts for promoting scientific use of fertilisers for building up a more effective distribution system backed by credit and other facilities and to adopt a sensible price policy which would offer incentives to the farmers to use fertilisers more efficiently and at a higher dose. The succeeding chapters in this report deal with these issues one by one.

CHAPTER IV

AGRONOMIC FACTORS IN PROFITABLE FERTILISER USE

4.01 Adoption of fertiliser use depends on various factors, such as, profitability of its use, availability of credit, irrigation and fertiliser supply, adoption of high yielding varieties and package of cultural practices which have been developed through intensive research over a period of time. The response functions to fertiliser use can be considerably shifted upwards with the application of scientific practices, such as, the balanced use of fertilisers and proper time and method of application of right type in right quantities. This chapter will recommend various agronomical practices which can improve the response ratio to fertiliser application and, therefore, the profitability of fertiliser use.

Establishment of research base 4.02 On the recommendation of the Royal Commission on Agriculture which submitted its report in 1928, the Imperial Council of Agricultural Research was set up in 1929. After Independence, it was renamed as Indian Council of Agricultural Research (ICAR) and was considerably strengthened over the years to undertake research aimed at increasing agriculture production. Concerted efforts of ICAR during the last 4 decades have accelerated attainment of self-sufficiency in food by the country.

Introduction of HYV 4.03 Most of the increase in the production of cereals took place from mid-60s with the introduction of high yielding varieties which efficiently converted relatively large fertiliser doses into grain, fibre and other produce. The Indian scientists were not merely recipients of improved varieties; they further improved upon them significantly. They also worked out profitable package of practices, including agronomic and plant protection measures, for different agro-climatic conditions of the country.

Expansion of research base 4.04 Indian Council of Agricultural Research has established 39 major Research Institutes dealing with various crops alongwith the research on agronomic practices. It also implements 78 All India Coordinated Projects dealing with various crops and agronomic practices. The All India Coordinated Projects relating to fertiliser use are given in table 4.1.

Table 4.1: MAJOR ALL INDIA COORDINATED RESEARCH PROJECTS OF THE ICAR RELATED TO SOIL FERTILITY, PRODUCTIVITY AND FERTILISER USE

S. No.	Subject of project	Centres (No.)	Year of Start
1	Agronomic research (replicated experiments)	43	1953
	(experiments on cultivators' fields)	54	
2.	Dryland agriculture	23	1970
3.	Water management	32	1967
4.	Soil test crop-response correlation	14	1969
5.	Micro-nutrients in soils & plants	9	1969
6.	Management of salt-affected soils	8	1970
7.	Chemistry of submerged soils	8	1980
8.	Biological nitrogen fixation	10	1979
9.	Microbial decomposition & waste recycling	8	1967
10.	Improvement of soil physical conditions	10	1969
11.	Management of diara lands	3	1980
12.	Long-term fertiliser experiments	11	1970

Note:- There are also a large number of very important crop improvement projects with a significant component of agronomy/soils research.

These projects are implemented in collaboration with 26 Agricultural Universities in various States. Almost in every State there is one or more than one Agricultural

University. Besides teaching, these agricultural universities are also engaged in conducting research on local agricultural problems. Each university has a full fledged division of agronomy and soil science which carries out research on fertiliser use and works out package of practices of fertiliser use.

Crop yield potential

4.05 Through the National Demonstration Project, Indian Council of Agricultural Research and Agricultural Universities have demonstrated, in farmers' fields, the production potential of new varieties with the adoption of new technologies. These demonstrations have shown that under good management, yields can be stepped up three to ten times the national average yields. This gap can be seen from table 4.2 given below.

Table 4.2: YIELD GAPS IN MAJOR CEREAL CROPS

Crops	Yield (q/ha)		
	Highest N.D. Yield	Average N.D. Yield	National average
Wheat	63.00	40.10	18.36
Rice	75.12	32.06	12.30
Maize	63.50	31.58	11.02
Pearl millet	45.00	26.08	4.72
Sorghum	62.50	36.14	6.63

Source: National Demonstration Project-An Overview, ICAR, 1985.

The data show that there is a considerable scope to increase the yields of crops.

Response to fertiliser application

4.06 Under the All India Coordinated Agronomic Research Project of I.C.A.R., the following average grain yield response to the application of one kilogram of nutrient under irrigated conditions has been established:-

Crop	Response kg. grain/kg. nutrient
Rice	11.9
Wheat	9.5
Maize	8.2
Jowar	5.6

Source: Project Bulletin No. 2, All India Coordinated Agronomic Research Project, ICAR, 1985.

Similarly, under unirrigated conditions, the response to fertiliser application has been observed as given below

Crop	Response kg. grain/kg. nutrient
Rice	7.2
Wheat	4.3
Maize	7.6
Jowar	4.1

Nutrient removal due to cropping

4.07 Intensive cultivation of high yielding varieties, to get higher production and productivity, results in heavy nutrient removal from the soil. Table 4.3 gives the magnitude of nutrient removal during production of 152.4 million tonnes of food grains which was achieved in 1983-84. Against the nutrient removal of 18.90 million tonnes, the nutrient application in the form of chemical fertilisers in 1983-84 was only 7.7 million tonnes. This not only results in heavy depletion of nutrients from the soil but also results in nutrient imbalances. For maintaining long term productivity, it is essential to maintain soil fertility level through judicious application of chemical fertilisers, organic manures and bio-fertilisers. It is also necessary to ensure that all the essential nutrients required for the normal growth of the plant are present in a balanced manner.

Table 4.3: NUTRIENT REMOVAL WITH CROP PRODUCTION

Foodgrains	Production 1983-84 (Million tonnes)	Aveg. Nutrient*			Total Nutrient			Total (Million tonnes NPK)
		Removal (kg/ tonne of grain)			removal (Million tonnes)			
		N	P	K	N	P	K	
Paddy	60.1	29.9	8.6	44.8	1.26	0.52	2.69	4.47
Wheat	45.5	27.2	15.0	36.0	1.24	0.68	1.64	3.56
Jowar	11.9	46.3	16.0	77.0	0.55	0.19	0.92	1.66
Bajra	7.7	33.5	12.2	112.6	0.26	0.09	0.87	1.22
Maize	7.9	42.4	17.5	39.0	0.33	0.14	0.31	0.78
Other cereals	6.4	21.9	11.7	50.7	0.14	0.07	0.32	0.53
Pulses	12.9	57.9	7.1	9.5	0.75	0.09	0.12	0.96
Total	152.4	-	-	-	4.53	1.78	6.87	13.18

Note: Ratio between food crop and commercial crop in nutrient removal is 2.3: 1.0.

Removal by food crops=13.18 million tonnes.

Removal by commercial crops=5.72 million tonnes.

Total removal=18.90 million tonnes.

*Source: N.C.A. Report, 1976.

**Soil fertility
status of Indian
soils**

4.08 Soil test results, over the years, have shown that bulk of the Indian soils are poor in nitrogen because of low quantum of organic matter or humus. A striking observation that has come out of this study is the low status of phosphorus fertility in nearly half of the districts; hardly a few districts are rich in available phosphorus, the remaining ones being in the medium category. This is a finding of great significance in the context of established role of phosphorus and of the need to maintain soil fertility level in our intensive system of agriculture. As regards potassium, its deficiency is much less prevalent since 70 percent of the districts come under the medium to high fertility class.

4.09 Intensive cropping, through the cultivation of high yielding varieties and multiple cropping, will result in heavy nutrient removal bringing about serious imbalances in soil fertility. At present, there is no programme to monitor the soil fertility status in a continuous manner under various cropping systems in different agro-climatic zones. The Committee recommends that such a programme should be taken up at national level, to collect and analyse data in regard to the changing pattern of soil fertility levels so as to help policy formulations to ensure that the proper soil fertility level is maintained.

**Status of soil
testing service**

4.10 441 Soil testing laboratories are in operation in India with a capacity to analyse about 6 million samples per annum. The capacity utilisation of 170 soil testing laboratories located in the North ranges from 47 percent in J & K to 103 percent in U.P. In the Southern zone, in the 100 soil testing laboratories, the capacity utilisation ranges from 56 percent in Kerala to 99 percent in Karnataka. In the Western zone which has 85 soil testing laboratories, the capacity utilisation ranges from 52 percent in Goa to 103 percent in Gujarat. The capacity utilisation of 86 laboratories in the East ranges from 38 percent in Arunachal Pradesh to 88 percent in Tripura. The average capacity utilisation in the East is only 41 per cent. Statewise capacity utilisation of soil testing laboratories is given in table 4.4.

Table-4.4: STATEWISE SOIL TESTING LABORATORIES, ANNUAL ANALYSING CAPACITY & CAPACITY UTILISATION (1983-86)

Name of State/UT	No. of soil testing labs.	Annual analysing capacity ('000)	Percent capacity utilisation			No. of districts not having soil testing laboratories
			1983-84	1984-85	1985-86	
NORTHERN ZONE						
1. Delhi	1 (0)	3	159	94	NA	-
2. Haryana	30 (2)	344	94	90	82	-
3. Himachal Pradesh	12 (1)	68	94	88	82	1
4. Jammu & Kashmir	7 (1)	55	29	40	47*	9
5. Punjab	49 (9)	480	88	106	91	-
6. Uttar Pradesh	71 (13)	1185	108	104	103	-
Total	170 (26)	2135	-	-	74	10
SOUTHERN ZONE						
7. Andhra Pradesh	31 (6)	296	87	85	90	-
8. Karnataka	21 (2)	582	67	93	99	-
9. Kerala	14 (2)	230	49	58	56	3
10. Tamil Nadu	32 (15)	966	NA	85	NA	3
11. Pondicherry	2 (1)	20	47	95	95	-
Total	100 (26)	2094	-	-	85	6
WESTERN ZONE						
12. Gujarat	23 (8)	267	91	102	103	Nil
13. Madhya Pradesh	29 (7)	279	67	71	62	21
14. Maharashtra	22 (5)	324	91	95	97	17
15. Rajasthan	9 (5)	130	94	80	86	19
16. Goa	2 (1)	18	33	48	52	-
Total	85 (26)	1018	-	-	84	57
EASTERN ZONE						
17. Assam	13 (8)	84	39	42	56	4
18. Bihar	42 (7)	428	34	39	42	2
19. Orissa	11 (0)	330	31	31	35	1
20. West Bengal	10 (3)	82	63	52	49	2
21. Nagaland	1 (1)	10	151	59	NA	6
22. Mizoram	1 (1)	5	17	35	71	2
23. Meghalaya	1 (1)	8	NA	NA	45	2
24. Manipur	2 (1)	10	13	04	NA	5
25. Tripura	2 (1)	16	19	53	88	2
26. Arunachal Pradesh	1 (0)	5	13	22	38	9
27. Andaman & Nicobar Islands	1 (0)	7	51	12	42	1
28. Sikkim	1 (0)	3	NA	NA	NA	3
Total	86 (23)	988	-	-	41	39
Total All India	441 (101)	6235	69	65	74	112

* For 3 quarters only.

Figures in parenthesis indicate the No. of mobile soil testing laboratories.

4.11 From a survey conducted on the performance of the soil testing laboratories in the country for a period of 3 years 1981-84, the extent of capacity utilisation in various soil testing laboratories was as given below.

Capacity utilisation (%)	Soil testing labs. (%)
Upto 20 per cent	1.43
21-40	8.04
41-50	6.03
51-60	5.17
61-70	8.34
71-80	10.15
81-90	12.75
91-100	27.40
More than 100	20.69
Total	100.00

4.12 Low capacity utilisation of soil testing laboratories is invariably due to the following reasons:-

- (i) inadequate and irregular flow of soil samples,
- (ii) inadequate staff,
- (iii) frequent break-down of instruments and delay in repair,
- (iv) lack of availability of funds and
- (v) frequent break-down in power supply.

4.13 The pre-requisites for the success of soil testing service are:

- (a) accurate and timely sampling of the soils,
- (b) communication of soil test results much before fertiliser application season,
- (c) fertiliser recommendations corroborate with latest research data and
- (d) follow-up of the adoption of the soil test recommendations.

To achieve these objectives, the Committee recommends that the working of each soil testing laboratory should be monitored regularly. Each State should have one 'lead' soil testing laboratory. The 'lead' laboratory should produce a need-based manual on the procedures of sampling, recommendations and follow-up action and regularly conduct training of personnel engaged in the soil testing. The soil testing laboratories should be manned by qualified personnel and should be provided with necessary funds for purchase of equipments and chemicals required for effective running of the soil testing laboratories.

4.14 It is felt that the capacity utilisation of the existing soil-testing laboratories can be improved by setting up regional soil testing laboratories which will regularly monitor the functioning of soil testing laboratories, help in repairing the equipment, train the staff at regular intervals to upgrade their skills and provide necessary technology for prescribing the recommendations based on the investment capacity and the size of the holdings of the farmers. This will create confidence in the farmers in adopting the soil testing service for increasing the efficiency of fertiliser use.

4.15 There are 89.4 million holdings in the country and each holding has several fields scattered all over the areas due to the fragmentation of land. Even for analysing one typical field in each holding once in three years, the soil testing capacity required will be about 30 million samples per annum. The existing capacity is about 6 million samples per annum. It would take 15 years to analyse each holding. The soil testing capacity in the country is, therefore, inadequate and should be raised at least to a level of 10 million samples per annum.

Soil testing service is yet to become popular with the farmers. A survey conducted on the extent of collection of samples (table 4.5), shows that 93.26 percent samples are collected by officials of Agriculture Department while only 6.74 percent samples are brought by the farmers directly.

Table 4.5 : CONTRIBUTION OF SOIL SAMPLES BY VARIOUS AGENCIES

<i>Name of agency</i>	<i>Percent soil samples</i>
1. Officers of Agriculture Deptt.	93.26
2. Direct by farmers	6.74
Total	100.00

The success of soil testing service will depend on the large scale participation by the farmers. The State Governments should develop suitable programmes to ensure large participation by the farmers in soil testing service.

Poor adoption of soil testing service

4.16 The All-India Soil Test Crop Response Correlation Project of ICAR is in operation for the last 18 years. The results of this project, however, are yet to be implemented by soil testing laboratories for various reasons. Soil testing recommendations are not tailored according to the investment capacity and the size of the holding of the farmer, with the ultimate result that the enthusiasm for soil testing in India is very poor. Soil testing has become an important tool for efficient use of fertilisers amongst farmers in developed countries who have large farms and sound financial status. In India also, it can be so if the orientation of our laboratories can be changed by constant training of personnel and monitoring the results.

4.17 Demonstrations, both at Research Stations and farmers' fields, under All India Coordinated Soil Test Crop Response Correlation Project of ICAR, conducted in the States of Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, West Bengal, Haryana, Punjab, Bihar and Delhi, have shown the superiority of fertiliser use based on soil testing as against that of generalised fertiliser application. The relevant data are given in table 4.6.

TABLE 4.6: PROFITABILITY OF FERTILISER USE ON THE BASIS OF SOIL TESTING
(Rs/ha)

<i>Crop (location)</i>	<i>General recommendations</i>	<i>Soil test based recommendations</i>
Wheat (Hissar)	1283	2487
Rice (Bahrampur W.B.)	90	1285
Soyabean (Jabalpur)	2339	3063
Jute (Barrackpur W.B.)	1890	2880

Source: *Indian Farming*, p. 83-87, 1981.

4.18 Soil testing is of fundamental importance in India to delineate the nutrient deficiencies in the soils and advise the farmers for making up the nutrient deficiency and help in balanced use of fertilisers. It will not only increase the profitability of fertiliser use but also improve the efficiency of all nutrients, including nitrogen which farmers generally prefer to use. Similarly, the soil testing service can be very useful in determining the secondary and micro-nutrient deficiency which has occurred actually in many soils of the country.

4.19 The acceptability of soil testing is weak because of the research gap in making recommendations according to the resource capability of farmers. Research needs to be strengthened and reoriented to develop technology which can facilitate fertiliser recommendations tailored to the investment capacity of the farmer.

4.20 It has been established that 16 elements are essential for normal growth of the plant. Out of this, Carbon, Oxygen and Hydrogen are supplied by air and water in abundance. Nitrogen, Phosphorous and Potassium, known as primary nutrients, are required in sizeable quantities and are obtained from the soil but the soil does not have sufficient reserves to supply the required quantities of these nutrients year after year.

with the result that these are to be applied in the form of chemical fertilisers, organic manures, etc., to sustain the crop yield continuously. Calcium, Magnesium and Sulphur are classified as secondary elements and are required in significant quantities. Calcium and Magnesium are generally available in sufficient quantities except in highly leached acid soils where these are required to be applied as soil amendments.

Regionwise NPK response 4.21 The regionwise pattern of response of NP & K fertilisers in major cereal crops on the basis of experiments in cultivators' fields from 1977-1984 may be seen in table 4.7.

Table 4.7: REGIONWISE PATTERN OF RESPONSE TO NP & K FERTILISERS IN MAJOR CEREAL CROPS (EXPERIMENTS ON CULTIVATORS' FIELDS (1977-1984))

Season/Crop	Region	No. of trials	Control yield (q/ha)	Yield Response (q/ha) at			
				N ₁₂₀	P ₄₀ over N ₁₂₀	K ₄₀ over N ₁₂₀ P ₄₀	'N ₁₂₀ P ₄₀ K ₄₀
Kharif Rice (I)	North-West	470	30.5	13.4	4.0	3.0	10.2
	South	1366	29.2	11.4	5.2	4.9	10.7
	North-East	967	24.0	14.8	8.0	5.0	13.9
Kharif Rice (RF)	North-West	1253	21.0	11.8	4.2	3.5	9.7
	South	517	27.4	10.5	5.8	5.2	10.7
	North-East	662	23.6	9.8	7.4	4.3	10.7
Rabi Rice (I)	South	1040	28.9	10.4	4.4	4.8	9.8
Summer Rice (I)	_do_	268	32.3	13.6	9.4	6.8	14.9
Rabi Rice (RF)	_do_	306	25.6	7.1	4.5	4.4	8.0
Rabi Wheat (I)	North-West	525	19.6	12.4	5.7	3.1	10.6
	South	1055	13.0	6.5	2.9	2.7	6.0
	North-East	1689	15.5	13.2	6.0	4.8	12.0

I= Irrigated RF= Rainfed

Source: ICAR-Project Bulletin No. 2, 1985 All India Coordinated Agronomic Research Project, Bangalore.

Sulphur deficiency 4.22 Sulphur deficiency has been noted in about 90 districts in the country affecting 23-30 million hectares of cultivated land. Yield response in 31 crops to sulphur application has been obtained. In general, such response is significant and profitable. The districts where widespread sulphur deficiency is noted are given in table 4.8

Table 4.8: SULPHUR DEFICIENCY DISTRICTS IN THE COUNTRY

State	Names of districts
Andhra Pradesh	Kurnool, West Godavari
Bihar	Ranchi
Delhi	Delhi
Gujarat	Amreli, Banaskantha, Junagadh, Kheda, Rajkot, Sabarkantha, Surendranagar
Haryana	Bhiwani, Gurgaon, Hissar, Mohindergarh, Sirsa

State	Names of districts
Himachal Pradesh	Hamirpur, Kangra, Una
Karnataka	Bangalore, Belgaum, Chickmagalur, Coorg, Dharwad, Hassan, Kolar, Mandya, N. Canara, S. Canara, Tumkur
Kerala	All districts
Madhya Pradesh	Balaghat, Bhind, Dewas, Dhar, East Nimar, Gwalior, Indore, Jabalpur, Mandsaur, Morena, Ratlam, Sagar, Sehore, Ujjain
Maharashtra	Aurangabad, Bhandara, Chandrapur, Pune, Kolhapur, Nanded, Osmanabad, Parbhani, Raigad
Orissa	Ganjam
Punjab	Faridkot, Ferozpur, Kapurthala, Ropar, Ludhiana, Patiala
Rajasthan	Jaipur, Jodhpur, Udaipur
Tamilnadu	Coimbatore
Uttar Pradesh	Allahabad, Bulandshahr, Farukhabad, Hardoi, Jhansi, Kanpur, Lalitpur, Mirzapur, Nainital, Sitapur, Varanasi

Source: H.L.S. Tandon, 1984 *Fertiliser News*, 31 (9): 9-16

4.23 Because of the important role of sulphur in crop production particularly in oilseeds and pulses, sulphur status of soils along with N, P_2O_5 and K_2O should be regularly monitored. In sulphur-deficient soils, steps should be taken to popularise the use of gypsum/pyrites, which are cheaper sources of sulphur. State Governments should take up special promotion programmes to promote use of sulphur in sulphur-deficient soils.

Micro-nutrient deficiency in soils

4.24 Out of 16 essential elements required for normal growth of the plants, seven elements such as Zinc, Manganese, Iron, Boron, Molybdenum, Copper and Chlorine are required in small quantities and are classified as micro-nutrients. Although micro-nutrients are required in small quantities, their deficiency can result even into a complete crop failure.

4.25 The All India Coordinated Scheme on micro-nutrients in soils and plants has delineated micro-nutrient deficiency in Indian soils. These studies have shown that deficiency of zinc was most widespread. Next to zinc, deficiency of iron appears to be wide-spread. Deficiencies of manganese and copper were also noted to some extent.

Effect of unbalanced use of fertilisers

4.26 Poor soil fertility and imbalanced use of fertiliser nutrients have resulted in low efficiency of applied nutrients. Studies conducted by Punjab Agricultural University have shown that the continuous use of only nitrogen without the addition of other nutrients has resulted in decline of yields. Yields could be increased only after the application of phosphates. Further, the yield has declined due to deficiency of zinc and could be improved with application of zinc sulphate. The data obtained in this regard are given in tables 4.9 and 4.10.

Table 4.9: EFFECT OF NITROGEN ALONE AND IN COMBINATION WITH PHOSPHORUS ON WHEAT GRAIN YIELD (Q/HA)

Treatment	Yield (q/ha)		
	1969-70	1970-71	1971-72
Control	11.73	7.56	12.65
N	17.20	12.87	21.45
NP	19.68	15.52	25.38

Source: Proceedings FAI-FAO Seminar, 1974.

Response to zinc application

4.27 The grain yield of cereals as influenced by zinc deficiency can be seen in the following table:-

Table 4.10: EFFECT OF ZINC APPLICATION ON YIELD OF CEREAL CROPS (Q/HA)

Crop	Zinc status of soil	N_{120}	P_{60}	K_{60}
		without zinc	with zinc	Response to zinc
Wheat	Deficient	38.1	44.5	6.4
	Highly deficient	10.9	30.8	19.9
Rice	Deficient	60.0	68.2	8.2
	Highly deficient	35.1	74.3	39.2
Maize	Deficient	18.0	33.3	15.3

Source: Information provided by P.A.U. in response to questionnaire.

4.28 Micro-nutrient deficiencies were noted after mid-sixties with introduction of multiple cropping and cultivation of high yielding varieties which are heavy feeders of nutrients. Increased use of high analysis fertilisers which have low micronutrient content as an impurity and lack of application of organic manures further accentuated micronutrient deficiencies. Micronutrient deficiency has resulted in very low response to N, P_2O_5 , K_2O application. For upward thrust in response function, serious efforts are required to intensify research on micronutrients to locate micronutrient deficient soils, to find response to micronutrient application to different crops and to identify the role of micronutrients in increasing the efficiency of major nutrients. This information should be collected from all the agro-climatic zones.

4.29 According to the available evidence, supply of quality micro-nutrients to the farmers poses a serious problem. The production of micronutrients, particularly zinc sulphate, has been reserved under small scale sector with the result that a large number of small units have come up with a production capacity ranging from 1 tonne to 10 tonnes per day. This has resulted in production of poor quality of micronutrient fertilisers, specially zinc sulphate. Punjab Land Reclamation and Development Corporation has started production and distribution of quality zinc sulphate and other single micronutrient carriers. The institutional agencies in other States should also be encouraged to take up the production and distribution of micronutrients.

Fertiliser use in rainfed agriculture

4.30 About 70 per cent of the cultivated land is unirrigated which receives only 20 per cent of the total fertiliser consumption of the country. These unirrigated areas account for more than 80 per cent production of jowar, bajra, pulses and oilseeds, about 67 per cent of the cotton production and 30 to 40 per cent of the production of rice and wheat. These soils are deficient in both major and micro-nutrients. Raising productivity of these soils would require judicious use of fertilisers.

Yield increase in rainfed agriculture with moderate doses of fertilisers

4.31 The All India Coordinated Dryland Project of ICAR through research trials in different agroclimatic regions in non-irrigated areas has developed technology for appropriate cropping patterns, application of cost effective doses of fertilisers, use of improved seeds and moisture-conservation practices. With the adoption of improved technology and fertiliser input, the yield potential of major rainfed crops even without irrigation is manifold (table 4.11).

