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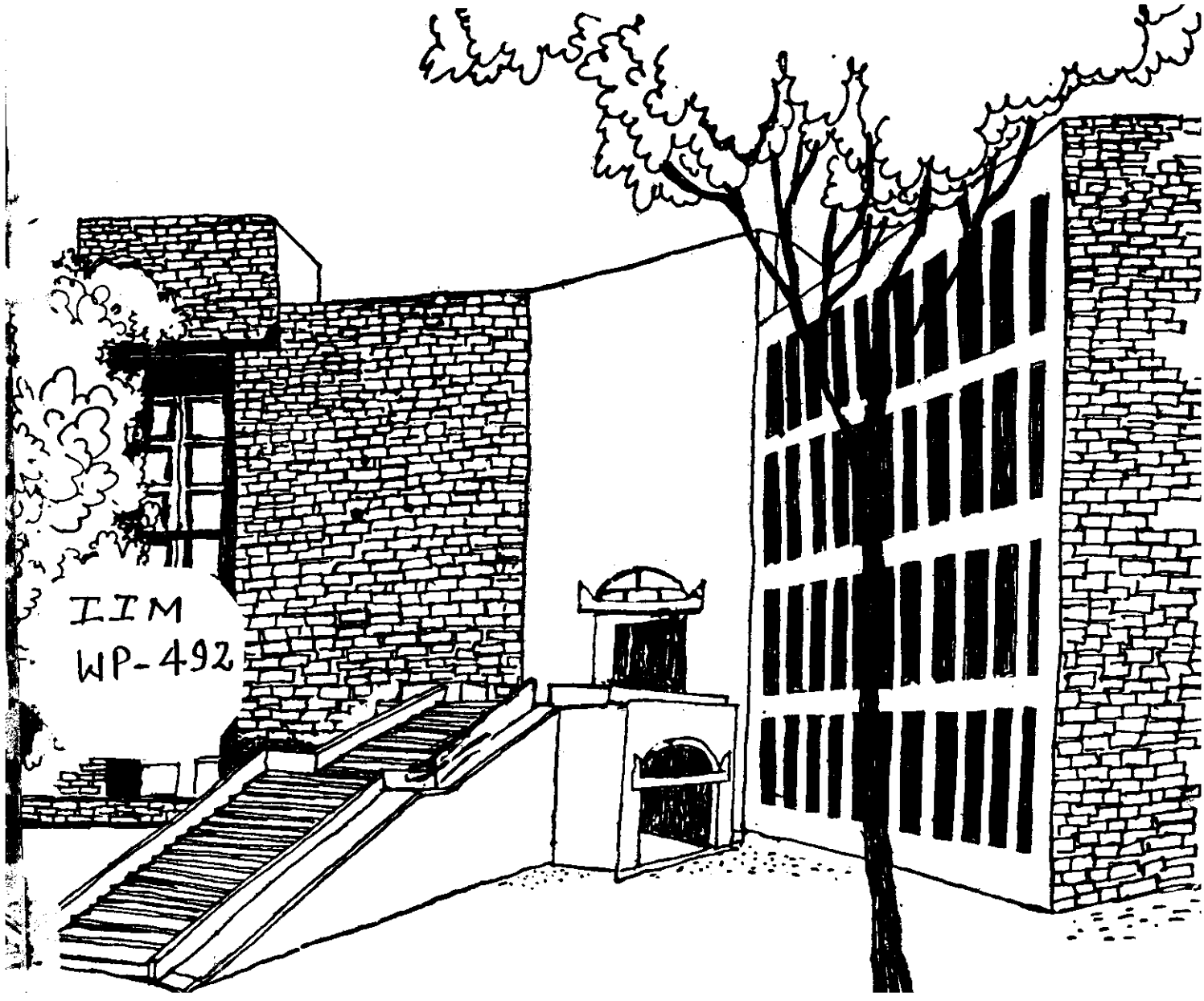

PROSPECTS OF GROWTH IN FERTILIZER CONSUMPTION IN THE WESTERN REGION

By

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W P No. 492

January 1984

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD-380015
INDIA

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I

"The future is not to be predicted but is a project to be accomplished."

