

Crop Prices and Interstate Differences in  
the Use of Chemical Fertilisers in India

by

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One may usually expect the allocation of fertiliser to be responsive - within the technical and the supply constraints - to changes in its price relative to crop prices. In other words, given the rate of increase in supply of chemical fertilisers and given the relevant administrative, institutional and technical conditions in India, fertiliser pricing may have important effects on the allocation of available supplies among different crops or among different regions of the country.

Price policy relating to chemical fertilisers in India until very recently has been as follows. For nitrogenous fertilisers, the Central Fertiliser Pool serves as an equilisation fund for balancing high domestic prices against low import prices and the disparities between the various ex-factory prices of fertilisers. The uniform price charged to the State Governments is more or less the average cost of making a particular variety of the fertiliser available at the major railhead destination. The differences between the prices finally charged from the cultivators and the Pool price is accounted for (barring black markets) by transportation and handling charges incurred by the State Government in distributing from the major railheads to the selling

points (often the villages); and this margin also was often fixed at a uniform average level for a state.

Supply of phosphatic fertilisers has most of the time consisted almost entirely of domestic production. Since 1952 when the super-phosphate Pool was abolished, zonal meetings have been convened every six months where representatives of the central Government, the States, and the manufacturers in the zone review the demand and supply position and decide upon the areas to be supplied by each of the manufacturers and the prices to be charged. The delivered costs at which supplies are obtained by the State Cooperative Societies vary with the distance from the supplying factory. In some States, the sale price of super-phosphate is fixed at a uniform level for the major railhead destinations. To this end the State Government concerned maintains a Pool to average out the freight costs, etc. In others, the sale price takes into account the actual freight cost and other expenses.

For most of the fertilizers, particularly the nitrogenous, the price charged from the cultivators has thus been based almost entirely on the objective of making the nationwide fertiliser distribution programme break even. And some care was taken to ensure near uniformity (except for occasional subsidies) in the price of a particular fertiliser throughout the country during a particular year.<sup>1</sup>

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<sup>1</sup> Though in this study we discuss fertiliser pricing up to the Third Plan Period and their allocative implications, we may note that more recently there has been some change in Government policy in this regard. In December 1965 it was announced that the new fertiliser plants (footnote continued on next page)

An uniform price level for a fertiliser may bias its allocation against the crop that is subject to a more intensive Government control (oriented to protect the urban consumer) or against the region with relatively low farm prices on account of inadequate buyers' competition in respect of the crops in which it happens to have a surplus.

During much of the first three Plan periods, fertilisers became more expensive in terms of cereals than in terms of some major commercial crops, like oilseeds and sugarcane (raw sugar). This might have affected the growth in application of fertilisers to cereals, although we cannot verify this bias because of lack of data on cropwise fertiliser consumption. As fertiliser consumption data are available on a statewise basis and as crop prices differ significantly between states, it may be possible to have some rough idea of the effect of the fertiliser pricing policy described above on interstate differences in its consumption.

The following table gives a cross-sectional picture of interstate differences in per acre consumption of chemical fertilisers along with some of the major factors that might influence cultivators' demand for

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which take out their license by the middle of 1967 would be permitted sale of at least 70 p.c. of their output at 'free' prices for a period of seven years after commencing production, i.e., roughly from 1969-70 to 1976-77. When this becomes effective after a few more years, there would probably be larger price variation with regional variation in demand for fertilisers and in cultivators' purchasing power. The Government - with its control over imported fertilisers, over supplies out of public sector plants, and with its right to take over up to 30 p.c. of production of the other plants at some negotiated price - would still have some control over the prices and supplies of fertilisers for the cultivators, though it would obviously be smaller than at present.

them. Extent of rainfall, intensity of irrigation and also nature of soil determine to a larger extent the mean response of most of the crops to any given dose of fertiliser application and the rate of decline to larger doses. The average price received by cultivators for the crops on which fertilisers are usually applied, and the availability of cooperative and other credit for current farm business expenditure determine their capacity to spend on fertilisers. Extent of tenant cultivation is also an important factor in this respect: the sharecropper or the tenant cultivator with insecure tenure has less incentive to invest in superior inputs; besides, his capacity to invest is also seriously limited by high rents and limited access to even cooperative credit.<sup>1</sup> Extent of multiple cropping may also have some impact. Larger intensity of cropping, given other things, would be associated with larger fertiliser application. To remove this factor, fertiliser consumption in cols (1) and (2) of the table is expressed in terms of per acre of gross sown area in each state. Consumption of organic manures while determined by some of these factors may also have an independent influence on consumption of chemical fertiliser in the sense that given other things, a state with a larger endowment of land for

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<sup>1</sup>Among all the occupational categories based upon agriculture, the tenant cultivator figures the least in proportion to his importance among the beneficiaries of credit programmes, as also of programmes relating to improved seeds, fertilisers, implements, etc. See Report of the Team for the Study of Community Projects and National Extension Service (vol. II, p. 101), issued by the Committee on Plan Projects, November 1959.

pasture and/or with more scope for green manuring may actually have a smaller demand for chemical fertilisers.

