Socio-Economic and Institutional Factors Influencing Fertilizer Use in the Punjab (Pakistan)

ABDUL SALAM*

Introduction

Application of chemical fertilizers is one of the quickest and simplest means of increasing farm production. Increased fertilizer use has been an important factor in increasing crop productivity in the developed countries and in those developing countries which have shown high rates of growth in the agricultural sector.

The use of chemical fertilizers in Pakistan started in 1952. With the introduction of fertilizer-responsive seeds for wheat and rice crops, and the availability of additional irrigation water from the installation of private and public tubewells, the use of fertilizers has become increasingly popular. The farmers were further encouraged to increase the use of fertilizers by a substantial price subsidy and the promotional efforts by the government and the fertilizer industry in Pakistan.

Despite the promotional efforts by the government and fertilizer industry, the application rate of fertilizer in Pakistan remains one of the lowest, even when compared with the fertilizer use levels in other developing countries. During 1970-71, fertilizer use per hectare of arable land in Pakistan was 15.1 nutrient kilograms. During the same period the rate of fertilizer use in the Philippines, Sri Lanka, Taiwan, South Korea and Japan was 25.2, 47.3, 243.6,

*The author is a Research Economist at the Pakistan Institute of Development Economics (PIDE). This paper is partly based on his unpublished Ph.D. dissertation, "Economic Analysis of Fertilizer Application in Punjab-Pakistan", submitted to the University of Hawaii. The author is deeply indebted to his Thesis Committee Chairman, Nicolaas Luykx, and the committee members, Peter V. Garrod, Joseph T. Keeler, Gary R. Vieth and W.G. Sanford, of the University of Hawaii, for their helpful criticism and valuable suggestions. He is also thankful to Sarfraz K. Qureshi for going through an earlier draft of the paper and suggesting useful changes. Helpful suggestions made in a seminar at the PIDE are also gratefully acknowledged. The author alone is responsible for any errors or omissions.

295.9 and 385.6 nutrient kilograms respectively [5]. It is, thus, important that the factors determining the use of fertilizers be understood so that a suitable package of government policies is evolved to increase the rate of fertilizer application in Pakistan. Previous studies in Pakistan have emphasized two main factors. First, as shown by one set of studies [2,3,8], farmers are price-responsive and an increase in fertilizer prices is likely to result in reduced use of fertilizer. Second, as observed by another set of studies [4,6], at the then-existing prices of fertilizer and wheat and with the prevailing input-output ratios for the improved varieties of wheat, increased fertilizer use is a profitable proposition for wheat farmers in Pakistan. Since the use of fertilizer is much below the level that would maximize the farmer's profits, it would be interesting and useful to analyse other relevant factors that may be constraining further use of fertilizers in Pakistan.

The use of fertilizer or, for that matter, any other innovation by the farming community is the combined result of the research to develop information on various aspects relating to the particular innovation, dissemination of the information, profitability of the innovation and its availability at the right time and place and in the accepted form. The ability of the farming community to finance the investment is also important in the acceptance of the new innovations. Knowledge on these aspects of fertilizer innovation in Pakistan is lacking. The present study would attempt to fill some of the gaps in this area and would trace out the effects of some socio-economic and institutional factors on fertilizer use in the Punjab.

The study is based on a farm survey in two districts of the Punjab. The data relate to the 1972-73 cropping year. The study is divided into three sections. Section I describes the sampling procedure in the study. Section II isolates the effect of various factors on the level and pattern of fertilizer use. The final section presents main conclusions of the study which are followed by some policy suggestions.

I. Sampling Procedure

The farm management survey was based on a multistage sample selection procedure. The process of sampling is briefly described below.

Selection of Districts

The 19 districts of the Punjab Province were divided into three strata. The cropping pattern and the availability of irrigation water have considerable influence on fertilizer use in each district. Secure water supplies are *sine qua non* for a profitable application of chemical fertilizers. *Barani* districts, i.e. those in which the main source of irrigation is rainfall, were excluded from the list of the districts from which the sample was drawn. Three districts, viz. Campbellpur, Jhelum and Rawalpindi, were thus dropped from the universe.