Jean Paul Sartre

Fertilizer consumption in the Western Region has come a long way in the last two decades --- from less than 100,000 tons in the early 1960s to about 550,000 tons by the early 1970s and further to about 1.2 million tons by the early 1980s.[1]

What are the prospects of further growth in the Western Region's fertilizer consumption?

The question is obviously important from the viewpoint of the fertilizer manufacturers located in the Western Region. There is already a sizeable surplus of production over consumption in both nitrogen and phosphorus, and substantial additional capacity is being installed in the region (Table 1).[2] Surely, fertilizer factories located in any region do not cater to the market in only that region. But with growing importance of domestic production in total availability of fertilizers, increased transport cost and problems of logistics in moving vast quantities of fertilizers in short-periods, the fertilizer industry located in the Western Region has substantial stakes in the prospects of growth in fertilizer consumption in their own command areas.

Gist of the talk given before the members of the Fertiliser Association of India, Western Region in Goa on January 6, 1984. The author is grateful to Mr.N.V.Namboodiri for research assistance.

Two other reasons also make the question about the prospects of further growth in the Western Region's fertilizer consumption quite pertinent. The first relates to the importance of the region in Indian agriculture and the second relates to its importance in generating the desired rate of growth in India's total fertilizer consumption.

The Western Region accounts for about one-third of India's cultivated land and 40 to 65 percent of the production of major crops like jowar, pulses, cotton and groundnut. Growth performance of agriculture in the Western Region is, therefore, important in achieving the required growth in India's agricultural production. As elsewhere, further growth in agricultural production of the Western Region will have to come through continuous increases in yields. Available evidence shows the impact of fertilizer use on the yield trends of certain crops in the Western Region.[3] To sustain these trends, continuous growth in fertilizer use will be as crucial as anything else.

Growth in the Western Region's fertilizer consumption will also be crucial in determining whether India's fertilizer consumption will grow by more than 500,000 tons every year during the 1980s and 1990s.[4] This is so not only because the region accounts for the country's one-third of the cultivated land but also because annual growth of 500,000 tons in total fertilizer consumption requires rapid growth in fertilizer use on unirrigated areas.[5] The Western Region with very low irrigation provides an ideal opportunity to judge the prospects of growth in fertilizer use on unirrigated land.

Thus, irrespective of the angle from which we see it, the question of the prospects of further growth in the Western Region's fertilizer consumption assumes unprecedented importance.

II

As stated at the outset, fertilizer consumption in the Western Region has come a long way in the last two decades. What is true about the region as a whole is also true about its four constituent states. By 1981/82, fertilizer consumption per hectare had reached 39 kgs. in Gujarat, 31 kgs. in Goa, 27 kgs. in Maharashtra and 11 kgs. in Madhya Pradesh. Of course these levels are considerably lower than those attained by some states and territories like Punjab (124 kgs.), Tamil Nadu (67 kgs.), Pondicherry (256 kgs.), and Delhi (75 kgs.). But the past growth in fertilizer consumption of the four states in the Western Region cannot be considered insubstantial especially because the per hectare level in each of them has increased by 10 times or more in the last two decades.

About the prospects of further rapid growth in fertilizer consumption of the Western Region, one could be either a pessimist or an optimist.

Despite impressive past growth, a linear trend fits the time-series of fertilizer consumption in Gujarat, M.P., and Maharashtra just as well as a semi-log trend as shown in Table 2. When projected, the linear trends give an estimate of 1.5 million tons of fertilizer consumption in 1989/90 in the three states taken together. This is barely 300,000 tons more than the 1982/83 level. On the other hand, projections of the semi-log trends put total consumption in 1989/90 at 3.4 million tons which is 2.2 million tons more than in 1982/83!

Even without the trend-fitting exercise, one could still be either a pessimist or an optimist about the prospects of further growth in the Western Region's fertilizer consumption.

The pessimist would point at the dominance of irrigated areas in India's impressive growth in fertilizer consumption,[6] and infer limited prospects in the Western Region because of its low irrigation. He would also point at low and uncertain rainfall in many parts of the Western Region and argue that these features, taken together with their implications for cropping pattern and limited scope for HYVs, explain why growth in the Western Region's fertilizer consumption cannot be as rapid as in some other parts of the country. He may even argue that acceleration in the past trends of the region's fertilizer consumption is out of question (at least in the 1980s) because most of the irrigated areas in the region must be already fertilized by the early 1980s, and hence there is little scope for further diffusion of fertilizer use on the existing irrigated land.

