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SEMINAR ON
FERTILIZER
DISTRIBUTION
AND USE
IN PAKISTAN
1979

Proceedings of Seminar on Fertilizer Distribution and Use in Pakistan

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- National Fertilizer Corporation of Pakistan Ltd. (NFC)
 - US-AID Mission to Pakistan
- Pakistan Agricultural Research Council (PARC)
- National Fertilizer Development Centre (NFDC)



NATIONAL FERTILIZER CORPORATION OF PAKISTAN LIMITED
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FOREWORD

A two day seminar on "Fertilizer Distribution and Use in Pakistan" was organized by the National Fertilizer Corporation of Pakistan Ltd., in collaboration with Pakistan Agricultural Research Council, National Fertilizer Development Center and USAID at Holiday Inn, Islamabad on February 28 and March 1, 1979. The seminar was convened to discuss and critically evaluate the findings of a national study carried out jointly by the National Fertilizer Corporation and USAID during 1976-78 on distribution and use of fertilizer in Pakistan.

The seminar was inaugurated by Khawaja Mohammad Safdar, the then Federal Minister for Food, Agriculture and Co-operatives. While 115 experts, scientists and planners representing 39 national and 9 international organizations participated in the seminar. The deliberations of the seminar extended over six sessions dealing with Research Methodology, General Farmers Investigation Survey, Institutional Credit Survey, Fertilizer Dealers Survey, Intensive Farmers Study and the report of the Recommendation Committee.

As a result of these deliberations, seventeen specific recommendations were developed in the areas of fertilizer research, extension, distribution and credit. These recommendations were discussed and finalized at the concluding session presided by Prof. Khurshid Ahmed, the then Federal Minister and Vice-Chairman, Planning Commission, Government of Pakistan.

This compilation presents the proceedings of the seminar and includes sessional papers, transcripts of the panel, general discussions and the recommendations. It is hoped that the text of the proceedings will serve as a useful reference material and the recommendations made at the seminar will be helpful in the formulation of fertilizer policies in Pakistan.

I wish to thank Pakistan Agricultural Research Council, National Fertilizer Development Center and United States Agency for International Development in making the seminar a successful event.

LAHORE
May 16, 1979

RIYAZ H. BOKHARI
Chairman

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RECOMMENDATIONS

Introduction

It was observed with satisfaction that a substantial progress has been made in developing and improving fertilizer use during the past five years. Growth in fertilizer consumption has registered progressive increase averaging about 12% annually for nitrogen and 34% for phosphorus. The N:P ratio improved from 6:1 in 1973-74 to 3.5:1 in 1977-78, indicating a better balanced use of fertilizer. Realizing the obvious importance of fertilizer as key input, the time is appropriate to formulate policy measures to sustain the encouraging growth trend and ensure efficient use of fertilizer at the farm level. There is, thus, a need to develop an appropriate package of technology as well as policy measures which when implemented will lead to increased and balanced use of fertilizer.

1. Fertilizer Research

In order to optimize the use of fertilizer for increasing crop production, it is imperative that systematic research is conducted under different soil and ecological conditions to determine the type of fertilizer, the amount, the time and the method of application to various crops. National Fertilizer Development Centre (NFDC) is already in the process of reviewing the status of this research with a view to identifying weaknesses and strengthening the programme. Pakistan Agricultural Research Council (PARC) should coordinate this research with NFDC, research institutes, universities and the fertilizer industry.

2. Soil Testing

The net-work of soil testing facilities should be reviewed and strengthened throughout the country so that individual farmer can have his soil tested easily as well as various soil series can be analysed routinely for developing soil fertility maps at district level to make specific fertilizer recommendations for different crops and soil types. Various fertilizer manufacturing/marketing companies should also be encouraged to provide such facilities on payment basis. This should be coordinated by NFDC.

3. Fertilizer Use Information

The existing information available on fertilizer use for crop production should be consolidated by NFDC in the form of a book and widely distributed amongst

relevant agencies engaged in fertilizer use, distribution and extension. This material can be further used in preparing leaflets for distribution amongst farmers.

4. Extension Service

One of the most important findings of the study relates to in-effectiveness of the extension service in motivating farmers for fertilizer adoption. Without going into the constraints which the extension service faces, it is recommended that PARC should initiate and coordinate a research project to determine the appropriate extension methods suitable for conditions prevalent in Pakistan and to evaluate the recently introduced "Training and Visit" (T & V) extension system introduced by the World Bank

5. Fertilizer Demonstration

The fact that fellow farmers were an important source of fertilizer information, signifies the role of demonstration in farmers' education on fertilizer use. There is, therefore, a need for an effective and continuous demonstration programme by the extension service and fertilizer industry.

6. Special Radio Channel for Agriculture

In view of the central importance of radio in farmers' education, a special radio channel, focussing exclusively on modern agriculture, adult education and rural development should be established for the rural population. The Ministries of Agriculture and Information & Broadcasting should develop proper organization and create requisite facilities for this channel.

The finding of the study that major agricultural operations in 'barani' areas are carried out by women, further emphasize the need for the special radio channel.

7. Television

There should be a regular TV programme on agricultural extension at least twice a week. The programme should concentrate on agricultural operations and their demonstrations through pictures and slides, rather than interviews with the specialists.

8. Dealers' Training

In order to further promote fertilizer use, the fertilizer dealers should possess the basic technical training to impart agricultural know-how to their customers.

NFDC should design a suitable training programme and coordinate its implementation through fertilizer manufacturers/marketers, ultimately leading to a training certificate as a pre-requisite for fertilizer dealership.

9. Road Infrastructure

There is a direct relationship between metalled road and the fertilizer consumption. This emphasizes the need for an extensive road network in the rural areas including the possibility of developing and opening up canal banks for rural transportation.

10. Transportation

Transport system should be developed to meet the increasing needs of fertilizer movement. Transport Task Force Committee should evolve a rational strategy in this regard. In addition, there is need to enlarge the capacity of private transport system by encouraging import of transport carriers through appropriate incentives such as exemption in import duty.

11. Storage

The highly seasonal nature of fertilizer demand, coupled with increasing volume of fertilizer to be distributed, suggests an urgent need for developing proper and adequate storages at appropriate levels (manufacturer, distributor, dealer and farmer) in the distribution channels. The issue being vital and complex merits an in depth consideration by the Executive Committee of the Fertilizer Planning Committee.

Special provisions for fertilizer storage facilities should be made in 'barani' areas to ensure timely availability of fertilizer, especially to coincide with the rainfall. The fertilizer manufacturers and the cooperatives should be the principal agencies to implement this programme.

12. Dealers' Commission

Dealers' commission and marketing incidentals should be periodically reviewed. While reviewing the commission, its adequacy for sub-dealers operating at village level should also be duly considered.

13. Credit

- (i) In view of the increasing disbursement of loans through the nationalized commercial banks, the Agricultural Development Bank, the

Cooperative Banks and other Government agricultural credit institutions, especially intended for the uplift of the small farmers, a stage has reached for an in-depth empirical study by the State Bank of Pakistan with the assistance of the Agricultural Credit Advisory Committee and the National Fertilizer Development Centre to evaluate the extent to which these resources have actually reached the grass roots level. The study should suggest the ways and means to improve the methodology of reaching the small farmers with seasonal credit and an effective recovery system thereof.

- (ii) The study has shown that short term production loans availed against personal surety are more effective for quick disbursement and better recoveries than the loans secured by other means. Banks and agricultural credit institutions should, therefore, promote a closer banker-customer relationship to increase agricultural lending for short term purposes against personal surety. The pass-book system should, however, constitute a long term strategy in view of its institutional character.
- (iii) The study has clearly revealed that fertilizer consumption and availability of credit for purchase of fertilizer in 'barani' areas is quite low. To accelerate agricultural development in the 'barani' areas, the banks and agricultural lending institutions should increase their lending for agriculture in these areas.
- (iv) The 'supervised credit' has proved to be an effective system of credit for small farmers. The banks, agricultural credit institutions and cooperatives should, therefore, extend such credit package to more villages.
- (v) The study has shown that a very large proportion of credit for fertilizer is based on non-institutional sources. It is, therefore, essential that an in-depth study of non-institutional credit system should be carried out by the State Bank of Pakistan. This study should include the transactional and interest costs of institutional and non-institutional credit as well as the consequent social effects on the borrowers.
- (vi) The study identified limited financial resources as one of the major constraints faced by fertilizer dealers. It is recommended that the feasibility of supplying credit to dealers be investigated, so that the gap between dealers' capacity to sell and his capacity to buy fertilizer can be bridged. The NFDC in collaboration with the fertilizer industry should undertake this study.

14. Fertilizer Adoption

The most significant finding of the study was that the adoption and level of fertilizer application is the same both on large and small farms. The same is true in case of tenants and owners. This is a very significant finding with far reaching policy implications. The Government should examine this finding and if necessary get it corroborated by other surveys because it leads to important policy measures in agricultural development planning.

15. Fertilizer Data

Systematic gathering, organization and analysis of data are essential for the rational management of the national fertilizer programme. The NFDC should develop the capacity to undertake and coordinate these studies on a regular basis.

16. Follow-up Studies

The study provides a strong data-base on critical aspects of fertilizer distribution and use on a national basis. There is a need to make such grass roots surveys a continuous exercise in order to measure and monitor changes in fertilizer use. In view of the demonstrated capacity of NFC-USAID Market Research Project to undertake such studies, there is a need to further strengthen this Project. The PARC in collaboration with NFC should coordinate these studies on country-wide basis.

17. Review of Previous Recommendations

The Planning Division should consolidate and review the recommendations from previous seminars on the subject of fertilizer distribution and use in order to determine as to what extent these recommendations have been implemented. A periodic evaluation of these recommendations is also suggested.

INAUGURAL SESSION

Welcome Address	Dr. Amir Muhammad Chairman, PARC.
Inaugural Address	Khawaja Mohammad Safdar Federal Minister for Food, Agriculture and Cooperatives.
Key Note Address	Dr. W.A. Wolffer Director (Acting) US AID.
Introduction to the Study	Mr. Riyaz H. Bokhari Chairman, NFC.

WELCOME ADDRESS

By

DR. AMIR MUHAMMAD

Chairman, Pakistan Agricultural Research Council.

Mr. Minister, distinguished participants,
ladies and gentlemen :

I welcome you all this morning to the seminar on, "Fertilizer Distribution and Use in Pakistan". This seminar is based on a national survey study carried out jointly by the National Fertilizer Corporation of Pakistan and USAID in which scientifically compiled information is being presented on the socio-economic and institutional aspects of fertilizer distribution and use. The data are based on a countrywide survey of farmers (large and small, tenants and owners), fertilizer dealers (public and private) and agricultural lending institutions (commercial and specialized).

The deliberations of this seminar will, therefore, not concern themselves with research data gathered by the scientists in laboratories or at experiment stations, but will present facts on farmers' reactions directly from the field. The data on interaction among government policies, implementing agencies and farmers will provide valuable information for formulation of future agricultural development policies in the country. In other words we have an opportunity here of examining first hand information about one major factor, i.e., fertilizer, its distribution and use, in our endeavour to increase agricultural production.

Sir, over the years there has been a great emphasis on determining factors constraining agricultural growth in Pakistan. The experts are of the view that environment constraints are the major impediments to higher agricultural productivity. A better understanding of how the institutional environment (marketing, credit and extension), technical factors (soil, water and inputs) and socio-economic factors (farm size, tenure and resources) restrict yield is of paramount importance. This seminar, therefore, assumes a major significance in our understanding of farmers' problems and in our efforts to bridge the gap between production obtained under average farming conditions with good management practices and the low national average yields.

The studies to be presented at the seminar reveal some very interesting findings. For example, the studies tell us that small as well as large farmers and tenants as well as owners are using fertilizer to about the same extent. This finding is somewhat surprising and contrary to the general belief that well-to-do progressive farmers use most of the fertilizer and the small farmers and tenants

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use very little. Obviously, this conclusion if approved by this meeting, will have strong implication for government policy making regarding fertilizer distribution. The studies also reveal the importance of agricultural credit and inadequacy of credit institutions in the past to cater for this need equitably. For instance, in 1975-76, about half of the fertilizer users in irrigated areas included in the survey purchased fertilizer, wholly or partially on credit, of which only 9% were able to obtain it from institutional sources. The remaining 91% got the credit primarily from landlords, friends/relatives and commission agents. The radio and fellow farmers were the principal sources of information on fertilizer use was yet another finding of the study.

These are only a few of the important findings that have emanated from the study and afford an excellent opportunity for policy consideration by the planners.

Sir, the socio-economic research at the farm level is a relatively recent phenomenon in Pakistan and constitutes a vital link between the government policies, agricultural institutions and farmers. The need for research will grow further as technological advancement is made in Pakistan, because only continuous feedback from the farming community will help determine the new directions that national policies will have to pursue for achieving national objectives of agricultural development. The Pakistan Agricultural Research Council has been striving to strengthen research in these areas. Several research projects have been launched recently on socio-economic aspects of farm production in different parts of the country. For this purpose, an effort is being made to delineate zones of agro-ecological similarity in the country so that agricultural development in these zones could be designed to suit their peculiar ecological conditions. A research project to study the cropping pattern in various ecological zones has been started in all the provinces to analyze the factors influencing the cropping pattern including the environmental conditions, availability of irrigation water, farm inputs, credit and prices of farm products. This research will further focus on the formulation of recommendations for development of profitable cropping patterns for various ecological regions of Pakistan which would be consistent with the endowments of physical resources, social organizations and economic conditions of the farming community.

It is obvious that the only way to achieve a breakthrough in agricultural productivity in the country is by widespread adoption of improved technology by the farming community. However, in spite of vigorous efforts by various National and International agencies, the transfer of technology to the small farmer has proved to be a very difficult task. It is, therefore, of utmost importance to determine the constraints which frustrate the efforts to transfer improved technology to small farmers under the peculiar set of socio-economic conditions prevailing in various parts of the country. The research programme to determine the factors which influence the transfer and adoption of new agricultural tech-

nology has been initiated in order to determine whether the transfer of technology is a function of individual specific factors such as resource ownership, access to resources, socio-economic characteristics and management skill or profitability and compatibility of technology in the farm environment.

Research studies have also been started to determine the efficiency of rural credit in increasing farm productivity, measures to improve farm marketing infrastructure, and magnitude of post-harvest losses and measures to minimise them, besides studies on several other socio-economic phenomena at micro and macro level.

Sir, we all realise that Pakistan has a tremendous potential to vastly improve its agricultural production and all of us are desirous to see rapid improvement in farm incomes. I sincerely hope that this seminar will prove to be an important step in our efforts to improve farm productivity under the peculiar socio-economic conditions prevailing in various parts of the country.

INAUGURAL ADDRESS

By

KHAWAJA MUHAMMAD SAFDAR

Federal Minister for Food, Agriculture and Co-operatives.

Dr. Amir Muhammad, Distinguished Participants,
Ladies and Gentlemen:

It is a great pleasure for me to inaugurate this seminar on, "Fertilizer Distribution and Use in Pakistan," which has been convened to discuss the results of a national survey study carried out jointly by NFC and USAID during 1976-78. I am hopeful this forum of experts, planners and policy makers will be able to make meaningful policy recommendations to overcome the constraints identified in the survey towards the adoption and increased use of fertilizer.