Agriculture in the canal-irrigated districts of the province is characterized by two distinct cropping patterns; wheat-rice and wheat-cotton. The canal-irrigated districts were stratified on the basis of the cropping pattern followed. Wheat-rice is the dominant cropping pattern in Gujranwala, Sialkot and Sheikhupura districts, whereas wheat-cotton is the main crop-

ping pattern followed in Sahiwal, Multan, Rahim Yar Khan, Bahawalpur, Bahawalnagar, Jhang, Lyallpur, Sargodha, Dera Ghazi Khan and Muzaffargarh districts of the province. On the basis of such criteria as (a) relatively large percentage of crop area under wheat, rice and cotton individually, (b) availability of tubewell irrigation water not constrained by saline underground water, (c) absence of special government projects like Salinity Control and Reclamation Projects (SCARP), etc. and (d) high aggregate fertilizer consumption in the district, Sahiwal and Gujranwala districts were selected to represent wheat-cotton and wheat-rice cropping patterns respectively.

Selection of Villages

A list of all villages in each of the two selected districts was prepared. Eight 'representative' villages from each of the sample districts were selected after consultation with the officials of the Department of Agriculture, Punjab Agricultural Development and Supplies Corporation and the Local Government. It was ensured that none of the selected villages was less than 6 to 8 miles from the market town. This was done in order to guard against the urban influence.

Selection of Farmers

Twelve farmers from each of the selected villages were chosen in consultation with the local leaders, village headmen, and ex-members and secretaries of the Union Councils. The main purpose of the survey was carefully explained to the local leaders and respondents. While selecting the farmers, it was ensured that all the *pattis*[1] of the village were represented in the sample. If more than one ethnic group were living in the village, as it often happened, efforts were made to include farmers from each of the ethnic groups. It was further ensured that their farms were spread around the village. The size distribution of farms was ascertained in each village. Effort was made to give proportionate representation to small, medium and large farms according to their relative importance in the selected village. Farms above 50 acres were excluded from the sample. In all, 192 farmers were interviewed from the two districts.

II. Findings of the Farm Survey

Use of Commercial and Conventional Fertilizer Materials

Out of the 192 farmers interviewed, approximately 90 percent reported having applied chemical fertilizers to at least one of their crops in the cropping year of 1972-73. The application of fertilizer was characterized by the dominance of nitrogenous fertilizers. As is clear from Table 1, an overwhelming majority of the sample farmers relied on nitrogenous fertilizers.

The major sources of nitrogen were various brands of urea, ammonium sulphate, ammonium nitrate and diammonium phosphate. Urea was by far the most popular nitrogenous fertilizer among the farmers.

[1]A village is often sub-divided into parts, called *pattis*. A *patti* is often an area existing in the minds of inhabitants, but it may have very obvious physical manifestations which differentiate groups living in a village [7].

Table 1

Farmers Applying Commercial and Conventional Fertilizer Materials on their Major Crops

Crops	Total Number of Growers	Chemical Fertilizer Users				Conventional Fertilizer Material (Farmyard Manure) Users	
		Nitrogen		Phosphate			
		Number	Percentage	Number	Percentage	Number	Percentage
Mexican wheat	172	153	89	68	40	75	44
Local wheat	24	10	42	1	4	16	67
IRRI rice	33	22	67	6	18	10	30
Basmati rice	133	95	71	21	16	75	56
Jhonna rice	38	23	61	6	16	16	42
Maize	39	36	92	3	8	32	82
Cotton (American)	95	79	83	25	26	45	47
Sugarcane	83	77	93	7	8	72	87

The evidence available from other sources also suggests the imbalance in the use of fertilizers in the country. Ahmad [1] reported that the prevailing Nitrogen-Phosphorus nutrient ratio in fertilizer use stood at 13:1 whereas, ideally, it should be around 4:1.

The use of farmyard manure, a conventional farm input, remains quite popular with the farmers. It may be pointed out that farmyard manure is one of the important means of maintaining soil fertility. It also improves structure and water-holding capacity of the soil.

During the field survey it was observed that only a few of the farmers were aware of the importance of soil-testing for determining the type and amount of fertilizers needed for improving their farm productivity. An overwhelming majority of the farmers had no knowledge about the nutrient status of their soils and the requirements of their farm crops in this regard.