The optimist, on the other hand, would point at Table 3 which shows that all four states of the Western Region have higher ranks in per hectare fertiliser consumption than in levels of irrigation among all states and territories of India. To him this means that the dynamism of growth in the Western Region's fertilizer consumption was not constrained by low levels of irrigation. To stress his point he would cite the example of Gujarat which, with less than 20 percent irrigation and relatively poor rainfall environment, had the highest per hectare fertilizer consumption in 1981/82 among all states and territories with irrigation levels up to 40 percent. This was possible due to substantial growth in fertilizer use on unirrigated areas.[7] Governed by this line of reasoning, the optimist would see bright prospects of growth in the Western Region's fertilizer consumption since current levels of fertilizer use are quite low, and also because there is sufficient scope for the repetition of Gujarat's experience in Madhya Pradesh and Maharashtra both of which are twice as big as Gujarat.

It is thus clear that on the basis of either projecting the trends fitted to the data on fertilizer consumption or evaluating the relevance of irrigation and rainfall environment to growth in fertilizer consumption, there is sufficient scope for pessimism as well as optimism while reflecting on the prospects of growth in fertilizer consumption in the Western Region during the 1980s.

III

There is substantial untapped potential of fertilizer use in the Western Region. But from this alone we cannot say that growth in actual fertilizer consumption would be rapid.

The potential of fertilizer use in a region is determined by fertilizer response functions, prices of crops and cost of using fertilizers, i.e., by variables which determine profitability of fertilizer use. Its precise measurement calls for calculating optimum rates of application on each and every unit of land by estimating fertilizer response functions for them. It is, however, possible to get an approximate idea of the potential from fertilizer recommendations and area under different crops because fertilizer recommendations are based on responses of different crops to fertilizer use under field conditions. Estimated in this manner, the total potential of fertilizer use in Gujarat, M.P., and Maharashtra roughly amounts to 0.73, 1.76 and 1.78 million tons respectively. Against this, actual fertilizer consumption in 1982/83 was 403,000 tons in Gujarat (i.e., 55 percent of the potential), 240,000 tons in M.P., (i.e., 14 percent of the potential), and 523,000 tons in Maharashtra (i.e., 29 percent of the potential). It is thus clear that there is a vast scope for further growth in fertilizer use in each of these states even under the existing conditions with respect to cropping pattern, crop varieties and irrigation.

The existence of sizeable untapped potential, however, does not automatically ensure prospects of rapid growth in fertilizer consumption. In other words, it is a necessary but not a sufficient condition. This is so because the pace of growth in actual fertilizer consumption depends on the rate at which untapped potential is converted into farmers' demand for fertilizer and this demand being met by making fertilizers available to farmers at convenient locations and at the right time. Viewed thus, the prospects of rapid growth in fertilizer consumption would depend on simultaneous development and well-coordinated functioning of agricultural extension systems of the state governments, promotional efforts of the fertilizer industry, agricultural and fertilizer distribution credit systems of cooperative and commercial banks, and agencies involved in fertilizer supply and distribution. The importance of urgently recognising this and meaningfully doing the needful to remove various lacune in these considerations which explain variations in the pace and pattern of the past growth in fertilizer consumption at different locations (i.e., blocks, districts and states) in the Western Region.[8]

The above position may seem surprising since it is generally believed that the spatial variations in fertilizer consumption are primarily governed by variations with respect to irrigation and rainfall. This is no more true in the Western Region. Fertilizer consumption per hectare varied widely among districts in Gujarat, M.P., and Maharashtra during the first two years of the 1980s. (The Coefficient of Variation was 59 percent in Gujarat, 72 percent in M.P., and 88 percent in Maharashtra). But irrigation and annual rainfall, which also varied widely among districts, "explain" only about one-fifth of the inter-district variation in fertilizer consumption in Gujarat and M.P., and none at all in

Maharashtra. Nor do the fluctuations in rainfall seem to have strong association with the pace of growth in fertilizer consumption in many districts. Thus, it seems high time we stop blaming low irrigation and poor rainfall environment for poor growth in fertilizer consumption at many locations, and focus our attention on many other variables which govern the pace of growth in fertilizer consumption.