Table 4.11: AVERAGE YIELDS OF SOME IMPORTANT CROPS IN SEMI ARID TROPICS (SAT) AND POTENTIAL YIELD OBTAINABLE UNDER RAINFED CONDITIONS WITH IMPROVED TECHNOLOGY AND FERTILISER INPUTS

Crop	Average yield kg/ha in SAT (30 year average)	Yield obtained (kg/ha) at ICARISAT under rainfed conditions	
		Low fertility and average management (1)	High fertility and average management (2)
Sorghum	842	2627	4900
Pearl Millet	509	1636	3482
Chickpea	745	1400	3000
Pigeonpea	600	1000	2000
Groundnut	794	1712	2572

- (1) For sorghum and pearl millet 43 N and 20 P₂O₅ and for pigeon pea and groundnut 20 N and 20 P₂O₅ kg/ha are added.
- (2) For sorghum and pearl millet 86 N and 40 P₂O₅, for chickpea and pigeonpea 18 N and 46 P₂O₅ and for groundnut 60 P₂O₅ kg/ha are added.

Source: J.S. Karwar, 1986 Second Regional Seminar: Rainfed Agriculture in Southern ASIA, New Delhi.

The uncertainty in rainfall and associated risk factors in rainfed agriculture make investment in fertiliser and its agronomic management a more difficult proposition. Therefore, to cover the risk, some incentives are required to be introduced for encouraging fertiliser use in such areas. There is a need to develop a system of distribution which will ensure advance stocking and fertiliser delivery at the door steps of farmers so that fertiliser is available whenever farmers need it.

Fertiliser use efficiency in wetland rice

4.32 Fertiliser use efficiency is comparatively poor in wetland rice, especially in the case of nitrogen application. Under the wetland rice conditions, the nitrogen losses occur due to volatilisation and denitrification and leaching. The efficiency of nitrogen utilisation in wetland rice soils can be improved through the use of applicators which can ensure deep placement of fertilisers into the soils. In China, an applicator for deep placement of briquetted super granule nitrogenous fertiliser has been developed. These applicators are in-expensive and light in weight and are now used in most of the rice-growing provinces in China.

4.33 Ammonium bicarbonate, a low quality volatile product, is the major source of nitrogen for crop production in China. Under normal broadcast conditions, they have found that the efficiency of nitrogen utilisation in the case of wetland rice ranges from 24-30 per cent. In contrast of this, the deep placement of briquetted ammonium bicarbonate through the applicator increased the efficiency of nitrogen utilisation to 37-52 per cent.

4.34 In wetland rice farming, major losses of nitrogen occur due to volatilisation, denitrification and leaching. This is further accentuated due to uncontrolled and erratic water situations. Environmental barriers and soil conditions add to the risk factor which is further compounded by the lack of appropriate technologies in such areas for fertiliser use. The low recovery of N by the rice crop is a major deterrent to the use of adequate quantities of N fertiliser in the modern fertiliser responsive rice varieties, particularly so in most of the rainfed rice areas in India.

4.35 Integrated management of nitrogen and water is of utmost importance for improving the fertiliser use efficiency. A large number of trials conducted through All India Coordinated Agronomic Research Projects have shown that the split application of nitrogen at critical stages of plant growth so as to synchronise with periods of most efficient utilisation of crop, deep placement of N in active root zone of plant and the use of coated and controlled-release N-fertiliser materials, increase the nitrogen use efficiency in the rice crop.

4.36 Although much work has been done on the possibility of coated and controlled-release urea material like sulphur-coated urea, neem cake coated urea, lac-coated urea, the cost of coating these materials has been often prohibitive and the coating materials in some cases are not easily available. Lowcost technology for production and marketing of these products should be developed. In the case of neem-coated urea, a beginning has been made to popularise this practice in the States of Maharashtra, Gujarat, Karnataka and Tamil Nadu. However, considerable efforts are required for collection, processing and distribution of neem cake for coating urea.

4.37 Field trials conducted by the ICAR have shown that the root zone placement of urea super granule increased the yield of the rice-crop, particularly in the heavy soils. Root zone placement was not found effective in the case of light and coarse soils in the States of Punjab, Western Uttar Pradesh and Haryana. Deep placement of urea super

granule has been found to be profitable in the rainfed low-land areas in Eastern Uttar Pradesh, Bihar, Orissa and West Bengal. It is in these areas that special extension programmes will have to be taken up for introducing the deep placement of urea super granule through appropriate applicators. The application of urea super granule in rice can be facilitated through line-sowing for which necessary extension efforts will have to be made. The adoption of this technology will increase both the efficiency of nitrogen and the productivity of rice crop in these areas.

4.38 Present research on rainfed and wetland fertiliser use is not adequate; there is lack of cost effective technology on fertiliser use in modern fertiliser-responsive varieties. The available research data are inadequate and limited. Further allocation of resources for research on fertiliser use in such crop production situations should be made. Research efforts should also be intensified to improve nitrogen use efficiency in wetland rice for which development of suitable applicator for deep placement of nitrogen would be most essential.

Need for recycling of organic waste and development of biofertilisers

4.39 Re-cycling of organic waste is essential to build up the humus content of the soil which improves its water-holding and nutrient-absorbing capacity. Organic manures are, however, bulky in nature and can be developed for local use only. The major component of the organic waste, available in the form of cowdung, finds its way as source of fuel.

4.40 During the Fifth Five Year Plan, a massive programme was launched by the Government of India for the development and use of organic manures through the following schemes:-

- 1) Setting up of bio-gas plants.
- 2) Setting up of mechanical compost plants in major cities.
- 3) Sewage/sullage utilisation as manure.

4.41 Bio-gas plants have a dual advantage of supplying both fuel and manure. 5.57 lakh bio-gas plants have been set up by the end of January, 1986, which can make available 12.1 million tonnes of manure. The programme of setting up of bio-gas plants is implemented by the Department of Non-Conventional Energy Sources under the Ministry of Energy.

4.42 To mobilise the urban waste for use as manure, 10 mechanical compost plants have been set up, two in Delhi and one each in Kanpur, Ahmedabad, Baroda, Bombay, Pune, Bangalore, Calcutta and Jaipur. These plants, however, are not running to full capacity, mainly due to the fact that the manure is bulky in nature and uneconomical to move from the plant to the consuming areas.

4.43 148 sewage schemes were sanctioned for utilisation of the treated sewage effluent as a source of irrigation and plant nutrients.

4.44 The National Development Council had recommended that all programmes relating to organic manures should be transferred to the State Governments w.e.f. 1st April, 1979.

4.45 In China, the use of organic manures has been practised extensively. They use all conceivable organic wastes including wastes from human, large animal and hog sources, compost of crop residues, ashes, oil-cakes, urban waste and mud from rivers and ponds. In addition, despite relative scarcity of land, green manures like Azolla, Alfalfa, Lupine, Vetch, Sesbania and Beans are cultivated on 10 million hectares, i.e. roughly 1/15th of the sown area. This has been done because the Chinese are concerned about the growing imbalance between chemical and organic manures, despite application of 25 million tonnes of nutrients in the form of organic manures. Organic

manure application has also put off the date when micronutrient deficiencies could become a limiting factor in China.

4.46 In view of the important role of organic manures in augmenting the nutrient availability and also to improve the soil fertility level, appropriate programmes for development of organic manures need to be taken up. Composting under ordinary conditions takes about 4-5 months for decomposition which is unduly long and it is not popular with farmers. In Thailand, a new technology of accelerating the composting process of organic residues through micro-biological means has been introduced. It reduces the composting period from several months to a few weeks. Using this technology, several private companies have set up compost plants for the treatment of agro-industrial wastes, such as, bagasse and distillery waste, wastes from rice mills, sawdust, corn cobs, etc. In these plants, composting is accelerated through micro-biological means. The Thai Government had also implemented a project for the production and use of compost in poor rural areas. The Department of Land Development of Thailand have also started indigenous production of activators. Thai activators are also reportedly exported to Malaysia and Philippines.

4.47 In view of the large potential for recycling of organic waste in India, the new technology of accelerating the composting process from several months to a few weeks on commercial scale should be tried at a few selected centres. If found successful, efforts could be made for the production of microbial activators indigenously.

Role of bio-fertilisers

4.48 Bio-fertilisers have a supplementary role in augmenting the nitrogen availability of specific crops in specific soils. Rhizobium culture inoculant has been found to contribute considerable quantities of nitrogen in pulses and legume oilseeds apart from leaving sufficient quantities of residual nitrogen for succeeding crops. Similarly, contribution of blue green algae for meeting a part of nitrogen requirement of wetland rice has also been recognised. It has been found that these two bio-fertilisers have universal application under Indian conditions for specific crops. However, their productivity depends on the effective strains produced locally by the research organisations. Bio-fertilisers have a promising role in augmenting the nitrogen availability of pulses, oilseeds and wetland rice. Government of India has sanctioned a National Project for Development and Use of Biofertilisers. Its major components are production, promotion, distribution and quality control. In the light of experience gained in this national project, these programmes need to be strengthened further.

4.49 Pulses including gram are cultivated in 23.54 million hectares (1983-84). Groundnut is also cultivated in 7.54 million hectares. The production of these crops can be substantially stepped up with the promotion and use of quality rhizobium cultures. The targetted production of 600 tonnes of rhizobium cultures per annum under the National Bio-fertiliser Project appears inadequate; necessary steps will have to be taken to increase the capacity for production of rhizobium cultures in the country. Similarly, there are 41.24 million hectares (1983-84) of cultivated area under rice which can benefit through the application of blue green algae. Application of 10 kg of BGA per hectare would require 0.4 million tonnes of blue green algae to cover entire wetland rice area while the National Bio-fertiliser Project has a target of production of 600 tonnes per annum. In order to maintain a culture bank which is pre-requisite for any blue green algae development programme, a National Culture Bank for blue green algae has been set up at IARI. However, further efforts will have to be made to increase the production and promotion of blue green algae for wetland rice.

Need for setting up of agency for fertiliser development

4.50 The ICAR system, through State Agricultural Universities, its Research Institutes and All India Coordinated Projects on different crops, has generated extensive literature on fertiliser use. However, there is no machinery which can ensure the flow of relevant research findings on fertiliser use to the extension system and also to monitor the efficiency of fertiliser use in different States. Much of the research data remain at present

confined to the libraries and laboratories of the Agricultural Universities, ICAR Institutes and Coordinated Projects. For effective utilisation of the research data on efficient fertiliser use, there is need for a specialised agency which interprets the research data into practical messages for continuous flow to various extension agencies. Such central agency also would institute studies on fertiliser consumption trends, functioning of soil testing laboratories, status of soil fertility, development of organic manures and bio-fertilisers. It could provide linkages between various national and international institutions concerned with fertiliser research and promotional activities. The agency may take up the following activities:-

- (i) Assessing the current level of efficiency of fertiliser use and profitability in different States and on different crops and monitoring the implementation of various programmes for securing optimal response to and profitability of fertiliser use.
- (ii) Assessing the current status of agronomic research for documentation of important findings and interpret all the research data for adoption of improved practices in fertiliser use.
- (iii) To assess the existing research activities in fertiliser use with a view to identify gaps for the purpose of strengthening the research capability.
- (iv) Consolidating and interpreting fertiliser response data for policy planning and refining fertiliser recommendations.
- (v) Strengthening and upgrading of soil testing laboratories with a view to make them more effective.
- (vi) To institute studies on constraints on greater diffusion of fertilisers, such as, availability of credit, effect of a farm-hold size and effect of input/output prices, etc.
- (vii) To make short-term and long-term fertiliser demand projections.
- (viii) To analyse constraints in fertiliser use and formulating policy recommendations to achieve the objectives of National Agricultural Policy.
- (ix) To undertake studies for improving the marketing system, including fertiliser dealers' training programme, etc.
- (x) Providing fertiliser-related personnel with a central forum, through workshops and seminars, for periodic discussions of their problems and formulating recommendations for their solution.
- (xi) Serving as a general centre for providing information on fertiliser use.
- (xii) To undertake special tasks assigned by the Government in the field of fertiliser use policies.

Product pattern

4.51 Fertiliser production in India started with the production of super phosphate in 1906. This was followed by the production of ammonium sulphate as a by-product of steel industry. Urea was first produced at Sindri in 1959. With greater emphasis on agricultural production with the beginning of the First Five Year Plan, emphasis was laid on increasing the indigenous production of fertilisers. Introduction of fertiliser-responsive high yielding varieties accelerated fertiliser production efforts to meet the growing demand of fertilisers. The evolution of fertiliser production in India during plan period is given in table 4.12.

Table 4.12: INSTALLATION OF N AND P CAPACITIES DURING PLAN PERIOD
(In 000 tonnes)

S. No.	Description	Capacity		Production	
		N	P ₂ O ₅	N	P ₂ O ₅
1.	1950-51 (Base year)	17	20	10	8
2.	Last year of First Five year Plan (1955-56)	85	64	80	12
3.	End of Second Five Year Plan (1960-61)	242	95	98	52
4.	End of third Five Year Plan (1965-66)	548	228	232	111

S. No.	Description	Capacity		Production	
		N	P ₂ O ₅	N	P ₂ O ₅
5.	Last year of three year Plan holiday(1968-69)	769	422	545	210
6.	End of Fourth Five Year Plan (1973-74)	1939	500	1060	323
7.	4th year of Fifth Five Year Plan (1977-78)	3028	915	2000	670
8.	Annual Plan (1979-80)	3891	1230	2226	757
9.	End of Sixth Plan (1984-85)	5561	1616	3800	1200

Source: Report of the Working Group on Fertilisers, Nov. 1984, Ministry of Chemicals & Fertilisers.

4.52 In mid-60s, to ensure balanced application of fertiliser nutrients, the production of NPK complex fertilisers was started in India. The production of NPK complex fertilisers in the country takes place through adoption of different technologies, viz. production of water-soluble phosphates from phosphoric acid and ammonia as well as the production of partly water-soluble nitrophosphate. The existing product pattern is as given in tables 4.13 and 4.14.

Table 4.13: CONTRIBUTION IN NUTRIENT PRODUCTION (1985-86)

Fertiliser		Share (%)
(a)	Share in N Production	
	1. Urea	79.45
	2. CAN	2.20
	3. Ammonium Sulphate	0.60
	4. Ammonium Chloride	2.48
	5. NP + NPK Fertilisers	15.27
	Total	100.00
(b)	Share in P ₂ O ₅ Production	
	1. SSP	23.94
	2. TSP	Negligible
	3. DAP	28.73
	4. Other NP + NPK Complex	47.33
	Total	100.00

Table 4.14: CONTRIBUTION OF VARIOUS NP AND NPK FERTILISERS IN NUTRIENT PRODUCTION (1985-86)

Fertiliser	Material	Production ('000 tonnes)				Share in nutrient production(%)		
		Nutrient			Total	N	P ₂ O ₅	K ₂ O*
N	P ₂ O ₅	K ₂ O	Total	N				
18-46-0	891.9	160.5	410.3	-	570.8	3.72	28.73	-
16-20-0	60.1	9.6	12.0	-	21.6	0.22	0.84	-
20-20-0	702.5	140.5	140.5	-	281.0	3.25	9.84	-
28-28-0	288.9	80.9	80.9	-	161.8	1.87	5.66	-
15-15-15	265.3	39.8	39.8	39.8	119.4	0.92	2.79	4.68
17-17-17	509.1	86.5	86.5	86.5	259.5	2.00	6.05	10.18
19-19-19	188.0	35.3	35.3	35.3	105.9	0.82	2.48	4.15
10-26-26	209.6	29.1	75.5	75.5	180.1	0.67	5.29	8.87
12-32-16	598.4	71.8	191.5	95.7	359.0	1.66	13.41	11.26
14-28-14	23.0	3.2	6.4	3.2	12.8	0.07	0.44	0.37
14-35-14	21.7	3.0	7.6	3.0	13.6	0.07	0.53	0.35
Total	3756.5	660.2	1086.3	339.0	2085.5	15.27	76.06	39.86

*K₂O figures indicate share of various fertilisers in total K₂O consumption.

4.53 The Sivaraman Committee, in its report submitted in 1965, indicated that fertilisers in mixed or complex form would be required for basal application with straight nitrogen for the top dressing. They had further suggested the product pattern for nitrogen in the form of urea and the complex fertilisers either in the form of ammonium phosphate or nitrophosphate for P and K application. This Committee had also laid greater emphasis on granulation of fertiliser mixtures. It was held that granulation provided products of standard quality and composition which helped in preventing fraud and adulteration. The other physical advantages of granular fertilisers were stated as follows -

- They are less likely to cake in storage.
- They flow more freely in a spreader or drill and can be more evenly distributed.
- They are not blown away and wasted in windy weather.
- By obviating the necessity of using conditioners, granulation enables mixtures to contain higher contents of actual nutrients.
- Granulation also helps to prevent segregation of the ingredients and makes for more uniform and homogeneous composition of the mixture.

4.54 India was just at the off-take stage in fertiliser consumption when Sivaraman Committee made recommendations on various issues involving the product pattern. At the time of introduction of fertiliser use, especially with the introduction of high yielding varieties, it was necessary to provide a balanced nutrient fertiliser material because of two reasons. First, the price of 1 kg. of nitrogen was Rs. 1.83 in ammonium sulphate while the price of 1 kg. of P_2O_5 in SSP was lower than that of nitrogen viz. Rs. 1.72. Second, the extension efforts were not quite adequate and the farmers were not aware about the advantages of the balanced use of fertilisers. However, due to increase in the prices of petroleum products and other fertiliser raw-material, the fertiliser prices have increased considerably; in particular the price of P_2O_5 is more than that of nitrogen. At present the price of 1 kg. of nitrogen in the form of urea is Rs. 5.1 while that of P_2O_5 in the form of DAP is Rs. 5.83.

4.55 A number of granulation mixing units and complex fertilisers have come into existence. A survey conducted on the granulated mixtures has revealed that a large number of samples of granulated mixtures were found to be sub-standard as compared to complex fertilisers. Over the past three decades, sufficient extension support has been developed with the result that the farmers are now better educated about the benefits of balanced use of fertilisers and are aware of different formulations which are being marketed.

4.56 On the question of the product pattern, many State Governments through their replies to our questionnaire have suggested that in view of the high cost of fertiliser nutrients there was need for tailoring the nutrient application according to the soil fertility status. They have suggested that the product pattern should be confined to urea in the case of nitrogen, DAP in the case P_2O_5 and MOP for K_2O . They have also mentioned that the farmers could prepare the required blends themselves by mixing these fertilisers, materials in required quantities. These States also felt that due to high cost of fertilisers, it was desirable to have selective use of nutrients. This could avoid wasteful application of nutrients resulting from uniform application of NPK complex fertilisers. There is much substance in these arguments.

4.57 The Committee, therefore, recommends that the future product pattern should be in the form of urea for nitrogenous fertilisers, DAP as the source of P_2O_5 and MOP should be made available to meet the requirements of K_2O . However, the existing NPK complex fertiliser capacity could continue while an attempt should be made to reduce the number of grades to ensure minimum number of grades for the same nutrient ratio.

CHAPTER V

EXTENSION STRATEGY FOR FERTILISER PROMOTION

Introduction

5.01 While evolving a profitable fertiliser use technology through research institutions is of first importance, transfer of such technology to the farmers through a sound extension strategy is also of fundamental importance for increasing crop yields. This is underlined by the fact that much of the modern technology is oriented towards efficient conversion of plant nutrients into food, fibre and other agricultural produce. This chapter sets out the historical development of the extension system in India with special reference to fertiliser use and outlines the fertiliser promotion measures followed in special projects for stepping up yields of paddy, oilseeds, pulses, millets, horticultural crops, etc. It then goes on to highlight the strategies needed for promoting efficient fertiliser use under difficult conditions such as rainfed areas and resource poor farms of weaker sections like small, marginal and tribal farmers. Finally, the chapter sums up the measures needed for strengthening the extension system for stepping up agricultural yields in general through efficient use of fertilisers.

Extension strategy before 1985

5.02 A systematic effort in extension of agricultural technology started with the establishment of community development blocks in early 1950s. The Village Extension Worker (VEW) was trained basically in agricultural technology with special emphasis on crop development. He was expected to demonstrate this technology to the farmers and convince them of its profitability so that they can also adopt improved agricultural practices including the use of improved seeds, fertilisers, plant protection measures, etc. He was supervised by a trained graduate Agricultural Extension Officer (AEO) supported by a District Agricultural Officer. The VEW was required to devote 80 per cent of his time to agricultural extension work. But thanks to the pressure of other work, particularly relief of distress, family planning, etc., the time spent in agricultural development was much less than the desired 80 per cent. Added to this was the fact that available agricultural technology was not particularly profitable and the VEW did not always carry high credibility with the farmers.

Package programme

5.03 The next stage arrived with the introduction of "Intensive Agricultural Development Programme" or the Package Programme which was taken up in 1960-61 in highly favourable areas i.e. irrigated areas where farm plans were prepared for each participating farmer to help increase his yields. Concerted efforts were made to build cooperative and other agencies to provide a package of inputs including seeds, fertilisers, pesticides and implements on credit. The package programme did make substantial progress on account of the concentration of resources in favourable irrigated areas but the progress was still slow since technology was only moderately profitable.

Slow progress

5.04 The per hectare yield of rice rose from 714 kg. in 1951-52 to 1078 kg. per hectare in 1965-66 and that of wheat during the same period from 653 to 913 kg. per hectare. Fertiliser consumption rose during this period from 0.5 kg. per hectare to 5 kg. per hectare.

Break-through

5.05 The water-shed in Indian agriculture was the year 1965 when imported Mexican wheat varieties were used by farmers in irrigated areas. The special characteristic of this wheat variety was its tremendous capacity to absorb large quantities of fertilisers and convert them efficiently into wheat grains; their dwarf stand and strong root system made this possible. The Green Revolution was thus triggered off by Mexican wheat varieties followed by high yielding varieties of paddy released by International Rice Research Institute in Philippines. While the increase in fertiliser use in fifteen years from 1951 to 1965 was only 4.5 kg per hectare, the increase in the five year periods 1965-70 and 1975-80 was 8 kg. per hectare and 15 kg. per hectare respectively; 1965 saw the take off in the modernisation of the crop system. Increased fertiliser use was the central feature in such modernisation.

**Recommendations
of Sivaraman Co-
mmittee**

5.06 The Sivaraman Committee in its report in 1965 recognised the emergence of high yielding varieties of paddy, wheat, maize, jowar and bajra and called for special measures to make fertilisers available and to promote their use. It called for a large and vigorous promotional campaign by the Government, in cooperation with the manufacturers, to convince cultivators that fertiliser use was profitable. Such a programme should consist of effective demonstrations, backed by adequate soil testing and advisory services. The purpose of the demonstrations should be to bring out the economic benefits from fertiliser use in concrete terms, in a language that the farmer can understand. The Committee called for a Fertiliser Promotion Corporation to ensure proper distribution of fertilisers at reasonable prices as well as to take up the above mentioned promotional measures. The Corporation was to be funded by a 1 per cent cess on both the landed cost of imported fertilisers and ex-factory price of domestically produced fertilisers; the Government of India was to contribute the rest out of the net profits earned by it in the import of fertilisers earlier.

**Recommendations
of the National
Commission on
Agriculture**

5.07 The National Commission on Agriculture in its interim report published in 1971 and in its final report in 1976 made a number of recommendations for promoting the use of fertilisers and manures in addition to the toning up of extension system. It spelt out the measures needed for efficient use of nitrogenous, phosphatic and potassic fertilisers, organic manures, soil amendments as well as of micro-nutrients and made detailed recommendations for cost-effective use of fertilisers. It also highlighted the importance of soil testing as a guide to the efficient use of fertilisers. The Commission advocated fertiliser promotion measures both by the producers and the Governmental agencies. While stressing the creation of a strong extension system, the Commission highlighted the importance of demonstrations, farm information and communication support, farmers' education and training and professional development of extension personnel.

**Professional ex-
tension system
including T & V
approach**

5.08 From mid-1970s, the agricultural extension system in India has been undergoing a change in response to the need for higher professional inputs in the extension process. It was felt that a multi-purpose VEW would not be able to meet the requirements of a farming community gradually growing sophisticated in its requirements. It was also necessary to improve accountability for transfer of technology which was impossible to achieve under a system of multi-purpose extension agent. The Training and Visit (T & V) system was tried on a pilot basis from 1974-75. In 1977, Rajasthan introduced the T & V system with five-fold reforms: (a) The extension system would get continuous technology inputs from the Agricultural Universities; the subject matter specialists would be trained by the Regional Research Stations set up for every agro-climatic zone; these stations would also answer all technical queries of the extension system. (b) Subject matter specialists were provided on important subjects e.g. Agronomy, Soil Chemistry, Plant Protection, etc. at the district level to train the AEOs and VEWs regularly every month in the messages to be transmitted to the farmers and for bringing the feed-back as to how these measures were being acted upon. (c) The VEW was required to transfer technology to about 80 to 100 contact farmers, in 8 to 10 villages, who were considered responsive to modern technology; he was required to visit their fields every fortnight, train them in modern technology and ensure its application in the contact farmers' fields. (d) The entire system was to be under one-line administration from Director of Agriculture down to the VEW. (e) The extension staff would help input agencies like cooperatives and private dealers in identifying the requirements and in planning the distribution of inputs but would not handle inputs by itself.