Comparison of Per Acre Fertilizer Use Among Various Farm Size Categories

Table 2 provides information on application rates of nitrogen and phosphorus (nutrients) on important crops on farms of different sizes. It is interesting to note that application rates of nitrogen as well as phosphorus nutrients are significantly higher on small farms than on other farm categories[2] on all the listed crops.

It appears that small farmers are trying to make up for their meagre land resources by using higher amounts of land-saving factor inputs such as fertilizers. Nevertheless, it should be pointed out that fertilizer application rates on all farm size categories are well below the recommended levels.[3]

Sources of Fertilizer Supply and Reasons for Their Preference

Prior to the "provincialization" of fertilizer distribution in the Punjab province,[4] there were a number of fertilizer suppliers at the retail level. Prominent among these were "commission agents" and "local dealers". In addition to these two sources, the Agricultural Development Corporation also had its agents distributing fertilizers. There were some rural cooperative societies which were distributing fertilizers to their members.

Commission agents are located in market towns and provide produce-marketing services to the farming community. Private companies dealing in fertilizers had also appointed some of these commission agents as their agents for the marketing of fertilizers.

Local dealers are defined as those persons who were located in the villages or nearby important commercial centres and were dealing in fertilizers either exclusively or in addition to other commodities. The majority of the local dealers were village shopkeepers. Information regarding the sources

[2]Small, medium and large farms in this study refer to farms of up to 12.5 acres, 12.6 acres to 25.0 acres and 25.1 to 50.0 acres respectively.

[3]Per acre recommended levels of nitrogen for Mexi-Pak wheat, local rice, cotton and sugarcane are 125, 60, 75 and 175 nutrient pounds respectively. Recommended rates of phosphorus for these crops are 75, 75, 50 and 75 nutrient pounds respectively [1].

[4]Fertilizer distribution was provincialized in September, 1973.

Table 2

Per Acre Fertilizer Use By Farm Size Categories on Selected Crops

Crops	Per Acre Use of Fertilizer on Sample Farms		
	Small Farms	Medium Farms	Large Farms
		Pounds of Nitrogen	
Mexican wheat[a]	54	48	50
Basmati rice[b]	67	46	58
Cotton (American)[c]	56	——51*——	
Sugarcane[d]	73	——65*——	
		Pounds of Phosphorus	
Mexicant wheat[e]	48	39	38
Basmati rice[f]	63	45	39
Cotton (American)[g]	46	——39*——	

*Farmers growing cotton and sugarcane were subdivided into two categories only: (i) small and (ii) medium and large combined.

[a]Application rate significantly higher on small farms as compared to those of medium and large farms at 10 percent and 30 percent significance levels respectively.

[b]Application rate significantly higher on small farms as compared to those of medium and large farms at 1 percent and 20 percent significance levels respectively.

[c]Application rate significantly higher on small farms as compared to that of other farms at 20 percent level of significance.

[d]Application rate significantly higher on small farms as compared to that of other farms at 10 percent significance level. Comparison of phosphorus used not made because of a few observations on its use on sugarcane.

[e]Application rate significantly higher on small farms as compared to those of medium and large farms at significance levels of 2.5 and 5 percent respectively.

[f]Application rate significantly higher on small farms as compared to those of medium and large farms at 20 percent and 2.5 percent significance levels respectively.

[g]Application rate significantly higher on small farms as compared to that of other farms at 10 percent significance level.

from which the sample farmers purchased their fertilizer supplies is tabulated in Table 3.

Table 3

Sources of Fertilizer Supply

Supply Sources	Number of Farmers served	Farmers served as Percentage of all Fertilizer Users
Commission agents	66	38
Local dealers	55	32
Commission agents and local dealers	26	15
Landlord	4	2
Commission agents, local dealers and landlord	6	4
Cooperative societies, Agricultural Development Corporation agents	16	9
All Sources	173	100