The agriculture production strategy of the country emphasises on increased and balanced use of fertilizer in conjunction with other inputs. The Government policies for increasing fertilizer use involve assuring adequate supplies of fertilizer through maximizing indigenous fertilizer production, establishing an attractive crop-fertilizer price relationship and ensuring an equitable fertilizer distribution system involving mix of private and public sector trade.

The first step involves investment on new fertilizer plants to achieve self-sufficiency in nitrogen production by 1981-82 and assurance of adequate supplies of imported fertilizers in the interim period. Secondly, Government has planned to raise the present production level of 313,000 nutrient tons of nitrogen and 18,000 of phosphorus to about 790,000 nutrient tons of nitrogen and 86,000 tons of phosphorus by 1981-82.

I am pleased to know from Dr. Amir Muhammad's address that contrary to general belief agricultural development has not remained confined to the privileged class of medium and large size farmers. The distribution of subsidies and price supports has been spread equally among small farmers constituting the bulk of the farming community. The Government is determined to ensure further equity for low income farmers, reducing the constraints on agricultural modernization which specially affect this group, and increasing production from available soil and water resources.

The major components of this strategy by the Government are :

- a) Steps to expand and streamline the distribution system for inputs and removing unnecessary restrictions imposed on them.
- b) Providing greater incentives for fertilizer manufacturers and marketers who participate in the national task of agricultural development.

- c) Provision of more agricultural credit for purchase of production inputs through cooperative institutions.
- d) Maintaining incentive price strategy by ensuring attractive benefit-cost ratio on the use of fertilizer and other complementary inputs.
- e) Undertaking to maintain adequate supplies of indigenous and imported fertilizer at the farm gate by improving internal transport, handling and godown network.

While these developments have been encouraging, there remains considerable potential for boosting up crop production through wider application of improved agricultural technology. Foremost is the potential arising from use of more adequate and better balanced amounts of chemical fertilizer. This provides an effective and economical way to move quickly towards food self-sufficiency. Identification of factors which act as barriers to adoption and increased use of fertilizer by farmers is, therefore, of critical importance to all of us. The studies conducted by N. C./USAID are indeed major steps towards bringing farmers and policy makers together on these issues.

Ladies and Gentlemen ! let me assure you that the focus of attention in our planning is on the small farmer who can now avail the advantage of agricultural credit and benefit from the adoption of modern technology to increase his farm productivity. Fertilizer is the key input required by our farmers and it is the endeavour of this Government to make it available as near as possible to the farm gate even in remote and 'barani' areas. This Government realizes the importance of fertilizer use in increasing agricultural output. That is why the fertilizer prices have been reduced to bring them within reach of small farmers. Its effect on consumption of fertilizer on the current wheat crop has been dramatic, as you all know.

I wish to assure this gathering that the Government intends to view positively the recommendations made in this seminar. While the delegates of each participating agency will present their contributions, I hope the views and opinion of all the distinguished participants of the seminar, as well as the representatives of the international agencies, will receive due consideration in the formulation of recommendations for national policies. This will enable us to develop the agricultural resources of this part of the world to the utmost possible level.

I hope that the delegates and experts gathered here will share their knowledge and cooperate to present constructive recommendations for the greater good of Pakistan.

Thank you.

Pakistan Painsdabad !

KEY NOTE ADDRESS

By

DR. WILLIAM A. WOLFFER
Director (A), USAID/Islamabad.

Mr. Minister, Distinguished Participants,
Ladies and Gentlemen :

I am pleased to participate in this seminar. Its potential for improving the country's fertilizer program and agricultural output is substantial. By working together, the group assembled here today can contribute much to the realization of this potential.

The studies on which this seminar is based were conceived in 1974 and 1975. As you may recall, wheat production in the spring of 1975 was only marginally higher than in each of the prior two years. Rice production in the fall of 1974 was lower than in each of the prior two years. And the autumn of 1975 marked the fourth consecutive year of declines in cotton production. Following the sharp decline in wheat imports that began in 1968-69, such imports had again begun to rise and in 1974-75 they reached the highest level in 10 years.

During that same year, fertilizer consumption increased by less than 6% the prior year had experienced an absolute decline. The price relationship between fertilizer and farm crops had deteriorated to the extent that during CY 1974 it required more pounds of wheat to purchase a pound of nitrogen fertilizer than at any time during the prior decade. As a result, there was a problem of unsold stocks of fertilizer.

There was also an imbalance in the use of fertilizer nutrients; the 6 to 1 nitrogen to phosphate use ratio was much too high for farmers, and the nation, to receive maximum benefits from the fertilizer applied. Private sector manufacturers/distributors of nitrogenous fertilizer did not have access to imported phosphatic fertilizer to provide to their dealers and the number of fertilizer dealers was clearly inadequate.

It was during this period that the Government decided on an agricultural production strategy which emphasized increased and better balanced use of fertilizer. To implement this strategy, the Government decided it would be necessary to reduce the price of fertilizer and increase the price of wheat and other major crops in order to establish a more favorable fertilizer - crop price relationship

To improve the nitrogen-phosphate balance, the Government also decided that the price of phosphates would have to be relatively more attractive and that phosphatic fertilizer would have to be made available to distributors who previously handled only nitrogen. Furthermore, in order to make fertilizer more widely and readily accessible to farmers, it was decided that the distribution system would have to be expanded and restrictions on private distributors' service areas removed.

To make increased fertilizer use possible, the Government sought assurance of adequate supplies of imports. Within the constraints imposed on it, the USAID responded to this request. The loan agreement which financed the importation of fertilizer also made provisions for the studies conducted by the National Fertilizer Corporation. Generally these studies were designed to determine the constraints to increased fertilizer use. They were especially concerned with small farmer participation. I will not discuss the studies. This will be done by other participants. However, I would like to compliment NFC on a job well done.

I would like instead to discuss briefly three related topics -- the progress that has been made in Pakistan's fertilizer program; some of the industry's broader problems which the studies either did not address or addressed in a different context than I will discuss them and finally what we would hope this seminar will accomplish.

Progress

Prior to the onset of the Green Revolution, growth in fertilizer consumption was very slow. The increase averaged only 13,600 nutrient tons annually for the six years ending in 1966-67. Consumption increased sharply over the following six years to 46,300 nutrient tons annually. And in the following six years, from 1973-74 up to and including the current year, growth will average over 88,000 nutrient tons annually.

In relative terms, growth will have averaged about 15% annually for each of the last two six-year periods, a rate resulting in more than a doubling of consumption in each of the periods. It is extremely encouraging that the percentage rate of growth in phosphate consumption is much higher than it is for nitrogen. During the last six years, this growth rate will be twice that of nitrogen resulting in a much improved balance in the nitrogen-phosphate ratio. This ratio reached 3.5 to 1 in 1977-78 and is expected to decline further in 1978-79. In 1973-74, it was 5.9 to 1 and in 1966-67, 27.7 to 1.

It is clearly a further mark of progress that small farmers are participating

proportionately with large farmers in the use of fertilizer. While the number of dealers especially in the barani areas is inadequate, a widespread network of retail outlets exists. In Punjab alone there are 6,000 reported private dealers/commission agents (Most likely this figure is high. Apparently it is the summation of all dealers/commission agents reported by all distributors. However, some outlets are dealers for two or even three different distributors. It thus appears that the 6000 figure contains substantial double counting). Distributors that manufacture nitrogenous fertilizer have access to imported phosphate fertilizer.

A major expansion of fertilizer production capacity is underway. One new plant started production 1st half of this calendar year; another should start by Mid-1980; and a third new plant is scheduled to begin production a year later. The first two plants will increase the country's rated production capacity of nitrogen and phosphorus by almost 150% of the rated capacity existing at Mid-1978 and when the three plants are in operation, rated capacity will be increased by well over 200%.

The very low level of fertilizer stocks in country at the start of 1978-79 is expected to increase to an adequate level by the end of this Fiscal Year, i.e., by July 1979. This build-up will have been accomplished while also providing fertilizer for a sharp increase in fertilizer consumption. Obviously, much has been accomplished in the country's fertilizer program in recent years.

There are few countries in the world that have sustained as high a relative rate of growth in fertilizer consumption over the past 12 years as has Pakistan. While chemical fertilizer offers the most attractive low cost method to increase output per unit of land, water and labor, this potential can be frustrated if supplementary/complementary inputs are absent. Unfortunately, the benefits from the fertilizer program after the early 1970s have been much less than they should have been, due to genetic defects especially in the varieties of cotton and wheat, poor cultural practices and perhaps salinity and high water tables.

Problems/Issues

Despite the very substantial accomplishments in the nation's fertilizer program, there remain a number of problems within the industry itself. Many of these problems are in fact a result of the rapid growth in fertilizer consumption. The problems that I will briefly discuss are the more general problems of the fertilizer industry. In most cases they are different from those that will be focused on by this seminar. Perhaps the latter can be attacked more effectively when viewed in the context of the fertilizer industry's more general problems.

Data Collection and Analysis

Systematic gathering, organization and analysis of data are essential for the rational management of the country's fertilizer program. There is a need, for example, to make both short and long run fertilizer supply-demand projections. These projections should be made and up-dated periodically as a matter of course and presented in formal and timely reports. The reports should contain an analysis of the implications of the projections for the scheduling of imports (both kinds and amounts of fertilizer), for domestic production, storage, transportation, port operations, and financing.

To provide quality timely analysis to the planners and managers of the country's fertilizer program, these activities need to be greatly strengthened, institutionalized and routinized. After all, fertilizer is now one of the country's larger industries. The industry will do approximately Rs. 300 crores of business this year (Delivered cost of imports plus domestic production valued at retail prices). The National Fertilizer Development Centre is now beginning to assume the responsibility for some of these functions. The provision of adequate support and competent personnel to the Centre can be one of the country's best investments in terms of benefits and costs.

Fertilizer Subsidies

At current domestic prices, only 1.5 pounds of wheat are required to obtain one pound of nutrients when buying nitrophosphate fertilizer, slightly more for DAP and 2.0 pounds when purchasing urea. This is the most favorable price relationship in over a decade. However, Pakistan's fertilizer subsidies are now large. The maximum allowable retail price to the country's farmers is less, and in some cases substantially less, than the FOB import price. World fertilizer prices will increase as will the domestic cost of producing fertilizer. Internal and external freight costs will also rise. I believe it is now time for the GOP to begin rationalizing fertilizer prices in order to reduce subsidies and to put the program on a more sound financing footing.

Changing fertilizer prices, however, may require that other prices be changed also, since a price relationship sufficiently favorable to fertilizer use needs to be maintained. For it is clearly preferable in terms of the country's development effort and balance of payments situation to produce, for example, its wheat at home rather than importing it. To illustrate, a ton of DAP applied to wheat should produce four additional tons of it under typical farming practices. The price of DAP delivered to Karachi port is about \$ 205 per ton; the corresponding price for wheat so delivered is about \$165 (or Rs. 62 per maund).

Provision of Phosphatic Fertilizer

Pakistan's requirements for nitrogenous fertilizer imports will fall sharply as the new domestic plants come into production. If the plants come on stream as scheduled, the country will be self-sufficient in nitrogen fertilizer by Mid-1981 according to projected increases in offtake. And if the Pakistan "Ajman" plant materializes, the country will have enough nitrogen upon which to base a campaign for increased application rates. However, phosphate import requirements will continue to grow.

It is now time for the GOP to decide on the type of phosphatic fertilizer to be imported under these conditions. Since it is expected that the country will be producing all the nitrogen needed to meet domestic demand, imported fertilizer should contain little or no nitrogen. The importation of nitrophosphate, which contains 23% nitrogen and 23% phosphate, obviously will be phased out and perhaps also diammonium phosphate which contains 18% nitrogen and 46% phosphate. Both of these fertilizers are now popular imports.

Transportation considerations dictate that the imported fertilizer should be high analysis, e.g., triple super phosphate containing 46% phosphate rather than single super phosphate containing 18%. To illustrate, ocean freight for bulk fertilizer now averages approximately \$45 per ton. If triple super phosphate is imported as the source of phosphate, ocean freight would amount to \$ 98 per nutrient ton of phosphate, of $P_2 O_5$. If single super phosphate were imported as the source, the corresponding ocean freight would be \$ 250. If the GOP decides that triple super phosphate is to be the major source of imported phosphate, the Government should now begin importing this fertilizer to introduce it to an increasing number of farmers in preparation for the days when no nitrogen imports will be needed.

Fertilizer Losses

There are apparently substantial weight losses between the time that fertilizer is discharged at the port and its arrival at inland destination points. A determination on the amount of these losses, where they occur and how to reduce them to commercially acceptable levels should be given a high priority by the GOP. To keep losses at a commercially acceptable level may require that a monitoring system be set up.

Transportation

Inadequate transportation is now a problem and it could become the industry's most important single problem when the country's new fertilizer plants come

into production. I am pleased that the Fertilizer Transportation Task Force Committee has now been constituted and is looking at future fertilizer transportation requirements.

Bulk Fertilizer

The foreign exchange cost of bulk fertilizer delivered at Karachi port is substantially less than the same fertilizer delivered in bags. However, there have been problems with bulk fertilizer that is bagged at the port and the internal costs of fertilizer so bagged are higher than for the corresponding costs of imported fertilizer that is already bagged. Still the potential savings of importing bulk, rather than bagged, fertilizer are great enough to merit a continued effort to develop an operation that meets the industry's requirements. I am pleased that the GOP plans to obtain assistance from NORAD in fertilizer bagging.

Storage

Fertilizer production is relatively uniform and continuous but farmer demand is highly seasonal. With the new fertilizer plants coming on stream, storage capacity will have to be increased to accommodate this disparity. I would like to suggest that serious consideration be given to provide additional incentives to dealers to store much of this fertilizer. I believe that total transport/handling costs could be reduced by such a scheme. It should reduce the number of times that fertilizer would have to be loaded onto and off of trucks, spread transport requirements more evenly over the year and place fertilizer in the locations where used so as to be available when needed. This scheme would have to be supplemented by some additional distributor storage capacity.

Public Outlets

The last issue that I would like to touch on briefly is that of retail outlets. It seems to me that there is now a real question of the need for, or even the desirability of having, public fertilizer retail outlets in some of the provinces. The Government already has a heavy load to carry. I am suggesting that the provision of public retail outlets is one activity from which Government could withdraw with a minimum of adverse effects.

As noted most of these problems/issues that I have mentioned will not be directly dealt with by this seminar. Hopefully, the National Fertilizer Development Centre will be asked to focus on some of these problems.

I now turn to my last major topic, what we want from this seminar.

Seminar Purpose

The National Fertilizer Corporation is mainly responsible for organizing this seminar. It is based on surveys conducted by that organization. Its Chairman did not wish to see the surveys become just another set of studies gathering dust on the shelf. Specifically, he wanted the studies' recommendations subjected to an evaluation by a broad range of experts to obtain their collective assessment of the validity of the recommendations. The recommendations judged valid and important would then be assigned priorities. The next step would be to try get the important measures implemented, the end purpose of this seminar. One needs only to look at the distinguished participants to be assured that the first two steps will be competently executed. The third step, however, is less certain of execution.

In short, the seminar has been organized so that its committees, with contributions from the audience, will be responsible for :

- sorting out the studies' recommendations that are adequately supported ;
- assigning priorities to these recommendations;
- suggesting the most likely way to get the measures implemented;
- suggesting the implementing agency;
- recommending additional needed research;
- developing a summary paper of the seminar proceedings, including the recommendations, and distributing this paper to involved agencies/officials.