**Coverage under T
& V system**

5.09 The above system has been extended with World Bank assistance to Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, J & K, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, West Bengal and U.P. The implementation of extension project in Himachal Pradesh has just started. Punjab is expected soon to start with implementation of the extension project. The system also

provides for a regular and systematic in-house evaluation of the above system of transfer of technology.

5.10 As recommended by the NCA, a strong farm information and communication support has been built in many States to support the professional extension system.

Subject matter specialist in soil science

5.11 In the districts adopting the system, a subject matter specialist with a Master's degree in Soil Science is desired to be provided. It is essential that this subject matter specialist is periodically trained to upgrade his knowledge. He should also maintain close coordination with the soil testing laboratories in order to give the farmers the best possible services and also to help the scientists in the soil testing laboratories appreciate the results experienced by the farmers. The proposed Fertiliser Development Centre (Chapter IV) should evaluate the work of subject matter specialists as an input in their assessment of the efficient use of fertiliser in each district.

Empirical evidence on adoption of fertiliser use by farmers

5.12 The National Council of Applied Economic Research (NCAER) while conducting a fertiliser demand study (1978) found that only 55 per cent of the farmers in India used fertilisers and that only 62 per cent of the total cropped area was fertilised. The NCAER classified the States by index of fertiliser adoption as under.

Table 5.1: CLASSIFICATION OF STATES BY INDEX OF FERTILISER ADOPTION

<i>Index of adoption of fertiliser</i>	<i>Farming households</i>	<i>Cropped area</i>
(i) Upto 30 per cent	Assam, Madhya Pradesh, Orissa.	Assam, Madhya Pradesh, Rajasthan, Himachal Pradesh, J & K, Orissa, Maharashtra.
(ii) 31 per cent to 60 per cent	Himachal Pradesh, J & K, Rajasthan, Bihar, Karnataka, Maharashtra, Uttar Pradesh.	Bihar, Karnataka, Andhra Pradesh, Gujarat, Haryana, Uttar Pradesh, Tamil Nadu, West Bengal
(iii) Above 60 per cent	Andhra Pradesh, Gujarat, Kerala, Haryana, Tamil Nadu, Punjab, West Bengal.	Kerala, Punjab.

5.13 Based on the sample data collected, the NCAER have been able to identify the reasons for the inability to use fertilisers by 45 per cent of the farming community.

Table 5.2: REASONS FOR NOT USING FERTILISERS

1. Not aware of fertilisers	10.8 per cent
2. Consider fertiliser harmful to the soils	9.8 per cent
3. No facility for irrigation	48.1 per cent
4. Non-availability of credit for fertilisers	17.5 per cent
5. Others (non-availability of fertilisers, uncertainty about profit of fertiliser use.)	13.8 per cent

From the above, it will be seen that the causes for non-use of fertiliser at 1, 2 and 5 which cover about 34 per cent of non-users, are primarily due to lack of proper extension support. This study recommended the need for gearing up extension work for creating proper awareness of the benefits of fertiliser use by the farmers. The survey also revealed that the majority of the non-user farmers had small operational holdings but those who

used fertilisers amongst these small holders, did use fertiliser in an intensive manner primarily with credit facilities. This is an area where deliberate policy action is needed to induce adoption of fertiliser use.

Analysis of empirical evidence of fertiliser use

5.14 Empirical evidence consistently indicates that fertiliser use began with a few farmers using it on selected crops in limited locations. Initially, there was inadequate diffusion of fertiliser use to lands where it was potentially profitable and the rates of its application on fertilised lands were sub-optimal. This shows that when the fertiliser use began, there was a vast untapped economic potential of use under the prevailing response functions and prices. Actual fertiliser consumption improved over time as a result of its spread to unfertilised lands and increase in the rates of its application in the fertilised lands. It is also evident that the pattern of growth in fertiliser use was influenced more decisively by developments in agricultural research, extension, credit, fertiliser distribution along with supply system. This is obvious because the farmers needed location-specific information on the responses of crops to fertiliser use in order to select crops which could be profitable and to work out details of fertiliser practices. The agriculture research system which generates such information and the extension system which delivers it to the farmers, influence the farmers in their decision to use fertilisers.

5.15 The fertiliser consumption in India which was only about 69,000 tonnes of fertiliser nutrients in 1950-51, witnessed a breakthrough in mid-60s with the introduction of high yielding varieties of wheat, rice, hybrid maize, jowar and bajra. Since then, consumption has been increasing continuously and has reached a level of 8.7 million tonnes in 1985-86 which comes to an average consumption of 50 kg. per hectare. In China, fertiliser consumption has increased from 100,000 tonnes in 1950-51 to 18 million tonnes in 1984-85, raising it to a level of 180 kg. per hectare.

5.16 The slow growth in fertiliser use in India compared to China is attributed to various deficiencies in fertiliser distribution system, etc. Fertiliser diffusion has been most rapid on crops and varieties which responded to fertiliser use. Spectacular concentration of fertiliser use in irrigated areas growing high yielding varieties of cereal crops also indicates strong influence of response functions on growth of fertiliser use in these areas.

Crop-specific extension and promotion programme

5.17 The impact of the green revolution which took place with the introduction of high yielding varieties from mid-60s was mostly felt in wheat and to some extent in rice in agriculturally developed States like Punjab, Haryana and western part of U.P. In spite of the availability of new technology of crop production, the rice yields in the traditional rice growing areas in the eastern region of the country continue to be relatively low. Similarly, there was no significant break-through in the production and productivity of pulses and oilseeds. Realising the need for stepping up production and productivity in these crops, Government have introduced special development programmes for raising productivity of rice in the eastern region and of pulses and oilseeds throughout the country.

Special rice production programme

5.18 In order to bring about substantial increases in production and productivity of rice in Assam, Bihar, M.P., Orissa, Eastern U.P. and West Bengal, special rice production programme was started from 1984-85 on a pilot scale in 51 blocks. This programme was enlarged in 1985-86 to 430 blocks. In this programme, emphasis is being laid on dissemination of improved rice production technology through demonstrations and training of farmers including farm women. It also has a provision for the development of infrastructural facilities like irrigation, drainage, land development, input sale centres, construction/renovation of godowns, etc. To motivate the farmers to take up improved practices of rice production, inputs like seeds, fertilisers, micro-nutrients, pesticides and farm implements are being supplied at subsidised rates. In the field demonstrations conducted in the selected blocks, efficient use of fertilisers is one of the important components of the transfer of technology. The programme has made notable impact in increasing rice production in this region.

National Pulses Development Project

5.19 There has been no significant break-through in the productivity of pulses for the last three decades, productivity of the pulses has increased slowly from 441 kilogram per hectare in 1950-51 to 536 kilograms per hectare in 1984-85. Pulses are rich in protein and form essential component of the diet of the majority of the Indian population. Concerted efforts have been made to increase the production of pulses through various extension and demonstration programmes. A centrally sponsored scheme on the development of pulses was initiated in 1972-73. The programme has been enlarged during the 7th Plan with a major thrust on increasing the productivity of pulses by adoption of improved technology, positioning of inputs at distribution points for adoption of need-based plant protection measures, use of phosphatic fertilisers and supply of good quality seeds of improved varieties, timely sowing and supply of rhizobium culture.

National Oilseeds Development Project

5.20 Although the production of oilseeds has been increasing over the years, there is still a large gap between the demand and the production. To narrow down this gap, the Government has launched in 1985 a National Oilseeds Development Project to produce 18 million tonnes of oilseeds by 1989-90. To achieve this target, a comprehensive programme is being implemented in 180 districts, with measures like subsidised distribution of inputs and demonstrations in blocks of 50 hectare of modern oil-seeds technology; the latter includes the use of quality seeds of improved varieties, phosphatic fertilisers, application of gypsum for groundnut, use of rhizobium culture for groundnut and soyabean, use of improved farm implements, plant protection measures and adoption of other improved package of practices.

Need for fertiliser promotion in un-irrigated areas

5.21 Vast un-exploited potential lies in more than 70 per cent of the un-irrigated cultivated land. This accounts for about 80 per cent production of jowar, bajra, pulses and oilseeds, about 60 per cent production of cotton and 30-40 per cent of the production of rice and wheat. Increasing the productivity of un-irrigated areas is essential both for social justice and stepping up agricultural production. Among the constraints in un-irrigated areas is low soil fertility. Unless concerted efforts are made to raise soil fertility through judicious use of fertilisers, farmers would have little incentive to invest in dryland technology. Location-specific information on fertiliser response functions needs to be generated by State Agriculture Universities for each agro-climatic zone. Improved coordination between agricultural research and extension is also needed so that research information can be effectively spread among the farmers. This cannot be over-emphasised because the additional production due to fertiliser application depends on such influences as the selection of improved seed with the right duration, right time of sowing, right time and method of fertiliser application, balanced nutrient application and plant protection, etc. Research findings have clearly indicated that the above practices with moderate doses of fertiliser application in the rainfed areas have considerably enhanced productivity.

5.22 Farmers in irrigated areas where about 80 per cent of the consumption takes place, can afford to apply further quantities of fertilisers but the return on such application is likely to fall due to the law of diminishing returns unless there is further break-through in technology. Un-economic fertiliser use can trigger demand for increasing support price of the crops grown in these areas. On the other hand, the application of moderate doses of fertilisers in rainfed areas would result in relatively higher returns and would also enable to sustain yield-based growth in agricultural production in India.

5.23 Government of India have sanctioned a National Water-shed Development Project for rainfed agriculture. The project is being implemented through State Agriculture Departments on a 50:50 basis. The project is being implemented in 400 water-sheds in 99 districts situated in 16 States. The major components of the project are as given below.

- i) Soil moisture management works for introducing rational cropping system, dryland horticulture, fodder production and farm forestry.
- ii) Contingency planning including seed stocking and supply of seedlings and grass seeds/slips.

- iii) Training:
 - (a) Organisation of short-term training courses, seminars, field tours for staff and farmers, etc. within the State.
 - (b) Training courses, seminars, study tours, etc. at regional/national level.
- iv) Adaptive trails in small and marginal farmer's fields.
- v) Improved tools and equipments:
 - (a) Purchase of survey equipments.
 - (b) Fabrication of adequate number of prototypes of newly designed hand and animal powered tools for testing in the field.
 - (c) Preparation of scientific field manuals, publicity materials, audio-visual aids for training including video cassettes.

5.24 As mentioned earlier, consumption in un-irrigated areas is hardly 20 per cent of the total consumption in the country. The major constraint in use of fertilisers in rainfed areas is the non-availability of fertilisers. The fertiliser dealers in rainfed areas have to stock fertilisers in advance and carry inventory for longer periods as compared to the dealers in the irrigated areas. There is also risk of carrying unsold stock to next season which in many cases may be as long as one year. This low turnover discourages dealers from opening retail points in un-irrigated areas.

5.25 To promote the use of fertilisers in the rainfed areas, a National Project on Development of Fertiliser Use in Rainfed Areas has been proposed. The proposed project has the following components:-

- (a) To develop infrastructure for distribution of fertilisers in rainfed/dryland areas.
- (b) To organise field demonstrations and farmers' training programmes to convince the farmers about the benefits of fertiliser use and to help them to increase their incomes.
- (c) To augment the soil testing facilities in the States and to establish regional soil testing laboratories to improve the efficiency of these laboratories.

5.26 Under this project, it is proposed to open 12,000 additional cooperative retail points. To make these retail outlets economically viable, it is proposed to provide a subsidy on inventory and transportation costs for advance stocking of limited quantities of fertiliser for a limited period.

5.27 The proposed project primarily will be implemented in the areas covered under the National Watershed Development Project.

**Role of industry
in fertiliser pro-
motion**

5.28 The fertiliser industry has also made significant efforts to increase fertiliser consumption in the country. Their programmes include soil testing, block demonstrations, farmers' training, distribution of seed-cum-fertiliser drills and distribution of minikits. Some of the units like IFFCO, MFL and IEL have also adopted villages to ensure all round development of the selected villages. IFFCO, a leading fertiliser manufacturer, has also made special efforts for the establishment of farmers' service centre where inputs like fertilisers, seeds, pesticides, implements and technology know-how are made available through a single window. IFFCO has also taken up multiplication of improved varieties of seeds in some areas.

5.29 The special feature in the promotional activities of Gujarat State Fertiliser Company (GSFC) relates to the establishment of farm information centres-cum-depots. These centres, manned by experienced agricultural graduates, provide the right type of fertilisers and pesticides together with necessary agronomical advice. These centres have become popular with the farmers and have helped in stepping up fertiliser consumption in Gujarat State to the national average level even though the irrigation coverage in Gujarat is only about half the national average.

5.30 The content and pattern of fertiliser promotion activities carried out by various fertiliser manufacturers have not been uniform. This is also reflected in the budgetary provisions of some of the manufacturers for their promotional programmes.

<i>Name of the manufacturer (installed capacity in lakh tonnes of nutrients)</i>	<i>Year</i>	<i>Budget provision (Rs. in lakhs)</i>
1. IFFCO (7.48)	1984-85	115
2. Mangalore Chem. & Fert. (1.56)	1985	53
3. HFC (5.01)	1984-85	196
4. NFL (7.02)	1984-85	54
5. SPIC (4.36)	1984	281
6. Coromandal Fert. Ltd (1.886)	1984-85	23

5.31 It has been observed that about 86 per cent of expenditure is incurred by one manufacturer for publicity alone; only 14 per cent of outlay went towards field demonstrations, farmers' and dealers' training programme, village adoption, etc. On the other hand, the outlay of another manufacturer does not include expenditure on publicity but includes expenditure on field demonstrations, farmers' training programme, village adoption, seed multiplication, installation of biogas plants and training. Funds provided for promotional activities by many manufacturers have no direct relationship with their production capacity.

5.32 At present, the Retention Price System implemented by the Department of Fertilisers does not include any provision for fertiliser promotion activities, with the result that the manufacturers do not find any incentive for investing on fertiliser promotion. The Committee strongly recommends that a provision of at least Rs. 20 per tonne of nutrient produced should be allowed for promotion activities under the Retention Price System, provided the expenditure has been incurred for the purpose.

Implementation of foreign aided fertiliser promotion projects

5.33 Two manufacturers in the country are also implementing fertiliser promotion programmes with the financial aid provided by some of the developed countries of Europe. They are briefly described in the following paragraphs:-

Indo-British Fertiliser Education Project

5.34 Hindustan Fertiliser Corporation Limited (HFC) is implementing fertiliser promotion programmes in 25 districts in the States of Madhya Pradesh, U.P., Bihar, Assam, Orissa and West Bengal. Under this programme, a cluster of villages is identified; in each cluster a key village is selected where field demonstrations are carried out to educate the farmers on use of fertilisers. The programme has also a component for construction of godowns and soil testing. This scheme provides for comprehensive staff component at the village level for organising the demonstration and also substantially subsidise field demonstrations. This programme is being implemented in collaboration with the State Government authorities.

E.E.C. Project

5.35 M/s NFL, FACT and RCF are operating fertiliser promotion programmes in selected districts in their marketing zones with the assistance from European Economic Community. These programmes are more or less similar to those implemented under the Indo-British Fertiliser Education Project; they include field demonstrations, soil testing, farmers' training, etc.

Intensive fertiliser promotion campaigns

5.36 In order to narrow the inter-district variation and to broaden the base of fertiliser consumption, an intensive fertiliser promotion campaign was launched in Kharif 1981 in 104 selected districts in the country. For each selected district, a lead manufacturer has been identified to implement various promotional programmes to increase the fertiliser consumption in the district. The districts selected under the programme include those which have good irrigation/sufficient rainfall but low fertiliser consumption.

5.37 Each lead manufacturer has conducted a bench-mark survey for the selected district and has accordingly prepared an action plan for increasing the fertiliser consumption in the district. Among the activities carried out in each district include field demonstrations, farmers training, distribution of minikits, soil testing and opening of additional retail outlets. The summary of the impact of the intensive fertiliser promotion campaign in the selected districts is given in following table:-

Table 5.3: INCREASE IN FERTILISER CONSUMPTION IN IFPC DISTRICTS DURING 1985-86 OVER 1981-82

<i>Name of State</i>	<i>Total No. of IFPC districts for which data available</i>	<i>Total No. of districts which registered increase above the State average increase during 1985-86 over 1981-82</i>
1. Karnataka	7	1
2. Tamil Nadu	6	3
3. Kerala	3	1
4. Andhra Pradesh	9	4
5. Gujarat	7	6
6. Rajasthan	11	8
7. Maharashtra	8	5
8. Madhya Pradesh	11	7
9. Assam	1	1
10. Bihar	9	3
11. Orissa	5	4
12. West Bengal	3	-
13. Haryana	5	5
14. Punjab	2	1
15. U.P.	12	9
16. Himachal Pradesh	3	1
Total	102	59

Lead fertiliser supply scheme

5.38 From Rabi 1985-86, Government of India has introduced the lead fertiliser suppliers scheme. Under this scheme, a lead manufacturer will be identified for each State and district. At the district level, the lead fertiliser supplier will work with the State functionaries and other fertiliser suppliers on the assessment of demand, collection of statistics on consumption and on opening stocks and would also prepare an action plan for increasing fertiliser consumption through various promotional programmes. At the State level, the lead fertiliser supplier will assist the State functionaries in assessment of demand projections, collection of statistics on consumption and opening stocks and also coordinate the fertiliser promotion programmes of various lead fertiliser suppliers at the district level. Before preparing the action plan for each district, the lead supplier conducts bench-mark survey on fertiliser use and promotional activities. Constraints will be identified and the fertiliser promotion programme will be tailored to overcome these constraints. The implementation of the programme will be monitored and evaluated by State level and district level committees under the supervision of the State Government.

5.39 The implementation of the promotional programmes for increasing the fertiliser consumption in each district would require concerted efforts and budgetary support. The expenditure incurred on the implementation of the promotional programme carried out by the lead fertiliser suppliers at the district level with the approval of the district implementation committee would qualify for reimbursement through FICC retention price system as recommended in para 5.32.

CHAPTER VI

CREDIT FOR FERTILISER PROMOTION

- Importance of fertiliser credit for crop production** 6.01 While fertiliser production is a continuous process, fertiliser consumption is seasonal which results in peaks and troughs in sales and stock. Small and marginal farmers who till about 76 per cent of the total holdings, have limited investment capacity for adoption of modern technology including the use of fertilisers. This is more true in the case of subsistence farmers who do not have market surplus. Credit services, therefore, have an important role to enable the majority of the farmers who fall under small and marginal category to adopt modern crop production technology. Credit services have assumed even greater importance in the context of the overall need to achieve quantum jump in fertiliser consumption, especially through the exploitation of vast potential in the un-irrigated areas. In fact, the 7th Plan has laid special stress on adequate credit availability to support the targetted fertiliser consumption level of 13.5 to 14.0 million tonnes for production of 178 to 183 million tonnes of foodgrains by the end of the Seventh Plan.
- Vital role of credit in fertiliser distribution** 6.02 Smooth flow of fertiliser from one agency to another in the distribution system is dependent on the adequacy of financial arrangements for payment of the cost of fertiliser lifted, till the cost is recovered after the sales. Efficient and timely movement of fertiliser depends on the capacity of the purchasing agencies to make suitable financial arrangement to the satisfaction of the seller. Fertiliser distribution is no exception to the normal business principle that no trader, whether in the cooperative or private, can afford to have large outstandings on the sales made by him over long periods. The Committee, therefore, recognises the vital role of adequate credit to the farmers and to the distribution agencies.
- Volume of fertiliser sales through cooperatives by the end of 7th Plan** 6.03 The Working Group on Agriculture Credit and Cooperation set up by the Planning Commission for formulating the 7th Five Year Plan has indicated that in the context of achieving the level of 183 million tonnes of foodgrains production in the terminal year of the 7th Five Year Plan, cooperatives should handle about 55% of the total consumption of fertilisers valued at about Rs. 3,800 crores. The cooperatives should also distribute improved seeds, pesticides and agricultural tools and implements of the value of Rs. 400 crores during 1989-90.
- Sources of credit** 6.04 The credit for fertiliser use/distribution is needed for two major purposes. First, it is required by the farmers for purchase of fertilisers during the season which is known as the production credit. The second is required at the distribution level for procurement, stocking and distribution of fertiliser before it is sold to the farmers and it is called as distribution credit.
- 6.05 Today the institutions which deal with agricultural credit are:
- (i) Cooperatives
 - (ii) Commercial Banks
 - (iii) Regional Rural Banks

It is estimated that the share of cooperatives in short term advances is around 70 per cent of the total institutional credit. This can be seen from table 6.1 given below

Table 6.1: SHARE OF COOPERATIVES IN SHORT-TERM CREDIT

	(Rs. in crores) (Quantity in lakh tonnes)							
	1950-51	1960-61	1970-71	1980-81	1981-82	1982-83	1983-84	1984-85
1. Short term credit advanced by:								
a) Cooperatives	22.90	182.82	519.34	1526.32	1795.85	1957.10	2241.78	2500.00
b) Commercial Banks and Regional Rural Banks	N.A.	N.A.	N.A.	517.00	623.00	800.00	940.00	1110.00
c) Total (a+b)	22.90	182.82	519.34	2043.32	2418.85	2757.10	3181.78	3610.00
2. Total fertilisers consumed (N+P+K)	0.69	2.92	21.77	55.16	60.64	63.88	77.10	82.11

Source: R.V. Gupta, 1986, Proceedings FAI Annual Seminar.

Role of cooperatives in fertiliser distribution and credit disbursement

6.06 Among the institutional agencies, it is only the cooperatives that provide production credit and also distribute fertilisers to the farmers. Such production credit has three components: 'A' component to finance wages of labour, 'B' component to finance the cost of inputs and 'C' to finance cost of additional labour consequent upon use of inputs covered by 'B' component. The short-term loans advanced by primary agricultural credit societies (PACS), the 'B' component of such loans and fertilisers distributed by cooperatives for the last few years are given in table 6.2.

Table 6.2: SHORT-TERM ADVANCES AND FERTILISER DISTRIBUTION BY COOPERATIVES

Year	Short-term loan advanced by PACS	'B' Component (Kind)	Per cent to total	Total fertiliser distribution (Quantity)	(Rs. in crores) (Quantity in '000 tonnes)		
					Quantity	Handled by cooperatives Value	Per cent to total quantity
1974-75	782.55	187.99	24.02	2589.00	1461.00	617.00	56.43
1975-76	918.23	230.79	25.13	2893.84	1736.00	716.00	59.99
1976-77	1062.41	424.50	39.96	3411.00	2046.00	743.69	59.98
1977-78	1111.20	451.68	40.65	4285.80	2143.00	708.68	50.00
1978-79	1261.91	518.61	41.1	5116.68	2150.00	803.79	42.00
1979-80	1357.65	576.29	42.4	5255.71	2350.00	900.00	44.71
1980-81	1518.86	624.10	41.1	5569.41	2487.36	1010.00	44.66
1981-82	1707.34	748.40*	43.8	6058.25	2847.45	1130.00	47.00
1982-83	2082.48	198.98@	43.2	6223.17	2951.53	4270.00	47.43
1983-84	2157.85	N.A.	N.A.	7709.40	3345.40	1600.00	43.00
1984-85	2333.56	N.A.	N.A.	8210.95	3600.40**	N.A.	43.80

*Estimated

**Provisional

@Target

Source: R.V. Gupta, 1986, Proceedings FAI Annual Seminar.

From the above table it will be observed that:

- i) there is a close link between the short-term advances by cooperatives and the fertilisers handled by them;
- ii) there is a closer or strong positive correlation between the 'B' component loans and the quantity of fertilisers sold by the cooperatives;
- iii) although the percentage of 'B' component loans in cooperatives increased from 24 per cent in 1974-75 to around 43 per cent in 1982-83, there is a wide Statewise variation from 6 per cent in Kerala to 75 per cent in Punjab. It is observed that Statewise high yields per hectare also have high correlation with the levels of 'B' component as in the case of Punjab.

6.07 The primary agricultural credit societies are the backbone of the cooperative credit structure as well as of the cooperative input supply system. Continuous efforts have been made for the last two decades for the reorganisation of PACS into economically viable units. The total number of PACS which used to be 2.5 lakhs in 1963-64 are expected to be reorganised into about 1 lakh societies with strong professional management.