Table 5

Sources of Financing Fertilizer Use for Different Farm Size Categories

Sources of Finance	Size Categories of Sample Farms							
	Small Farms		Medium Farms		Large Farms		Farms of all Categories	
	Number	Number as Percentage of Sample Small Farms	Number	Number as Percentage of Sample Medium Farms	Number	Number as Percentage of Sample Large Farms	Number	Number as Percentage of all Sample Farms
Personal Savings	18	28	23	30	10	32	51	29
Personal savings and non-institutional credit sources	38	60	41	52	17	54	96	56
Personal savings and institutional credit sources	6	9	14	18	2	7	22	13
Personal savings, institutional and non-institutional sources of credit	2	3	0	0	2	7	4	2
All sources	**64**	**100**	**78**	**100**	**31**	**100**	**173**	**100**

Note: A total of 19 sample farms did not use any fertilizer. Nine of them were small farms, six were medium farms and four were large farms. They are not included in the table above.

Table 6

Reasons for Inadequate Fertilizer Use According to Farm Size

Farmers' Reported Reasons for Inadequate Fertilizer Use	Size Categories of Sample Farms							
	Small Farms		Medium Farms		Large Farms		Farms of all Categories	
	Number	Number as Percentage of Sample Small Farms	Number	Number as Percentage of Sample Medium Farms	Number	Number as Percentage of Sample Large Farms	Number	Number as Percentage of all Sample Farms
High price and lack of funds	1	2	1	2	2	8	4	3
Lack of water	5	10	5	9	2	8	12	9
Non-availability of fertilizer	2	4	1	2	1	4	4	3
Lack of funds and water	7	15	5	8	2	8	14	10
High prices, lack of funds and non-availability of fertilizer	10	21	19	32	5	20	34	26
Lack of water and supply of fertilizer	3	6	6	10	1	4	10	8
Adequate use	20	42	22	37	12	48	54	41
Total	**48**	**100**	**59**	**100**	**25**	**100**	**132**	**100**

availability of fertilizer at the appropriate time, lack of funds and the high prices of fertilizers. The behaviour of farmers of different farm sizes appears to be quite similar in this regard.

Availability of purchased farm inputs at convenient locations and at the right time is important for determining their use level. Non-availability of chemical fertilizers at the appropriate times is a limiting factor. In response to questions relating to the availability of fertilizers, 48 percent of the farmers reported that fertilizer supplies were not available when they needed them most, while 45 percent of the fertilizer users did not experience any problem in acquiring their fertilizer requirements (Table 7). The remaining farmers reported that they could obtain fertilizers at the required time, but with considerable difficulty. Table 7 shows that the problem of non-availability of fertilizers is relatively more acute for small farmers.

Reaction to Fertilizer Price Increase

During 1973 (before the survey was undertaken) the prices of fertilizer were increased by the government twice in quick succession. These price hikes were necessitated by the increasing price of fertilizers in the international market as Pakistan relied quite heavily on fertilizer imports to meet its domestic requirements. When asked about the effect of increased prices on their fertilizer use the majority of the farmers felt that they would be using approximately the same amount of fertilizer as before, as the farm product prices had also gone up. About one-third of the farmers reported their intention to reduce the fertilizer use. The proportion of farmers reporting reduction in their fertilizer use was approximately the same in each farm size category (Table 8).

It appears that in future fertilizer prices are going to be increasingly important in farmers' decision regarding the use of fertilizers. The events of the 1974-75 cropping season, when fertilizer prices were temporarily reduced and fertilizer sales experienced a tremendous increase, further bear out the hypothesis that in Pakistan's agriculture a stage has reached at which fertilizer prices are going to be the major factor in determining its demand.

Effect of Availability of Credit on Fertilizer Use

Asked if in the event of availability of cash or kind credit of fertilizers they would increase their use of fertilizers or start using fertilizer if they were not already doing so, an overwhelming majority of the farmers in small and medium size farm categories replied that this would help them in overcoming their resource constraints and thus they would increase their use of fertilizers (Table 9). Since the lack of funds is one of the major reasons for the inadequate use of fertilizers, the availability of cash or kind credit of fertilizers, especially to small and medium farmers, could play an important role in increasing their fertilizer use. About 11 percent of the sample farmers were opposed to borrowing on interest.