Such discussion in terms of States, rather than more homogeneous and disaggregative regions in terms of soil-climate-crop complex is of limited use; moreover, we have not considered all of the factors that might have any bearing on interstate disparities in fertiliser consumption. However, the following table does indicate broadly the relative importance of the price factor (among a small number of highly significant factors) in influencing interstate differences in fertiliser consumption.

[It may be noted that while fertiliser consumption in the table refers to the agricultural year (July-June) 1960-61, the crop prices refer to the marketing year (October-September for autumn crops like paddy, jute, cotton and April-March for winter crops like wheat, maize). The implicit assumption is that the price expectation relevant for fertiliser application in the next year is based on current prices. At the time of sowing and fertiliser application, the peak marketing season for the last harvest is still under way, and there is no other indicator of likely prices for the coming harvest until the sown crops reach their maturity.]

Let us consider the four Southern States first: Andhra Pradesh, Kerala, Madras and Mysore, all having more or less similar soil conditions consisting mainly of coastal alluvium and black soils but characterised by considerable differences in the rate of fertiliser application. In Kerala and Madras plentiful rainfall in the coastal districts

TABLE: Consumption of Chemical Fertilisers in Different States, and Some of the Factors Affecting It, 1960-61.

State	(1) Per Acre Consumption of Chemical Fertilisers: N+P <sub>2</sub> O <sub>5</sub> +K <sub>2</sub> O (lbs. per acre) in 1960-61	(2) Use in 1960-61 of		(3) Gross irrigated area as p.c. of gross sown area in 1960-61	(4) Percentage of districts with rainfall above 45 inches in a normal year	(5) Inter-State disparity index of average price for the major crops in 1959-60 (all- India average = 100)	(6) Total credit from all sources for current farm business expenditure (Rs. per acre)	(7) Percentage of culti- vated area under pure and mixed tenancy
Andhra Pradesh	3.76	.37	12.1	29.4	5	104	10.73	23.3
Kerala	4.34	.06	10.4	19.4	95	104	14.71	57.2
Madras	5.81	.11	18.6	44.2	40	107	19.64	21.9
Mysore	1.75	.14	2.2	9.2	27	99	8.83	32.6
Gujarat	1.73	.02	Negligible	7.5	11	95	5.93	13.3
6 Maharashtra	1.78	.02	Negligible	6.8	25-30	110	3.73	22.7
Rajasthan	0.25	.04	0.4	12.5	0	96	8.64	11.0
Punjab	0.85	.30	1.7	39.9	15	95	7.60	48.6
Uttar Pradesh	2.08	.69	1.1	25.5	55	98	6.76	8.6
Madhya Pradesh	0.33	.01	1.2	5.2	60	87	4.18	19.9
Orissa	1.10	.20	10.3	17.6	90-95	87	1.97	21.9
Bihar	1.69	.04	4.1	18.6	35	100	3.14	32.2
West Bengal	2.06	.04	6.6	21.5	85	112	3.19	34.9
Assam	0.38	.15	3.7	23.3	95-100	98	2.55	34.6

See next page for notes to this table

## NOTES TO TABLE:

Col. (1) is obtained by adding together the consumption in each state of nitrogenous fertilisers (ammonium sulphate, ammonium sulphate nitrate, calcium ammonium nitrate and Urea - all in terms of N), Superphosphate (in terms of  $P_2O_5$ ) and Muriate of Potash (in terms of  $K_2O$ ), during the agricultural year July 1960 to June 1961 and then dividing this by the gross sown area in the state during the year.

Cols. (2) & (3): The divisor again is gross sown area in the production year (July-June) 1960-61. Gross irrigated area refers to those irrigated by minor as well as major irrigation works.

Col. (4) is obtained from district-wise annual rainfall figures during 1952-53 and during 1956/57 - 1958/59. Sources: Agricultural Situation in India, August 1964; Shome and Raichandhuri, Rating of Soils in India, Proceedings of the National Institute of Sciences of India, vol 26(a) Supplem. I)

Col. (5): the crops covered by the price disparity index are: rice, wheat, gram, jowar, groundnut, sugarcane (in terms of raw sugar), cotton, and jute. Ministry of Food and Agriculture publishes monthly prices for each crop at some of the major wholesale markets in each state. From these we have worked out the average all-India price of a crop during 1959-60. For averaging the state-wise wholesale prices of a crop we have used as weights the percentage shares of the major states growing this crop in the total production of the crop in 1959-60. With this all-India average price for each crop as 100, the state-wise prices for that crop are expressed as index numbers. For each state, these are then averaged into the crop price index shown in the Table; the weights used for this average are the percentage shares of the different crops in total value of agricultural production in each state.

Col. (6): In considering expenditure on fertiliser the relevant credit category to be used is that for current farm business expenditure. According to the Rural Debt and Investment Survey of the Reserve Bank of India for 1961-62 (Reserve Bank of India Bulletin, Sept. 1965), only about one third of cash loans was used for current farm business expenditure. This survey provides information - on a statewise basis - about credit used for current farm business expenditure. The survey relates to 1961-62. In the absence of similar data for 1960-61, we have used the 1961-62 figures as indicative of the ranking of states in this respect for 1960-61.