A scrutiny of the available data indicates that the following aspects deserve attention to improve the prospects of further growth in fertilizer consumption in the Western Region.

In the efforts to convert the untapped potential into farmers' demand for fertilizers, certain crops which account for bulk of the potential and which are not yet commonly fertilized deserve attention on a high priority basis. These crops are non-HYVs of cotton, jowar and bajra in Gujarat, the same three crops plus pulses in Maharashtra, and rice, wheat, jowar, maize, pulses and all oilseeds in M.P. Fertilizer use on these crops is viable under the prevailing price environment but it is not yet widespread because these crops have remained outside the mainstream of efforts to convince the farmers they should be fertilized. This is not to say that the entire potential of fertilizer use on the remaining crops in each state has already been tapped. But diffusion of fertlizer use on them seems to be well under way. Therefore, what is required in their case are not the efforts to convince farmers about profitability of fertilizer use on them but details of fertilizer practices like timing and methods of fertilizer application and balance among nutrients.

Efforts in the above directions by agricultural extension system and fertilizer industry is one aspect of converting untapped potential into farmers' demand for fertilizers. These

efforts must be backed up by increasing the flow of crop loans to farmers and removing various deficiencies in the agricultural credit systems.

To meet growing fertilizer demand resulting from these efforts, adequate fertilizers will have to be made available to farmers at convenient locations in a timely manner. In this context, it is not sufficient to worry only about inter-district variations in the number of fertilizer outlets. Three other aspects also deserve attention: (1) variations in the number of outlets among various blocks of the same district, (2) various deficiencies in the working of the fertilizer distribution system especially with respect to procurement and stocking of fertilizers by the lower level agencies, and (3) infrastructure facilities to handle movements and storage of growing quantities of fertilizers.

IV

My purpose in highlighting the above issues is not to downplay the importance of such variables as prices of crops and fertilizers as well as irrigation, cropping pattern and crop varieties in influencing the pace of growth in fertilizer consumption. That accelerated development of the irrigation potential and dryland technology will improve the prospects of rapid growth in the Western Region's fertilizer consumption is self-evident. What is, however, not sufficiently realized is that even without dramatic developments on that front, there is vast scope for accelerated growth in fertilizer consumption but the prospects of such growth would depend on concerted and well-coordinated efforts by the state governments and the fertilizer industry in various directions mentioned in the previous section. In the absence of such efforts, one cannot be optimistic about fertilizer consumption rising at the pace indicated by the semi-log trends fitted to the past data.

Footnotes

1. "Western Region" in this talk includes Gujarat, Madhya Pradesh, Maharashtra and Goa. All figures of fertilizer consumption are in terms of nutrients.

2. In 1982/83, the Western Region accounted for 18 percent of the total consumption of N plus P_2O_5, whereas its share in the total production of these nutrients was 35 percent. The share of the region in total capacity will go up from 27 per cent in 1983 to 39 percent when projects under implementation will be completed.

3. See Gunvant M.Desai and N.V.Namboodiri, "The Deceleration Hypothesis and Yield Increasing Inputs in Indian Agriculture", paper presented in the Symposium on "Recent Trends in Agricultural Growth in the Western Region in India" organised by the Indian Society of Agricultural Economics and Indian Institute of Management, Ahmedabad on September 9-10, 1983.

4. The need for annual increment of more than 500,000 tons in India's fertilizer consumption is indicated by the estimates of required fertilizer consumption by the year 2000.

5. See Gunvant M.Desai, "Economics of Sustained Rapid Growth in India's Fertiliser Consumption", paper presented in the FAI-FAO annual seminar on "Systems Approach to Fertiliser Industry" in New Delhi, December 9-10, 1983.

6. Nearly three-fourth of the past growth in India's fertilizer consumption has been on irrigated areas.

7. On the basis of the Agricultural Census of Gujarat for 1976/77, the share of unirrigated areas in total fertilizer consumption was as high as 55 percent.