Recommendations of CRAFTICARD on institutional credit

6.08 The Committee to Review Arrangement for Institutional Credit for Agricultural and Rural Development (CRAFTICARD, 1981) emphasised the need for strengthening the primary agricultural cooperative societies with a view to transform them into truly multipurpose service institutions in the credit delivery system. In the light of the CRAFTICARD recommendations, NABARD has issued a set of guidelines to the States on the future development of reorganised societies as given below:

- i) The society should be working on profit.
- ii) The society should reach short-term loan business of not less than Rs. 2 lakhs.
- iii) The society should be manned by a full time Secretary.
- iv) The society should have its own or a hired building to carry on its banking business.
- v) The society should play healthy role in distribution of inputs and consumer goods.
- vi) The society should preferably have a godown for undertaking non-credit business.

In so far as planning for development of societies into truly multi-purpose societies is concerned, the NABARD's guidelines, among others, include the following:-

- a) A membership drive should be taken up to enrol all the small/marginal farmers and economically weaker sections in the area of operation of the society. For this purpose, like the Governments of Andhra Pradesh and Orissa, State Governments may consider providing term-loans to persons belonging to weaker sections for enabling them to purchase shares of PACS.
- b) The societies should reorient their lending policies and procedures with an objective of meeting the entire credit needs of the rural sector, particularly weaker sections as defined by CRAFTICARD.
- c) Selected societies should integrate their credit functions with other non-credit activities like supply of fertilisers, seeds and other inputs and distribution of essential consumer items.

Effect of overdues on the capability of credit institutions

6.09 Non-repayment of dues or accumulation of overdues is a serious problem in rural credit. Increase in overdues affects the capability of the credit institutions to expand their lending programmes in the subsequent years. In so far as the institutional agencies are not able to rotate funds lent, they become ineligible to borrow additional funds; their credit support programme suffers a serious set-back and institutional viability is affected. The position in regard to the overdues of the cooperatives is given in table 6.3.

Table 6.3: STATEMENT SHOWING THE PERCENTAGE OF OVERDUES TO DEMAND AT PRIMARY AGRICULTURAL CREDIT SOCIETIES LEVEL

S. No.	Name of States/ Union Territories	1980- 81	1981- 82	1982- 83	1983- 84	1984- 85
1.	Andhra Pradesh	47.0	39.4	39.4	N.A.	N.A.
2.	Assam	83.0	89.4	95.4	N.A.	N.A.
3.	Bihar	45.5	66.8	74.8	63.0	88.6
4.	Gujarat	50.1	36.9	32.8	N.A.	N.A.
5.	Haryana	31.5	30.9	30.2	34.0	38.0
6.	Himachal Pradesh	41.4	40.8	40.8	N.A.	N.A.

S. No.	Name of States/ Union Territories	1980- 81	1981- 82	1982- 83	1983- 84	1984- 85
7.	Jammu & Kashmir	52.0	53.3	53.3	N.A.	N.A.
8.	Karnataka	50.9	47.2	37.6	38.0	N.A.
9.	Kerala	20.8	18.6	20.2	20.0	27.0
10.	Madhya Pradesh	45.5	45.3	43.6	46.4	N.A.
11.	Maharashtra	42.8	42.0	38.5	N.A.	N.A.
12.	Manipur	90.6	79.1	79.1	68.7	N.A.
13.	Meghalaya	52.0	68.8	93.2	84.8	N.A.
14.	Nagaland	58.6	25.3	25.3	N.A.	N.A.
15.	Orissa	39.9	43.0	41.3	47.0	47.6
16.	Punjab	19.8	19.8	19.8	N.A.	N.A.
17.	Rajasthan	39.0	38.9	38.3	42.4	N.A.
18.	Tamil Nadu	43.8	67.3	55.2	48.4	44.8
19.	Tripura	85.0	94.6	88.0	N.A.	N.A.
20.	Uttar Pradesh	47.0	48.5	50.4	N.A.	N.A.
21.	West Bengal	61.3	53.1	69.0	59.0	61.0
22.	Sikkim	-	-	-	N.A.	N.A.
23.	Andaman & Nicobar	90.0	86.4	86.4	N.A.	N.A.

6.10 About 45% of the fertiliser sold in the country in 1987 is distributed through the cooperatives. These cooperatives have access to institutional credit for procurement, stocking and distribution. On the other hand, the private trade which distributes about 55% of the fertilisers in the country depends partly on commercial banks and partly on private funds. The fertiliser manufacturers also provide credit facilities for one month in the case of urea and two months in the case of complex fertilisers.

Share of 'B' Component in fertiliser distribution by cooperatives

6.11 The 'B' component which was Rs. 187.99 crores or 24% of the short-term advances, accounted for 30% of fertiliser distributed by the cooperatives in 1974-75. In 1982-83, the 'B' component loan was estimated at Rs. 898.98 crores and accounted for 70% of the total value of fertilisers distributed by cooperatives; in other words, while in 1974-75 cash sale by cooperatives accounted for 70% of total sales of cooperatives, the position in 1982-83 was reverse as the cash sales accounted for only 30% of total sales by cooperatives. As mentioned earlier, 'B' component varied widely from 6% in Kerala to 75% in Punjab. It is necessary to increase the total quantum of production credit through:

- a) incentive for 'B' component,
- b) increasing the percentage of borrowing members which is hardly 30% now and
- c) determined efforts to scale down overdues.

These measures would also lead to large cash sales by cooperatives. The Committee feels that since cooperatives also function in interior and rainfed areas, this institution can promote fertiliser use in the rainfed areas in a big way and the Committee recommends that the 'B' component loan in kind may be provided at a lower rate of interest as an incentive.

6.12 On account of overdues, a cooperative society often is not able to get credit accommodation from the district cooperative bank. This completely chokes the flow of credit to the members of the society. Under such circumstances, it is recommended that special arrangement should be made for providing 'B' component loan in kind to new and non-defaulting members.

Need for timely sanction of credit

6.13 Credit to the farmer should be sanctioned well before the time of application of fertiliser. Delays in sanctioning of crop loan should be avoided; credit limits should be

set for a three year period and pass books and cheque books issued to the farmers as in the case of Punjab.

6.14 Analysis of credit delinquency shows that it is neutral to size of the holdings or stage of development of the area. Strong administrative measures should be taken against defaulters who by their default not only deny future credit facilities to themselves but also to other fellow-members.

Need for strengthening of primary cooperatives

6.15 Primary cooperatives which have direct link with the farmers should be strengthened and should be encouraged to stock fertilisers in advance and also to sell for cash. They should be provided with special credit limits to achieve this objective. There should also be a regular training programme of the personnel handling fertiliser sales so that they can give sound advice to farmers.

Credit need for procurement, stocking and distribution

6.16 Efficient procurement, stocking and distribution of fertilisers at the wholesale level needs an assured source of credit. Until 1966, bulk supply of fertilisers to various States was made from the Central Fertiliser Pool maintained by Government of India. The Central Government allowed credit for a period of 18 months to State Governments in respect of consignment despatched from the Pool and the State Governments, in turn, extended credit facility to the distributing agencies, mainly the State level marketing federations which were enjoying virtual monopoly in the matter of distribution. On the recommendation of the Sivaraman Committee on Fertilisers, the Government of India curtailed this credit facility; consignment credit was allowed to the extent of only 50% of the total quantity of fertilisers lifted from the pool and the period of credit was also reduced from 18 months to 6 months. Owing to the budgetary constraints, the State Governments were unable to make adequate provision for the expanding fertiliser distribution activity. Under these circumstances, the Reserve Bank of India agreed, from the year 1967, to provide accommodation to State cooperative banks for financing apex marketing societies for purchase, stocking and distribution of fertilisers. Initially, the Reserve Bank of India agreed to provide credit limit upto Rs. 5.00 crores for any individual State within the overall ceiling of Rs. 50 crores for the country as a whole. With the introduction of social control and later nationalisation of 14 major commercial banks in 1969, the situation changed as the commercial banks entered the field of agricultural credit in the big way. The Reserve Bank of India, therefore, decided to withdraw the refinancing facility for the purpose. Since 1970, it has been providing financial assistance only in those cases where the State cooperative marketing societies were unable to obtain the necessary funds from the commercial banks.

Credit need of marketing federations under Credit Authorisation Scheme

6.17 The credit needs of State level marketing federations for procurement, stocking and distribution of fertilisers became so large in some of the States, due to increase in the volume of sales and revision in prices, that no single financial institution by itself was in a position to meet their requirements fully. Consortium of banks involving the State Bank Group/other commercial banks and the State Cooperation Banks were formed for meeting their credit requirements. The requirements of the State level federations are assessed annually in advance and the limit up to which each bank in the consortium could finance each federation is mutually agreed upon amongst the banks participating in the consortium. The Credit Planning Cell of the Reserve Bank of India directly organises the credit limits for fertiliser operations in respect of State level agencies in Punjab, Haryana, U.P., Bihar and Karnataka. In the circumstances, the borrowing institutions now do not have to approach different banks individually; the system also helps to obtain credit on uniform terms and conditions simultaneously from different banks. In respect of some of the State level agencies, credit limits for fertiliser distribution are authorised under 'Credit Authorisation Scheme' by the Industrial and Export Credit Department of the Reserve Bank of India. Where either the State cooperative banks or commercial banks are unable to meet the credit requirements of such agencies fully, NABARD provides refinance to the State cooperative banks in

respect of the accommodation provided by them to the State level cooperative marketing federations for their fertiliser distribution activity.

6.18 It has since been decided that the credit levels for undertaking wholesale distribution of fertilisers sanctioned by the State cooperative banks and commercial banks, above the cut off point under the Credit Authorisation Scheme, would require the prior authorisation of NABARD/RBI. This decision is stated to have been taken to regulate the financing of fertiliser distribution of the State level cooperative agencies.

6.19 Cooperatives today are distributing around 4 million tonnes of fertilisers in terms of nutrients through nearly 64,000 retail outlets. The requirements of working capital for the marketing federations for distribution of fertilisers are very large.

In the context of expanding role of cooperatives in the distribution of fertilisers, there would be a continuous expansion in the requirements of working capital for these federations. Unless adequate and also smooth arrangements for such credit are made, the expansion of fertiliser distribution activity by the cooperatives would be hampered. It is in this context that the Committee would suggest that the existing system of credit authorisation needs to be reconsidered, both in terms of the principle underlying the system of credit authorisation and in terms of the procedural delays that the credit authorisation scheme entails. As no speculative element is involved in fertiliser trade and as this is a service that the cooperative system is providing to the farmers, the Committee strongly urges that the credit for fertiliser marketing may be taken outside the purview of the present credit authorisation scheme. The cooperative federations should be able to have easy access to working capital funds from the State cooperative banks which, in turn, should be able to obtain refinance facilities from the NABARD. Wherever necessary, the cooperative federations should also have access to credit from commercial banks outside the purview of credit authorisation scheme.

Need for reducing interest rates to apex agencies dealing with fertiliser distribution

6.20 Bank credit for procurement and distribution of fertilisers is treated by the RBI as a priority activity. Advances made by the commercial or cooperative banks to State cooperative marketing federations and other apex agencies handling wholesale distribution of fertilisers, since June, 1987, are charged interest at the rate of 15.5%, a rate considered by RBI as concessional as compared to 17.5% applicable to wholesalers in the private sector. The Committee discussed this issue with the NABARD and the RBI representatives. The Committee finds that the rate of interest of this magnitude is affecting the sound working of the marketing federations. The Committee, therefore, recommends that the interest burden of the marketing federations needs to be reduced from the existing interest rate of 15.5 to 14 per cent.

6.21 For the primary level retail cooperatives, the rate of interest on fertiliser credit upto Rs. 1.00 lakh should also be 11.5% only to match the rate of interest being paid by borrower members of the primary agricultural credit societies; most of these borrow less than Rs. 5000 and pay only 11.5% interest. A lower rate of interest on fertiliser supply credit would be desirable considering that large areas of the country are monocropped, rainfed and involve high risk and in these areas PACS/PCMS are required to maintain stocks for longer period in the interior areas. NABARD refinance should also be available to the State cooperative banks for financing fertiliser distribution activities of retail cooperatives at 3% below the bank rate, instead of 1% above the bank rate; it should be at par with the short-term agriculture credit accommodation provided by NABARD for financing the agricultural operations so that the State cooperative banks/district cooperative banks would be in a position to charge a lower rate of interest on fertiliser supply credit at the retail level.

6.22 At present, the State cooperative marketing federations have to carry fairly large stocks, say, equivalent to 6 months, which NABARD considers as unwarranted. In this connection, it may, however, be pointed out that according to the present instructions

of the Government of India, the State Governments/cooperative institutions are required to lift fertiliser on regular basis with 1/6th of allocation made to them under ECA allocation within 10 days of the offer made by the fertiliser manufacturers/pool agencies. It becomes, therefore, necessary for the cooperatives to carry over stocks of fertilisers for a period longer than 120 days. The present period of 120 days for fertiliser credit does not cover the fertiliser stocking requirement of cooperatives, particularly in dryland areas and mono-cropped areas. The period of credit, therefore, should be increased to 180 days from the date of drawal instead of 120 days as at present.

6.23 At present, complete exemption from the provision of margin is granted whenever bank credit supported by State Government guarantee to the working capital loans is obtained by the PACS/PCMS for fertiliser distribution. Banks, in such cases, have, however, been asking for 25% to 40% margin. Prior to 1978, fertiliser credit was available to apex-level federations with 10% margin when the Government guarantee was not envisaged. It is for those PACS/PCMS where Government guarantee is not available that the fertiliser distribution credit should be available at 10% margin as has already been agreed to in the case of private sector retailers in fertilisers. It is reported that this question is already under active consideration of RBI/NABARD. The Committee urges for a very early decision.

Need to ensure utilisation of short-term credit for input distribution by the marketing federations

6.24 To help the State institutional agencies for advance stocking of fertilisers, Government of India has been providing short-term loan to the State Governments on a very low rate of interest, i.e. 6.5%. The volume of short-term loan has increased from Rs. 156 crores in 1979-80 to Rs. 260 crores in 1986-87. Details of credit limits given to States are set out below:

Table 6.4: SHORT-TERM LOANS SANCTIONED TO STATE/U.T. GOVERNMENTS FOR PURCHASE AND DISTRIBUTION OF AGRICULTURAL INPUTS DURING 1979-80 TO 1986-87

		(Rs. in crores)								
S. No.	Name of State/U.T.	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	
1.	Andhra Pradesh	18.00	28.00	19.00	10.80	11.94	10.80	10.80	10.00	
2.	Assam	1.00	3.00	3.50	4.09	5.25	5.86	5.15	1.00	
3.	Bihar	10.73	13.00	14.00	19.00	22.00	21.05	20.00	11.03	
4.	Gujarat	6.00	8.00	10.00	13.51	10.50	10.22	16.30	35.87	
5.	Haryana	7.00	12.00	13.50	15.75	16.75	16.30	13.80	17.46	
6.	Himachal Pradesh	1.00	1.00	0.15	1.00	1.05	1.04	1.00	2.00	
7.	Jammu & Kashmir	0.80	1.50	1.75	1.50	1.55	1.55	2.50	2.00	
8.	Karnataka	6.00	12.00	11.00	14.00	14.50	14.40	13.40	17.85	
9.	Kerala	2.00	2.00	3.00	3.50	3.00	3.60	4.10	2.00	
10.	Madhya Pradesh	8.97	19.00	12.00	21.00	24.00	24.50	20.65	11.01	
11.	Maharashtra	7.00	11.00	10.00	16.00	16.50	16.50	19.50	30.84	
12.	Manipur	—	—	1.28	1.28	0.73	0.70	0.75	0.63	
13.	Meghalaya	—	0.47	1.15	1.57	1.42	1.42	1.25	0.47	
14.	Nagaland	0.30	0.03	—	—	—	—	—	—	
15.	Orissa	5.00	8.00	5.00	13.00	11.80	13.12	11.50	10.75	
16.	Punjab	7.00	11.00	14.50	27.00	23.50	22.85	25.85	39.78	
17.	Rajasthan	9.00	16.50	20.00	22.00	19.50	22.14	18.00	7.65	
18.	Sikkim	—	—	—	0.30	0.03	—	—	—	
19.	Tamil Nadu	—	—	—	10.00	15.50	14.35	13.35	11.35	
20.	Tripura	0.20	—	0.67	0.50	0.05	0.10	0.10	0.60	
21.	Uttar Pradesh	33.00	39.00	42.00	40.00	44.00	42.50	43.00	38.48	
22.	West Bengal	13.00	16.50	17.50	15.00	16.43	17.00	15.00	9.23	
Total		156.00	200.00	200.00	250.00	260.00	260.00	256.00	260.00	

It has been observed that some of the States divert this soft loan for activities other than fertiliser distribution. The Committee, therefore, recommends that the Government of India should issue guidelines to ensure that this credit, made available to the State Governments, is strictly used for distribution of fertilisers and is extended in full to the cooperative marketing federations.

The Committee also recommends that such short-term loan disbursement should be based on the volume of sales made through the cooperatives in each State.

Need to study the credit requirements of private trade

6.25 In the above paragraphs, the credit needs of the cooperative institutions have been discussed. It is, however, significant to note that private trade which has nearly 55% of the total quantum of fertiliser distribution in the country, does not have access to the cooperative credit network. This, therefore, points to the need for examining the sources of funds and their related terms and conditions so that credit does not become a constraint to efficient fertiliser distribution. It would, however, appear that private dealers are either operating with their own surpluses or are dependent on the informal sector consisting of money-lenders, friends and relatives, etc. The study conducted by FAI on the impact of credit on fertiliser consumption has shown that 80% of the private dealers are using credit for financing their fertiliser trade. The study has also shown that an overwhelming number of dealers are found to finance more than 50% of their requirements through funds drawn from the informal sector. In 15% of the cases, dealers were found to draw funds only from other sources for financing their fertiliser business. Only in few cases, a dealer is found to be exclusively dependent on the manufacturers for meeting his business requirements. The survey has shown that the commercial banks occupy the position next to the informal sector in so far as financing of the private trade is concerned. The facilities to private trade from commercial banks needs to be reviewed by the Reserve Bank periodically to ensure that legitimate credit support is made available.

CHAPTER VII

FERTILISER MARKETING AND DISTRIBUTION

7.01 The Government of India set up a Central Fertiliser Pool in 1944 to ensure equitable distribution of available fertilisers. The practice of pooling the indigenous production and imports, particularly of the main nitrogenous fertilisers, continued upto December, 1965. Under this arrangement, Government of India used to acquire the available indigenous production at a retention price. The quantities so acquired were added to the imports and thus total fertilisers available within the country in the pool were allotted to various States/agencies at a uniform price throughout the country. The Government, however, did not exercise any control on the complex fertilisers, super phosphate, ammonium chloride, etc. and the manufacturers were free to market the same throughout the country. Government of India used to receive the requirements of the nitrogenous fertilisers from the States and accordingly, the States were allotted their requirements out of the pool fertilisers. The States, in turn, distributed the pool fertilisers through various agencies like cooperatives, public depots, private dealers, etc.

7.02 The consumption of fertilisers upto 1965-66 continued to be very low (5 kilograms per hectare). This was also the time when all out efforts were initiated to increase food production through the introduction of high yielding varieties, particularly of wheat and rice. The Sivaraman Committee also recommended in 1965 a number of measures for increasing fertiliser consumption in the country. Amongst others, it made two important recommendations, viz. (i) to increase the domestic production considerably; and (ii) to do away with the pooling of indigenous nitrogenous fertilisers over a period of time and gradually allow the manufacturers to market their output. Keeping these recommendations in view, the Government modified its policy, in December 1965, granting freedom of marketing to the indigenous manufacturers. Under this policy, new units were allowed to market 70 per cent of their production through their own channels, the Pool reserving the right to acquire upto 30 per cent of the production. In fact, even the existing units were also brought under this policy and by January 1969 all these units were permitted to market their entire production through their own channels. This attracted additional capital to the fertiliser sector and the market development effort of the various units helped in achieving a faster growth of fertiliser consumption.

7.03 Meanwhile fertiliser distribution and prices had been brought under statutory control through the operation of the Fertiliser (Control) Order, 1957 (FCO) which was promulgated under the Essential Commodities Act, 1955.

7.04 Government of India allowed complete freedom of marketing of indigenous fertilisers to the industry between 1969 and March 1972. During this period, it regulated the marketing of imported fertilisers only. However, there were serious shortages of fertilisers during 1971-72 which forced the Government of India to intervene and to exercise complete control over distribution of all fertilisers under the Essential Commodities Act. Even the movement of fertilisers was brought under the control of the Essential Commodities Act through the promulgation of Fertiliser Movement (Control) Order, 1973. The situation of control over fertilisers in respect of allocations, prices, quality and movement has remained unchanged since then.

present system of
distribution of
fertilisers

7.05 Under the existing system, the requirement of fertilisers is assessed both on long-term and short-term basis. Long-term projections of fertiliser consumption are based on the agricultural production targets. However, a much more detailed exercise is undertaken by the Department of Agriculture & Cooperation in the Union Ministry of Agriculture for working out the short-term requirements of fertilisers for each

agricultural season separately. This exercise is taken up jointly with the Union Department of Fertilisers, Planning Commission, Ministry of Railways as well as with the State Departments of Agriculture and the fertiliser industry. The assessment of fertiliser requirement is initially made by each State Government. It is based on the likely coverage under high yielding varieties and other development programmes, irrigation facilities, existing level of fertiliser consumption, special programmes, if any and other factors like availability of credit and infrastructural facilities. This exercise is finalised during the Zonal Conferences which are held before the beginning of each crop season. Adequate provision is also kept for pipeline requirement for each State.

7.06 Based on the assessment, a coordinated fertiliser supply plan is drawn up for each State for Kharif and Rabi seasons separately. The supply plan indicates the manufacturer-wise quantities to be supplied to each State. The indigenous production is first fully allotted and then shortfall in any State is met through allocations from the imported fertilisers. The pool, therefore, performs the role of residual supplier.

7.07 Prices of fertilisers are statutorily controlled under the FCO and are uniform throughout the country irrespective of the distances from the production centres/ports.

7.08 Cost of production and cost of imported fertilisers is often higher than the consumer prices. The difference between the two is subsidised by the Government of India.

7.09 The transportation of fertiliser from the production centres/ports upto the block level is also fully reimbursed by the Government of India.

Evaluation of the existing system

7.10 The existing system of fertiliser demand assessment, allocations and distribution has succeeded in delivering the goods to a large extent but it has certain inherent drawbacks which need to be pointed out. Some of these drawbacks and possible remedies are discussed in the following lines:-

- i) The States quite often project very ambitious requirements as there are no financial stakes on their part. This exaggeration is also borne out of their anxiety to ensure that there is more than adequate availability of fertilisers in all parts of the State at all times.
- ii) No detailed exercise is made by the States for working out their requirements at the district level. The entire assessment is worked out at the State headquarters based on simple rule of thumb. In fact, there is no scientific mechanism for working out requirements of fertilisers from the block level upwards.
- iii) There is no proper arrangement to compute the consumption of fertilisers concurrently during the season and to project the opening stock at the beginning of the next season. This leads to unrealistic opening stock figures at the beginning of the next season which affect calculation of the net requirements for the State during a season.
- iv) There is a tendency on the part of the States to show progressively higher consumption of fertilisers and claim progress, irrespective of ground realities. There is no system through which the consumption reported by the State is cross-checked with the actual supplies.

7.11 The above factors have led in the past and have the potential to lead even in future to faulty planning of imports leading to gluts or shortages. The situation of excessive availability can result in unhealthy practices like unduly higher discount to dispose of stocks whereas the shortages manifest in blackmarketing, adulteration, hoarding, etc. Both these situations are undesirable and must be avoided as far as possible. The Committee has been informed that the Department of Agriculture and Cooperation have recently taken the following steps to rectify some of the above mentioned defects in the existing system and improve the quality of assessment:-

- i) The assessment of demand for each State must be on the basis of assessment at the district level.
- ii) The district level assessment will be made jointly by the lead fertiliser supplier and the District Agricultural Officer.
- iii) The statistics relating to consumption and likely opening stocks at the beginning of the next season will be jointly worked out at the district level by the District Agricultural Officer and the lead fertiliser supplier; the State Agriculture Department would aggregate the same for the State.

7.12 Agreement has been made by the Union Agriculture & Cooperation Department and Fertilisers Department with the State Governments that there will be a lead fertiliser supplier for every district and one for the State as a whole. The functions assigned to the lead fertiliser suppliers will include demand, stocks and consumption assessment, fertiliser promotion, training of dealers and farmers, soil testing, demonstrations and opening of additional retail outlets. Details of functions of lead fertiliser suppliers are as given below.

At the district level

- i) Assessment of requirements of the district for each season in consultation with the district agricultural authorities.
- ii) Compilation of fertiliser statistics regarding consumption and stock position, etc.
- iii) Fertiliser promotion activities, particularly in rainfed, difficult and inaccessible areas.
- iv) Training of the dealers as well as farmers.
- v) Opening of additional retail outlets in the rainfed areas.
- vi) Intensive soil testing programme in the district.