There will be a continuing committee to encourage the implementation of recommended measures and starting recommended research. Additionally, the GOP has agreed that the Fertilizer Planning Committee will review the seminar recommendations in the context of implementation.

In closing, I would like to note that the U.S. has long been involved in assisting Pakistan in developing its fertilizer program. From both public and private sources, it has helped finance five of the country's current and future fertilizer plants. The U.S. has also provided a relatively large amount of fertilizer to Pakistan on very concessional terms. And in consultation with the Government, U.S. advisors have assisted in the formulation of policy measures which have done much to give the fertilizer industry its current dynamics and its capacity to serve the farmer.

We continue to be interested in the expansion and increased efficiency of fertilizer use and distribution and in the participation of the small farmer in

the fertilizer program. I believe this seminar will contribute to this end. NFC is currently working on a follow-on survey which we are helping finance. The results of this latter survey should be very interesting and, as the earlier studies have done, provide useful information for policy purposes.

There is clear latitude for additional quality research on fertilizer. However, if important research findings are not extended, or not put into practice, research becomes rather futile and wasteful. To illustrate, even though chemical fertilizer offers the most attractive low-cost method to increase output per unit of land, water and labor, last spring's wheat crop demonstrated that this potential can be frustrated. The 345,000 nutrient tons of fertilizer applied to that crop should have increased wheat production by approximately 2.5 million tons above what it would have been, had there been no fertilizer applied. It seems obvious that this did not happen, mainly because appropriate complementary inputs were not being used by farmers.

INTRODUCTION TO THE STUDY

By

RIYAZ H. BOKHARI

Chairman

National Fertilizer Corporation of Pakistan Ltd.

Minister for Food, Agriculture and Cooperatives, Distinguished
Delegates, Honoured Guests, Ladies and Gentlemen :

It is my special privilege to welcome you all this morning to the seminar on "Distribution and Use of Fertilizer in Pakistan" organized by the Pakistan Agricultural Research Council, National Fertilizer Development Centre, USAID and National Fertilizer Corporation of Pakistan. I am particularly indebted to our chief guest, Khawaja Mhammad Safdar, Minister for Food, Agriculture and Cooperatives and this illustrious gathering of scholars for being with us today.

Ladies and gentlemen ! this is indeed a unique occasion where a public sector organization and an international agency have pooled their expertise and resources to develop a formal and scientific system of feedback from the farm to the policy makers on the vital issues of fertilizer distribution and use.

The papers that will be presented at the seminar are based on a national survey study on "Distribution and Use of Fertilizer in Pakistan" carried out jointly by NFC and USAID during 1976-78 under USAID/Pakistan Agreement No. 204-76-2. The study was envisaged during negotiations for a loan agreement of \$ 35 million signed between the Governments of Pakistan and the United States of America in December 1975. This agreement provided financing for import of agricultural inputs, primarily fertilizers. Its objective was to boost agricultural production by improving fertilizer availability and enhancing growth rate in fertilizer use, both on a national and per acre basis.

The study had the dual objectives of identifying factors inhibiting the adoption and increased use of fertilizer particularly by small farmers as well as providing baseline data of critical importance in measuring future changes in fertilizer use.

In view of the inter-related nature of the subject, the study was carried out in four integrated phases namely, the General Farmers Investigation Survey, Fertilizer Dealers Survey, Institutional Credit Survey and Intensive Farmers

Study.

The General Farmers Investigation Survey focussed primarily on the identification of social, economic and institutional factors related to fertilizer use.

The Fertilizer Dealers Survey, compiled and analysed data regarding the capacity and efficiency of sale outlets. The study analysed the country's fertilizer distribution network in order to identify problems of dealers, particularly private dealers and to suggest remedial measures.

The Institutional Credit Survey, explored a number of agricultural credit issues of interest to the Government and the banking community. Particular emphasis was placed on assessing the banks' performance in reaching farmers of various tenurial status and farm sizes, including small farmers and tenants.

The Intensive Farmers Study, verified the findings of the General Farmers Investigation at micro-level and initiated additional enquiry into the socio-economic factors for non-use of fertilizer, discontinuation of use, and low use of fertilizer in the representative villages of the irrigated and 'barani' areas. The study dealt in depth with qualitative information about the factors influencing fertilizer use, role of non-institutional agricultural credit prevailing among farming communities and its impact on fertilizer use.

In view of the dynamic nature of these studies, a follow-on survey study was undertaken in 1978 to measure changes of critical importance in fertilizer distribution and use that have occurred over the past two years.

Mr. Minister, the objectives of this seminar are two-fold. First, to translate the recommendations of the studies into specific programme planning especially in areas where sufficient empirical evidence based directly on information gathered at farm level has been analysed in the study. Secondly, to determine priorities for further research as indicated in the findings of the studies. We in the National Fertilizer Corporation earnestly believe that this seminar will provide the means of achieving these objectives and hopes that the policy makers and programme planners will be provided with a sound basis for developing effective strategies in the vital area of fertilizer distribution and use.

Thank you.

Pakistan Paindabad !

First Session

RESEARCH METHODOLOGY

Chairman

Mr. Sarfraz Khan Malik
Additional Secretary,
Economic Affairs Division,
Islamabad.

Panel Discussants

1. **Dr. M. S. Kakli**
Chief, Food and Agriculture Section,
Planning Division, Islamabad.
2. **Dr. Ahmad Saeed Khan**
Dean, Faculty of Agricultural Economics
and Rural Sociology,
University of Agriculture,
Faisalabad.
3. **Mr. S. M. Ishaque**
Deputy Director General,
Statistical Division, Karachi.
4. **Mr. G. Bertilsson**
National Fertilizer Development Centre,
Islamabad.

RESEARCH METHODOLOGY AND SAMPLING DESIGN FOR THE STUDY ON "DISTRIBUTION AND USE OF FERTILIZER IN PAKISTAN"

Introduction

The primary task before the Government of Pakistan is to boost crop production through wider application of improved agricultural technology to harvest maximum benefits through the use of more adequate and better balanced amounts of chemical fertilizer. The factors which influence farmers' decision making regarding the use of fertilizer, are not clearly understood. This inadequacy can often impede the development of suitable policy prescriptions geared towards bringing about increased use of fertilizer among farmers.

Research conducted in several countries suggests that fertilizer provides more rapid, quicker and greater increase in yield at less cost per acre than any other agricultural input. Identification of factors which act as barriers to the increased and balanced use of fertilizer by farmers is, therefore, of critical importance to a nation such as Pakistan which has established goals of self-sufficiency in food-grains and an improved standard of living for its rural population.

National Fertilizer Corporation of Pakistan and US AID undertook a joint research study on "Distribution and Use of Fertilizer in Pakistan" in December, 1975. The original study was carried out in four inter-related phases, General Farmers' Investigation Survey, Fertilizer Dealers' Survey, Institutional Credit Survey and Intensive Farmers' Study. The study was designed with the following objectives in view :

- 1— To identify social and economic factors related to fertilizer use.
- 2— To study the existing institutional credit system and its impact on fertilizer use.
- 3— To study the existing fertilizer distribution system and suggest measures for evolving an efficient and equitable distribution system.

* Mohammad Iqbal Chaudhry, Project Leader, NFC – US AID Market Research Project, National Fertilizer Corporation of Pakistan, Lahore.

- 4— To collect baseline data of critical importance in order to measure future changes in fertilizer distribution and use in Pakistan.
- 5— To make specific recommendations to Government of Pakistan for increased fertilizer use at farm level.

The salient features of research methodologies developed for each of the above surveys appear here-in-after.

General Farmers Investigation Survey

Research Design

The basic questions asked in the General Farmers Investigation (G.F.I.) pertained to the following areas :

- (a) Proportion of fertilizer users and non-users.*
- (b) Rates of fertilizer application (nitrogen and phosphate) on major crops.
- (c) Sources of financing fertilizer purchases.
- (d) Sources of information about fertilizer use by farmers applying this input.
- (e) Reasons for not using and discontinuation of fertilizer use.
- (f) Fertilizer users' attitude towards .
 - (i) convenient access to fertilizer sale outlet,
 - (ii) availability of desired type of fertilizer (brand wise), and
 - (iii) supply of fertilizer bags of standard weight.
- (g) Socio-economic characteristics of the users.
- (h) Means and cost of transportation for fertilizer purchase.
- (i) Distance and the type of road ('Katcha' and 'Pacca') between the farm and the fertilizer sale outlet.

* The term refers to fertilizer adoption and its application level.

Sampling Method

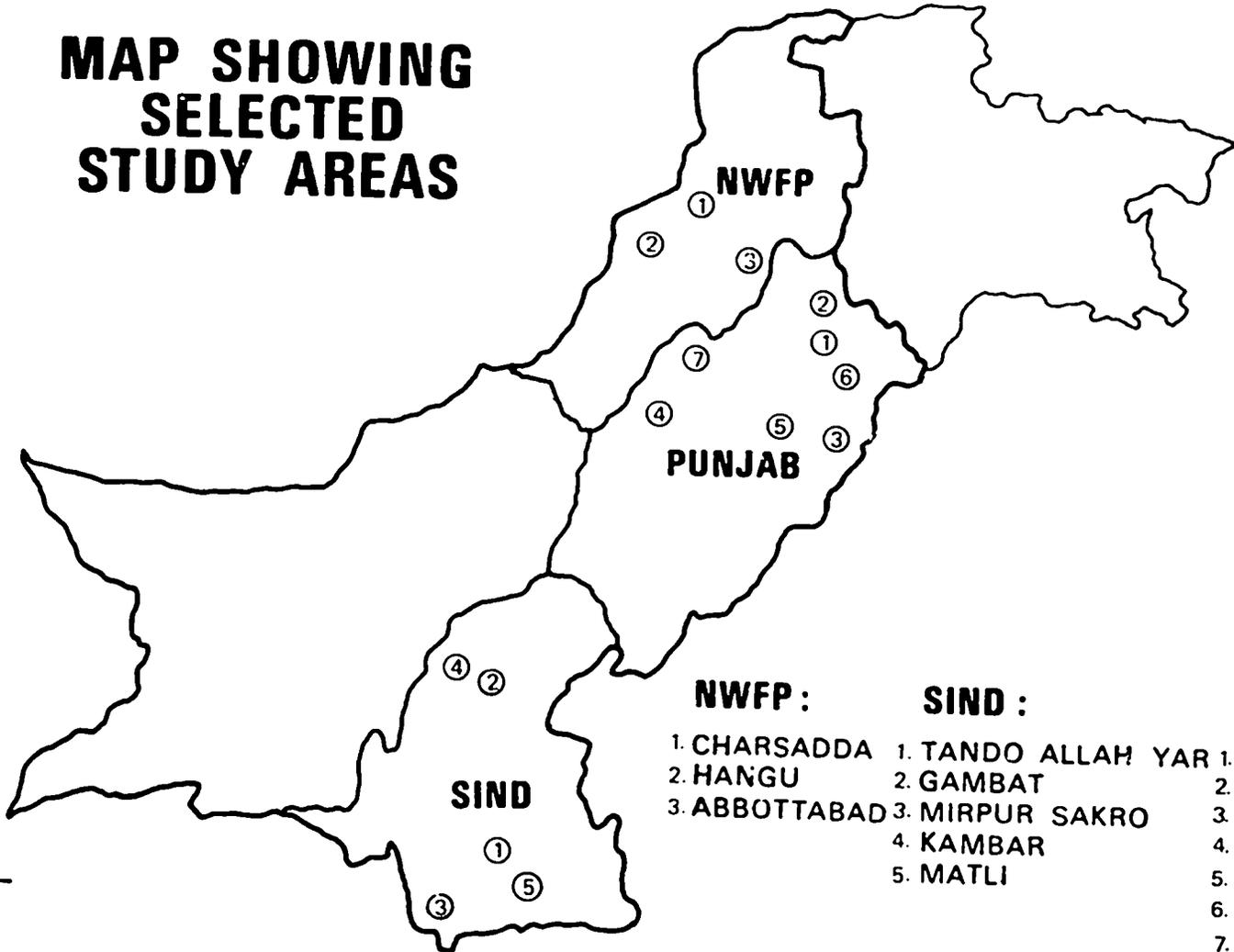
Selection of Study Area (Tehsil)

The sampling frame for the General Farmers' Investigation Survey was designed to meet the dual purpose of providing baseline data and diagnostic insights. A multi-stage sampling technique was used to select study areas ('tehsils' in the North West Frontier Province and Punjab 'talukas' in Sind), villages within these areas, and respondents within these villages.

Fifteen study areas (3 tehsils in NWFP, 7 tehsils in the Punjab, and 5 'talukas' in Sind) corresponding to about 10 per cent sample of these administrative units in the three provinces were selected randomly after stratification for cropping pattern and availability of irrigation water. These two stratification variables were used because of their strong theoretical association with fertilizer use. Data for percentages of cultivated area irrigated and under individual crops were obtained from the Agricultural Census of 1972. The fifteen study areas selected represent nine major cropping patterns and 11 irrigated and 4 rainfed (barani) tehsils/'talukas.'

The table 1 shows the characteristics of the sample tehsils/'talukas' .

MAP SHOWING SELECTED STUDY AREAS



NWFP :

1. CHARSADDA
2. HANGU
3. ABBOTTABAD

SIND :

1. TANDO ALLAH YAR
2. GAMBAT
3. MIRPUR SAKRO
4. KAMBAR
5. MATLI

PUNJAB :

1. GUJAR KHAN
2. CAMPBELLPUR
3. DIPALPUR
4. RAJANPUR
5. T.T. SINGH
6. HAFIZABAD
7. ISA KHEL

Selection of Villages

The latest maps of the sample tehsils/'talukas' were collected from the office of the Survey of Pakistan and respective District Councils. Ninety degree angles were drawn from the tehsil headquarters to the boundary lines. The total length from all directions was measured and summed up. An area within a radius of two and four miles was subtracted from the total distance, in case of tehsil and district headquarters respectively, as it did not represent typical characteristics of rural areas. The average distance was equally divided into three concentric zones of small, medium and long distances from the tehsil headquarters. A list of all the villages falling within first concentric zone (small distance) was prepared. One village was selected by applying the purposive random sampling technique in such a way that the village fell 75 per cent or more on a 'pacca' road. The second village located 75 per cent or more on a 'katcha' road from the tehsil headquarters was selected from the opposite direction within the same concentric zone. The next pair of villages was selected from the second and third concentric zones by applying the same technique.