8. This is clearly brought out for Gujarat in Report of the Working Group on Fertilizer Distribution System in Gujarat, Government of Gujarat, Agriculture and Forest Department, April 1983.

Table 1: Production and Consumption of Fertilizers in the Western Region, 1982/83

		Gujarat	M.P.	Maharashtra	Goa	Western Region
				000 Tons		
1	Production & Consumption in 1982/83					
	N: Production	642.5	5.5	208.9	174.0	1,030.9
	Consumption	248.5	146.1	310.5	2.1	707.2
	Balance	394.0	-140.6	-101.6	171.9	323.7
	P_2O_5: Production	331.4	21.6	132.7	33.8	519.5
	Consumption	119.5	75.0	123.8	1.1	319.4
	Balance	211.9	-53.4	8.9	32.7	200.1
	Both: Balance	605.9	-194.0	-92.7	204.6	523.8
2	Capacity(as on Oct. 1983)					
	In Production					
	N	771.1	6.7	317.0	171.0	1,265.8
	P_2O_5	345.4	25.8	173.7	42.0	586.9
	Total	816.5	32.5	490.7	213.0	1,852.7
	Under Implementation					
	N	668.0	345.0	757.0	16.4	1,786.4
	P_2O_5	-	76.6	10.6	42.0	129.2
	Total	668.0	421.6	767.6	58.4	1,915.6
	Approved in Principle					
	N	75.2	228.0	-	-	303.2
	P_2O_5	160.6	-	7.0	-	167.6
	Total	235.8	228.0	7.0	-	470.8

Source: Fertiliser Statistics, 1982/83, The Fertiliser Association of India, New Delhi, November 1983.

Table 2: Estimated Trend Lines from 1962/63 to 1982/83 Fertilizer Consumption Data and Projected Consumption for 1989/90: Gujarat, M.P., Maharashtra

State	Estimated Trend[1]	$\bar{R}^2$	Projected Consumption, 1989/90 (000 Tons)	Implied Annual Growth	
				000 Tons	Percent
Gujarat	Linear:				
	Y = -28.249+19.441 T (-1.644) (14.208)	0.91	516	19.4	4.5
	Semi-log:				
	Log Y=3.500+0.131 T (31.419)(13.749)	0.92	1,292	110.7	14.0
M.P.	Linear				
	Y= -19.302+11.401 T (-1.891)(14.039)	0.91	300	11.4	4.5
	Semi-log:				
	Log Y = 2.769+0.142T (18.640)(11.983)	0.88	844	75.9	15.2
Maharahtra	Linear:				
	Y = 0.575+22.771 T (0.037)(18.598)	0.95	638	22.8	4.2
	Semi-log:				
	Log Y = 4.161+0.107T (50.844)(16.345)	0.93	1,265	95.0	11.2

1 Estimated from time-series of annual consumption for the period 1962/63 to 1982/83. Figures in breakets show t ratios

Table 3: Levels of Fertilizer Consumption and Irrigation in Different States and Territories of India

State/Territory	Fertilizer Consumption (1981/82)		Cropped Area Irrigated (1978/79)	
	Kgs./Hectare	Rank	Percent	Rank
Pondicherry	256	1	77	2
Punjab	124	2	83	1
Delhi	75	3	55	3
Tamil Nadu	67	4	50	5
Uttar Pradesh	52	5	44	6
Andhra Pradesh	50	6	36	8.5
Haryana	46	7	54	4
Gujarat	39	8	19	15.5
Karnataka	34	9	15	19
Kerala	33	10.5	12	20.5
West Bengal	33	10.5	20	13.5
Goa	31	12	9	23
Maharashtra	27	13	12	20.5
Jammu & Kashmir	22	14	41	7
Himachal Pradesh	20	15	17	17.5
Bihar	18	16	33	11
Manipur	15	17	35	10
Madhya Pradesh	11	18	11	22
Orissa	10	19.5	19	15.5
Meghalaya	10	19.5	22	12
Rajasthan	8	21	20	13.5
Tripura	7	22	3	24
Assam	3	23	17	17.5
Nagaland	2	24	36	8.5

Source: Fertiliser Statistics, 1981/82, FAI, New Delhi, 1982