At the State level

- i) The lead fertiliser supplier at the State level in consultation with the Director of Agriculture will chalk out the strategy for fertiliser promotion.
- ii) Compile the State level fertiliser statistics regarding consumption and stock position.
- iii) Help the State agriculture authorities in assessing the State requirements of fertilisers and any other activity which may be relevant to the fertiliser industry.

7.13 The Committee is in agreement with these steps and would urge that this concept is made fully operational in the shortest possible time. The Committee would also like to recommend that there should be periodical review of the implementation of this concept, both at the State level and at the national level. Adjustments in the functions of the lead fertiliser suppliers should be brought about in the light of experience gained in the years to come. The Committee would, however, like to caution that the assessment of fertiliser requirements should not be solely influenced by the views of the fertiliser industry and interests of the farmers must be kept in view during this joint exercise. It must be ensured that the availability of fertilisers throughout the country is slightly ahead of the requirements at any time in the year. Under the imperfect market conditions in India, a marginal shortage can lead to malpractices like black marketing and adulteration, setting back of the cause of fertiliser promotion for a long time.

Role of cooperatives

7.14 Cooperatives have a very important role to play in the marketing of fertilisers in the country. In most of the States, they have a fairly large network and in some of the States they also command sizeable share. It is perhaps the single most important agency which has been relied upon by the farmers for catering to their needs in remote and inaccessible areas. It is also expected to carry adequate stocks of fertilisers at all times and also build advance stocks of fertilisers at the village level. Recognising this, the Government rightly has given it preferential treatment with a higher distribution margin

as compared to that given to the private dealers. However, the Committee regrets to point out that the share of cooperatives in the fertiliser trade has been decreasing and has come down from about 45 per cent in 1979-80 to 35 per cent during 1986-87. The share of cooperatives has been coming down rapidly in almost all the States (table 7.1).

Table 7.1: STATE-WISE PERCENTAGE SHARE OF HANDLING OF FERTILISERS BY COOPERATIVES

S. No.	State	1979-80	1983-84	1984-85	1985-86 (Provisional)
1.	Andhra Pradesh	19.5	13.0	13.4	13.0
2.	Assam	38.4	37.6	52.5	37.0
3.	Bihar	61.9	65.1	51.6	14.0
4.	Gujarat	94.3	89.6	97.6	70.0
5.	Haryana	45.0	39.6	40.1	31.0
6.	Himachal Pradesh	100.0	97.0	98.8	100.0
7.	Jammu & Kashmir	94.7	79.9	100.0	100.0
8.	Karnataka	32.9	28.1	25.9	26.0
9.	Kerala	53.2	57.2	57.5	26.0
10.	Madhya Pradesh	58.5	48.6	45.9	42.0
11.	Maharashtra	61.7	79.4	92.1	58.0
12.	Manipur	100.0	71.1	94.1	85.0
13.	Meghalaya	100.0	93.5	81.3	89.0
14.	Nagaland	100.0	96.8	100.0	100.0
15.	Orissa	47.4	27.2	18.6	38.0
16.	Punjab	51.6	48.4	49.3	38.0
17.	Rajasthan	55.4	40.7	44.0	39.0
18.	Tamil Nadu	30.2	41.8	38.4	22.0
19.	Tripura	-	16.6	31.0	NA
20.	Uttar Pradesh	40.0	35.9	37.5	28.0
21.	West Bengal	16.4	17.1	15.9	22.0
22.	All Union Territories	NA	NA	NA	NA
	All India	44.7	43.8	43.4	40.0

This is not a healthy trend. The Committee recommends that the State Governments should look into it and take necessary steps to reverse this trend. Government of India should also examine possibilities of strengthening the cooperative system. The Committee recommends continuation of preferential treatment to the cooperatives in the area of distribution margin. The existing distribution margin should not only continue but should be increased from the existing Rs. 20/- to Rs. 50/- per tonne of Urea and corresponding increases in other products. The Committee recommends that the performance of cooperatives should be reviewed periodically with a view to not only ensuring that they retain a healthy share but also to ensure that they open more and more retail outlets in the inaccessible and difficult areas. The share of the cooperatives must gradually be raised over the next 3 years from the existing 35 per cent to 55 per cent. The Committee recommends that the share of cooperatives should go up to 70 to 75 per cent by the turn of the century.

Alternative to the existing system of distribution of fertilisers

7.15 The existing system of distribution of fertilisers envisages not only fixed quantities for each State but also prescribes, in some cases, the districts in a State to which a particular unit has to supply the fertilisers. There is a feeling that such a system may not be best suited to the present-day conditions in the country. This is more so when the indigenous industry has acquired considerable strength and the share of indigenous production in the overall requirements is of the order of 65 to 70 per cent.

7.16 It is common knowledge that merely 75 per cent of fertilisers sold is consumed in about 30 per cent of the area in the country. The Committee is also aware of the views

expressed in certain quarters that there is no justification for continuing the present extent of subsidy particularly when its benefits flow largely to the better off farmers in the irrigated areas. It has been suggested that possibilities should be explored to devise arrangements through which fertilisers could be sold at concessional rates to small and marginal farmers in the irrigated areas and all farmers in the rainfed areas, while increasing the prices at which the fertilisers are sold to bigger farmers in the irrigated areas.

7.17 Another suggestion which has been made to the Committee is to do away with the present system of allocation. It is argued that the industry should be permitted to freely market their product anywhere in the country after the retention price for each unit is fixed and the transport allowance is also fixed on normative basis.

7.18 Yet another suggestion put before the Committee related to the complete removal of transport allowance except for unirrigated and inaccessible areas along with complete freedom to the indigenous manufacturers for marketing their product. It was suggested that Government should regulate only the imported fertilisers and supply them in the priority areas at prices fixed by the Government.

7.19 The Committee examined the above proposals as follows:-

- i) According to one view in the Committee, it appears reasonable that fertilisers should be sold at concessional rates to small and marginal farmers and farmers in the rainfed areas whereas the better off farmers should be asked to pay higher prices. This is perhaps similar to what obtains in the public distribution system where essential commodities like foodgrains, sugar, etc. are made available to the consumers from weaker section of the society. This is regulated through a network of public distribution system and ration cards. The scale of foodgrains distribution in some States varies, depends on the financial status of the family. However, when we consider applying this principle to the fertiliser sector, we find that there are likely to be large number of practical difficulties in ensuring that better off farmers actually purchase their fertiliser requirements at higher prices. We have to keep in mind that about 75 per cent of the total operational holdings of 90 million are with small and marginal farmers, accounting for about 26 per cent of the total area. Even in the irrigated areas, small and marginal farmers constitute about 87 per cent of the operational holdings, accounting for about 50 per cent of the irrigated area (1976-77 census). The number of small and marginal farmers and area operated by them have increased over the years. The apprehension about the enforcement of land reform laws has manifested in partition of landed property, at least in the revenue records, thus reducing the number of large farmers considerably. In any case, if preferential treatment has to be given to small and marginal farmers in the irrigated areas and all other farmers in the rainfed areas, then the better-off farmers in the irrigated areas will constitute a microscopic minority and any policy, meant to give relief to the weaker section, will become almost impossible to implement when their number is so large and the number of the better-off farmers is so small.

Another factor which will render implementation of such a scheme almost impossible, is the fact that there are a large number of scattered holdings which are irrigated by underground water sources, tanks, lift irrigation schemes, bandharas, etc. and their share in the total irrigated area is very significant as compared to the area under medium and major irrigation projects. The possibility of small and marginal farmers becoming the covert suppliers of fertiliser to the better off farmers in such a scheme cannot be ruled out. Even the cost of administering such a scheme where millions of farmers have to be issued with cards, will be prohibitive and may even be counter-productive. The Committee, therefore, is not in favour of such a scheme.

ii) According to one view in the Committee, the second proposal relating to spatial freedom of marketing also appears *prima-facie* reasonable, particularly when viewed in the back ground of the current situation of availability of fertilisers in the country. If such a system is introduced, one may presume that open market forces will operate in such a manner that there will be a healthier competition among various suppliers and that farmers will get fertilisers more promptly along with better services. The Committee has given serious thought to this proposal and it considers that the scheme will not be justified in the light of the following analysis:-

- a) Domestic production is around 65 to 70 per cent of the requirement. This situation is likely to continue for many years to come. The indigenous industry, therefore, would primarily be concerned with marketing their own production and they would not mind if the share of imported fertilisers gradually goes down.
- b) India is a vast country with 127 agro-climatic zones and the level of consumption varies from 2.35 kilograms in Nagaland to around 160 kilograms per hectare in the Punjab.
- c) About 75 per cent of total fertilisers are consumed in 30 per cent area which is under irrigation.
- d) The productivity level in the irrigated areas has reached almost a plateau in many States and the present rate of growth of fertiliser consumption is only in the region of 3 to 5 per cent in the highly irrigated States.
- e) The new technology for rainfed farming offers a great potential for increasing fertiliser use and consequently for increasing production. It is this area which will provide substantial increases in agricultural production in the future and must, therefore, receive the highest attention of the policy makers.

The complete freedom to the fertiliser industry for marketing of fertilisers is likely to result in a scramble around the irrigated areas. Whatever attention they are now required to pay towards the rainfed areas under the existing arrangements is likely to be diluted considerably. Another potential danger of this option is that a strong marketing organisation can outprice and ultimately wipe out a weak marketing organisation through manipulations. It can thus result in further sickness in some of the weaker units. The country needs an annual growth rate of about 10 per cent in the fertiliser consumption for it to keep pace with the increased requirement of foodgrains for its population. Under such a situation, it will be extremely difficult to attract the industry to less-developed areas even if adequate incentives are offered. It is in the interest of the country that fertiliser industry is encouraged to supplement the role of the State Governments in fertiliser promotion, particularly in the under-developed areas and such a role can best be performed by the industry when they are given a specific area of responsibility. The Committee, therefore, does not support this proposal.

iii) Finally, in the Committee a third suggestion was made which is similar to the first proposal about dual prices. If such a proposal is implemented, this will effectively mean that fertilisers will be sold at higher prices in the irrigated areas as compared to other areas. The Committee has dwelt in some detail about the difficulties in managing any such scheme where the priority area involves a very large number of farm holdings which are scattered throughout the length and breadth of the country. All the difficulties mentioned in our comments under the first proposal are applicable to this proposal also. The Committee, therefore, does not recommend implementation of this proposal also.

General observations and recommendations

7.20 The existing system of fertiliser distribution through allocations has been developed over the last 15 years and has, by and large, stood the test of time. It takes a long time and considerable effort to develop any system and make it work in a large country like ours. Fertiliser is a very important and expensive input its use needs to be

increased, particularly in areas where present level of consumption is low. Fertiliser industry which has played a significant role in India's agricultural development so far, must be encouraged to continue to play such a role and, in fact, must be motivated to go to more difficult areas. The existing system, therefore, needs to be further refined and strengthened rather than abandoned.

Buffer stock

7.21 The Committee's interaction with the fertiliser industry also indicates that even the industry does not seem to be in favour of doing away with the existing system as they find that their interests are to a large extent taken care of. In order to bring stability into the marketing system, the Committee recommends that marketing territory of each fertiliser unit should be decided on a long term basis and frequent changes should not be brought about in the system. Adequate provision should be made for the entry of the new fertiliser units which are likely to come up in the future. One of the major suggestions put forth by the fertiliser industry related to creation of a buffer stock by the Government so that excessive quantities are not put out in the market at any point of time which may result in unhealthy practices and at the same time the country carries a certain reserve stock to meet any sudden spurt in demand. Fertiliser supplies have to be planned at least a year in advance and if two agricultural seasons have deficient monsoon, fertiliser stocks do accumulate putting the industry to undeserved loss.

7.22 The Committee has considered this proposal and it feels that planners must always ensure adequate availability of fertilisers; even if the planners are to err, they must err on the safer side. The Committee does not favour the idea of creating and managing a separate buffer stock of fertilisers as it considers that there will be difficulties in operating such a buffer stock at short notice and there will be vested interests in ensuring that such stocks do not get released in time. It is likely to result in un-necessary expenditure and also deterioration in the quality of stocks stored in the buffer stock. However, the Committee fully appreciates the anxiety of the fertiliser industry in a situation where the total availability of fertilisers is much more than the requirement. The industry primarily would be anxious to get suitable allowance for the extra stocks it is asked to carry. The Committee reiterates that the system of treating the indigenous production as the main supplier and imported fertilisers as the residual supplier, which was the practice till the year 1985-86, should be implemented scrupulously so that inventory costs of extra imported fertilisers are paid. Under this system there will be no separate stock which is identified as buffer stock, as it is carried by the handling agencies which are also the fertiliser manufacturers and the latter should rotate their product periodically to avoid any deterioration due to long storage. This will also ensure that the stocks kept in excess of their allocations are closer to the consumption centres and, therefore, can be made available at very short notice through additional allocations whenever the situation so warrants.

7.23 The Committee had also an occasion to interact with the farmers' representatives to understand their problems. Some of the points which came to the notice of the Committee and which deserve a mention in our report are related to the registration of dealers and size of packaging.

Relaxation in the dealers registration

7.24 At present, every fertiliser dealer who sells any quantity is required to register himself with the registration authority which is generally at the district level. This inhibits a large number of small traders who are otherwise catering to various needs of the farmers in the villages, from dealing in fertilisers. The Committee is of the view that small traders should be encouraged, particularly in the villages, to take to fertiliser dealership in small quantities so as to reach large number of farmers in remote and difficult areas. This may be possible if restrictions of registration are removed from such small dealers. The Committee recommends that it should serve the purpose of efficient fertiliser distribution if dealers are exempted from registration provided they maintain a record of the source from where supplies are obtained and the stock at any time with

them does not exceed a certain upper limit, say about 1/2 tonne of all types of fertiliser material.

Need for smaller packaging

7.25 The requirement of fertilisers in hilly areas and in rainfed areas is not very substantial, particularly in the case of small and marginal farmers. The present size of packaging (50 kgs.) poses not only the problem of resources for the small and marginal farmers but also causes difficulty to transport in hilly areas. The Committee, therefore, recommends that small packages of the size of 15 to 20 kgs. should be introduced by the industry and they should be permitted to charge extra cost involved in such packaging which could also be statutorily notified.

Fertiliser handling, movement & storage

7.26 The volume of fertiliser traffic to be moved from the supply points (production units and ports) is expected to increase to a range of 25 to 30 million tonnes by 1989-90. Historically, the railways have borne the main burden of transporting fertilisers from supply points to the railheads close to the consuming centres. The secondary movement from the railheads to the retail distribution outlets is undertaken by road. However, over the years, the railways have been finding it difficult to cope with all the fertiliser traffic as and when offered. Road transport has come to be increasingly used, even in long-distance primary movement of fertiliser products, increasing the cost of distribution. Besides, there are limits to which road transport can substitute for rail in the long distance movement. Despite the best of efforts by the railways, there had been delays in getting in time adequate number of wagons by many a fertiliser plant. In some cases, such as the new gas based plants at Thal and Hazira, production had to be curtailed due to such transport problems.

7.27 A number of railway stations have been designated as rake-handling points by the railways. This arrangement, however, has not proved to be satisfactory, primarily because many of the rake-handling points notified by the railways lack even the minimum of infrastructural facilities, such as proper railway sidings, covered platforms, facilities for transit, storage, proper road connections, etc. These limitations have resulted in avoidable losses in handling and delay in unloading. This deficiency at terminals is affecting wagon turn-out. Ultimately it affects wagon availability. There is an urgent need to improve the terminal facilities. Since the development of facilities to meet effectively the transport needs at each of the rake-handling points will involve enormous investments, it is felt that a limited number of major fertiliser handling points located in high consumption areas and on existing rail routes be developed fully as nodal points for fertiliser distribution. The Committee understands that such an exercise has been taken up by the Department of Fertilisers which must be expedited. While planning various facilities at the nodal points, the following requirements should be kept in view:-

- i) Full railway siding with covered platform.
- ii) Exclusive warehousing facilities for fertilisers adjacent to the railway siding which will be used for transit storage pending distribution to the consumption centres.
- iii) Mechanical handling arrangements (use of conveyor belts) to transfer the products from the wagon to the warehouse.
- iv) Facilities for circulation and loading of trucks.
- v) Communication, lighting and other facilities.

Rationalisation of allocation

7.28 Government of India is subsidising transport cost upto the block headquarters. This burden of transport subsidy is bound to increase with the increased use of fertilisers. The Committee is fully conscious of the need to restrict this expenditure to the minimum possible extent. The Committee is also conscious of the increased burden that the country's transport system will have to face in the years to come on account of increased use of fertilisers and hence the need to optimise the available transport capacity by rationalising allocations. The Committee, therefore, recommends that the allocation of fertilisers should be so planned that there is no cross movement and also

the distances from the supply points to the consuming centres are minimal. The Committee understands that the Department of Agriculture & Cooperation has already undertaken such an exercise which must be pursued and implemented.

Quality control

7.29. Quality of fertilisers is another important aspect which needs continuous attention of the Government. The quality of fertiliser purchased by the farmer cannot be tested by any farmer himself. The States, therefore, should have a very vigilant quality control set-up backed-up by adequate number of fertiliser testing laboratories to ensure that the interests of the farmers are adequately safe-gaurded. The Committee recommends that the Government of India should help State Governments in creating and updating the status of their fertiliser quality control laboratories.

Sales tax and other levies of the State Govt.

7.30 It has come to the notice of the Committee that different States have different rates of sales tax on fertilisers while some of the States have altogether exempted fertilisers from the purview of sales tax. Fertilisers are heavily subsidised by the Government of India; any imposition of sales tax or other levies by the States will defeat the common purpose of fertiliser promotion for which such a heavy subsidy is being given for fertilisers. The Committee, therefore, recommends that the States should be persuaded to exempt chemical fertilisers from all kinds of levies, including sales tax.

Distribution margin for dealers

7.31 The distribution margin for dealers is fixed by the Department of Agriculture & Cooperation. The existing distribution margin rates were fixed in May, 1983. Before the dealers' margin was fixed, a study was carried out by the PDIL which recommended revised distribution margin for the dealers on the basis of increases in the cost of each activity in the course of distribution. However, the margins revised by the Government indicated only a lumpsum amount without indicating componentwise break-up. This amount was also less than the amount recommended by the PDIL. Fertiliser dealers have been representing that their margin should be increased as costs of most of the activities on which they have to incur expenditure have gone up. One of the terms of reference of the Committee is also to recommend the distribution margin, both for private trade as well as for the cooperatives.

7.32 The Committee has considered the issue at length. It recommends that since retention price and the freight subsidy are being handled by the F.I.C.C., it will be desirable that the same agency should look into the question of dealers' margins. The Committee is recommending this approach to avoid any possible duplication in allowing compensation on account of production, distribution and marketing expenses. The Committee would also like to recommend that FICC should afford an opportunity to both the private dealers and the cooperatives to put up their case before them and the dealers' margin should also be revised periodically alongwith retention prices. The Committee would, however, like to emphasise that cooperatives should continue to get preferential treatment, as already brought out in para 7.14 above. To encourage the opening of retail points in the interior rainfed areas, the Committee recommends that all dealers who open new outlets in these areas should get an incentive of Rs. 10/- per tonne during the first three years of their operation.

CHAPTER VIII

ECONOMICS OF FERTILISER USE IN CROP PRODUCTION

8.01 Profitability of fertiliser use depends upon at least three important factors:

- The productivity of technology;
- Relationship between the prices of fertilisers and those of produce and
- Risks and uncertainties involved in crop production.

These are dealt with one by one in the following paragraphs:-

Productivity of technology

8.02 Crop yields have been increased substantially in many areas of the world, particularly over the past two decades. The single important factor has been evolution of highly fertiliser responsive high yielding varieties of cereals. Before mid-1960s, the available varieties of paddy, wheat and maize lodged under the weight of heavy vegetation when fertiliser doses exceeding 30 to 40 kgs. per hectare were applied; much of such applied fertiliser was converted into vegetation rather than grain. From mid- 1960s, dwarf paddy and wheat varieties were evolved; they were capable of converting higher doses of fertilisers into grains; they could develop their strong root system and remain up-right despite the load of heavy grains. It is the widespread use of these varieties which has led to a tremendous expansion in the use of fertilisers. However, these varieties also needed associated cultural practices including effective control of weeds, pests and diseases, appropriate cropping system and sequence, conservation and controlled use of water, soil improvement and conservation practices, in addition to increased use of fertilisers. Efficient farm management also became increasingly important for such high yielding varieties; greater attention was needed to ensure timeliness of operations. Crop production acquired the exacting specifications characteristic of industrial processes. Crop production pattern in the different countries now shows that high crop yields and high values of production per hectare are characteristics of areas of advanced economic development where there is a high degree of application of improved practices including the use of fertilisers.

Yardstick of additional production due to fertiliser use

8.03 Indian Agricultural Statistics Research Institute, New Delhi, has organised a large number of experiments ranging from 10,000 to 25,000 in the farmers' fields under the All India Coordinated Agronomic Project and has worked out physical responses to the use of fertilisers. Additional production from application of nitrogen in kharif rice and wheat are given in table 8.1; responses to three doses in 40 kg, 80 kg and 120 kg of nitrogen per hectare on kharif rice, rabi rice and irrigated wheat in different States are set out.

Table 8.1: YARDSTICK OF ADDITIONAL PRODUCTION FROM USE OF NITROGEN ON HYV OF RICE AND WHEAT.

Name of State	Yardstick of additional production (kg for each kg N)		
	N ₄₀	N ₈₀	N ₁₂₀
Kharif Rice (1967-80)			
1. Assam	4.6	4.5	3.9
2. Maharashtra	6.6	5.9	5.5
3. Madhya Pradesh	10.0	9.5	8.3
4. Kerala	10.8	8.7	7.5
5. Orissa	11.1	10.5	9.5
6. Karnataka	11.9	10.9	10.0
7. Andhra Pradesh	12.1	11.0	9.7
8. Tamil Nadu	12.5	10.7	9.3
9. Uttar Pradesh	14.0	11.9	10.6
10. Gujarat	15.0	11.9	10.7
11. Punjab	16.6	15.7	15.4
12. Haryana	17.6	18.6	14.9

13. Himachal Pradesh	18.4	12.8	12.0
14. J & K	18.4	16.0	13.0
15. Bihar	19.7	16.3	14.6

Rabi Rice (1967-80)

1. Assam	5.9	4.2	3.5
2. Kerala	9.2	7.6	5.9
3. Tamil Nadu	9.5	8.4	7.9
4. Maharashtra	9.6	9.6	8.0
5. Andhra Pradesh	13.1	11.5	10.6
6. Orissa	13.6	13.1	12.4
7. Karnataka	15.3	14.3	13.6
8. West Bengal	16.3	9.9	9.7

Wheat Irrigated (1977-82)

1. Andhra Pradesh	3.8	3.8	4.5
2. Karnataka	5.2	4.4	4.3
3. Orissa	5.9	6.0	6.1
4. Maharashtra	6.6	6.7	6.7
5. Gujarat	6.8	6.2	6.2
6. Madhya Pradesh	10.4	8.9	8.5
7. Haryana	11.0	10.7	10.2
8. Himachal Pradesh	11.4	10.0	8.7
9. Punjab	15.6	13.0	10.8
10. Uttar Pradesh	15.7	13.0	12.1
11. Rajasthan	18.4	15.5	13.5
12. Bihar	18.9	16.7	15.3

- Sources: 1. C.R. Leelavathi, S.P. Bapat and P. Narain, 1986. Revised yardsticks of additional production of rice due to improvement measures. IASRI, New Delhi.
2. N.S. Randhawa, P.N. Bhargava and H.C. Jain, 1984. Current status of yardsticks of crop response to fertiliser. Proceedings FAI Group discussion on "Means to increase crop response to fertiliser use."

Additional production from the application of nitrogen, phosphorus and potash at the rate of 80-40-40 per hectare for irrigated/rainfed rice and irrigated wheat is given in table 8.2.

Table 8.2: COMPOSITE YARDSTICKS FOR ADDITIONAL PRODUCTION OF RICE AND WHEAT FOR APPLICATION OF NPK (80-40-40) FOR THE PERIOD 1977-82

Name of State	Additional production (kg) for each kg nutrient		
	Kharif Rice (Irrigated)	Kharif Rice (Rainfed)	Wheat (Irrigated)
1. Gujarat	6.1	-	5.9
2. Tamil Nadu	8.2	-	-
3. Maharashtra	8.8	-	5.9
4. Andhra Pradesh	9.7	-	4.7
5. Uttar Pradesh	9.7	-	11.2
6. Punjab	10.8	-	10.1
7. Haryana	10.9	-	9.6
8. Orissa	11.3	10.6	8.2
9. Himachal Pradesh	11.6	-	10.7
10. Madhya Pradesh	11.6	-	9.3
11. Karnataka	12.5	12.8	5.8
12. Bihar	14.0	-	12.9
13. Assam	-	5.6	-
14. Kerala	-	8.6	-
15. Manipur	-	9.4	-

Source: N.S. Randhawa, P.N. Bhargava and H.C. Jain, 1984. Current status of yardsticks of crop response to fertiliser. Proceedings of FAI Group discussions "Means to increase crop response to fertiliser".