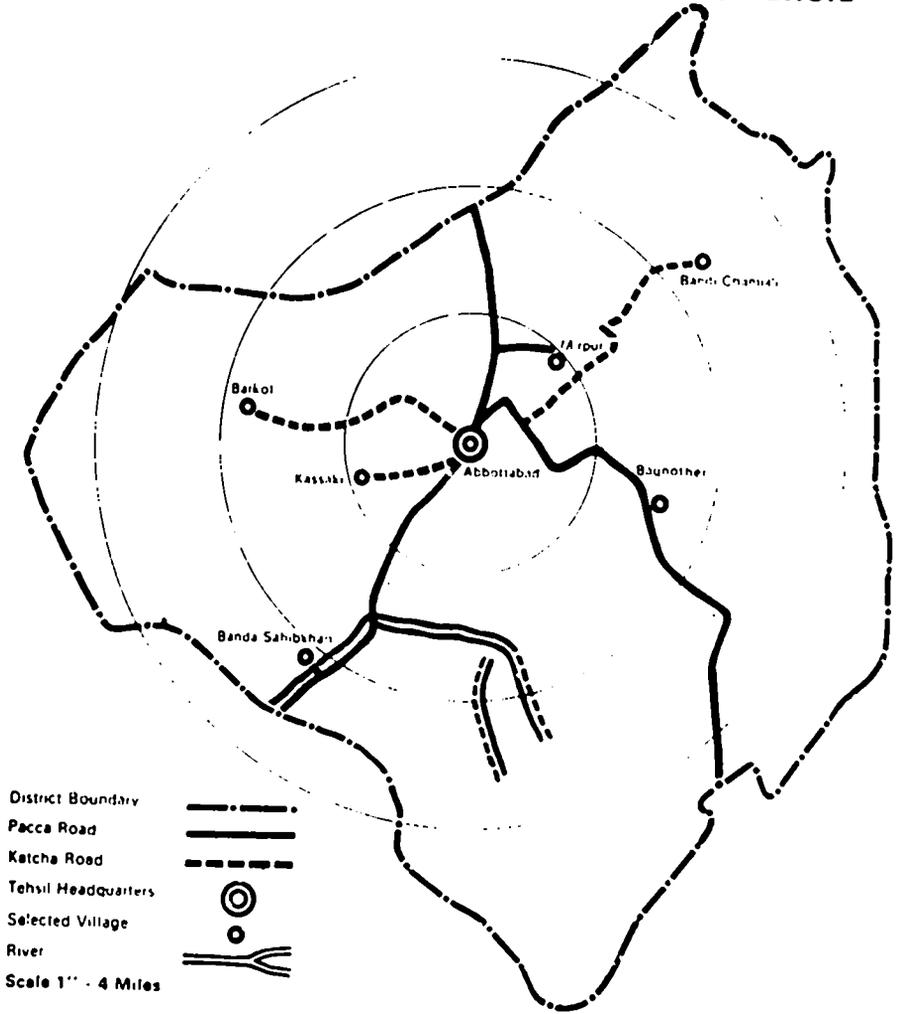
Six villages per study area and in all 90 villages were selected randomly after stratification within the tehsil or study area for distance of the village from and ease of access to the tehsil/'taluka' headquarters. Ease of access was measured in terms of the percentage of total distance made up by metalled (pacca) road and unmetalled (katcha) road or track.

The purpose of stratifying the sample villages in this manner was to attempt to facilitate testing of the hypothesis that access to market center offering a variety of services and supplying agricultural inputs including credit and fertilizer influences farmers use of fertilizer. Three pairs of villages (a) near, (b) at an intermediate distance, and (c) far from the market center, respectively, were selected with the help of maps and on-site inspection. Insofar as possible each pair was made up of one village linked to the market center primarily by 'pacca' road and other primarily by 'katcha' road. No village was selected within two miles of the tehsil/'taluka' headquarters or within four miles of the district headquarters in order to avoid selecting villages not having typical characteristics of the study area in terms of cropping pattern and variety of other features. Diagram showing concentric zones and selected villages is given on page 7.

Selection of Farmers

Approximately, 10 farmers per village or 900 in all were selected as respondents. Based on tehsil-wise data from the Census of Agriculture 1972 showing the distribution of farms by size and tenurial classes, a quota was established for each farm size tenure class in a given tehsil or 'taluka' before enumeration. The distribution of the sample was made roughly proportional to the distribu-

DIAGRAM SHOWING CONCENTRIC ZONES AND SELECTED VILLAGES IN A SAMPLE TEHSIL



tion reported in the census. The interviewers were instructed to obtain names of the farmers in the village from a village leader or key informant. At least three times as many names were to be recorded for a given farm size/tenure class as required for a given village and names randomly selected from the lists. While it would have been desirable to draw a completely random stratified sample, this would have required a census of all households in the village, an approach which was not judged feasible due to time and financial constraints. Still, the procedure adopted should have eliminated some of the bias resulting from interviewing each of a small number of respondents named by the village headman, a common practice for research surveys in Pakistan.

Unit of Study

The basic unit of study and analysis was a farmer who was in actual possession of a piece of land, who planned its utilization/cultivation and implemented the plans either personally or through hired labour and bore financial responsibilities for farming operations.

Characteristics of the Sample

Of the total 882* farmers (650 in irrigated and 232 in 'barani' areas) selected for the study, 42 per cent were owners, 38 per cent tenants, and 20 per cent owner-cum-tenants. Seventy two per cent were owning/operating 0-12 acres of land, 20 per cent owned/operated 13-25 acres and 8 per cent 25 acres and above. This distribution was fairly close to the proportions of farmers under two categories of tenure and size in the data published in Pakistan Census of Agriculture 1972. According to the Census, of the total 3.76 million private farms in Pakistan, 42 per cent were owner farmers, 24 per cent and 34 per cent owner-cum-tenants and tenants respectively. Farms upto the size of less than 12.5 acres were 67 per cent of the total, 21 per cent farms belonged to the size category of 12.5 to 25 acres, eight per cent to 25 to 150 acres and three per cent to 150 acres and above category.

* *The number of farmers belonging to different tenurial statuses and farm sizes varied from village to village. The total number of respondents came to 882, i.e., 18 less than target. The reason for this was that certain categories of farmers were not available in the sample villages.*

FERTILIZER DEALERS' SURVEY

Research Design

Hypotheses

Major research areas such as fertilizer dealers' operations, economic returns of the dealership, dealers services, fertilizer marketing, credit and farmers demand for fertilizer were explored in the study.

Universe

The 15 sample tehsils/'talukas' of Punjab, Sind and NWFP provinces which were selected for the GFI were taken as the universe of the study.

Unit of Study

The unit of study was a fertilizer retailer selling chemical fertilizer during the survey year, and in at least one prior year, on commercial basis in 'mandi' towns, large 'non-mandi' towns and in villages in 15 tehsils/'talukas' of Punjab, Sind and NWFP provinces.

Sample Stratification

The GFI not only suggested hypotheses concerning fertilizer dealers but also helped in identifying various types of dealers operating in the universe. In order to have an adequately representative sample, the fertilizer dealers of the universe were stratified into the following four major types .

- a— Public sector sale depots operated by salaried staff of PAD & SC/SASO/ADA sales depots.
- b— Licensed private dealers located in 'mandi' or 'non-mandi' towns.
- c— Licensed commission agents ('arties') operating in regular 'mandi' towns and dealing in fertilizer and other agricultural commodities.
- d— Village shopkeepers selling several kinds of goods in addition to fertilizer.

Sampling Procedure

A complete enumeration of all current and recent past dealers in the tehsils/

'talukas' covered under the GFI survey would have been ideal. This approach was not feasible, however, due to cost and time constraints. To ensure representation of all four of the major types of fertilizer dealers in the GFI survey area, the sample approach described below was planned :

- a— Twenty dealers were to be selected in a given tehsil/'taluka' in which twenty or more dealers of all types were identified in the GFI survey.
- b— Fifteen dealers were to be selected from tehsil/'taluka' in which 11 to 19 dealers of all types were identified in GFI.
- c— Ten dealers were to be selected from a tehsil in which ten or less dealers of all types were identified in GFI survey.
- d— Two village shopkeepers were to be selected in a sample tehsil in which no dealers of this category were identified in the GFI survey, of course, subject to the condition that there were in fact some dealers of this type who had not been identified in the GFI survey.
- e— Three dealers of a given type were to be interviewed in a given sample tehsil in which only one dealer of that type was identified in the GFI survey.
- f— In fixing the aggregate quota for a given tehsil/'taluka', the minimum number for each category of dealers was to be determined first. The difference between the sum of individual quotas and the aggregate tehsil quota was to be allocated proportionately among those categories for which more than the minimum number of dealers were identified in the GFI survey.

Applying the foregoing criteria, the composition of the sample would have been as is shown in Table 2.

Actual Sample Selection

The number of dealers called for on the above criteria could not be found due to the time constraint faced. In some cases they might not have existed. Consequently the sample finally selected was deviated from the planned one and a small number of dealers was interviewed. Dealers in 'barani' areas were more under-represented than dealers in irrigated areas. The same was true for public as opposed to private dealers.

The procedure finally adopted for selecting the sample was :

- a- To the possible extent all dealers identified in GFI Survey were interviewed.
- b- In cases where there were not enough dealers identified in the GFI Survey to meet the specified stratification scheme, the field interviewers were asked to search for additional dealers of the specified category within the tehsil/'taluka' for interviewing.

Table 3 gives the distribution of fertilizer dealers actually interviewed.

INSTITUTIONAL CREDIT SURVEY

Research Problem

The Institutional Credit Survey (I.C.S.) was intended to explore a number of agricultural credit issues of interest to the Government and the banking community. Particular emphasis was placed on assessing the banks' performance in reaching farmers of various farm sizes and tenurial statuses including small operators. Also examined closely was the comparative repayment history of different groups of farmers borrowing under various collateral arrangements.

Specific questions addressed to the study were as follows :

1. Have small farmers and tenants received an equitable share of production credit supplied by the banks? How this varied by regions and banks?
2. How quickly have institutional lenders processed production loan applications? How has this varied by collateral? By bank?
3. What has been the comparative repayment history of small versus large farmers? Owners versus tenants? Loans secured against personal security versus Pass Book—secured and land-secured loans.
4. What are the characteristics of the supply of production credit?

The study does not investigate farmers' attitude towards credit and their perception of lack of credit as a constraint to increased farm production. These topics are treated in another report concerning anthropological study of four villages entitled "Intensive Farmers' Study".

Sampling Design

Data were collected from the same 15 sample areas covered under the G.F.I. carried out as the first phase of the Project. These sample areas (tehsils in the North West Frontier Province and Punjab, 'talukas' in Sind) were selected randomly after stratification by cropping pattern and availability of irrigation water, the two variables were strongly related theoretically to fertilizer use.

Unit of Study

The unit of study was a bank branch extending agricultural production credit in areas surveyed during fiscal year 1975-76. Banks from which data were obtained were :

1. Agricultural Development Bank of Pakistan (ADBP);
2. National Bank of Pakistan (NBP);
3. National Bank of Pakistan, Agricultural Credit Programme NBP (ACP),
4. Habib Bank Limited (HBL);
5. United Bank Limited (UBL);
6. Muslim Commercial Bank Limited (MCB),
7. Allied Bank of Pakistan (ABL).

Information was not collected from the agricultural cooperatives because of the difficulties of getting reliable data in the required form.

All bank branches providing any kind of agricultural credit in the sample areas were included in the survey. As Table 4 shows, 166 of 408 branches in the 15 tehsils/'talukas' (41 percent) reported disbursing agricultural credit in 1975-76. However, only 19 branches in 'barani' areas (11 percent) made agricultural loans as compared to 147 in the irrigated areas (61 percent).

Data Collection and Processing

A complete enumeration of production loans extended by the banks from July 1, 1975 through June 30, 1976 in the survey areas was made between September and November, 1976. Detailed data were collected from ledgers at each branch site and included for each loan, the date of application, date of disbursement, date of maturity, dates of repayment, purpose, amount, type of security, mode of disbursement, and tenorial status and amount of land operated by the borrower.

Limitation of the Study

The principal limitation of the study is that data were not collected on loan applications which were made but not approved. Thus, it is not possible to determine whether, for example, a higher proportion of small farmers' applications were rejected than large farmers', an important question indeed in assessing small farmers' access to institutional credit.

INTENSIVE FARMERS' STUDY

Sampling Method

Selection of Tehsils

From the G.F.I. four out of fifteen sample tehsils were selected as study areas. The criteria for the selection of tehsils were : (a) source of irrigation water, (b) annual rainfall, (c) cropping pattern and (d) past use of chemical fertilizer. Abbottabad (District Hazara – NWFP), T. T. Singh (District Lyallpur now Faisalabad – Punjab), Rajanpur (District D.G. Khan – Punjab) and Campbellpur (District Campbellpur – Punjab) were the tehsils selected. Studies in Sind province could not be done due to election and political activity.

Selection of Villages

In each tehsil one village from the six surveyed in the G.F.I. was selected. The village chosen was : (a) representative of the tehsil cropping pattern, (b) representative of the tehsil pattern of farm size and land tenure, (c) located at an intermediate distance from tehsil headquarters and (d) had at least 200 households or 2000 residents living in a compact form of settlement. Village Bagnother (Abbottabad), Chak No. 319 G.B. (T.T. Singh), Sikhaniwala (Rajanpur) and Dakhnair (Campbellpur) were selected for the in depth study.

Selection of Households

Through a census of village households and with the help of village key informants such as the 'numberdar' and the revenue 'patwari' a list of the heads of all agricultural households based on size of holding and tenancy was prepared. This list was used for drawing a stratified proportionate random sample of 20 – 30 households in each village. The random number table was used to draw sample. The size of the sample, by village, is given in table 5.

The Interviewing Guide

An interviewing guide was developed for the investigation after pretesting it in the provinces of Punjab, Sind and North West Frontier. The first part of the interviewing guide provided an outline of information to be collected on village physical and social infrastructure. The remaining parts provided an outline of information relating to individual farm households. This included :

- a) household biographical data,
- b) agricultural and marketing practices,
- c) fertilizer use and cropping patterns,
- d) credit use and remittance from off-farm earnings,
- e) decision making process as concerning social and agricultural matters and
- f) communication patterns and respondents' contacts with the outside world (urban orientation).

The Study Team and its Training

The eight best field interviewers of the General Farmers' Investigation Survey team were retained to work as field investigators for the intensive study. The role of women in the decision making process regarding fertilizer use, credit use and agricultural marketing practices was to be studied. Therefore, four female interviewers were added to the group. Two teams each consisting of four male and two female investigators headed by a supervisor were formed. The team was required to spend one month gathering information in each village studied. For such a long period it was not possible to make accommodation arrangements in the villages and the teams were allowed to stay in hotels or rest houses in nearby towns. A jeep was provided to each team to facilitate travelling from the place of residence to the village under study.

The investigators were given two weeks training in case study techniques. The project's supervisory staff with the assistance of local and US AID sociologists and anthropologists provided the training. The investigators and the supervisory staff stayed for four days in village near Lyallpur (Faisalabad) for practical training.

Collection of Data

Using key village informants the teams collected information about facilities, land use and farming practices in the village. To gather information in the sample households selected, the male and female heads of households were contacted three to five times by the male and female investigators respectively. Additional information was collected through participant observation on various aspects of the study. The information was recorded on questionnaires, forms and diaries maintained by the interviewers. Data collection started during the last week of December, 1976, and was completed by the middle of March, 1977 in all four villages.

Reliability Check

NFC supervisory staff and the US AID officials made frequent visits to the survey teams in the villages to check the reliability of the data collected and the appropriateness of study techniques. They re-interviewed farmers in about 10 percent of the sample households. In addition, the supervisors were required to check the data each evening and to discuss problems with the teams. As a result, it would appear that the data reliability is adequate.