Social Groups Influencing Use of Fertilizers

Farmers were asked regarding the individuals or groups with whom they discussed matters relating to fertilizer use or who influenced their dicisions

Table 7

Availability or Non-availability of Fertilizers by Different Farm Size Categories

Status of Fertilizer Availability	Size Categories of Sample Farms Using Fertilizer							
	Small Farms		Medium Farms		Large Farms		Farms of all Categories	
	Number	Number as Percentage of Sample Small Farms	Number	Number as Percentage of Sample Medium Farms	Number	Number as Percentage of Sample Large Farms	Number	Number as Percentage of all Sample Farms
Fertilizer not available at the appropriate time	34	53	35	45	14	45	83	48
Available but with difficulty	2	3	7	9	4	13	13	8
Available when needed	28	44	36	46	13	42	77	44
Total	**64**	**100**	**78**	**100**	**31**	**100**	**173**	**100**

Note: **The information in this table pertains to fertilizer-using farms only.**

Table 8

Effect of Fertilizer Price Increase on Fertilizer Use on Various Farm Size Categories

Effect of Price Increase	Size Categories of Sample Farms							
	Small Farms		Medium Farms		Large Farms		Farms of all Categories	
	Number	Number as Percentage of Sample Small Farms	Number	Number as Percentage of Sample Medium Farms	Number	Number as Percentage of Sample Large Farms	Number	Number as Percentage of all Sample Farms
Increased fertilizer use since crop prices have also increased	2	3	1	1	2	6	5	3
Using same amount of fertilizer since crop prices have also increased	37	58	50	64	18	58	105	61
Reduced use of fertilizer	25	39	27	35	11	36	63	36
Total	**64**	**100**	**78**	**100**	**31**	**100**	**173**	**100**

Note: A total of 19 sample farmers (9 small, 6 medium and 4 large farmers) did not use any fertilizer and have not been included in the table above.

Table 9

Effect of Future Availability of Credit on Fertilizer Use on Various Farm Size Categories

Farmers' Response on Effect of Future Availability of Credit	Size Categories of Sample Farms							
	Small Farms		Medium Farms		Large Farms		Farms of all Categories	
	Number	Number as Percentage of Sample Small Farms	Number	Number as Percentage of Sample Medium Farms	Number	Number as Percentage of Sample Large Farms	Number	Numbers as Percentage of all Sample Farms
Will not use more fertilizer	6	8	5	6	8	23	19	10
Will use more fertilizer	50	69	61	73	15	43	126	66
Will use more fertilizer if no interest is charged on credit	9	12	7	8	5	14	21	11
Will not borrow on interest at all for buying fertilizer	8	11	11	13	7	20	26	13
Total	**73**	**100**	**84**	**100**	**35**	**100**	**192**	**100**

regarding the amounts of fertilizer application to different crops, or from whom they sought advice regarding the use of fertilizers. Their responses are tabulated in Table 10.

It appears that neither the fertilizer suppliers nor the local extension agents were important in significantly influencing the fertilizer use of the sample farmers. An overwhelming majority of the farmers held discussion among their family members and consulted with other farmers on matters relating to their application of fertilizers.

In response to another question, farmers indicated that they considered the radio extension broadcasts, sponsored by the provincial Department of Agriculture, as the most important source of information regarding fertilizer and other factor inputs and improved methods of cultivation. This programme was very popular among the farmers. However, the local extension agents of the agricultural department did not rank high with the farmers as a source of information (Table 11).

A comparatively higher proportion of medium and large farmers consulted with local agricultural extension agents regarding fertilizer use and related matters. Similarly, a higher proportion of farmers falling in the medium and large size categories, as compared with those falling in small category reported having received advice on the use of fertilizers and other improved inputs from the agricultural department personnel. While it may be said that medium and large farmers consult extension agents more frequently, it may equally be claimed that these agents concentrate their efforts mainly on better-off farmers, and small farmers who need their services most are not given due consideration.

Farmers' Views on Provincialization of Fertilizer Distribution

Farmers were asked about their reaction to the 'provincialization' of the fertilizer distribution. Forty-five percent of the farmers thought that it would be in the interest of farming community as it would regulate supplies and discourage malpractices such as black-marketing, adulteration of fertilizers and underweighting of bags. Another 17 percent of the farmers were of the view that only if provincialization can guarantee regular supplies will it be desirable (Table 12). About 20 percent of the farmers were of the view that the provincialization of fertilizer distribution will fail to deliver the goods and will create problems especially for the small farmers.