These responses have been obtained under controlled conditions with optimum practices under the supervision of technical experts.

8.04 The following main conclusions emerge from the data:-

- i) In the case of kharif rice, the additional production, at the level of 40 kg. of nitrogen per hectare, ranges from 4.6 kg. in Assam to 19.7 kg. of grain in Bihar, per kg. of nitrogen. Poor response to fertiliser application has been observed in the States of Assam and Maharashtra. High response has been obtained ranging from 15 to 19.7 kg. paddy per kg. of N in the States of Gujarat, Punjab, Haryana, Himachal Pradesh, Karnataka and Bihar.
- ii) In the case of wheat, poor response has been obtained in the States of Andhra Pradesh, Karnataka, Orissa, Maharashtra and Gujarat, ranging from 3.8 to 6.8 kg. per kg. of N. Higher response has been obtained in the States of Punjab, Uttar Pradesh, Rajasthan and Bihar, ranging from 15.6 to 18.9 kg. per kg. of N.
- iii) With the increase in the level of fertiliser application, the additional production for each kg. of nutrient tends to decrease; this corroborates the hypothesis of diminishing returns on fertiliser use.

8.05 As mentioned above, additional production obtained at experimental trials do not necessarily reflect the conditions prevailing in farms managed by farmers themselves. At the farm level, the response curve to fertilisers will depend on the quality of seeds, nature and source of irrigation, cropping pattern, cultural practices adopted, timely availability of fertilisers and time and method of fertiliser application. The response to fertiliser application will increase with the use of improved varieties of seeds, availability of irrigation from a source over which the farmer has better control, introduction of efficient cultural practices, adoption of efficient cropping pattern and timely application of fertilisers through better management. These options are not equally available to all farmers; nor are all farmers equally well placed to exercise these options. At the micro-level, therefore, some additional features come into play which determine aggregate response to fertilisers.

8.06 An expert group had been appointed to quantify, in material and financial terms, the implications of achieving foodgrain production at the level of 185 million tonnes in 1989-90, the last year of the VII Five Year Plan. On consideration of available evidence, the Group assumed a response ratio of 1:8 to assess the requirements of fertilisers. This response ratio was calculated on the basis of contribution made by irrigation, land stocks and fertilisers in the production of foodgrains. Ratios were calculated for the periods 1967-68 to 1983-84 as well as 1978-79 to 1983-84 separately; ultimately the Group suggested a response ratio of 1:8 for the VII Plan. The higher this ratio, the greater the profit from the fertiliser application, assuming that fertiliser price relationship remains constant or becomes favourable to farmers.

Price relationship
between fertiliser
and crop

8.07 Fertiliser crop price ratio is the second important factor in determining the profitability of use of fertilisers. From table 8.3, it would be seen that when the fertiliser prices were almost doubled in 1974-75 because of international oil crisis, the ratio deteriorated for the farmer by 80 per cent for rice and 38 per cent for wheat and 5.9 kg. of rice and 4.1 kg. of wheat were required to purchase 1 kg. of nitrogen; as a result, a negative growth rate of 9.3 per cent was registered in fertiliser consumption.

Table 8.3: YEAR-WISE FERTILISER PRICES AND FERTILISER CONSUMPTION GROWTH RATE

Year	Maximum sale price of urea material (Rs./tonne)	Produce equivalent to one kg. N		Fertiliser consumption growth rate(%) over previous year
		Paddy	Wheat	
1971-72	923	3.78	2.64	+ 20.3
1972-73	959	3.83	2.74	+ 4.2
1973-74	1050	3.26	3.00	+ 2.5
1974-75	2000	5.88	4.14	- 9.3
1975-76	1850	5.43	3.83	+ 12.4
1976-77	1650 to 1750	4.82 to 5.13	3.40 to 3.62	+ 17.8
1977-78	1550	4.38	3.06	+ 25.7
1978-79	1550	3.96	3.00	+ 19.4
1979-80	1450	3.32	2.74	+ 2.7
1980-81	2000	4.14	3.72	+ 4.9
1981-82	2350 to 2000	3.78 to 4.44	3.35 to 3.93	+ 9.9
1982-83	2350	4.19	3.60	+ 5.3
1983-84	2150 to 2350	3.54 to 3.87	3.09 to 3.38	+ 20.7
1984-85	2150	3.41	3.07	+ 6.5
1985-86	2150 to 2350	3.28 to 3.60	2.97 to 3.25	+ 6.4
1986-87	2350	3.50	3.15	+ 3.0

However, after such slump in 1974-75, the consumption of fertilisers swung upward sharply when fertiliser prices were reduced and this trend continued upto 1979-80. There was a slackening in the pace in 1980-83 due to sharp increase in the price of fertilisers. Monsoon conditions no doubt affect fertiliser use but other things being equal, the fertiliser crop price ratio profoundly influences fertiliser use; more of it in chapter IX.

Risks and uncertainties

8.08 Unlike industrial processes, the growing of crops continues to be influenced by many variables which the cultivator cannot control. The risks and uncertainties mainly relate to losses due to pests and diseases, droughts and floods, input and produce prices as well as to timely availability of fertilisers and other inputs. Adequate availability of credit and other complementary inputs also influence farmers' decisions on the use of fertilisers. A higher return is needed to compensate for the higher cost of plant protection for pests and diseases inherent in high yielding varieties of cereals as well as in oilseeds and pulses. Droughts and floods are also risk factors which have plagued farmers in many parts of the country. While crop insurance is relevant in this connection, it has been found to be available to a minority of farmers who take loans from financial institutions. The returns on fertiliser application have to be sufficiently high to compensate for these risks and uncertainties.

8.09 Conditions of land tenure, if unfavourable, will greatly reduce the incentive to the farmer to use fertiliser; thus the share-cropping system under which the share-cropper is required to bear the cost as well as the risk of fertiliser use is a severe disincentive to the scientific use of fertilisers.

Cropping trend in optimum fertiliser use

8.10 The conditions governing fertiliser use for a crop at the farm level change over time and thus altering the optimum level of fertiliser. This can occur either due to change in the relationship between input and output prices or a shift in fertiliser response curve which may occur due to improvement in crop production technology or some alterations in physical/local factors.

Factors governing possibility of fertiliser use

8.11 The profitability of fertiliser application can increase if:

- i) The relative price of fertiliser decreases while there is no deterioration in the fertiliser response function.
- ii) The fertiliser response function shifts upwards due to application of improved technology while the relative price of fertiliser does not rise.
- iii) Fall in fertiliser prices is not fully offset by a downward slide in the response function.
- iv) The relative output price increases while there is no change in the response function and the price of fertiliser.

Cost benefit ratio

8.12 The question of determining a minimum cost benefit ratio which will induce the farmers to increase the use of fertilisers was discussed in the National Workshop on Fertiliser Consumer Prices attended by eminent agricultural economists held at Bangalore. The workshop recommended as follows:-

While there are difficulties in suggesting an immediate cost-benefit ratio, the ratio should be such that allowances are made for associated costs, risks and uncertainties. Study should be encouraged to generate data on these aspects from the cost of cultivation and other studies.

8.13 Considering the response ratio of 1:8 assumed by the expert group referred at 8.06 and the price ratio between the existing consumer price of nitrogen (through urea) and the procurement price of wheat and paddy, it appears that investment of one rupee on fertiliser yields wheat worth Rs. 2.3 and rice worth Rs. 2.5 respectively. To the extent the farmer gets adverse prices for fertiliser and produce and to the extent his physical response is less than 1:8, cost-benefit ratio will be worse than 1:2.3 for wheat and 1:2.5 for rice respectively.

8.14 It has been noticed that 65 per cent of all fertilisers is used on rice and wheat crops and bulk of such use is in irrigated areas growing high yielding varieties which have a low risk quotient. Fertiliser use is growing practically only in these two crops; in other crops, the risk factor is much larger and has a strong inhibiting influence on fertiliser use. In these circumstances, it is possible that a cost-benefit ratio between 1:3 and 1:3.5 may be called for to promote fertiliser use in high risk areas like unirrigated areas and high risk crops like oilseeds and pulses. Adequate data are not available to come to definite conclusions. The recommendation of the Bangalore conference for conducting more studies (vide para 8.12), therefore, is strongly supported by the Committee. The Department of Agriculture & Cooperation may utilise the Agro-Economic Research Centres or other appropriate agencies for instituting such studies which should be published periodically.

8.15 Regarding the criterion for fixing nutrient prices of nitrogen, P_2O_5 and K_2O in complex fertilisers, there is a demand that the prices of nutrients should be uniform in all fertilisers and that in particularly NPK complex fertilisers, the price of N, P_2O_5 and K_2O should be comparable to the most efficient products of nitrogen as in urea, of P_2O_5 as in DAP and of K_2O in MOP. At present, the prices of nutrients in NPKs and NPs are slightly higher than in urea, DAP or MOP, as the case may be.

8.16 The Ministry of Agriculture had in the past promoted the establishment of manufacturing capacity of complex fertilisers i.e. NPKs and NPs in the interest of balanced use of fertilisers. Elsewhere in the report, it has been recommended that with the growing awareness of balanced fertiliser use and with the increasing cost of producing complex fertilisers, it would be necessary to reverse this trend and to encourage farmers to mix high analysis fertilisers for use according to the soil test recommendations.

8.17 However, such capacity of complex fertilisers as have come into production, also needs to be run on a viable basis. Complex fertilisers have their own advantages i.e. lower

unit cost of transport on account of their high degree of concentration and relative freedom from adulteration on account of their granulated character. The farmer, in many cases, has been found agreeable to pay higher prices for complex fertilisers on account of these advantages. To reverse this, would lead to reducing the price of complex fertilisers and to increasing the subsidy burden on the exchequer, a measure at this moment not considered advisable. In the circumstances, it is recommended that the existing system of pricing of complex fertilisers should continue and no reduction in prices would be warranted.

CHAPTER IX

FERTILISER PRICES IN INDIA AND ABROAD

9.01 The question of fertiliser prices is of importance to the farmers as well as the fertiliser producer. The Planning Commission has fixed the VII Plan target of 13.5 to 14 million tonnes of nutrients in 1989-90 in order to achieve, inter-alia, a foodgrain production of 178 to 183 million tonnes during that period. Similarly, to achieve, inter-alia, a production of 240 million tonnes of foodgrains by 2000 AD, the Planning Commission has estimated the fertiliser requirement of at least 20 million tonnes. Fertiliser pricing has, therefore, to be viewed in the context of the above objectives

9.02 The high target of food production is required not only to feed an increasing population but also to step up the nutrition levels of the existing population. The scope for bringing additional land under agricultural production is limited. Therefore, such additional foodgrain production can be achieved only by increasing the productivity per unit of land already under cultivation. Fertiliser is the most important input to increase the productivity per unit of land. To promote greater use of fertilisers, satisfactory fertiliser pricing policy would be essential.

Control on fertiliser prices

9.03 Government control on fertiliser prices, mostly indigenous fertilisers, in India dates back to the Second World War. Fertiliser had to be sold to farmers at fixed prices while the cost of domestic production and of imports varied from time to time. However, all such fertilisers from the two sources were pooled together for sale at a uniform price throughout the country under an administrative order. This arrangement continued till 1957 when the Fertiliser (Control) Order, under the Essential Commodities Act, was promulgated. With a view to regulate distribution of all fertilisers on an equitable basis and making fertilisers available at fair prices, the Fertiliser (Control) Order, 1957 had a provision to fix maximum price or rate at which any fertiliser could be sold by a manufacturer or dealer. From that time, the prices of urea, ammonium sulphate and calcium ammonium nitrate were statutorily controlled by the Government under the provisions of the Fertiliser (Control) Order. Regarding super phosphate, retail prices were informally regulated by the Fertiliser Association of India according to the formula suggested by the Tariff Commission. This formula was based on certain assumptions made by the Tariff Commission about the market conditions and installed capacity of the units in production at the beginning of the First Five Year Plan.

9.04 Till November 1977, there was no need to subsidise domestic production the indigenous cost of production plus a reasonable profit margin could be realised under the prices regulated. However, following the steep escalation in the cost of feed stocks and other inputs as well as in the investment cost of new plants, the cost of production of fertilisers increased sharply. National interest required that fertiliser production in the country should be promoted on a stable and profitable basis and for these purposes subsidies were approved for manufacturers who could not recover their costs despite efficient operations. Urea, ammonium sulphate and calcium ammonium nitrate were brought under such a scheme of "retention price" for individual units from November, 1977; such protection to CAN and AS was withdrawn with effect from 8th June, 1980 but was reintroduced on 21st August, 1984.

9.05 The prices of complex fertilisers like NPs and NPKs were not governed by the price control until March, 1976. Each manufacturer was free to fix his own price for the same product. However, with effect from 16th March, 1976, phosphatic fertilisers were also brought within the purview of the informal price control because of international oil crisis and consequent increase in the price of basic raw-materials required for production of phosphatic fertilisers. This resulted in a sharp increase in the consumer

prices of phosphatic fertilisers, affecting the growth of P_2O_5 consumption. Realising the implications of low growth of P_2O_5 consumption, the Government introduced a scheme of uniform subsidy of Rs. 1250/- per tonne of P_2O_5 and to that extent, the then prevailing consumer prices were reduced. With effect from 1st February 1979, even complex phosphatic fertilisers were brought within the purview of the statutory price control and ultimately of the retention price scheme. With effect from 23rd May, 1982, even single super phosphate was brought under the statutory price control and retention pricing system.

9.06 Potash requirement is entirely met through imports since there is no source of domestic production. The import of potassic fertilisers was channelised through State Trading Corporation from 1958 and Indian Potash Supply Agency Limited became their handling agents at ports. Sales were effected at prices fixed by State Trading Corporation of India with the concurrence of the Ministry of Food & Agriculture. Minerals & Metals Trading Corporation became the channelising agency effective from 1st January, 1970 in place of State Trading Corporation and Indian Potash Supply Agency Limited continued to be the handling agents for M.M.T.C. The imports of potassic fertilisers are being made under the directions of the Ministry of Agriculture and the consumer prices are uniform throughout the country. Although the consumer prices of potassic fertilisers were informally controlled earlier, their consumer prices were brought under the statutory price control in February, 1979.

Retention pricing system

9.07 The administration of the retention pricing system was entrusted to Fertiliser Industry Coordination Committee (FICC) headed by Secretary to the Government of India, incharge of fertiliser development and consisting of representatives of Finance, Agriculture and other concerned Ministries and of fertiliser industry. The Government had two objectives. The first was to ensure a reasonable fertiliser consumer price to induce the farmers to use fertilisers. The second was to ensure a reasonable return on investment and facilitate the healthy development and growth of the fertiliser industry.

9.08 The FICC retention pricing scheme was designed on the recommendations of a high level Fertiliser Pricing Committee headed by Dr. Marathe which examined various pricing alternatives and evolved one that would reconcile the interests of both the consumer as well as that of fertiliser industry. Under this scheme, fair ex-factory realisation for each unit is fixed on the basis of a combination of norms and actuals of cost of production, besides equated freight for its marketing area. The difference between the net realisation (consumer price minus distribution margin) on the one hand and the retention price plus equated freight on the other hand, is mopped up from or paid to each unit by the Government. The need to fix a separate price for each unit arose mainly because of the wide variations in the cost of production resulting from differences in vintage, feedstock and location of plant, etc. The system is also based on the norm of capacity utilisation at 80 per cent of ammonia plants with post-tax return of 12 per cent on "net worth".

9.09 Because of the increase in investment, raw material and operational costs as well as the expansion of fertiliser production, the subsidy disbursement for domestic producers has risen from Rs. 275 crore in 1980-81 to Rs. 1700 crore in 1986-87.

Long Term Fiscal Policy

9.10 The Long Term Fiscal Policy announced by the Government in December, 1985 has stipulated that the total non-plan revenue expenditure could be contained within 12 per cent of GDP by 1989-90 only if the total of food and fertiliser subsidies are held to about 1 per cent of GDP. It has also recognised that a steep increase in the price of fertilisers at one stroke could have an adverse impact on agricultural growth. It has, therefore, called for efforts for reducing the cost of manufacture, especially by taking steps to economise on energy requirements. However, a note of caution has also been sounded that if subsidies continue to grow at the present rate, they will either be at the

expense of developmental expenditure or they will need higher budget deficits which in turn will affect costs and prices, thereby calling for higher subsidies. While determined efforts must be made to increase revenues, a measure of constraint in respect of subsidies is considered unavoidable. It has, however, been suggested that a balanced approach is to try and contain subsidies within a certain level in terms of GDP.

Role of fertiliser in long term development strategy

9.11 As fertiliser constitutes an important input in increasing agriculture production, its pricing and subsidies cannot be viewed in isolation but as a part of the overall objectives and strategies for the development of agriculture in the country. Even highly developed countries like US and EEC members heavily subsidise their agriculture. In the USA, it is in the form of PIK Programme (Payment In Kind) and ARP (Area Reduction Programme). Farm subsidies in the USA, EEC and Japan are of the order of 25, 48 and 20 billion US dollars. In the developing countries, fertiliser consumption has increased from about 3.7 million tonnes in 1961 to 43 million tonnes in 1983-84, i.e. nearly 12 times, for augmenting food production for domestic consumption. Cereals and pulses production increased from 430 million tonnes to 941 million tonnes during the same period. This development was stimulated by subsidising the use of fertilisers as well as by carefully planned extension activities. This strategy helped to maintain a reasonable input-output ratio to enable farmers to use fertilisers profitably and at the same time retain reasonably low foodgrain prices in order to protect foodgrain consumers. A significant proportion of the latter in the developing countries subsists below the poverty line. Use of subsidised fertilisers helped additional production and augmented gainful employment of the increased agricultural labour force. Thus fertiliser subsidy has been an effective tool in promoting production, productive employment and income generation. Equally important, it has provided greater food security to developing countries, reduced their dependence on food import and saved scarce foreign exchange. Self-reliance in food has given them a new confidence to plan their further development. Subsidies have facilitated exports of agricultural products, thereby earning valuable foreign exchange. Lastly, it has stimulated the growth of fertiliser and other ancillary and agro-based industries, providing employment and assisting in economic development.

Policy package for pricing

9.12 Fertiliser consumption in India has made remarkable progress mainly because of a thoughtful policy package which has taken into account realities of the country's agricultural sector. Consumption has risen from 0.292 million tonnes in 1960-61 to 2.177 million tonnes in 1970-71 and on to 5.516 million tonnes in 1980-81 to an estimated 9.0 million tonnes in 1986-87. The increase in consumption during the five years of the 6th Plan has been around 60 per cent. In the course of the 7th Plan ending 1989-90, consumption has to rise by 64 per cent. The five important elements of the policy package on fertiliser pricing are:

- a) uniform prices for the whole of the country,
- b) uniform prices for domestic production as well as imports,
- c) uniform prices for all farmers irrespective of holding size,
- d) continuing the retention price policy and
- e) reducing cost of production of domestically produced fertilisers.

They are dealt with in the following paragraphs:-

Uniform prices for all the regions

9.13 It has been argued that consumers near the source of production or near the port may pay a lesser price than the consumers located far away from them. The argument is untenable for the following reasoning. Government policy must aim at avoiding regional distortions in development planning. An industry based on imported raw materials must be normally located near ports or in other areas with satisfactory infra-structures. In such areas, the ability of consumers is greater than in remote area where poverty is more acute. If differential pricing based on the transport cost to the remoter areas were introduced, as opposed to uniform pricing throughout the country, the well-off near the sources of production or import would, in fact, be more benefited than the

less privileged in the remoter areas. However, as long as foodgrains prices are uniform throughout the country, the prices of fertiliser as the main and costliest input must also remain uniform.

Pricing of domestic production and imported fertilisers

9.14 It has been contended that imported fertilisers should be sold at the landed price. But this is likely to lead to complete disruption of fertiliser distribution arrangements. It is known that import prices of fertilisers are subject to large fluctuations according to demand and supply situation in the international market. To expose the capital intensive domestic fertiliser industry to the vagaries of international market is a surest way of discouraging establishment of fertiliser production capacity in the country. A variant of this argument has been that potash which is wholly imported should be priced according to the landed cost. Here again, the larger considerations militate against such an argument. Optimum returns from nitrogen and phosphates can be reaped only if potash is used in appropriate proportions as recommended in the soil test. It has been observed that many short-sighted farmers do not use potash. Promotion of the use of potash may call for appropriate cross subsidy in favour of potash by loading the price of nitrogen. Summing up, smooth distribution of fertilisers require uniform pricing for domestic production as well as imports.

Lower prices for weak farmers

9.15 It has been argued that a dual pricing policy involving concessional prices for small and marginal farmers and higher prices for the medium and larger farmers may help to reduce the subsidy burden. Once again, this is impossible to administer. Not less than 76 per cent of the 90 million holdings in India belong to small and marginal farmers; it will require a large army of officials to issue cards to these 69 million farm families so that they can draw fertilisers at a preferential price against such cards. Moreover, it may lead to leakage of benefits to the medium and large farmers. The problems of accounting confronting the 1,50,000 fertiliser dealers distributing fertilisers at differential prices will also be quite daunting. Moreover, the intention of the Government to give concessions to small and marginal farmers can be carried out in many other ways through subsidies for durable assets like pump sets, tubewells, etc. whose administrative problems are far more manageable. Some countries which had introduced differential prices for the use of fertilisers for different crops had to beat a hasty retreat. In conclusion, it can be said that a dual pricing policy is difficult to administer and that its purpose can be achieved through other simpler means.

Retention price policy

9.16 Another important imperative for efficient expansion in the fertiliser use in the country is the continuation of the retention price policy for the foreseeable future. The costing structures of different fertiliser plants are varied for reasons beyond their control. Moreover, the need for import of fertilisers will continue in India for quite some time and the prices of imports will continue to be governed by forces of international demand and supply. In the circumstances, the need for a regime of administered prices for smooth development of fertiliser production and consumption, particularly featuring the retention price policy, is totally unavoidable.

Reducing the cost of production

9.17 Finally, there have to be continued efforts to reduce the cost of production of domestically produced fertilisers. This could be achieved by increasing the capacity utilisation of the existing and new plants. Energy consumption in the plants needs to be considerably reduced as well as the expenditure on marketing and distribution. Movement of fertilisers should be rationalised and criss-cross movement avoided. All these steps are bound to reduce the cost of production and distribution and hence the subsidy burden in the ultimate analysis.

Fertiliser prices in India and abroad

International comparison

9.18 It is not easy to make accurate comparison of Indian fertiliser prices with those of other developing countries. Yet, a broad approximation can be made by considering the number of kilograms of paddy needed to buy one kilogram of nitrogen. Table 9.1 presents such a picture.

Table 9.1: PADDY AND FERTILISER NUTRIENT PRICE RATIO IN SELECTED COUNTRIES IN ASIA AND PACIFIC (1984-85)

Country	Kg. of paddy required to buy 1 kg. N
Bangladesh	2.01
Burma	0.69
India	3.41
Indonesia	1.24
Malaysia	1.26
Nepal	2.87
Pakistan	2.47
Philippines	3.78
Republic of Korea	0.99
Sri Lanka	1.63
Thailand	3.91

Note: Price of paddy is Government support price wherever applicable and market price in other cases.
Source: Agro-chemicals News in Brief-FADINAP Sept '88

9.19 It is clear from the above table that fertiliser prices were far more favourable in 1984-85 in countries like Bangladesh, Burma, Indonesia, Malaysia, Nepal, Pakistan, Republic of Korea and Sri Lanka compared to India.

Trends of fertiliser prices in India

9.20 Table 9.2 sets out year wise urea prices, consumption and rate of growth for 16 years. Urea is the single most important fertiliser used in India and the prices of other fertilisers have moved up and down, broadly in proportions similar to that of urea. There has been an escalation of around 150 per cent in price of urea in the last 16 years but the prices of paddy and wheat have also risen more or less to the same extent in the same period.