DISCUSSION

Sarfrāz Khan Malik : Thank you very much Mr. Iqbal Chaudhry for your introduction to the methodology. To my humble mind two or three issues come to light straight away. First of all why Baluchistan Province was not included within the purview of the study. You have just got the answer that the fertilizer consumption was only one per cent of the total consumption, therefore, it was decided not to include Baluchistan in the study.

The second point is that there were two main factors decisive in determining the random sample procedures, and the 15 study areas out of 146 tehsils in the three provinces were selected on the basis of stratified random sampling. Stratification variables were cropping pattern and the availability of irrigation water. Are the study areas in accordance with the total cultivated area of the provinces concerned? In Punjab the total culturable commanded area (CCA) is 19.5, in Sind 13 and in Frontier one and a half million acres. This factor could have been another parameter which could affect the results of the study. We would like to be guided by the experts.

How far distinction between perennial and non-perennial areas in Punjab and Sind was made while selecting the study areas? There is no area of the Bahawalpur Division.

Iqbal Chaudhry : We had non-perennial tehsils like Isa Khel and Rajanpur in the sample. But for the sake of codification, classification and interpretation of data we lumped the partly irrigated tehsils in irrigated ones. If this was not done, there would have been three sub-populations, that is, irrigated, semi-irrigated and 'barani' which could have posed serious problems at the time of interpretation of data and applying sophisticated statistical tests. To the second query regarding the percentage of the land under various crops, the major stratification variable was the cropping pattern, the type of crops grown and not the area under various crops. The relevant variable for any fertilizer policy is the type of crop grown so as to know the fertilizer types and quantity required for individual crops. Any way, this is a good point. We will take this into consideration in our future studies.

M. S. Kakli : Farmers' income is an important variable in fertilizer use. How can we enable the farmer, especially, the small farmer to apply more fertilizer for increasing production? How can we improve our distribution system so that the fertilizer is made available near the farm-gate at a price which a farmer can easily afford? There are other implications and perhaps this is the first study of its kind which is comprehensive because it has studied many areas like the socio-economic characteristics, marketing systems, agricultural credit and so on.

But the basic point to be considered is whether results of this study are good or bad, will logically depend upon the research methodology adopted for the study. There could have been inclusion of more variables.

Similarly, we could decide whether or not sample was random. Whether or not sample was representative of the whole country. So a number of issues can be raised and I am sure the discussion on each point can go on for more than the time we have this morning.

Sarfaraz Khan Malik : May I request Mr. Ishaque to present his comments?

S. M. Ishaque : I would like to make my observations starting with the stratification of the universe which has been dealt with by the author very well. He has mentioned that two variables, namely, cropping pattern and availability of irrigation water, having strong theoretical relationship with fertilizer use, were used for stratification. This is alright, but if more variables are available for stratification, it was lot more easy to stratify the universe. May be that the constraint with him was that information was available only with regard to these two variables. So he has rightly classified on these very bases. However, after classifying the universe into different strata according to these two variables, he has grouped the primary sampling units 'talukas' and tehsils. He has tried to concentrate upon the sampled tehsils and 'talukas' which involve more travelling cost. The advantage may be that in the primary sampling unit he could concentrate upon his field staff more efficiently and for that very purpose house to house within every primary sample. But disadvantage for using these as primary sampling units is that in Pakistan the size of primary sampling unit is very large. In Punjab and NWFP we have only three/four per district. Whereas, in case of Sind the average 'talukas' in a district are about seven or eight. I wonder whether he has given consideration to the size of the primary sampling unit when he has selected these units from the strata. All possible advantage can be obtained if these primary sampling units are selected through probability proportionate to size. This size can be the cultivated area, cropped area, or the number of cultivators as may be the case. I am not sure whether he has tried this exercise before actually planning the sample.

Coming to the selection of second stage, he has mentioned that within the selected primary sampling units he has further sub-stratified them into three categories and from each category he has selected one village. Here he has introduced personal bias in the selection of the villages. Once he has sub-stratified them, he cannot make a start with a village having 75 per cent or more 'pacca' road from the thesil headquarters. Then such villages are being selected purposively and thus you cannot assign a probability of selection, so far as normal methods of estimation of sampling technique are applicable.

Here a personal bias had been introduced as he has to make a choice whether he wanted purposive selection or still he wanted to have a random selection which could have facilitated the inclusion of normal reliability of estimation.

The next most important point is with regard to the size of sample itself. I personally feel that a sample of only 900 farmers is quite inadequate when he has such a large stratification consisting of cropping pattern and then sub-stratifying the universe into three zones and then through each zone you have so much cross classifications. It will be very difficult to have appropriate number of observations to try your calculations.

Then the allocation of the sample to the irrigated and un-irrigated areas is not in proportion to the cultivated area because I find that there has been weight-age to the un-irrigated areas, whereas, the use of fertilizer is more in irrigated areas. Therefore, there should have been a larger proportion of sample allocated to irrigated areas rather than un-irrigated areas. Here we find about one-third is allocated to un-irrigated areas. So I think that in this particular case the distribution could have been either in proportion to the cultivated area, or to the cropped area, or to the number of farmers which might have been available from either the agricultural census or the population census. I do not think he has given importance to this while recording, but the original document says that when selecting the farmers he has resorted to the information from the village headman. Here a large number of farmers are omitted from being given a chance of selection.

Now come to the Intensive Farmers' Study. Initially, the author has indicated that the entire universe was divided into the strata. Then again we have 15 primary sampling units belonging to different strata. Here again he has merged them into homogeneous strata that goes against the original purpose. There is a stratification and different primary sampling units have been selected on that basis. There is no point in merging them again because then you will not be drawing true conclusions. The stratification means there is no homogeneity within these stratifications and once you are merging two strata it means you are creating more heterogeneity which is a negation of your original scheme. This is my view point.

Sarfraz Khan Malik : Mr. Ishaque, as a statistician, would you like to comment on the probability that the results are true?

S. M. Ishaque : Actually, for that very reason we may have to go into detailed results.

Iqbal Chaudhry : The disadvantage of introducing purposive selection is that

you cannot estimate statistical error correctly to check the reliability of data on the normal distribution curve and apply statistical tests. But you can apply them under various assumptions. Most of Mr. Ishaque's questions are concentrated around adequacy vs. representativeness of the sample. It is a very simple thing. If we have ideally one farmer who represents the socio-economic, physiographic and agro-climatic characteristics of Pakistani agriculture then he alone was sufficient to represent the entire universe. Since population is not so much homogeneous, therefore, we have to stratify it into various sub-populations in order to make the universe more and more homogeneous. In doing so, the universe was divided into three tiers, first being the study area (tehsil/taluka). At this stage, cropping pattern, past fertilizer use and source of irrigation water were the stratification variables. At the second tier, i.e., village level different stratification variables, namely, distance and ease of access (measured in terms of un-metalled and metalled road) from the tehsil/'taluka' headquarters were introduced. This was done on the ground that physical distance and type of road from village to the tehsil/'taluka' headquarters are related to fertilizer use. At this stage, stratified purposive random sampling technique was applied to select the required type of villages. I think this technique is acceptable both theoretically and statistically, as statistics is applied to serve the purpose and the purpose cannot be sacrificed to serve statistics. The only danger I could foresee is the inclusion of personal bias, but this has been checked by way of random selection of the villages.

I agree with Mr. Ishaque that in terms of probability theory and application of statistical tests, ideally there should have been 100% randomization. In that case, there was possibility that all the villages were selected either at 'pacca' or 'katcha' road which could have introduced built-in bias in the study and eventually resulted in invalid findings. In order to minimize this probability, we introduced the purposive sampling technique under which equal representation was given to both 'katcha' and 'pacca' villages. I think it is quite consistent with the logic of survey analysis and this technique is generally followed in sample surveys under similar situations.

Now coming to the selection of the farmers, I agree that ideally there should have been 100% census of farmers. Then you can apply statistical tests based on the probability theory, normal distribution and independent random sampling. I may point out that census is both time and resource consuming, which usually takes at least two days of a team of four interviewers in the typical irrigated village. You can work out the man days required for 100% listing of 90 villages and imagine whether or not it is worth having this exercise. Keeping in view these factors we resorted to obtain names of the farmers from village key informants, which is the normal practice followed in rural areas of Pakistan. At least three times names were recorded for a given farm size/tenure class as

required for a given village and names were randomly selected from the list using random numbers table while fixing quota to the distribution of 60 farmers in a tehsil, a lot of table work was done. This distribution was in proportion to agriculture and population censuses data of 1972.

Turning to the question of adequacy vs. representativeness once again. These two sampling requirements are placed at two different poles depicting heterogeneity and homogeneity of the universe. If you increase the adequacy then the degree of representation comes down and vice versa. In order to accommodate both adequacy and representativeness we decided to synthesize both the requirements, within reasonable limits, by way of having about 10% sample at the tehsil level where there is a high degree of heterogeneity and about one per cent sample at the village and farm levels where relatively a greater degree of homogeneity was found.

I might add here that there are two major sources of error, i.e., sampling and non-sampling (human) error, which we cannot avoid. However, we can estimate and reduce the sampling error by way of probable error, standard error and standard deviation and increasing adequacy and representation of the sample. The major source of error is the non-sampling error which can be controlled through proper training of field staff, clear understanding of the research objectives and comprehension of concepts involved and asking right questions to the right persons by the right interviewers. The person who interviews the respondent, records the information and establishes rapport, is to be taken into consideration. So I concentrated much more on the selection of the interviewers, their training and the reliability check. You will be glad to know that the reliability results showed about 85 % reliability with the original survey. I think this is quite acceptable level in any socio-economic survey.

Turning to Mr. Ishaque's last question on Intensive Study, he seems to have confused heterogeneity with homogeneity. Actually, all the heterogeneous aspects of the tehsil were supposed to be represented in the typical community (village) i.e., representing stratification variables in that village, so that the findings had the scope for the tehsil under study.

G. Bertilsson : There is a very valuable and interesting information in this report and the crucial question is, of course, what is the reliability of findings. I have to ask you brief questions. Whether comparisons with other investigations and other known facts can be made? References have been recorded on the literacy rate. Is that in accordance with other known facts? So is the age of the respondent. Does it fit with the Population Census? Is that something the same which has come out of sampling procedure?

Concerning the average application rates, if we calculate the average use of

fertilizer in Pakistan among all farmers, how well it does fit with national consumption. In Intensive Study you have arrived at quite a low sample, 20 – 30 households. Could you do something on the probability theory?

Iqbal Chaudhry : The variables like age, literacy, education, urban orientation and other socio-economic variables were considered as independent variables. Multiple regression model was developed in which the probability of fertilizer use was predicted. For example, an owner of 45 years of age operating 10 acres of land, having five years of schooling, located in an irrigated area on a 7 miles 'pacca' road from the tehsil, will have, say 85 % probability of fertilizer use. In the second question, i.e., age, literacy, and tenancy distribution of the sample was approximately close to Population and Agricultural Censuses 1972. On the question of use rate, the next session deals with the topic in detail.

Since I do not have much time, I will discuss in brief the question of sample size of 20 – 30 households. As mentioned in my presentation, it was not a statistical study, but essentially an anthropological study. Primarily, qualitative information was collected. The selected household remained under study for 3-4 days by the male and female interviewers. This was not a snap-shot type of study. The idea was to confirm the findings of our first (G.F.I.) survey at the micro level and to come up with additional workable hypotheses to be tested later on.

Sarfraz Khan Malik : Dr. Ahmad Saeed Khan, Would you kindly raise your issues?

Ahmad Saeed Khan : First of all I would like to bring to your kind notice, that having a session on methodology at this time is going to increase our understanding in planning the future surveys. If you are going to discuss and try to find out whether the results are valid and reliable, how far we can depend upon the results? I must congratulate the Market Research Project of the NFC, which has conducted the study first of its type and nature. It is very difficult to develop any methodology and they have done excellent work in developing the same.

I agree with Mr. Ishaque who raised certain technical questions with regard to size of sample, stratification and inclusion of certain important factors. I can point out that tubewell is a very important consideration because the number of tubewells in this country has increased to near about .15 million. Similarly, the tractors are also very important for fertilizer use. If you look at the surveys made by certain people you will find that fertilizer consumption on tubewell

farms is higher than irrigated and 'barani' farms. If you find a person owning a tractor, he has increased the cropping intensity, mobility, and is an educated and enlightened person. If you are ignoring these factors you are definitely not going to produce reliable results. However, we will see how we can utilize these results in order to improve our educated guess, because most of the decisions in the country are made on educated guesswork based on experiences of certain individuals. Definitely, these studies are going to improve upon those decisions by providing certain empirical information.

With regard to the comments raised by Mr. Sarfraz Khan Malik why Baluchistan was not included, it was for the convenience of the researcher that Baluchistan was excluded from the study as fertilizer use was very low. Time and manpower involved over there is much higher as compared to the information available. Therefore, I think this is why Mr. Iqbal Chaudhry dropped Baluchistan Province.

Mr. Sarfraz Khan Malik and Mr. Ishaque have raised questions with regard to selection of 900 farmers and the cropped area. They might have taken into consideration these factors. In Punjab the conditions in the irrigated areas are very homogeneous and when the conditions are homogeneous you can take a small sample. I think in view of these conditions they have taken the sample.

Lastly, I would request the organizers that instead of having a session on methodology after completing the research, let us start any survey and call the people for one day or so to improve and defend the methodology.

M. S. Kakli : I beg to differ with Dr. Ahmad Saeed Khan about the purpose of discussion on methodology and research techniques. The idea is not to do the postmortem just to find faults or what the weaknesses of the study are? The idea is to discuss thoroughly what could have been the weaknesses of the study and with what confidence should we take the results especially for the planning and policy making.

Iqbal Chaudhry : I agree with the idea of including additional variables in the study. Dr. Ahmad Saeed Khan has introduced important variable of technological adoption. This is a useful variable but the problem would be how to get readily reliable data in a printed form. That is all from my side.

Sarfraz Khan Malik : Thank you very much Mr. Iqbal Chaudhry. I am sorry for the short time left for the general discussion. I give the floor to Mr. Afzal.

M. Afzal : In Master Planning (Wapda) we have carried out a field survey consisting of 2000 farmers all over the Indus Basin and in estimating the probability of fertilizer use by the farmers. We have estimated the regression coefficients

for irrigation water which has come to .449 and the other corresponding regression coefficients are insignificant, varying from .002 to .075. Secondly, I have a minor comment that in the survey you have selected 10 farmers out of each village while the size of the villages was not taken into consideration in terms of population as well as in terms of farming and non-farming households. So if you have selected 10 farmers from each village regardless of the size of the population of the village and the number of farming and non-farming households, the representativeness of the sample as a whole can be questioned.

Dilawar Ali Khan : My first comment is in line with what Mr. Afzal has just said. On an average we have 250 – 350 villages per tehsil and in a tehsil like T.T. Singh selection of 6 villages I think is too low. Later on you stratified at access and distances from the tehsil. You had affected representativeness of tehsil sample and in future this point should be looked into. The next thing is that of 10 farmers issue that Mr. Afzal was talking about. If you have 9 column stratification by farm sizes and tenancy I think you have one observation per cell and that is also questionable having a limited number of sample farmers. We might have avoided stratification.