It appears that any scheme which improves the timely availability of fertilizer to the farming community would be welcomed by the farmers, as non-availability of fertilizers at the required time and place causes considerable inconvenience to the farmers and discourages the use of fertilizer. The recent decision of the government regarding reinvolvement of private sector in the distribution of fertilizers is a step in the right direction as it would encourage healthy competition not only among the private dealers but also between the public and private sectors.

III. Conclusions

The rate of fertilizer application was higher on small farms than on medium and large farms. However, the application rates in all the farm

Table 10

Farmers' Responses to Questions Regarding Discussion/Advice on the Use of Fertilizer with various Socio Economic Groups

Questions Asked of the Farmers	Size Categories of Farms Using Fertilizers									
	Small Farms					Medium Farms				
	Numbers of Respondents			Percentages of Respondents		Numbers of Respondents			Percentages of Respondents	
	Total	Saying 'No'	Saying 'Yes'	Saying 'No'	Saying Yes'	Total	Saying 'No'	Saying 'Yes'	Saying 'No'	Saying 'Yes'
(A) Do the fertilizer suppliers advise regarding the use of fertilizers?	64	57	7	89	11	78	70	8	90	10
(B) Do you discuss matters relating to fertilizer use with extension agent?	64	55	9	86	14	78	50	28	64	36
(C) Do you discuss matters relating to fertilizer use among your family members?	64	3	61	5	95	78	2	76	3	97
(D) Do you discuss matters relating to fertilizer use with other farmers?	64	4	60	6	94	78	7	71	9	91

—*Continued*

Table 10—(*Continued*)

Questions Asked of the Farmers	Size Categories of Farms Using Fertilizers									
	Large Farms					All Farms				
	Numbers of Respondents			Percentages of Respondents		Numbers of Respondents			Percentages of Respondents	
	Total	Saying 'No'	Saying 'Yes'	Saying 'No'	Saying 'Yes'	Total	Saying 'No'	Saying 'Yes'	Saying 'No'	Saying 'Yes'
(A) Do the fertilizer suppliers advise regarding the use of fertilizers?	31	29	2	94	6	173	156	17	90	10
(B) Do you discuss matters relating to fertilizer use with extension agent?	31	23	8	74	26	173	128	45	74	26
(C) Do you discuss matters relating to fertilizer use among your family members?	31	1	30	3	97	173	6	167	4	96
(D) Do you discuss matters relating to fertilizer use with other farmers?	31	4	27	13	87	173	15	158	9	91

Table 11

Institutions Advising Farmers About Fertilizers and Improved Agricultural Practices by Farm Size Categories

Advising Institutions	Size Categories of Sample Farms							
	Small Farms		Medium Farms		Large Farms		Farms of all Categories	
	Number	Number as Percentage of Sample Small Farms	Number	Number as Percentage of Sample Medium Farms	Number	Number as Percentage of Sample Large Farms	Number	Number as Percentage of all Sample Farms
Agricultural Department	4	5	5	6	5	14	14	7
Radio	42	58	36	43	14	40	92	48
Radio and Agricultural Department	8	11	30	36	11	32	49	26
Private Agencies and Radio	2	3	—	—	—	—	2	1
No institution	17	23	13	15	5	14	35	18
Total	**73**	**100**	**84**	**100**	**35**	**100**	**192**	**100**

Table 11

Institutions Advising Farmers About Fertilizers and Improved Agricultural Practices by Farm Size Categories

Advising Institutions	Size Categories of Sample Farms							
	Small Farms		Medium Farms		Large Farms		Farms of all Categories	
	Number	Number as Percentage of Sample Small Farms	Number	Number as Percentage of Sample Medium Farms	Number	Number as Percentage of Sample Large Farms	Number	Number as Percentage of all Sample Farms
Agricultural Department	4	5	5	6	5	14	14	7
Radio	42	58	36	43	14	40	92	48
Radio and Agricultural Department	8	11	30	36	11	32	49	26
Private Agencies and Radio	2	3	—	—	—	—	2	1
No institution	17	23	13	15	5	14	35	18
Total	**73**	**100**	**84**	**100**	**35**	**100**	**192**	**100**