Table 9.2: YEAR-WISE FERTILISER PRICES, FERTILISER CONSUMPTION GROWTH RATE

Year	Maximum sale price of urea material (Rs./tonnes)	Produce equivalent to one kg N		Fertiliser consumption growth rate (% over previous year)
		Paddy	Wheat	
1971-72	923	3.78	2.64	+ 20.3
1972-73	959	3.83	2.74	+ 4.2
1973-74	1050	3.26	3.00	+ 2.5
1974-75	2000	5.88	4.14	- 9.3
1975-76	1850	5.43	3.83	+ 12.4
1976-77	1650 to 1750	4.82 to 5.13	3.40 to 3.62	+ 17.8
1977-78	1550	4.38	3.06	+ 25.7
1978-79	1550	3.96	3.00	+ 19.4
1979-80	1450	3.32	2.74	+ 2.7
1980-81	2000	4.14	3.72	+ 4.9
1981-82	2350 to 2000	3.78 to 4.44	3.35 to 3.93	+ 9.9
1982-83	2350	4.19	3.60	+ 5.3
1983-84	2150 to 2350	3.54 to 3.87	3.09 to 3.38	+ 20.7
1984-85	2150	3.41	3.07	+ 6.5
1985-86	2150 to 2350	3.28 to 3.60	2.97 to 3.25	+ 6.4
1986-87	2350	3.50	3.15	+ 3.0

9.21 Broadly speaking, fertiliser consumption has gone up when (a) a new technology or a new seed leading to profitable use of fertilisers has just been released or (b) the weather conditions have been favourable or (c) the prices of fertilisers have remained stationary or have been reduced.

Effect of price increase

9.22 Out of the 16 years under consideration, seven years have witnessed increase in fertiliser prices, five years reduction of fertiliser prices and five years stationary prices. It is useful to analyse the trends in fertiliser consumption under these three price regimes. In the seven years witnessing increase in fertiliser prices, consumption of fertiliser either fell or exhibited very poor increase, far below the average increase of 10 per cent experienced in the past. The respective variations were as follows:-

1972-73	:	4.2%
1973-74	:	2.5%
1974-75	:	(-) 9.3%
1980-81	:	4.9%
1981-82	:	9.9%
1985-86	:	6.4%
1986-87	:	3.0%

Effect of stationary prices

9.23 Fertiliser prices were stationary in four years and in two of them, fertiliser consumption experienced an increase of 19.4 per cent (1978-79) and 20.3 per cent (1971-72). The other two years are 1982-83, experiencing 5.3 per cent growth and 1984-85, experiencing 6.5 per cent growth.

Effect of reduction in fertiliser prices

9.24 There were five years which experienced a reduction in the price of urea in which there was growth exceeding 17 per cent in three years, 12.4 per cent in one year and 2.7 per cent in another year. The following are the specific details:-

1975-76	:	12.4%
1976-77	:	17.8%
1977-78	:	25.7%
1979-80	:	2.7%
1983-84	:	20.9%

Conclusion

9.25 While weather had an important impact on fertiliser use, the fact remains that the years of spurt in fertiliser use are broadly the years in which urea prices were reduced; satisfactory growth was also witnessed when fertiliser prices were held stationary. The growth in fertiliser use was minimal in the years when the urea prices were increased. It is clear that other things being equal, price increases tend to reduce fertiliser use.

CHAPTER X

FERTILISER CONSUMER PRICES

10.01 The most important issue before the Committee relates to the level of fertiliser consumer prices, taking into account the macro-economic aspects of country's planned development. At present, there is a subsidy of the order of 30% on all fertilisers put together which are used in the country. Government is concerned at the sharp increase in the levels of subsidies for fertilisers in the recent years; they have risen from Rs. 515.26 crores in 1980-81 to Rs. 1893.00 crores in 1986-87.

Table 10.1: SUBSIDY PAID ON IMPORTED AND INDIGENOUS FERTILISERS IN INDIA

Year	Imported fertiliser (Rs. crores)	Indigenous fertiliser (Rs. crores)	Total (Rs. crores)
1976-77	52.47	59.79	112.26
1977-78	45.91	127.33	173.24
1978-79	120.08	172.17	292.25
1979-80	281.80	320.78	602.58
1980-81	335.26	180.00	515.26
1981-82	100.22	275.00	375.22
1982-83	55.36	550.00	605.36
1983-84	141.83	900.00	1041.83
1984-85	727.31	1200.00	1927.31
1985-86	323.00	1600.00	1923.00
1986-87	193.00	1700.00	1893.00

(Estimated)

In the Long Term Fiscal Policy Document presented by the Government to the Parliament in December 1985, an indication has been made that the total amount of food and fertiliser subsidy should be contained at a level of 1.0% of GDP by 1989-90 in order to direct adequate resources for planned development. The estimated fertiliser subsidy during the 5 years of VII Plan may be around Rs. 8,800 crores as against Rs. 4,500 crores incurred during the VI Plan.

10.02 What is causing greater concern is the fact that the new fertiliser units which are coming up now, will have a much higher cost of production than the earlier ones, thus leading to higher subsidy burden per tonne of fertiliser than ever before. Apprehensions have been expressed that the annual subsidy levels may rise to Rs. 3,500 crores or more unless the consumer prices of fertilisers are raised and the burden of subsidy thereby reduced.

10.03 The Committee has given most earnest consideration to this important issue.

Basic role of agriculture sector

10.04 In India, as in most developing countries, progress in all other sectors of the economy is dependant on the progress made in the agricultural sector. Dynamic agriculture provides income and employment to the largest section of the population (67%) in the country and promotes the establishment of farm-based industries and services. It also provides labour and capital resources for the development of other sectors of the economy and contributes substantially to the national income and export earnings. Consequently, pricing policies which are crucial to safeguard the health of agriculture, the key industry on which the country is dependant for socio-economic growth, do affect the health of the secondary and tertiary sectors also.

Equity considerations in Indian planning

10.05 In Indian planning, equity and social considerations have been given an important role as efficiency and economic considerations. The goal of planning is to raise the level of living of all sections of the population. With three fourths of the country's population directly depending on agriculture for their livelihood, any macro-economic policy in India has to be subservient to the cause of this large section of population. In some of the industrial countries, farm population is as low as 5% of the total population; they do not have the same compulsions as India has.

10.06 Secondly, nearly 35% of our population is below the poverty line. Two thirds or more of their income is used for food. Whatever reduces the cost of production of food, is a great relief to them.

10.07 Thirdly, 76% of our holdings are tilled by small and marginal farmers. Nothing should be done which creates disincentives for efficient crop production by them. Use of fertilisers again has very important implications for development of millions of farmers in India. It was noticed in late 1970s that only half of India's cultivated lands were fertilised and again only half the farmers applied fertilisers. The capacity of almost all farmers to increase their yields and thus their income depends largely on their capacity to increase their fertiliser use.

10.08 Fourthly, the population of India has been growing at nearly 2% per annum; an annual increase in food production of the order of 6 million tonnes is essential to provide adequate nutrition to the people. As of now, there is no technology for increasing food production in which the use of fertilisers does not have a spearhead role. An annual increase in fertiliser consumption of the order of 10% is indispensable if our country's agriculture is to sustain the population with food, fibre and raw materials.

10.09 With these four important basic considerations, there can be no compromise.

10.10 For increasing consumption of fertilisers, both price and non-price factors are important. While soil testing, demonstrations, credit and efficient distribution will go a long way, price factor would also have an important role in helping promote the use of fertilisers. Since nearly half of the increment in yields has come from the use of fertilisers in India, it can be said without exaggeration that India's agricultural development is closely related to its capacity to increase fertiliser use on cost-effective basis.

Experience of developing countries

10.11 It is useful to review the experience of 16 developing countries in four continents as brought out by the FAO in its publication "Role of fertiliser pricing policy and subsidies in agricultural development" (FAO, Rome 87). These countries are Pakistan, Bangladesh, Indonesia, Republic of Korea, Malaysia, Nepal, Philippines, Sri Lanka, Brazil, Egypt, India, Mexico, Nigeria, Turkey, Yugoslavia and Zambia. The broad conclusions from these 16 countries' case study show that while price regulations on subsidy systems differ from country to country, the following conclusions emerge almost uniformly:-

- i) Foodgrain prices are generally kept at a reasonably low level to protect weaker sections of society.
- ii) Fertiliser prices are also kept low in order to encourage their increased use with a view to increasing foodgrain production to meet the growing demand and to achieve greater self-reliance. Generally, the ratio in terms of kilograms of grain required to buy a kilogram of nutrient has been discerned at 3:1 on an average, although in certain cases a lower ratio provided a greater incentive to increase consumption.
- iii) The systems have entailed a heavy fertiliser subsidy over the years. Whenever fertiliser prices increased significantly owing to reduced subsidies, a reduction in fertiliser consumption or a slower than desired growth rate was the result. Consequently, either fertiliser prices had to be reduced again or output prices

had to be increased. In certain cases, the price changes lead to decrease in agricultural production.

- iv) With increasing fertiliser consumption, governments generally felt the increasing burden of the subsidy due largely to increased prices of raw materials and other inputs, imported as well as indigenous. Government or quasi-government bodies control these prices. Such price control systems are applied, for want of a better alternative by which subsidies could be reduced, without retarding the increase in agricultural production and without affecting the weaker sections of society.
- v) In certain countries, differential fertiliser pricing for different crops was tried but was abandoned due to leakage from low to high value crops.
- vi) In a number of Asian developing countries including China, fertiliser consumption per ha. was higher than in India and correspondingly the average crop yields per ha. were also higher than in India.

Experience of developed countries

10.12 Developed countries such as Japan, the United Kingdom and other European countries provided a strong subsidy incentive initially and phased out the fertiliser subsidy when they had reached an advanced stage of economic development. Such fertiliser subsidies have been reduced in New Zealand and Australia but were accompanied by significant increase in crop prices.

Arguments against subsidy

10.13 However, recently international financial institutions as well as others have been arguing that fertiliser subsidy should be either stopped or should be gradually eliminated, on the following grounds:-

- All subsidies lead to mis-allocation of budget resources.
- They often benefit rich people who are not supposed to be beneficiaries.
- There should be greater emphasis on fertiliser promotion to increase fertiliser use; non-price factors are far more important than price factors.
- Fertiliser subsidies lead to deficit financing causing inflation.
- Many small and marginal farmers use higher doses of fertilisers than medium and large farmers and a rise in price may not reduce their consumption significantly.
- Many developed countries subsidising agriculture can afford to do so while poor countries like India should use their resources for more important investments than on farm subsidies.

Implications and options

10.14 It is necessary to analyse the implications of these arguments. The question that arises is whether or not India has reached a stage at which it can eliminate or reduce subsidies on fertilisers substantially and, if yes, what the options could be. We have noted earlier that there is considerable scope to increase agricultural production and productivity of land by intensifying the use of fertilisers and other related inputs.

10.15 There can be two broad policy options. The first is the one followed at present, namely low-input and low-output prices helping to increase production and to protect weaker sections of the society; the second is the high-input and high-output prices which will put small and marginal farmers and poor consumers of foodgrains at considerable disadvantage.

10.16 The simplest way to eliminate subsidy on fertilisers would be to remove Government price controls and allow free market forces to determine prices. This could result in an increase in fertiliser prices and would certainly lead to increase in output prices. In India, the problem of subsidy on urea would necessitate an increase of about 50% in its price, based on the average cost of production and distribution. The increase would be higher if the urea price were to match with the cost of the marginal units i.e. newly commissioned high cost units.

10.17 What is the effect of an increase in fertiliser prices? As indicated earlier, some 70% of the fertiliser is being used in 100 out of the 426 districts, chiefly on irrigated

cereal crops, sugarcane and cotton, etc. High cost fertiliser will continue to be used in these areas and the farmers will reap good though slightly diminished profits. But fertiliser use in low consumption areas like dryland areas and eastern rice belt will be severely discouraged and yields there will continue to stagnate or will fall. This will ultimately deepen the existing disparity of agricultural incomes and regional imbalances, defeating the socio-economic objectives of the VII Plan.

10.18 Moreover, the small and marginal farmers who constitute the majority, would be severely discouraged. They would not have resources to pay the higher price; neither would they have a marketable surplus to realise the higher value of output so that they can pay for the fertiliser nor will they be able to repay the loan which they have obtained to buy fertilisers. If the prices of foodgrains go upto unreasonable levels, the large number of poor people in the country will not be able to buy adequate food to enable them to function as human beings.

10.19 Moreover, the policy option of high-input high-output price may also set in motion a high inflationary trend. If the fertiliser price would tend to settle somewhere between the lowest and the highest cost of production, the recently commissioned fertiliser units entailing higher capital costs would also be priced out while older units would earn windfall profits which would not be re-invested in new fertiliser units. This would retard the growth of the industry on the one hand and agricultural development on the other, making the country more dependant on imports and thereby further straining its scarce foreign exchange resources.

10.20 The following analysis of fertiliser use in the countries with subsidies and without subsidies clearly establishes that with subsidies they experienced higher growth in the use of fertilisers than without subsidies:-

<i>Growth % per year</i>				
	<i>Africa</i>	<i>Asia</i>	<i>Near East</i>	<i>Latin America</i>
With subsidy	16.2	19.6	11.0	13.2
Without subsidy	8.9	10.2	6.9	7.8

(FAO: *Role of Fertiliser Pricing Policies*, Rome 1987)

**Regulation of
fertiliser and food
prices**

10.21 Another option is to retain price control but regulate the consumer prices of fertilisers and foodgrains. Two alternatives are available. The first is to increase fertiliser prices to match their average cost of production including a reasonable return or equate the consumer prices with the farm gate cost of imported fertilisers. Here again, each of these alternatives may be accompanied by a stationary output price in order to protect the consumers of foodgrains or appropriate increase in foodgrains to provide a reasonable input output ratio.

10.22 If the fertiliser prices are increased without increasing output prices, it would no longer be worthwhile for farmers to use fertilisers at their usual application rates and the consumption of fertilisers and hence the foodgrains production would be adversely affected. It would also retard the growth of fertiliser industry and affect the health of the existing units. To bridge the gap between demand and availability, fertilisers and/or foodgrains would have to be imported. This would aggravate the foreign exchange situation apart from the possibility of substantial increase of international prices as in the 1970s, all resulting in a much higher cost to the economy. Fertiliser and/or food aid to overcome these problems cannot be a long-term solution, as it would make for permanent dependence on outsiders.

10.23 On the other hand, if fertiliser prices are to be increased and output prices follow, as a consequence the same implications would follow as under the 'no price control' situation i.e. the small and marginal farmer would not have sufficient marketable

surplus to benefit from higher prices. Furthermore, if the increase in output prices were accompanied by an increase in the price of food distributed through the public distribution system the lower-income consumers would suffer accordingly.

10.24 In fact, there is no subsidy either to the farmer or to the fertiliser industry.

10.25 The farmers and industry are only a channel to facilitate efficient management of the food economy.

**Cost of domestic
production of fer-
tillisers**

10.26 It is also necessary to examine whether the domestic cost of production of fertilisers reflects true resources cost. There is considerable evidence to show that it is not. There have been excise and customs duties charged on indigenous and until recently on imported equipment, leading to higher investment costs per tonne. It is also reported that the investment cost per tonne in many new plants is higher than the corresponding cost of similar plants elsewhere in the world. These charges constitute 16 to 17% of the total capital cost of a plant and do not represent a net transfer of resources to the Government. Under the retention pricing scheme, the provision for depreciation and the cost of capital actually increases, since customs and excise duties inflate the capital costs. On an average, for a gas-based plant, say with a capacity of 2700 tonnes a day like the Ammonia/Urea complex at Thal/Hazira, the additional average per tonne subsidy amounts to about Rs. 400 at 80% capacity utilisation. This additional liability could be easily avoided if taxes and duties imposed on equipment and machineries used in the fertiliser industry were eliminated. In the circumstances, the large magnitude of the subsidy burden on account of fertilisers is to be viewed in the light of the imperatives in the pricing of fertiliser feed stock and taxation on fertiliser machinery, whether imported or domestically produced.

10.27 A further important cause of the increased production cost is the steep rise in the cost of main inputs controlled by public agencies. (The landed price of naphtha has increased to about 3 times the price of 1978-79 and that of gas to some producers is nearly six times) that of the price previously paid by another producer.

10.28 In most of the States, power rates have been increased by 200 to 300 per cent in recent years. The prices of imported sulphur is 2 1/2 times and that of rock phosphate about twice that prevailing in 1979. Similarly, the price of imported phosphoric acid is considerably higher and railway freight has almost doubled during the last few years. All these factors are beyond the control of the industry and most of the increases are due to cost of inputs. The increased subsidy on fertilisers is off-set by the increase in charges by various public agencies like the railways.

10.29 (The prices charged to the fertiliser units for gas feed stock varies from about US \$4.0 to about US \$6.0 per million BTU as against an average US \$2.3 per million BTU in Europe and in Saudi Arabia it is as low as 30 US cents per million BTU and less than US \$ 1 in Indonesia. If these prices were reduced to, say, US \$ 2.50 per million BTU, the cost of production of fertilisers will come down substantially.

10.30 Summing up, it may be stated that abolition of a fertiliser subsidy or a substantial reduction in fertiliser subsidy is fraught with serious consequences in terms of agricultural production, given the structural pattern of Indian agriculture. However, (considerable reduction in subsidy burden is possible if the pricing of various services and inputs for fertiliser industry can be reviewed as indicated above. Apart from such measures, any other substantial restructuring of fertiliser prices may become self-defeating.)

**No scope for price
reduction**

10.31 Evidence in chapter IX shows that fertiliser-cum-crop price equation in many developing countries of Asia is far more favourable to farmers than in India. There is a constant demand from farmer organisations for reduction of fertiliser prices which has

the consequence of increasing the fertiliser subsidy. But in the light of present situation, there is no case for reduction of fertiliser prices despite the fact that such prices in India are extremely adverse to the farmers in relation to the price environment for farmers in Bangladesh, Burma, Indonesia, Malaysia, Pakistan, Korea and Sri Lanka. The existing heavy subsidy burden on the exchequer makes it very difficult to reduce the prices of fertilisers.

Precondition for increasing fertiliser prices

10.32 This does not mean that fertiliser prices should not be increased marginally for all times to come. As urged by agricultural economists in the Bangalore conference, (non-price factors in fertiliser promotion have an important role to play.) We have recommended in chapters IV and V a series of promotional measures for stepping up profitability of fertiliser use for the farmers. Improvement in agricultural research and extension expansion of irrigation, better water management, more efficient fertiliser distribution and expansion of credit will all increase the application as well as profitability of fertiliser use. The country needs an annual average increase in fertiliser consumption of the order of 10%. It is essential to step up investment in various promotional measures to a point where fertiliser consumption can go far above 10% per annum. It is necessary to make a detailed review every year of the increase in fertiliser consumption over the preceding 3 years in different areas and among different groups of farmers. If such a review reveals a substantial increase in fertiliser consumption well above 30% in the preceding 3 years, there is reason to step up fertiliser prices by a factor of 5 to 7%, depending upon the percentage of increase in fertiliser use. At the same time, the support price for produce should be appropriately increased to cover the additional cost of fertiliser. It is only under these circumstances that we are recommending the possibility of increasing fertiliser prices with a view to bring down the subsidy burden but such an exercise should be undertaken with great care and keeping in view the interest of farming community and the needs of balanced economic development consistent with social justice.

Farm subsidies in India and abroad

10.33 Subsidy for agricultural development, particularly for fertilisers, has been criticised on doctrinaire grounds. Subsidy *per se* is considered an undesirable instrument for development. Yet even in highly developed economies where farm population is only 5 to 10% of the total population and where farm production is less than 10% of the gross domestic product, farm subsidy is being given on a far higher scale without consideration of the doctrines which are being cited for India. For example, farm subsidy in the USA is reported to have reached over \$25 billion (Rs. 30,000 crores) in 1986 which works out at Rs. 920 per tonne of food produced in that country; the corresponding figure is Rs. 255 per tonne for food produced in India. In EEC, the farm subsidy in 1986 was as high as US \$48 billion while in Japan it was US \$20 billion.

10.34. The question is one of optimising output, employment and welfare under Indian conditions. Such food and fertiliser subsidies have to be unavoidably given for that purpose. We would recommend their continuance subject to our observation in paragraph 10.32.

Fundamental issue in planning

10.35 Every country has to follow a pricing policy, including a taxation and subsidy policy, suited to its socio-economic philosophy. In India's planned development equity objectives and alleviation of poverty are as important as efficiency objectives and speedy increase in production. Fertiliser being a fundamental instrument for increasing farm productivity and increased farm productivity being of fundamental importance to feed the millions of Indians, fertiliser pricing policy needs to be evolved with great care. It should not be a prisoner of any doctrine which is unrelated to the philosophy of planning under Indian conditions.

To be published in the Gazette of India Part-I, Section-I.

No.21-43/84-Fert.Plg.
Government of India
Ministry of Agriculture & Rural Development
Deptt. of Agriculture & Cooperation

New Delhi, the 23 July, 1985.

RESOLUTION

The Govt. of India in the Ministry of Agriculture & Rural Development, Dept. of Agriculture & Cooperation has set up High Powered Committee known as Fertiliser Consumer Prices Committee to go into all aspects of Consumer Prices of Fertilizers, vide this Deptt.'s Office Memorandum No. 1-6/83-FA(CP) dated 1st May, 1984. Subsequent to the Resignation of Dr. A.S.Kahlon from the chairmanship of the Committee, Dr. G.V.K.Rao has been appointed as Chairman of this Committee. The composition of the reconstituted Committee is as under and its terms of reference are also reproduced below:-

I. COMPOSITION

- | | | |
|----|--|------------------|
| 1. | Dr. G.V.K.Rao. | Chairman |
| 2. | Dr. P.V.Shenoi,
Additional Secretary,
Deptt. of Agri. & Coopn.,
New Delhi. | Member Secretary |
| 3. | Dr. N.S.Randhawa,
Director General,
Indian Council of Agril. Research, and
Secretary, DARE,
New Delhi. | Member |
| 4. | Dr. I.Z.Bhatty,
Director General,
National Council of Applied
Economic Research,
New Delhi. | Member |
| 5. | Dr. Y.K.Alagh,
Chairman,
Bureau of Industrial Costs & Prices,
New Delhi. | Member |
| 6. | Dr. G.S.Bhalla,
Chairman,
Commission for Agril. Costs. & Prices,
New Delhi. | Member |
| 7. | Adviser (Agriculture)
Planning Commission,
New Delhi. | Member |
| 8. | Executive Director,
FICC, | Member |

Ministry of Chemicals & Fertilisers,
New Delhi.

- | | | |
|-----|--|--------|
| 9. | Shri K.S.Bains,
Joint Secretary,
Deptt. of Heavy Industries,
New Delhi. | Member |
| 10. | Joint Secretary (Fert.)
Deptt. of Agriculture & Coopn.,
New Delhi. | Member |
| 11. | Economic & Statistical Advisor,
Deptt. of Agriculture & Coopn.,
New Delhi. | Member |

The Joint Commissioner (Fertilizer Technical), Department of Agriculture & Cooperation will act as Joint Secretary to the Committee and will provide all technical assistance to the Committee.

II. TERMS & REFERENCES

- i) To ascertain socio-economic and agronomic factors which influence the crop production through use of fertilizers and to suggest various parameters which should govern the fertilizer pricing policy. These parameters should include cost benefit ratio both for irrigated and non-irrigated crops, level of consumption reached in particular region and the extent of irrigation.
- ii) To suggest a minimum cost benefit ratio which will induce the farmers to increase the use of fertilizer for achieving the targetted levels of agricultural production through increased use of fertiliser.
- iii) To suggest system for fixing nutrient prices of N, P₂O₅ & K₂O in complex fertilizers.
- iv) To suggest such policy measures which could result in increasing the efficiency of fertilizer use and thus improve the cost benefit ratio.
- v) To make recommendations for evolving a suitable product pattern keeping in view the appropriate use of nutrients based on soil and crop requirements.

III. POWERS

- i) The Committee will devise its rules for the conduct of business as it may consider necessary.
- ii) To set up sub-committees or groups technical or otherwise to look into, examine and to make recommendations on specific issues referred to them by the main Committee.
- iii) It shall also have powers to co-opt. members or invite persons, representatives of various Deptts., technical bodies as and when considered necessary for specific purpose.
- iv) To decide about the place, date and periodicity of its meetings or those of

sub-committees, groups etc. set up by it.

The Committee would complete its work and submit its report to the Government within a period of 6 months from the date of its constitution.

The non-official members will be entitled to draw their TA/DA in connection with the attendance at the meetings of the Committee as admissible under the TA Rules of Govt. For this purpose they will be treated as Grade I Officers of the Government of India.

The Secretariat for the Committee will be provided by the Department of Agriculture & Cooperation.

Sd/-
(B.K.Taimni)
Joint Secretary to the Govt. of India

ORDER

Ordered that a Copy of the Resolution may be communicated to all concerned.

Ordered that the Resolution be published in the Gazette of India for General information.

Sd/-
(B.K.Taimni)
Joint Secretary to the Govt. of India

The Manager,
Govt. of India Press,
Faridabad. Copy of the original O.M No.1-6/83-FA(CP) dated 1st May, 1984 for constitution of the Committee is enclosed.

To be published in the Gazette of India, Part I, Section I

No.21-43/84-Fert. Plg.
Government of India
Ministry of Agriculture & Rural Development
Deptt. of Agriculture & Cooperation

New Delhi, the 7th Oct., 1985.