Then you are talking about owner-cum-tenant category. Did you make any differentiation while considering the tenancy groups? I think this is a point which is becoming important. We are gradually shifting away from kind-tenancy towards cash-tenancy. Cash-tenancy is just akin to owner-operations. Last point is rather minor. We are having a sample of institutional credit agencies. You are talking about different lenders and you are treating all of them alike. All the banks have different policies of agricultural credit. Agricultural Development Bank of Pakistan and National Bank of Pakistan, I think have different commitments so far as agricultural credit is concerned. So it would have been advisable to treat specialized banks separately.

Iqbal Chaudhry : In response to Afzal and Dilawar's comments on the adequacy of villages and farmers in each village while listing non-farming community was excluded. Actually, at this level of stratification, tehsil farm size and tenancy characteristics were supposed to be represented by six villages and 60 farmers. It was not essential that only ten farmers were to be selected in a particular village. I think our "follow-up-Study" will bring us a comprehensive and more reliable information than our original study. You know, you live and learn and I believe learning is a continuous process.

I agree with Dr. Dilawar on treating specialized and non-specialized banks together in Institutional Credit Survey. But our emphasis was on irrigated and 'barani' areas rather than specialized vs. non-specialized banks. Nevertheless, within sub-populations of irrigated and 'barani' banks could have been treated

separately and interpretation would have been more meaningful than the one available. Anyway, the original report contains typology of specialized vs. non-specialized banks which facilitates the reader in understanding the survey findings.

The unit of study was a farmer, but universe was classified into two sub-populations, i.e., irrigated and 'barani'. The problem of frequencies in various cells would have arisen, if tehsil was the unit of analysis. However, we had this problem in 'barani' sub-population, as about 50% of the respondents were non-users. So most of the cells in the 'barani' sub-population remained empty. In our "follow-up-study" we have increased the number of villages from 6 to 8 and of farmers from 60 to 80 in 'barani' tehsils. In this way we will have sufficient number of observations. Nevertheless, you become wiser by experience.

To the next question of classification of owner-cum-tenants, it included both cash-lessees and share-croppers. The required number of each category was randomly selected in proportion to their number in the village. Once again, in our "follow-up-study" we have treated these categories separately.

Bashir Ahmed : When we had the sample studies, there were two types of errors. One is the sampling error and the other is non-sampling. Now we can reduce the sampling errors by enlarging size of the sample and through stratifications, but that will not affect the non-sampling error. So I would like to know what measures were taken to control the non-sampling errors because that could also affect the reliability of the results.

Iqbal Chaudhry : I personally concentrated more on controlling the non-sampling errors, which related to the selection of right interviewers with right qualifications. All the interviewers had M.A., M.Sc., degrees ranging from social sciences to natural and physical sciences. Then their orientation, training in the class room and pretesting of both interviewing schedule and the interviewers were done very carefully. Furthermore, there was close and frequent supervision/guidance of the field staff. As you know, it is a difficult area if you employ highly qualified interviewers, there are greater chances of their own perceptions to be recorded in the questionnaires rather than farmers' actual response. The team leaders and supervisors checked each and every question of the filled-in questionnaires in the field. If there were some discrepancies, the interviewers were sent back to the original respondents for having correct responses.

Ashraf Malik : Fertilizer is a new technology to Pakistan. There are two important aspects. One is the introduction or adoption of this technology. The other relates to its optimum use at the farm level. I think the methodology can be

valid in terms of what were the objectives of this sampling technique and what was its focus. To me the focus of this methodology was on the adoption side rather than the optimum use of the technology at the farm level. To my mind from the adoption point of view the methodology has proven to be quite strong, within the limited resources and have served the purpose. But I do not think this methodology is adequate to decide the sample in different agro-climatic regions where they have to figure out what would be the optimum allocation of fertilizer produced or imported in different regions.

Iqbal Chaudhry : I agree with and appreciate Dr. Ashraf's comments on research methodology, i.e., the primary purpose of our sampling design was based on fertilizer use rather than use rate. But one of the objectives of the study was to collect bench-mark data. So it was primarily a reconnaissance survey. And an exploratory survey like this basically deals with "what is", "where is" and "how much" on the phenomenon under study. In our "follow-up-study" we have included the technological variables like source of irrigation water, land preparation methods, seeds, ownership of farm machinery and fertilizer use rate on major crops.

Sarfraz Khan Malik : Ladies and Gentlemen: I thank all of you for your participation during the first session of this seminar. On your behalf as well as on my own behalf I thank the Project Leader Mr. M. Iqbal Chaudhry for having presented the methodology so intelligently to us and also the panel members who took active part in the discussion. I think whatever be the limitations of the study, it is for you to derive your own conclusions, but one thing seems to me to be very clear that the NFC as well as the Government of Pakistan are happier with the results of this study than they would have been without any study. Thank you, Ladies and Gentlemen, I adjourn this meeting.

Table - 1

Characteristics of the Sample Tehsils/'Talukas'

TEHSIL	SOURCE OF WATER	MAJOR CROPS	DISTRIBUTION OF FARMS BY SIZE CATEGORY (Percentages) in acres				PERCENTAGE FARMS OPERATED BY			
			0-4.9	5-12.5	12.6-24.9	25 and above	Owner	Owner-cum-Tenant	Tenant	
Charsadda	*Irrigated	Wheat Maize Sugarcane	60	31	7	2	34	18	48	
Hangu	Partly Irrigated	Wheat Maize	68	27	4	1	70	16	14	48
Abbottabad	*Rainfed	Wheat Maize	74	22	4	0	84	12	4	
Gujar Khan	Rainfed	Wheat Maize	35	45	15	5	60	36	4	
Campbellpur (Attock)	Rainfed	Wheat Coarse Grains	39	36	17	8	45	34	21	
Dipalpur	Irrigated	Wheat Cotton Fodder	25	36	23	16	31	17	52	
Rajanpur	Irrigated	Wheat Cotton Fodder	20	37	25	18	24	20	56	

Toba Tek Singh	Irrigated	Wheat Cotton Sugarcane	31	45	19	5	44	33	23
Hafizabad	Irrigated	Wheat, Rice Fodder	16	40	28	16	37	24	39
Isa Khel	Partly Irrigated	Wheat Pulses	20	25	27	28	36	43	21
Tando Allah Yar	Irrigated	Wheat Cotton Fodder	9	55	26	10	21	8	71
Gambat	Irrigated	Wheat Cotton Fodder	35	44	14	7	48	22	30
Mirpur Sakro	Irrigated	Pulses Rice Barley	22	52	18	8	28	12	60
Kambar	Irrigated	Rice Pulses Wheat	34	52	12	2	26	14	60
Matli	Irrigated	Wheat Rice Sugarcane Cotton	9	50	31	10	28	7	65

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Source :—Census of Agriculture 1972.

- *Irrigated tehsils/ talukas' are those administrative units where water is mainly supplied by canals.*
- *Rainfed (barani) tehsils are those not served by the canal network and mainly depend on rainfall for crop cultivation. However, areas in barani tehsils are irrigated by artificial means such as lift irrigation and 'nullahs'.*

Table - 2

Fertilizer Dealers' Sample Stratification

Tehsil/'Taluka'	Public Dealers.	Private Dealers			Total
		Village Shop-keepers.	Commission Agents	Town Shop-keepers.	
IRRIGATED	37	31	32	84	184
Charsar da	2	4	4	10	20
Dipalpur	3	3	3	11	20
Hafizabad	4	2	5	9	20
Isakhel	4	2	2	5	13
Kambar	3	3	2	7	15
Matli	3	3	3	6	15
Mirpur Sakro	3	3	2	5	13
Tando Allahyar	3	3	3	6	15
Rajanpur	3	3	2	5	13
Toba Tek Singh	4	2	3	11	20
Gambat	5	3	3	9	20
BARANI	12	17	9	20	58
Abbottabad	3	8	3	6	20
Campbellpur	3	3	2	6	14
Gujar Khan	3	3	2	4	12
Hangu	3	3	2	4	12
TOTAL	49	48	41	104	242

Table -- 3

Distribution of the Dealers Interviewed.

Tehsil/'Taluka'	PUBLIC DEALERS	PRIVATE DEALERS			Total
		Village Shop-keepers.	Commis-sion Agents.	Town Shop-keepers.	
IRRIGATED	30	21	24	78	153
Charsadda	1	4	3	9	17
Dipalpur	3	2	4	9	18
Isa Khel	3	1	—	3	7
Gambat	2	2	3	9	16
Hafizabad	5	—	4	8	17
Mirpur Sakro	2	3	1	3	9
Matli	3	—	4	5	12
Kambar	1	3	2	5	11
Rajanpur	3	3	—	4	10
Tando Allah Yar	3	2	2	8	15
Toba Tek Singh	4	1	1	15	21
BARANI	6	14	1	15	36
Abbottabad	2	8	1	6	17
Campbellpur	3	3	—	6	12
Gujar Khan	1	1	—	1	3
Hangu	—	2	—	2	4
TOTAL.	36	35	25	93	189

Table - 4

Number and Bank Branches Included in the Sample

Banks	AREA				Total	
	Irrigated		Barani			
	Total Branches	Branches reporting agri. credit	Total Branches	Branches reporting agri. credit	Branches	Branches reporting agri. credit
ADBP	11	11	5	5	16	16
NBP	42	21	41	—	83	21
NBP (ACP)	11	11	2	1	13	12
HBL	51	34	34	3	85	37
UBL	54	40	35	9	89	49
MCB	57	24	32	1	89	25
ABL	16	6	17	—	33	6
Total	242	147	166	19	408	166

Table — 5

Size of Sample

Village	Tehsil	Households
Chak No. 319 G.B.	Toba Tek Singh	25
Sikhaniwala	Rajanpur	20
Dakhnair	Campbellpur	31
Bagnother	Abbottabad	24
Total		100

Second Session

GENERAL FARMERS INVESTIGATION SURVEY

Chairman

**Dr. Amir Muhammad
Chairman,
Pakistan Agricultural Research Council,
Islamabad.**

Panel Discussants

- 1. Dr. R.H. Goldman
Ford Foundation, Islamabad.**
- 2. Dr. Bashir Ahmad
Joint Chief Economist,
Planning and Development Department,
Lahore.**
- 3. Secretary,
Department of Agriculture,
Government of the Baluchistan,
Quetta (Representative).**
- 4. Dr. M. Sharif
Director,
Sind Sugar Industry Research Institute,
Hyderabad.**

GENERAL FARMERS' INVESTIGATION SURVEY*

Objectives

The General Farmers' Investigation (G.F.I.) Survey was designed with the following specific objectives in view :

1. To study fertilizer use pattern on major crops among farmers of different farm sizes and tenurial classes.
2. To identify social, economic and institutional factors related to fertilizer use.
3. To gather baseline data for measuring future changes in fertilizer use.

Research Questions

Key questions addressed in the study were .

1. What percentage of farmers use fertilizer? How does this vary by crop, farm size, tenurial class and access to irrigation?
2. How much and what kinds of fertilizers do farmers, who use fertilizer, apply to major crops? How do these characteristics vary by farm size, tenurial class and access to irrigation?
3. What changes have occurred in the proportion of farmers using fertilizer, as classified by farm size and tenurial class overtime?
4. How do farmers using fertilizer finance their fertilizer purchases? What sources of credit do they have, and what is the relative importance of each? How do these characteristics vary by farm size, tenurial class and region?
5. What are the major sources of information about fertilizer and what is their relative importance?
6. What is fertilizer users' attitude towards (a) convenience of access to fertilizer outlets and (b) the performance of the distribution system in supplying the desired type of fertilizer at appropriate time and in providing bags of fair weight and in good condition?
7. What reasons do farmers give for not using and discontinuation of fertilizer use? What is the relative importance of each in irrigated and rainfed regions?

* Dr. M. E. Tusneem, General Manager (Technical) National Fertilizer Marketing Limited, Lahore.

8. Furthermore, information was collected on several other aspects i.e., means of transportation, sources of fertilizer purchase, transportation cost per bag, average distance travelled for the purchase, working hours of fertilizer sale outlet and type of road from fertilizer sale outlet as they influence fertilizer use.

Sampling Method

A multi-stage sampling technique was used to select study areas (tehsils in the North West Frontier Province and Punjab, 'talukas' in Sind), villages within these areas and respondents within these villages.

Fifteen study areas (3 tehsils in NWFP, 7 tehsils in Punjab, and 5 'talukas' in Sind) corresponding to about 10 per cent sample of these administrative units in the three provinces were selected randomly after stratification for cropping pattern and availability of irrigation water. These two stratification variables were used because of their strong theoretical association with fertilizer use. Data for percentages of cultivated area irrigated and under individual crops were obtained from the Agricultural Census of 1972. The fifteen study areas selected (11 irrigated and 4 rainfed tehsils) represent 9 major cropping patterns and two agroclimatic zones (irrigated and rainfed). The characteristics of the sample tehsils/'talukas' are shown in table 1.

Six villages per study area or 90 villages in all were selected randomly after stratification within the 'tehsil' or study area for distance of the village from and ease of access to the tehsil/'taluka' headquarters. Ease of access was measured in terms of the percentage of total distance made up by metalled (pacca) road and unmetalled (katcha) road or track.

The purpose of stratifying the sample villages in this manner was to attempt to facilitate testing of the hypothesis that access to market center offering a variety of services and supplying agricultural inputs including credit and fertilizer influences farmers' use of fertilizer. Three pairs of villages (a) near, (b) at an intermediate distance and (c) far from the market center respectively, were selected with the help of maps and on-site inspection. Insofar as possible each pair was made up of one village linked to the market center primarily by 'pacca' road and one primarily by 'katcha' road. No village was selected within two miles of the city limits of the tehsil/'taluka' headquarters or within four miles of the city limits of district headquarters in order to avoid selecting villages atypical of the study area in terms of cropping pattern and other characteristics.

Approximately, 10 farmers per village or 882 in all were selected as respondents. The distribution of the sample farmers in term of farm size and tenancy was

roughly proportional to the distribution reported in the Agricultural Census, 1972.

The basic unit of study and analysis was a farmer who was in actual possession of a piece of land, planned its utilization/cultivation and implemented the plans either personally or through hired labour bearing financial responsibilities for farming operations.

Characteristics of the Sample

Of the total 882* farmers (650 in irrigated and 232 in barani areas) selected for the study, 42 per cent were owners, 38 per cent tenants and 20 per cent owner-cum-tenants. Seventy two per cent were owning/operating 0–12 acres of land, 20 per cent 13–25 acres and 8 per cent 25 acres and above. This distribution was fairly close to the proportion of farmers under two categories of tenure and size in the data published in Pakistan Census of Agriculture, 1972. According to census, of the total 3.76 million private farms in Pakistan, 42 per cent were owner farms, 24 per cent and 34 per cent owner-cum-tenant and tenant farms respectively. Farms upto the size of less than 12.5 acres were 67 per cent of the total number of farms, 21 per cent farms belonged to the size category of 12.5 to 25 acres, eight per cent to 25 to 150 acres and three per cent to 150 acres and above category.

MAJOR FINDINGS

Incidence of Fertilizer Use

Table 2 shows the number and percentage of sample farmers using and not using some fertilizer during the 1975-76 crop year. Application of chi-square test of difference of sample proportions reveals two important facts. The first is that there is no significant difference either among farm size categories or tenure classes in the percentage of farmers using some fertilizer.† This applied to both the predominantly irrigated and mainly rainfed (barani) areas. The second observation is that there is a significant difference between irrigated and 'barani areas in the percentage of farmers using fertilizer (80 per cent versus 45 per cent). The difference is actually understated because some farmers not using

*The term "significant difference" refers to a difference between two or more statistics (such as sample proportions or means) which has at least a 90 per cent probability of not being due to chance.