Table 12

Farmers' Opinions About Provincialization of Fertilizer Distribution

Opinion about Provincialization of Fertilizer Distribution	Size Categories of Sample Farms							
	Small Farms		Medium Farms		Large Farms		Farms of all Categories	
	Number	Number as Percentage of Sample Small Farms	Number	Number as Percentage of Sample Medium Farms	Number	Number as Percentage of Sample Large Farms	Number	Number as Percentage of all Sample Farms
Useful if it can maintain regular supplies	12	16	14	17	7	20	33	17
Useful as it will encourage regular supplies and discourage black marketing	22	30	31	37	12	34	65	34
Useful because fertilizer will be available on credit	0	0	2	2	0	0	2	1
Useful as everybody will have access to fertilizer supplies	5	7	14	17	1	3	20	10
Will not be desirable as only large farmers will have access to fertilizer supplies	20	28	12	12	7	20	39	20
No opinion formed yet	11	15	10	14	5	14	26	14
No opinion given	3	4	1	1	3	9	7	4
Total	**73**	**100**	**84**	**100**	**35**	**100**	**192**	**100**

categories were well below the recommended levels. The fertilizer use was characterized by the dominance of nitrogenous fertilizers with relatively lesser appreciation of the role of phosphate fertilizers in crop production. Personal savings and non-institutional sources of credit were the main sources of financing the farmers' investment in fertilizers. Farmers were quite price conscious and high prices of fertilizers were likely to have an adverse effect on their fertilizer use. Resource constraints, high prices and lack of fertilizer supplies at the needed time were some of the major reasons for the inadequate use of fertilizers. The main sources of fertilizer supplies were commission agents and local dealers. Proximity of the supply sources, provision of credit and social acquaintance of the farmers with the fertilizer suppliers were important in farmers' preference of these sources. Radio extension bulletins, sponsored by the provincial Department of Agriculture, were considered an important source of information in matters relating to fertilizer use, other factor inputs and improved methods of cultivation. Local extension agents of the agricultural departments were concentrating their efforts on relatively large farmers.

Various policies need to be seriously considered for increasing fertilizer use and changing its pattern of consumption in the province. Facilities for testing and analysis of soils need to be established within each district and pertinent facts and the soil deficiencies need to be highlighted. The price of the fertilizer should be fixed at a level which guarantees a reasonable level of profit to the farmers. Institutional credit sources need to be encouraged to provide short-term loans for the purchase of fertilizers. The access of small farmers to institutional credit should be made easy. While opening new fertilizer sales depots their proximity to the consumption centres and their accessibility by link roads should be taken into consideration.

References

1. Ahmed, Saleem. "Fertilizer Marketing in West Pakistan." Paper presented at the CENTO Workshop for Agricultural Planners, held at Islamabad, November 27 to December 4, 1972.
2. Ayub, Mahmood A. "An Econometric Study of the Demand for Fertilizers in Pakistan." *Pakistan Development Review*. Vol. XIV, No. 1. Spring 1975.
3. Chaudhry, M. Ghaffar and M. Anwar Javed. "Demand for Nitrogenous Fertilizers and Fertilizer Price Policy in Pakistan." Unpublished paper kindly made available to the present author.
4. Eckert, Jerry B. "The Economics of Fertilizing Dwarf Wheats in Pakistan's Punjab." July 1971. (Mimeographed)
5. Food and Agriculture Organization. *Annual Fertilizer Review* 1971. Rome. 1971.
6. Qureshi, B.A. and M. Jameel Khan. "Economics of Fertilizer Application to Wheat Crop; The Results of Survey in Lyallpur District." *Pakistan Development Review*. Vol. X, No. 1. Spring 1970.
7. Raza, Muhammad Rafique. *Two Pakistani Villages: A Study in Social Stratification*. Lahore: Punjab University Sociologists Alumni Association. 1965.
8. Salam, Abdul. "Economic Analysis of Fertilizer Application in Punjab-Pakistan." Unpublished Ph.D. Dissertation, University of Hawaii, Honolulu. 1975.