Col. (7): 1961 Census data, as analysed by P.S. Sharma in Indian Journal of Agricultural Economics, October-December, 1965.

and availability of irrigation in the low-rainfall inland districts and larger availability of short and medium term credit for buying fertilisers, etc. and relatively high prices for the major crops have all worked together towards raising fertiliser consumption. Comparing between these two states, the larger tenurial disincentive, smaller intensity of irrigation and inferior credit availability in Kerala seems to be partly responsible for its fertiliser consumption being less than in Madras. Poor rainfall and irrigation conditions in Mysore<sup>1</sup> and relatively small prices for the major crops may be partly responsible for the fertiliser consumption in this state being lowest of the four south Indian states. Better irrigation, smaller tenurial disincentive and higher crop prices may have led to larger fertiliser consumption in Andhra Pradesh as compared with Mysore.

How to explain the low level of fertiliser use in Punjab and Madhya Pradesh as compared with Gujarat, Maharashtra, and Uttar Pradesh which are roughly similar in respect of crop complex? The irrigation condition and the tenurial incentives are not much better in Gujarat

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<sup>1</sup>In Mysore, the proportion of districts enjoying assured rainfall of more than 45 inches is relatively small. The larger number of poor-rainfall inland districts of Mysore have very little irrigation, in contrast with the poor-rainfall inland districts of Madras and Andhra Pradesh. Eight districts of Mysore, viz., Bidar, Gulbarga, Bijapur, Belgaum, Dhawar, Raichur, Bellary and Chitaldurg, with a normal rainfall range of 22-36 inches had only about 3.3% of their gross sown area under irrigation (in 1955/57 - 1958/59). On the other hand, the four lowest-rainfall districts of Madras (viz. Madurai, Tiruchirapalli, Tirunelveli and Ramanathapuram with a normal rainfall range of 32-35") had about 38% of their gross sown area under irrigation. In Andhra Pradesh too, the low-rainfall (less than 35 inches) districts of Nalgonda, Ananthapur, Khammam, Chittoor, Guntur, Cuddapah, Medak, Mahboobnager have about 16-19 p.c. of their area under irrigation.



and Maharashtra than in neighbouring Madhya Pradesh and the rainfall situation is much worse. But the price incentive is much better and though the supply of credit for current farm investment is not much higher most of it is low-interest cooperative credit, particularly in the case of Gujarat. Low fertiliser consumption in Punjab relative to Uttar Pradesh and Maharashtra, in spite of high intensity of irrigation, seems to be due largely to four factors (a) greater tenurial disincentive, (b) relatively low level of crop prices, (c) poorer rainfall condition, and (d) waterlogging and ill-drained soil charged with sodium salt in some of the eastern districts of Punjab, especially parts of Sangrur, Ambala, Karnal and Rohtak.

Use of fertilisers is the lowest in Rajasthan which is easily explained by inadequate soil moisture (with poor rainfall and little irrigation) in most parts of the state and low average crop price due to the lack of high-priced crops like sugarcane, rice, and cotton in the cropping pattern which is still predominated by 'dry' crops like millets.

Among the four east Indian States, rainfall and irrigation conditions are not much different between Orissa, West Bengal and Assam. Higher crop prices and larger availability of credit seem to account for the larger fertiliser consumption in West Bengal as compared with Orissa. Difference in crop prices explain some of the difference in use of fertiliser between Assam and West Bengal, but not between Assam and Orissa. The latter can probably be explained by the fact that in Orissa there are no slow-running rivers which from year to year deposit

fertility-raising silt as in the Surma river basin of Assam, and that 3-4 of the 10 districts of Assam have clayey soils with high nitrogen content. In other words, an Assamese cultivator in a similar economic position is pressed less hard to replace the nutrients removed each year by crops, as part of it is done by nature.

Considering the more striking differences in fertiliser consumption and in some of major factors affecting it, one can thus conclude that relatively low crop prices have been at least partly responsible for keeping down fertiliser consumption in Orissa, Madhya Pradesh and Punjab. Supplying fertilisers at subsidised rates ( tied, if necessary, with larger supplies of improved, fertiliser-consuming varieties of seeds) for these states might have been a partial solution to the problem, at least in the short run of a few years.

We may note that the year 1959-60 was characterised by fewer restrictions over interstate movements (by private traders) of two of the major crops (viz., rice and wheat) as compared with 1950-51, 1958-59 or 1965-66. This tended to reduce interstate price disparity in respect of foodgrains. On the other hand, Government distribution of imported cereals was considerable during this year: net Government supply of rice and wheat out of imports and/or carried-over stocks was about 3.5 million tons during 1959-60 which amounted to 8.5-9 per cent

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<sup>1</sup>See 'Rating of Soils in India' by Shome and Roychandburin in Proceedings of the National Institute of Sciences of India, Vol 26(a), suppl. I, 1960.

of the year's production of these two crops. It is not mere coincidence that the three States for which we find relatively low average crop price as inhibiting the use of chemical fertiliser are also the major surplus states for rice and wheat. Distribution of the imported supplies in the large cities might have pre-empted some of the major market for the surplus of these states.