In continuation of this Ministry's Resolution of even number dated 23rd July, 1985, regarding High Powered Committee known as Fertilizer Consumer Prices Committee to go into all aspects of consumer prices of Fertilizers set up under the Chairmanship of Dr.G.V.K.Rao, it has been decided to nominate Shri K.P.Geethakrishanan, Additional Secretary, Deptt. of Expenditure, Ministry of Finance and Shri Gunuvant M. Desai, Professor, Indian Institute of Management, Ahmedabad as regular members of Committee. The other terms & conditions of the Committee will remain the same.

Sd/-
(J.K.Arora)
Joint Secretary to the Govt. of India.

ORDER

Ordered that a copy of this may be communicated to all concerned.

Ordered that this may be published in the Gazette of India for General information.

Sd/-

(J.K.Arora)

Joint Secretary to the Govt. of India.

The Manager,
Govt. of India Press,
Faridabad.

Copy to:

Shri K.P.Geethakrishanan, Additional Secy., Deptt. of Expenditure, Ministry of Finance,
and Shri Gunuvant M. Desai, Professor, Indian Institute of Management, Ahmedabad along
with copy of the Resolution of even number dated 23rd July, 1985 for information.

Sd/-

(J.K.Arora)

Joint Secretary to the Govt. of India.

To be published in the Gazette of India, Part I, Section I

No.21-43/84-Fert. Plg.
Government of India
Ministry of Agriculture
Deptt. of Agriculture & Cooperation

New Delhi, the 6th March, 1986.

In continuation of this Ministry's Resolution of even number dated 23rd July and 7th October, 1985, regarding constitution of High Powered Committee known as Fertilizer Consumer Prices Committee set up under the Chairmanship of Dr.G.V.K.Rao, it has been decided to extend the term of the Committee from 22nd January, 1986 to 22nd July, 1986. Further it has also been decided to add the following aspects to the existing terms of reference of the Committee.

"To ascertain the distribution margin for fertilizers for its adequacy or otherwise and other allied issues."

The other terms and conditions of the Committee will remain the same.

Sd/-

(P.V. Shenoi)

Additional Secretary to the
Government of India

ORDER

Ordered that a copy of this may be communicated to all concerned.
Ordered that this may be published in the Gazette of India for General information.

Sd/-

(P.V. Shenoi)

Additional Secretary to the
Government of India

The Manager,
Govt. of India Press,
Faridabad.

To be published in the Gazette of India Part I, Section-I.

No.21-43/84-Fert.Plg.
Government of India
Ministry of Agriculture
Deptt. of Agriculture & Cooperation

New Delhi, the 26th August, 1986.

In continuation of this Ministry's resolution of even number dated 23rd July, 7th October, 1985, and 6th March, 1986 regarding constitution of High Powered Committee known as Fertiliser Consumer Prices Committee set up under the chairmanship of Dr.G.V.K.Rao, it has been decided to extend the term of the Committee from 22nd July, 1986 to 31st December, 1986.

The other terms and conditions of the Committee will remain the same.

Sd/-
(J.K.Arora)
Joint Secretary (Fert. & Seeds)

ORDER

Ordered that a copy of this may be communicated to all concerned.

Ordered that this may be published in the Gazette of India for General information.

Sd/-
(J.K.Arora)
Joint Secretary (Fert. & Seeds)

The Manager,
Govt. of India Press,
Faridabad.

To be published in the Gazette of India Part-I, Section-I.

No.21-43/84-Fert.Plg.
Government of India
Ministry of Agriculture
Deptt. of Agriculture & Cooperation

New Delhi, the 28 Jan.1987.

In continuation of this Ministry's resolution of even number dated 23rd July, 7th October, 1985, 6th March and 26th August, 1986 regarding constitution of High Powered Committee known as Fertiliser Consumer Prices Committee set up under the chairmanship of Dr.G.V.K.Rao, it has been decided to extend the term of the Committee from 1st Jan.1987 to 30th June, 1987. Further it has also been decided to nominate Dr.B.K.Dhar,

Joint Commissioner (Fert.) to serve as a member of the Committee. He will also continue to act as Joint Secretary of the Committee.

The other terms and conditions of the Committee will remain the same.

Sd/-
(J.K.Arora)
Joint Secretary (Fert. & Seeds)

ORDER

Ordered that a copy of this may be communicated to all concerned.

Ordered that this may be published in the Gazette of India for General information.

Sd/-
(J.K.Arora)
Joint Secretary (Fert. & Seeds)

The Manager,
Govt. of India Press,
Faridabad.

Workshop on Fertiliser Consumer Prices

Conclusions and Recommendations*

I

SOCIO-ECONOMIC AND AGRONOMIC FACTORS RELEVANT TO FORMULATION OF FERTILISER CONSUMER PRICING POLICY

The Workshop underlined the importance of attention to the critical socio-economic and agro-economic factors relevant to formulation of fertiliser price policy. The most important objective is to ensure the achievements of the targets of food and agricultural production in the VIIth and subsequent plans. The expansion of fertiliser consumption from the current levels of 9 million to around 14 million tonnes of nutrients has a critical role; 80 per cent of the additional agricultural production will have to be achieved by increase in fertiliser consumption. Indigenous production systems of fertilisers as well as the systems of distribution need to be not only expanded but also rendered more efficient to meet the challenges of increased consumption. Given the current and prospective position of balance of payments and uncertainties of international prices of fertilisers and of supplies, the country cannot have reliance on imported fertilisers on any large scale. However, this should not be taken to imply that we should produce fertilisers domestically at any cost.

The Workshop also considered the socio-economic background which needs to be kept in view in formulating the fertiliser price policy. The huge volume of subsidies including fertilisers have contributed to a situation where there is a deficit in the revenue account of the Central Government and fertiliser price policy will have to be consistent with the goals of long-term fiscal policy. Simultaneously there is also a need to ensure that fertiliser price policy is in conformity with the anti-inflationary policies. This will imply that the former would not generate pressures for upward revision in prices at many points in the economic system. This is considered relevant because of the high and rising cost of fertilisers as a proportion of the total purchased inputs of the cultivator and the possible impact of such revisions on the procurement prices, issue prices, etc. At the same time, the Workshop also recognised the possible adverse impact of growing subsidies on the whole process of developmental effort as well as equity within agriculture and the negative result that such a process will have in diminishing the opportunities for upward shifts in responses of agricultural production to inputs which alone could provide a stable and sustained basis of growth in fertiliser consumption.

II

FEEDSTOCK PRICES, FERTILISER PRODUCTION AND DISTRIBUTION COSTS AND FERTILISER SUBSIDY

The fertiliser subsidy has grown at the rate of about 40 per cent a year in recent years. In view of the serious fiscal crisis and the other equally important resource allocation and income distribution considerations, it was felt that there is a very strong case for measures designed to reduce, if not totally eliminate, the subsidy. It was suggested that, given the strong link between feedstock prices and the fertiliser subsidy, the Government should immediately review the feedstock pricing policy with a view to seeing if the prices could be lowered. While doing this, the Government may look into how the feedstock prices the Indian

* This statement was prepared by a Drafting Committee consisting of Prof. G. Parthasarathy, Dr. Anand P. Gupta and Prof. V.M. Rao. The statement was presented to the concluding session of the Workshop and has been revised in the light of the discussion in the session.

fertiliser producers face compared with those which producers in fertiliser exporting countries do.

The participants strongly felt that all possible measures be taken to reduce the operating and capital costs involved in producing and distributing fertilisers in the country. Many participants felt that there is considerable scope for reduction of unit cost of fertiliser production. They strongly suggested that detailed plant-wise data on the working of the fertiliser retention price scheme and details of handling, internal transportation and distribution costs be made available at least to certain selective researchers so that the data could be properly analysed and remedial measures taken.

III

POLICY MEASURES FOR INCREASING FERTILISER USE AND ITS EFFICIENCY

There was a broad consensus among the participants that the objective of achieving a substantial step up in the fertiliser use from its present level needs close attention to a number of non-price factors. It was mentioned that there is an untapped potential for fertiliser use in the dry areas and in the eastern parts of the country, including North Coastal Andhra, which requires policies to improve extension system, credit, timely availability of fertilisers in small and inaccessible villages and measures to overcome the risk and uncertainties in the crop yields. It was also mentioned that in certain areas like Punjab and Andhra Pradesh there appeared to be pockets where fertiliser use exceeds the recommended doses and in effect have low marginal return. This again requires action on the non-price front such as better extension programme to make the farmers aware of the problem of low marginal returns, investigations into the reasons for low marginal returns when the overall fertiliser intensity is still at a modest level, etc. Some of the participants presented the findings indicating high benefit-cost ratios for fertiliser at the optimum point. This also seems to suggest that the main problem is not with the price environment but with the non-price constraints obstructing the farmers' perception of the optimum point and his willingness and ability to reach it.

The emphasis on non-price factors does not mean that the policy with respect to fertiliser consumer price is not relevant over the future years. It was argued that since the improvements in the situation pertaining to non-price factors may be slow and time consuming, there would be a strong case to use fertiliser price policy as a promotional device to reach fertilisers to dry areas, to crops like pulses and oilseeds, and to small and marginal farmers. Another point mentioned in this connection was that the high cost domestic fertiliser industry makes it necessary to have subsidised fertiliser prices for farmers. It was mentioned that the situation of easy availability of imported fertilisers at lower than the domestic costs cannot be expected to continue for ever. It is hence important to build up the domestic industry and to provide an element of subsidy in fertiliser consumer price until the domestic costs of fertiliser production in real terms come down. Since these subsidies would accrue chiefly to large farmers, who use the major share of the fertilisers, it would be necessary to levy appropriate direct taxes on this class to achieve the equity objective. It was felt that a regime of fertiliser subsidy combined with higher incidence of direct taxes on the large farmers would be better than a regime of dual pricing for fertilisers.

Minimum Benefit-Cost Ratios:

While there are difficulties in suggesting a minimum benefit-cost ratio, the ratio should be such that allowances are made for associated costs, risks and uncertainty. Studies should be encouraged to generate data on these aspects from the cost of cultivation and other studies. G.V.K.Rao Committee should also consider the need for on going studies to guide the fertiliser policies.

**Fertiliser Consumer Prices Committee
Questionnaire to the State Governments**

PART A Fertiliser Consumption

1. What is cropwise fertiliser consumption in your State according to Agricultural Census carried out in 1976-77, 1981-82? On the basis of this data indicate the major crops which consume maximum quantity and reasons thereof in terms of fertiliser response, cost benefit ratio, etc.
2. What methodology is adopted to work out recommended doses of fertilisers for various crops? What agencies are involved in working out recommendations? At what intervals these recommendations are reviewed and revised?
3. Describe details of fertiliser application practices including time and method of application, use of soil amendments and micronutrients in major crops of the State.
4. What methodology is used to arrive at estimates of consumption and opening stock?
5. What steps are taken to ensure the reliability of data for consumption and opening stock?
6. What is the yearwise target of nutrientwise fertiliser consumption for the State from 1985-86 to 1989-90?
7. Give the yearwise percentage fertiliser consumption targetted for irrigated and non-irrigated areas during the Seventh Five Year Plan.
8. What is taluka/blockwise consumption of N, P₂O₅ & K₂O during last five years?
9. What is the value cost ratio (VCR) with the use of fertilisers in selected crops like wheat/rice/jowar/bajra/maize/pulses/oilseeds both under irrigated and unirrigated conditions? What response ratios for different crops are used for planning exercises of agricultural production in the State? Indicate the data used to work out these ratios.
10. Is the existing fertiliser/output (wheat/rice/jowar/bajra/pulses/oilseeds) price relationship both under irrigated/unirrigated conditions favourable for fertiliser use? If not, what should be the fertiliser/output price relationship to promote further use of fertilisers?
11. Does the existing fertiliser/output price ratio have any impact on fertiliser use by various categories of farmers? If so, the impact may be quantified according to each category of farmers.
12. Do you feel that off-season rebate will have any impact on increasing fertiliser consumption? If so, what system of off-season rebate do you suggest?
13. Do you feel that a plateau has been reached in fertiliser consumption in any of the cereal/commercial crops under irrigated conditions? If so, what are the reasons thereof?

14. What are the reasons for low fertiliser consumption in rainfed/dryland agriculture? The degree of non-use may be quantified in terms of (i) lack of/untimely rains, (ii) non-availability of fertilisers in time/lack of retail outlets/lack of storage/lack of advanced stocking.
15. Is there any programme to increase the yield per hectare of various crops during the 7th Five-Year Plan? If so, a brief description of various programmes may be indicated.
16. What are the programmes for increasing the efficient use of fertilisers? Give a brief description of each programme.
17. Are there any fertiliser promotion programmes implemented by the State Govt. to (i) increase the fertiliser use, (ii) to increase the efficiency of fertiliser use? Please give a brief description of each programme.
18. How many Soil Testing Laboratories exist in the State? Give the capacity and capacity utilisation of soil testing laboratories for the last three years 1981-82 to 1983-84.
19. Are any fertiliser promotion and soil testing programmes implemented by the fertiliser industry in your State? If so, give brief description carried out by each manufacturer.
20. What are the various NP/NPK complex/granulated mixtures being marketed in your State? Cropwise consumption of each grade may be indicated for the last three years 1981-82 to 1983-84.
21. Is the use of these grades justified on the basis of crop requirement and soil fertility status of various soil types of your State?
22. Do you consider that balanced use of fertilisers could be achieved through selective use of nutrients by combining straight fertilisers (like urea/DAP/MOP) based on soil test values instead of using complex/granulated mixtures which add to the cost of fertilisers?
23. Is the fertiliser consumption reflected by the increase in production of food-grains/commercial crops? Give districtwise/regionwise data to show that fertiliser consumption has increased the food/commercial crop production.

PART B - Fertiliser Marketing

1. What is the fertiliser marketing system adopted in the State at apex (State), intermediate (district) and ground (village) level? Indicate clearly the percentage of total fertiliser marketed through each agency.
2. What are the salient features of working of fertiliser marketing system in the State?
3. Indicate the names of agencies at apex level responsible for lifting fertilisers allocated to the State Govt. Indicate the performance of each agency in terms of fertilisers lifted during the last five years.
4. What arrangements have each agency at apex level made for distributing the fertilisers lifted by them? What are the shortcomings of these arrangements? What assistance is given by State Govt. to these apex level agencies to lift fertilisers allocated to State under ECA?

5. What percentage of total margin is passed on to various levels of fertiliser marketing channels i.e., apex, intermediary and primary level?
6. What are the functions performed by each agency? How far margin allowed to various agencies at different levels is justified on the basis of various functions like supervision charges, handling charges, transport and extension/promotion charges, etc.?
7. Is the margin allowed to retailer sufficient to cover his expenses?
8. What steps are taken by various agencies to meet monthly requirements?
9. Is there any coordination between various agencies involved in fertiliser marketing?
10. GOI bears the cost of transporting fertiliser upto block headquarters. Is there any scheme under which State Govt. is providing subsidy on fertiliser movement from block to the village level?
11. What steps are taken for fertiliser sale promotion by various marketing agencies at different levels?
12. What is the fertiliser storage capacity available at rail/district/block/village level? Indicate the data for 1984-85 in this regard.
13. Is this capacity sufficient for buffer storage for meeting monthly requirements?
14. If the available fertiliser storage capacity is insufficient, what steps are being taken to increase the capacity in the 7th Plan?
15. What is the number of fertiliser retail points functioning in the State during the last five years? How many retail outlets are handling more than 20 tonnes of fertilisers? What is the break-up of these retail points under Govt., cooperatives, other institutional agencies and private trade?
16. From whom do the private and institutional retail agencies obtain their supplies and the problems of retail points in getting adequate supplies in time?
17. What is average number of farmers covered by each retailer and what is the minimum and maximum distance to be travelled by farmers to get their supplies?
18. Is the number of retail points functioning in the State sufficient? If not, is the State Govt. planning to increase the retail points? What strategy State Govt. plan in opening new retail points?
19. What are the targets of opening additional fertiliser retail points in the 7th Plan?
20. What is average level of storage charges per month per tonne of fertiliser in the State at rail/district/block and village level?

21. What is average level of transportation charges per tonne per k.m. of material from block headquarters to the interior?
22. What are the views/experience of State Govt. for selling fertilisers through mobile retail vans in the interior?
23. Is 50 kg. packing ideal? Does the State Govt. want any change in this packing system in favour of small or large packing?

PART C Fertiliser Credit

1. What are the arrangements for providing credit to apex level agencies to lift and stock fertilisers allocated to State?
2. What are the arrangements made for providing adequate credit to intermediary agencies and retailers to procure and stock fertilisers?
3. What is the districtwise actual data for the last 3 years for production loan and distribution credit?
4. What is the magnitude of long term, medium term and short term credit utilised for agricultural purpose for the last three years (1982-83 to 1984-85)?
5. How does State Govt. utilise the short term credit given by Government of India to State Govt. for input distribution at low rate of interest?
6. What is the credit utilised by institutional agencies for stocking the fertilisers?
7. What is the line of credit available to farmers for purchase of inputs like fertilisers, seed and pesticides?
8. What is the ratio between cash and kind component of production credit discussed for the last three years (1982-83 to 1984-85)?
9. What is the percentage recovery of production credit extended to farmers for the last three years (1982-83 to 1984-85)?
10. Have any parameters been drawn for scale of financing? If so, please give details thereof.
11. What is the time lag between the submission of loan application and sanction of of loan for purchase of fertilisers by farmers?
12. To what extent does the lack of credit affect the fertiliser consumption by farmers?
13. What is the extent of credit utilised by farmers from the commercial banks for purchase of fertilisers? Give data for the last three years (1982-83 to 1984-85).

PART-D Fertiliser Promotion

1. How many persons are engaged by State Govt. at headquarters, district and block/village level for promoting fertiliser use?

2. Is there any refresher training course for staff for updating the knowledge in efficient and balanced use of fertilisers ?
3. What activities are undertaken by State Govt. in promoting efficient fertiliser use ?
4. To what extent Radio, T.V. and Films are used for promoting efficient fertiliser use ?
5. Is there any co-ordinating committee at headquarters and district level for ensuring smooth supply of fertilisers ?
6. How many soil testing laboratories are functioning in the State ? Please indicate the break-up in private/public and Govt. sector. Also indicate the annual analysing capacity and its capacity utilisation in the State for the last three years (1982-83 to 1984-85).
7. What are reasons for low utilisation capacity ?
8. What is the total budget earmarked for soil testing during 6th Plan period and how much of it was utilised by the soil testing laboratories ?
9. Does the State Govt. plan to open new soil testing laboratories ? What is the financial outlay for soil testing laboratories in your State during 7th Plan ?
10. Have any soil fertility maps been drawn on the basis of soil test service in the State ?
11. Are fertiliser recommendations modified in the light of soil test results to ensure efficient use of fertilisers ? If so, kindly indicate areas of deficiency/sufficiency of primary and micronutrients in the State.
12. Have the State Govt. evaluated impact of soil testing laboratories on fertiliser practices of the farmers ? If so, what are the salient findings ?
13. What are the various promotional programmes carried out for efficient use of fertilisers for the last three years (1982-83 to 1984-85) ?
 - a) Number of demonstrations held.
 - b) Farmers training camps organised.
 - c) ABC trials laid for using fertilisers on the basis of soil test results.
14. What is the contribution of T & V system in promoting efficient use of fertilisers in rainfed and irrigated areas ? The facts may be supported by actual data for the last three years.
15. What is the contribution of fertiliser industry in promotion of fertiliser use in your State ? Indicate industrywise activities on fertiliser promotion for the last two years (1983-84 to 1984-85).
16. What is the mechanism of coordinating the fertiliser promotion carried out by the fertiliser industry ?

17. What are the special fertiliser promotion programmes for increasing fertiliser consumption in dryland areas?

PART E - Planning and Monitoring of Fertiliser Scene

1. What is the strength of staff involved in matters relating to fertiliser procurement, distribution, movement, quality control and marketing/promotion?
2. What is the nature and source of data on fertiliser off-take, opening stocks, consumption, number of fertiliser retail points, etc.?
3. How State Govt. maintains coordination between crop loans and fertiliser supply?
4. How coordination is maintained between extension agencies and fertiliser distribution?
5. What is the system developed at State and district levels to coordinate varied activities related to fertilisers?
6. How such data are analysed and used to improve the workings of various sub-systems connected with fertiliser use?

Questionnaire for Agricultural Universities

1. Do you have any system of evolving package of practices including recommended dose of fertiliser application? If so, give details thereof and indicate the basis and periodicity of their review.
2. Do you have any special research projects on fertiliser use? If so, give details thereof.
3. On the basis of these findings, what are your recommendations to increase the efficiency of fertiliser use?
4. Has your University conducted any research on economics of fertiliser use? If so, give details thereof.
5. On the basis of your research data, indicate favourable value cost ratio for major cereal crops both under irrigated and unirrigated conditions.
6. Have you carried out any cost of production studies for any cereal/commercial crops? If so, give details thereof.
7. Have you carried out any studies on relationship between fertiliser use and production of cereal/commercial crops? If so, give details thereof.
8. Do you think that a plateau has been reached in any crop in your State with the use of chemical fertilisers?
9. What is the optimum fertiliser dose you recommend for obtaining maximum yield with maximum profits for major cereal crops in your State?
10. Have you identified any constraints for increased fertiliser consumption in your State? If so, give details thereof.
11. Have you carried out any studies on fertiliser use efficiency? If so, what are the limiting factors in your soils which limit the yield potentials?
12. What strategies do you suggest for increasing the efficiency of fertiliser use?
13. On the basis of fertility level of the soils of your State, whether the present consumption level of NPK is balanced? If not, what steps are being taken to rectify the nutrient imbalances?
14. NP/NPK/Granulated mixtures add to the cost of production. Do you think that balanced use of nutrients can be achieved through selective use of straight fertilisers?
15. What is the magnitude of micronutrient deficiency in your State? What is the increase in yield per hectare with the addition of deficient micro nutrients? Give details thereof.

Questionnaire to the Fertiliser Industry

1. What is the cost of production of each product, ex-factory rate, for the last five years?
2. What is the break-up of cost of production in terms of cost of inputs/services and utilities, packing/marketing charges, depreciation, etc. for the last five years?
3. What improvements in capacity utilisation and use of raw materials and utilities have been accomplished by the company since the introduction of fertiliser retention price scheme?
4. Are there any plans to reduce the cost of production? If so, give details thereof.
5. What is the marketing area for each product?
6. Are you able to fulfil the ECA allocations? What arrangements are made by the company for lifting of allocations and the extent to which these arrangements are satisfactory?
7. What are the actual carry-over stocks for the period ending September and March for the last 10 years?
8. What are your marketing channels for each product? How much is marketed through Cooperatives/Agro. Industries/Agriculture Deptt./Sugarcane Fed./private trade? Figures for 1983-84 and 1984-85 may be indicated.
9. What proportion of supplies to each State is marketed through your own depots? Indicate data for the last five years.
10. What is the actual number of your own retail points in different States? Besides selling fertilisers, what are the other activities of these retail points?
11. Do you have any godown capacities at State/district/block/village level? Indicate the total godown capacity and at each level alongwith source of godowns, own/SWC/CWC/private: figures for 1983-84 and 1984-85 may be given.
12. How many retail points are commanded by your marketing agencies under Cooperatives/Private/Agro. Industries?
13. Do you extend any credit to the marketing agencies? Indicate the factual data for the last five years.
14. Do you extend any credit to the farmers to purchase fertilisers? If so, give details thereof.
15. Do you have any off-season rebate scheme? If so, give details thereof.
16. Do you experience any bottleneck in transporting fertiliser material?
17. What programmes are being implemented for market development? Give details thereof.

18. What are your promotional activities? Describe each separately. No. of soil testing laboratories/demonstrations/farmers training camps/any other activity. What expenditure is incurred on these items annually for the last three years 1982-83 to 1984-85.
19. Do you have promotional staff? If so, give break-up at State/ district/block level.
20. Do you have any special programmes on efficient use of fertilisers? If so, give details thereof.
21. Do you have any programme on distribution of seed-cum-fertiliser drills? If so, give details thereof.
22. Do you have any special programmes for increasing fertiliser use in dry-land areas? If so, give details thereof.
23. What measures do you consider necessary to increase the efficiency of fertiliser production and fertiliser use?
24. Have you worked out value cost ratio of fertiliser use in irrigated/unirrigated areas for major cereal crops? If so, give details.
25. What is the existing system for maintaining coordination between fertiliser related activities of State Govt., Agriculture Universities and your company?

* * *

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1. Shri M.S.Pandit,
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2. Shri K.Rajan,
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8. Shri I.S.Kingra,
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13. Shri S.Dey,
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14. Shri S.P.Bansal,
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15. Shri M.S.Bal,
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1. Shri L.D.Kataria,
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11. Shri V.S.Kaundia,
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