† The number of farmers belonging to different tenurial statuses and farm sizes varied from village to village. The total number of respondents came to 882, i.e., 18 less than target. The reason for this was that certain categories of farmers were not available in the sample villages.

fertilizer in irrigated areas operated under 'barani' conditions while some farmers using fertilizer in 'barani' areas had access to irrigation water. In the 'barani' areas, for example, 31 per cent of farmers using fertilizer irrigated at least part of the land they fertilized.

The fact that within areas stratified for availability of irrigation water there was little difference in the percentage of farm operators who were fertilizer users among farms of different sizes and operated under various tenurial arrangements has a special significance. It appears that small farmers and tenants have adopted fertilizer to about the same extent as other farmers.

The sharp difference in the incidence of use of fertilizer among farmers of all sizes and tenure groups between areas which are mainly irrigated and those which are primarily 'barani' indicates clearly that farmers' adoption of fertilizer is influenced by the availability of adequate and dependable supplies of irrigation water.

However, in evaluating farmers' access to fertilizer it is not enough to make comparisons of "use" and "non-use" alone, since in practical terms the potential for increasing yield and farm income depends upon the quantity and nutrient balance of fertilizer applied, as well as upon other factors.

Quantities and types of fertilizers applied by sample farmers to major crops are discussed in Table 3 which shows the percentage of sample farmers growing wheat, rice, and cotton who reported applying nitrogenous (N) and phosphatic (P) fertilizers to these crops.

The chi-square test was applied to test the hypotheses that the differences in the proportions of sample farmers applying nitrogen and phosphate between crops, areas, farm size categories, and tenure classes could be explained by chance.

The results of the analysis indicate first that there was no significant difference among farm size and tenure groups with respect to percentages of farmers applying nitrogenous fertilizers to each of wheat, rice, and cotton during the period covered by the survey. This is consistent with the result reported earlier that farm size and type of tenurial arrangement was not associated with use or non-use of fertilizer on at least one crop during the 1975-76 crop year.

Second, significant differences among farm size and tenure groups with respect to percentages of farmers applying phosphatic fertilizers to each of the three crops were found only for the following cases: (1) There was a significant difference in the proportion of farmers in different size categories using phos-

phates on cotton and 'barani' wheat; and (2) the percentage of owner operators applying phosphates to irrigated wheat and cotton was significantly higher than for other tenorial classes. With regard (1) there is no clear trend in the percentage of farmers using phosphates on irrigated wheat among the farm size categories, so it is difficult to explain why the variations occur. Among growers of 'barani' wheat, however, there appears to be a greater tendency for operators of large holdings to apply phosphates than those farming small holdings. This may indicate that small farmers are less than willing and able to take the risk of experimenting with the relatively newly available phosphates than large farmers. In the case of (2) it might be hypothesized that owner operators have characteristics which lead them to adopt phosphatic fertilizers, introduced later into Pakistan than nitrogenous fertilizers, more quickly than tenants. Alternatively, it is possible that in areas where owner operators are more common than tenants and owner-cum-tenants, phosphatic fertilizers have been distributed more widely than in other areas.

Additionally, it can be hypothesized that the tenants and owner-cum-tenants are less informed about the benefits of phosphatic fertilizer use in the 'barani' areas. Secondly, the low use of phosphate in 'barani' areas may be due to the financial constraints in case of small tenants who normally bear the full cost of farming operations but have to pay share of the produce ranging from one half to two thirds of the crop harvest to the land-lord. The Government decision to keep the prices of phosphatic fertilizers at a much lower level as compared to nitrogenous fertilizer is, therefore, very important in encouraging the use of phosphatics. Further research will be required to reject or substantiate these hypotheses.

Third, only a small percentage of sample farmers had used any phosphatic fertilizer on each of wheat, rice and cotton. Just five of the 198 farmers who grew 'barani' wheat (2.5 per cent) reported using any phosphates. The highest percentage of farmers using phosphates was found for irrigated wheat and that was only 30 per cent of those who grew the crop. On the other hand, this is substantially higher percentage than the 7 per cent of dwarf wheat farmers who reported using phosphates in a 1969-70 study carried out in the Multan District of the Punjab. Thus, while the percentage of farmers using phosphates remains low, it appears to have increased several fold, at least for irrigated wheat, during 1969-70 to 1975-76 period.

Fourth, the percentage of farmers using some fertilizer on rice was significantly lower than for irrigated wheat and cotton. Again, additional analysis will be needed to explore the reasons for this result.

Finally, the percentage of farmers applying both nitrogenous and phosphatic

fertilizer to wheat under 'barani' conditions was significantly lower than the percentage of those growing irrigated wheat.

Fertilizer Application Rates

Table 4 provides a crop-wise comparison of application rates of nitrogen and phosphate by sample farmers using some fertilizer. Data are provided for wheat, rice and cotton. As before, farmers are classified by farm size, tenurial class and area (irrigated versus 'barani').

A test of difference of means was used to test the hypotheses that the difference in mean application rates of nitrogen and phosphate between crops, areas, farm size categories and tenure classes could be explained by chance. Results of the analysis are as follows :

1. Growers of irrigated wheat and cotton applied significantly more nitrogen per acre than rice growers.*
2. Growers of irrigated wheat used significantly more phosphate per acre than rice growers but not cotton growers.
3. Growers of irrigated wheat applied significantly more nitrogen and phosphate per acre than those growing wheat under 'barani' conditions.
4. Farmers in the 1-5 acre farm size category used significantly more nitrogen per acre than those in the 13-25 acre category for irrigated wheat; 6-12 and 26 and above categories for 'barani' wheat, 13-25 acre category for rice, and 6-12 and 13-25 acre categories for cotton.
5. Owner operators applied significantly more nitrogen per acre than owner-cum-tenants for irrigated wheat, owner-cum-tenants and tenants for 'barani' wheat, and owner-cum-tenants and tenants for cotton.
6. There was no significant difference among either farm size categories or tenurial classes in the mean application rates of phosphate for wheat, rice and cotton.**

* This finding is consistent with results of a 1974 survey of farmers done by ESSO which indicated that farmers applying some fertilizer used an average of 54, 54 and 41 nutrient pounds of nitrogen, respectively, on Mexipak wheat, cotton and IRRI rice. See Pakistan Nitrogen Demand Forecast Study Karachi, Pakistan, October, 1974. Carried by ESSO Pakistan Fertilizer Company Ltd.

** Where differences in means appear by inspection to be significant the null hypothesis can not be rejected because of the combination of small numbers of observation and high variation in the sample application rates.

Several comments should be made about these findings. First, although application rates for all three crops were considerably lower than the recommended rates, actual application rates by sample farmers as a proportion of recommended rates were highest for cotton, followed by wheat and rice. Second, the average application rate of fertilizer among fertilizer users was significantly greater for irrigated than for 'barani' wheat. Third, item "4" above together with the analysis accompanying Table 2 indicates that supplies of fertilizer in the distribution system during the year under study were not only adequate to allow about the same percentage of small farmers to use some fertilizer as large farmers, but also to permit small farmers to use as much or more fertilizer per acre as operators of large holdings.

Fourth, that owner operators in the sample generally applied more nitrogen per acre than tenants and owner-cum-tenants may indicate that some features of tenancy, act as barriers to optimal use rates of fertilizer. Finally, while it is true that small farmers and owner operators using fertilizer tended to apply significantly more fertilizer than other farmer groups in the statistical sense, in absolute terms the difference in the rate was usually not great, seldom exceeding the equivalent of 10 nutrient pounds or one-fifth of a bag of urea on the average.

Changes in Fertilizer Use

Data from the Pakistan Agricultural Census of 1972 permit us to document changes in the proportion of farmers using fertilizer during the years between the census and the present survey. As shown in Table 5 there have been substantial increases in the percentage of farmers using fertilizer operating under each type of tenurial system. These increases are statistically highly significant.

Similar significant increases have occurred in the proportion of farmers using fertilizer on farms of all sizes (Table 6). While the percentage increase is greatest in the largest and smallest size categories, the absolute increase is greatest in the 6 to 12 acre farm category, which includes about 40 per cent of the country's farms. It is clear that all farmer groups including tenants and those operating small holdings, have participated fairly well in the process of fertilizer adoption and consequent gains in productivity.

Credit

Farmers using fertilizer were asked how they had financed their most recent fertilizer acquisition. As shown in Table 7, 48 per cent of sample farmers using fertilizer in irrigated areas reported purchasing fertilizer wholly or partially on credit, as compared to 23 per cent of farmers in 'barani' areas.* The difference in these proportions is significant.

* *Credit includes institutional and non-institutional credit in cash and in kind, i.e., fertilizer.*

Within the irrigated areas the proportion of tenant farmers using credit was significantly greater than that of farmers operating under other tenurial arrangements (62 per cent versus 42 per cent and 25 per cent for owner-cum-tenants and owners respectively). The decision of the present Government to increase the flow of agricultural credit in the country, with emphasis on small and tenant farmers yielded a positive result as indicated by the findings of the survey. Credit received by tenants was mostly in the form of fertilizer provided by landlords. When the effect of tenurial status was controlled for, there was no significant difference among farm size categories in the percentage of farmers using some credit for fertilizer. This indicates that the variations in the percentages of farmers using credit among farm size categories in the irrigated areas simply reflected variations in the frequency of use of credit among farmers within the three tenurial classes.

In the 'barani' areas the hypothesis that there was no significant difference in the proportion of farmers using credit to finance fertilizer either among farm size categories or tenurial classes could not be rejected.

These results indicate that for the areas surveyed, farm size is not significantly correlated with whether a farmer using fertilizer finances it at least partly with credit or with his own resources. In addition, it is apparent that a higher proportion of tenants in irrigated areas used credit for fertilizer than farmers in other tenurial classes, probably because landlords often arrange for purchase and delivery of the input to the farm gate, recovering the tenants' share of the cost at or shortly after harvest. These data do not shed light, however, on the important question of whether lack of access to credit is a principal reason for not using fertilizer or for using less than the amount the farmer desires. This question has been discussed in the report later on.

Table 8 shows the percentage of farmers who used credit with sources for purchasing fertilizer. It is clear that bank credit was relatively of minor importance in financing fertilizer purchases. Of those farmers in the irrigated survey areas who borrowed to finance fertilizer, only 9 per cent reported obtaining institutional credit. This means that only about 4 per cent of the farmers in these areas who used fertilizer financed it wholly or in part with institutional credit. Of the remaining 91 per cent of farmers obtaining fertilizer credit who borrowed from non-institutional sources, landlords were by far the most frequent source of credit, followed by friends and relatives. Commission agents, shopkeepers and agricultural processors were not very important sources of fertilizer credit.

In the 'barani' areas surveyed, friends and relatives were the most frequent sources of fertilizer credit. Bank credit was relatively more important than in the irrigated study areas, but this should not be interpreted as being true generally. The sample size was too small to permit generalization across all

'barani' regions. In fact, 6 of the 7 farmers in the 'barani' areas surveyed who received institutional fertilizer credit were located in a single village. Thus, in 22 of the 24 'barani' villages sampled, no one obtained institutional fertilizer credit.

Sources of Information

Farmers who used fertilizer were asked if they had received information about fertilizer from various possible sources. As shown in Table 9, the most commonly cited source in both irrigated and 'barani' areas was fellow farmers. Another major source was the farm radio programme, as 35 per cent of farmers in irrigated areas and 21 per cent in 'barani' areas reported receiving information about fertilizer over the radio. The third important source was relatives, particularly in the 'barani' areas. A much lower percentage of farmers in both irrigated and 'barani' areas learnt about fertilizer from the agricultural extension staff and newspapers. About one per cent of the farmers said that they had received information from fertilizer dealers or had received advice about use of fertilizer based on soil tests.

It was further investigated how the information sources referred to above influenced the fertilizer application level. The difference-of-means test revealed that farmers' source of information about fertilizer had little influence on fertilizer application levels both in 'barani' and irrigated areas. It appears that level of fertilizer use was more determined by factors, such as, fertilizer price, availability of irrigation water and access to credit rather than farmers exposure to information sources alone.

Distance Travelled by Farmer

The average distance travelled by the farmers to purchase fertilizer was about 4 miles irrespective of irrigated and 'barani' areas. An average distance of 4.3 miles and 4 miles, was generally travelled by the farmers belonging to the 'barani' and irrigated areas respectively. With respect to type of road, the farmers of 'barani' tehsils and those of irrigated ones, covered an average distance of 2.34 and 1.92 miles respectively on 'pacca' roads. On an average the farmers from irrigated areas travelled more on 'katcha' roads than the farmers in 'barani' areas (1.98 miles).

This implies that the effective pull of fertilizer sale outlet is upto a distance of 4 miles, which means that fertilizer should preferably be made available within a radius of 4 miles from farmer's residence in order to ensure its widespread use. This finding has an important bearing on the planning of a fertilizer distribution network.

Reasons For Not Using Fertilizer

Farmers reporting that they had never used fertilizer were asked why they had not. As shown in Table 10, the response occurring most frequently in the predominantly irrigated areas was that fertilizer was too expensive (22 per cent of all responses), followed by shortage of funds, insufficient water, and non-availability of fertilizer (18, 18 and 12 per cent of all responses, respectively). Together these reasons accounted for 70 per cent of the responses farmers gave for not using fertilizer.

In the mainly 'barani' areas surveyed the reasons given were largely the same, but the relative importance of responses was somewhat different. Here the most common reason given for not using fertilizer was that the farmer could not get sufficient water or that this was true because he was in a 'barani' area (33 per cent of all responses). Other frequently cited reasons were that fertilizer was too expensive, the fertilizer source was too far away, and the farmer could not raise sufficient funds to buy fertilizer (25, 12 and 10, per cent of all responses, respectively).

Table 11 shows that the farmers, who had previously used fertilizer but discontinued its use later on, were asked the reasons for the same. The most prominent reasons for discontinuation in irrigated areas ranked in the order; no funds available, fertilizer too expensive/not profitable, insufficient water supply and non availability of fertilizer.

In 'barani' areas, the reasons were essentially the same, except water supply was considered relatively more important as compared to irrigated areas.

The central importance of water availability as it affects farmers' decisions to use or not use fertilizer is once again evident. Even in the predominantly irrigated areas lack or shortage of water was one of the most frequently cited reasons for discontinuing fertilizer use. The response that fertilizer was too expensive was also important in both irrigated and 'barani' areas, but reflected crop fertilizer price ratios prior to the April, 1976 Government decision to lower the retail price of fertilizer and support the prices of major crops.

It appears that lack of funds may currently be relatively more important as a constraint to adoption of fertilizer in irrigated than in 'barani' areas because some of the other barriers to use of the input (such as water availability and physical access to fertilizer outlets) are less serious in most irrigated areas. However, in both areas financial constraints make it difficult for many low-income farmers to obtain fertilizer, a finding which has been confirmed by several other studies in Pakistan.

Relative Importance of Factors Affecting Fertilizer Use.

Table 12 shows the results of the multi-variate analysis, including regression coefficient, F - Statistic, and levels of statistical significance of the individual independent variables.

The F - statistic for the equation as a whole was 37.11, a value which is highly significant. This means that the probability that the regression results occurred by chance sampling error and that the independent variables are really not associated with the probability that a farmer uses fertilizer is considerably less than one-in-a-thousand.

As can be seen in table 12, the independent variables "use of irrigation," "distance of fertilizer source," and "farmer's education" were all highly significant. "Farm size" was significant at the 5 per cent and "ratio of 'pacca' to total miles" (a proxy for quality of road) at the 10 per cent level. The other two variables - "farmer's age" and "farmer's tenurial status" - were not significant.

Turning now to the regression coefficients, the signs of the coefficients seem logically consistent. As expected, use of irrigation, education and better road quality are positively (directly) correlated with adoption of fertilizer. Also as expected, a negative (inverse) relationship exists between distance to the fertilizer source and adoption of fertilizer.

The size of the unstandardized regression coefficients, like the significance levels for the individual independent variables, varied widely. However, this simply reflects the different units in which these variables are measured. These coefficients are most usefully interpreted by incorporating them into the regression model to calculate the probability that a given farmer uses fertilizer. This is done by summing the intercept coefficient and the products of the coefficients of the individual independent variables times any given values of these variables. For example, the model predicts that a farmer using irrigation, living 5 miles by 'pacca' road from a fertilizer outlet, having 3 years of education, and operating 10 acres of land has a probability of using fertilizer of .33 (the intercept coefficient) + (.449x1) + (-.018x5) + (.075x1) + (.02x3) + (.002x10) = .844 or about 84 per cent. If the farmer does not use irrigation, holding other characteristics constant, the probability of his using fertilizer decreases from .844 to .395 (= .844 - .449) a fall of 53 per cent. In contrast, changing farm size from 10 to 2 acres, other factors unchanged, results in a decrease in the probability of a farmer's using fertilizer from .844 to .828, a fall of less than 2 per cent. The model thus provides a means for predicting the effect on a given farmer's

behaviour (use or non-use of fertilizer) when one explanatory variable is changed, other variables held constant. It does not, however, permit anything to be said about the relative cost-benefit ratios of alternative investment such as installation of irrigation facilities versus road improvement.

To summarize, the null hypotheses that access to irrigation, distance to the fertilizer source, education of the farmer, farm size and quality of road linking the farm to the fertilizer source are not correlated with adoption (use versus non-use) of fertilizer are rejected. As measured by their relative significance, use of irrigation is by far the most important explanatory variable, followed by distance to the fertilizer source, farmer's education, farm size and quality of the road linking the farm to the fertilizer source. The hypotheses that the farmer's age and tenorial status have no effect on adoption of fertilizer cannot be rejected.

SUMMARY AND CONCLUSIONS

1. Adoption of Fertilizer

Statistically significant increases have occurred between 1971-72 and 1975-76 in the proportion of farms on which some fertilizer was used (52 per cent versus 70 per cent). These increases occurred on small as well as large farms and on farms operated by tenants as well as owners.

In 1975-76 crop year, there was no significant difference, either among farm size categories or tenurial classes in the proportion of sample farmers using some fertilizer within each predominantly irrigated and rainfed (barani) areas.

Adoption of phosphate lags far behind that of nitrogen both in the irrigated and 'barani' areas.

2. Fertilizer Application Rates

Nitrogen : Farmers operating small holdings (less than 6 acres) applied on the average as much or more nitrogen per acre of wheat, rice and cotton as those operating larger holdings. Owner operators applied on the average significantly more nitrogen per acre than owner-cum-tenants for irrigated wheat while owner-cum-tenants and tenants for cotton and 'barani' wheat.

Phosphate : With one minor exception, there was no significant difference either among farm size categories or tenurial classes, in the average application rate of phosphate to wheat, rice and cotton.

3. Factors Related to Fertilizer Adoption

(a) Irrigation

Regression analysis indicates that in terms of relative significance, use of irrigation was the most important variable associated with the probability that a given farmer used some fertilizer.

Insufficient water was the most common reason given in the 'barani' areas for not using fertilizer (33 per cent of all responses) and the third most common reason in irrigated areas (18 per cent). Insufficient irrigation water was the second most common reason (27 per cent) in the 'barani' areas for the discontinuation of fertilizer use (20 per cent of all responses) and the third most common reason in irrigated areas (16 per cent).

Eighty per cent of sample farmers used some fertilizer in irrigated areas as compared to 45 per cent in 'barani' areas.

(b) Credit.

Shortage of funds was the second most common reason cited in irrigated areas for not using fertilizer (18 per cent of all responses) and the fourth most common reason in the 'barani' areas. Similarly, shortage of funds was the principal reason (30 per cent) for the discontinuation of fertilizer use in the irrigated areas (28 per cent of all reasons) and the third most common reason in 'barani' areas.

Most farmers who applied fertilizer and reported using credit to obtain it, borrowed from non-institutional sources. In irrigated areas, only about 9 per cent of farmers who borrowed and 4 per cent of those who used fertilizer said they had used institutional credit. However, among those who did borrow from institutional sources in these areas, significantly higher proportions of large farmers and owner operators obtained fertilizer credit than small farmers and tenants. The number of farmers in the sample in the 'barani' areas who obtained institutional credit was too small to determine differences among farmer groups.

(c) Physical Access

Regression analysis indicates, that both distance of the farm from the fertilizer source and quality of the road linking the farm to the fertilizer source are significantly related to fertilizer adoption. Availability of desired type at the sale outlet is related to fertilizer use level in irrigated areas. On an average a user farmer travels 4 miles to purchase fertilizer.

(d) Information

The most commonly cited source of information about fertilizer was other farmers. Other important sources were the farm radio programme and relatives. A low proportion of farmers reported receiving information from the agricultural extension staff, newspapers and fertilizer dealers.

A substantial proportion of farmers not using fertilizer could not name a single type of fertilizer. The percentage was significantly higher in 'barani' than in irrigated areas (75 per cent versus 26 per cent).

Less than one per cent of fertilizer users had their soil tested.

(e) Profitability

"Fertilizer too expensive/not profitable" was the most common reason (32 per cent) for the discontinuation of fertilizer use. It constituted the primary reason in the 'barani' areas (23 per cent of all reasons) and the second most common reason (19 per cent) in the irrigated areas. This indicated farmers reaction to high fertilizer prices which prevailed during the survey period (March 1976). The decision of the Government to reduce fertilizer prices in April 1976 and subsequently in October 1978 had gone a way to eliminate this constraint.

Discussion

Amir Muhammad : Before I ask Dr. Goldman to start the discussion, I would like to know the sample size on which these conclusions are based. I think this is very important because the analysis indicates that there is no difference in fertilizer use between farmers of 10 acres range and 2 acres range.

M. E. Tusneem : The regression analysis is based on 724 farmers growing wheat out of 882 farmers surveyed during the crop year 1975-76.

Amir Muhammad : Another important finding of the study is that tenant and landlord use the same amount of fertilizer. My idea of the real situation is that most tenants use fertilizer if the landlord provides it. At least the share-croppers do so. The cash tenancy is another story, if that is the category here then what I am saying is not relevant, but most of the share-croppers in any case get the fertilizer from the landlord. In this case, it would probably not be a fair statement to say that the tenant and landlord use it to the same extent. It is really the landlord using the fertilizer on his lands which the tenant is using.

M. E. Tusneem : Tenant category includes both share-croppers and cash tenants. Secondly, the tenant in Sind is a little different than the tenant in Punjab. In Sind the landlord makes his tenant use fertilizer at about the same rate as he would use at his own farm. For example the survey indicates that tenants in Sind were invariably using a bag of urea and a bag of DAP on wheat which is a fairly high application rate. That is why in the total sample, the tenants and owners did not show any significant difference in fertilizer use.

Amir Muhammad : I will give a little personal experience of fertilizer use in my village. Now, that is just a one-man sample. It is not a detailed analysis or anything. I have got a little land and have used fertilizer on wheat as recommended and that piece of wheat crop really stands out in the whole area. You can almost spot it if you are flying by plane from Rawalpindi to Lahore. Most of the people in the village, some related to me, came to me and admired it. I said, 'Why don't you do it' I have not used any magic. I only put fertilizer. Why don't you use fertilizer?' The answer, in most cases was that they didn't have much money. "How can I buy fertilizer?" they asked. So I said, "I will take you to the bank. The bank will give money and you can get the fertilizer and use it" . They said, "When you get the credit, police starts running after you and I have seen to many people beaten up. I don't want to spoil the life of my family". Then I said to the farmer, "I will guarantee if you do not get money to repay the credit, I will pay it for you. How about that?" Finally, he said, "You know my dying father said, Son don't ever take credit unless it really comes close to death. I shall not just take credit and I will earn myself and put my own hard earned income into my land and make more money". Now what do you do there? I don't know whether this is an isolated instance

or whether there are more instances like that because there you run outside of economics, enter into social attitudes and community beliefs. Apparently, from the data you have here, you did not run across these kind of people.

M. E. Tusneem : We did come across such farmers during the survey. In the micro analysis which will be presented tomorrow you will find similar instances. We found that the farmers in some villages were quite credit shy, while in others they were not. For example in a village near Toba Tek Singh, the farmers were highly credit minded, whereas in another village near Abbottabad, they would not like to talk about credit. So variance in farmers' attitude towards credit was there. The survey, however, presents the average response.

R. H. Goldman : I would like to cover a number of points. Ever since I arrived in Pakistan I have been working in one way or another on fertilizer use. I think there are important questions generated by the study having important policy implications.

The first important question, I think, is how and on what basis we can place judgement about the reliability of this data?

In addition to our underlying statistical theory and some notions about representability of the sample, we can judge reliability of the data on average application rates recorded for various crops. Based on information on the percentage of farmers who were actually using fertilizer and the acreage from the national aggregate estimates under those crops, I carried out the exercise on N.F.C. data. From the overall analysis, we come to 324.4 thousand nutrient tons of nitrogen consumption on wheat, cotton and rice as against a total nitrogen consumption of 443 thousand nutrient tons during 1975-76. This constitutes about 73% of total consumption. The remaining 27% can be attributed to sugarcane, maize and other crops. It is estimated that sugarcane represents about 16% and maize 5% of the total nitrogen consumption. The remaining 6% can be accounted for fodder and other crops. This analysis gives us considerable confidence in the N.F.C. data. There are some other sources of confidence. As Afzal mentioned that Wapda, Master Planning surveyed about 2000 farmers last year and came up with the same regression coefficient on irrigation water as shown by N.F.C. data.

There are some other sources of fertilizer use data. The Agricultural Census of 1972 did not record application rates, but did record users and non-users. I compared the NFC data with the Agricultural Census and I am sorry I did not bring the figures. I can recall there is a difference in the percentage of users which one would expect since one sample is from 1975-76 and the other is 1972. But those were consistent with recording that there is no significant difference across the farm sizes and the percentage of users even in 1972 as recorded by the Agricultural Census.

Agha Sajjad Haider who is sitting here collected samples of the Central Punjab a couple of years ago. He was looking at the sources of income distribution, difference in income distribution and percentage of users and application rates. Application rates are more or less, what are reported in the NFC survey. I think it is an extremely important conclusion because the general belief here and in many developing countries is that somehow small farmers and tenants are excluded from access to modern inputs. Now it may be that small farmers and tenants are excluded from access to some modern inputs in Pakistan.

The NFC's survey indicated that something like 18% of farmers who reported that they discontinued use, because they do not get access to the credit. Many people placed great importance on credit but it seems to me to be a small proportion of such people, where that remained a constraint. If the potential access to the credit is a constraint then how is that we found no difference in the application rates over percentage of users across farm sizes. If credit is really biased towards large farmers one would expect that the large farmers would be the greater users percentage-wise and will also be using more of the inputs. While we do not find that better and we also found that there has been a dramatic increase in fertilizer use since 1965, but even since 1972 almost doubling the availability of nitrogen. How this thing took place if the credit is a substantial constraint and how did it take place in such a way that the small farmers continued to have equal access to fertilizer. It's particularly striking when we find that only 9% of the people are getting credit from the institutional sources. This means that if credit was contributing to the increase in use of fertilizer it must have come from non-institutional sources.

An important point on marketing of physical inputs. I think one generates a number of hypotheses that needed to be tested about the effectiveness of some of our institutional and non-government input market channels and how we may be able to improve the functions of these channels of inputs.

Another interesting thing I found while going through the NFC study and in doing some other work with other sample surveys and in having access to the recent print-outs from the NFC's 'Follow-on Study' is that farmers are using same quantities of fertilizer regardless of the farm size and tenancy type but they use in a very discriminatory fashion. Farmers who do not have access to irrigation water do not use very much. Farmers who have access to irrigation water use a fair amount.

The same farmer will plant 'basmati' rice on part of his acreage and IRRI-6 on another part of his acreage. On 'basmati' he may use no fertilizer at all or he may use at the most 25 pounds of nitrogen, whereas, on IRRI-6 he is using 50 pounds of nitrogen. This tells me that the farmer understands a good deal about his agronomic requirements. He understands that 'basmati' is not

responding well to fertilizer. He understands that it is attacked by the stem-borer more frequently and that the expected rate of return of fertilizer in 'basmati' rice is very low. IRRI-6 responds very well, is prone to stem-borer and its expected rate of return is very high. He, therefore, used more on it. This is the same farmer, on the same farm, with simply two different varieties of the same crop. This tells us something about the farmers. They are not using recommended level of fertilizer because they do not have access to information or extension. They are making the decisions and the decision is made, at least, to a large extent, on the evaluation of the risks and expected economic returns and we have to understand more of the decision making process.

There is another point. If there are such a large number of small farmers who are using fertilizer, these farmers probably have a low amount of marketable surplus. It raises the important question about what is the best way to gain leverage on these farmers through price policy. Is it more effective to raise the prices of out-put of the crop or is it more effective to lower the price of fertilizer? For farmers who are not marketing a large percentage of their crop, the best way to get access to fertilizer is to lower the fertilizer prices. On the other hand, if their marketing is small and proportionate to their crop as Ahmad Saeed Khan once pointed out to me then even a small proportion if marketed at a higher price gives great deal of liquidity. It is an important question because it has implication on the magnitude of subsidy to fertilizer.

The final point relates to methodology. The regression similar to one Tusneem has put up on the screen, the dependent variable is not a continuous variable, such as the amount of Nt. Lbs.fertilizer applied to crop. Interpreting the regression coefficients of these kinds is not very straight forward. In the case of NFC study three important variables, the access to irrigation, the distance from the fertilizer sale outlet and quality of road had a very high statistical significance. That is all I have got to say. Thank you.

Amir Muhammad : May I ask Dr. Bashir for his comments on the study.

Bashir Ahmad : Dr. Amir Muhammad and Dr. Goldman have quoted several studies which support the major conclusion of the NFC study, i.e., almost equal participation of different farm sizes in fertilizer use. I would quote one more study This was on fertilizer use on Mexican Wheat conducted by the Planning and Development Department in 1970. It was a small sample covering just three districts but the results support the conclusions drawn by NFC.

So far as the other major conclusion that application rates were also similar, I have seen the results of another study which gives different results. This was the study undertaken on the Fertilizer Marketing and Distribution in 1970 – a US.AID study. This showed the average off-take much different for different

farm sizes. Now I realise this is quite an old study. I do not know what the coverage was but I think Mr. Afzal would help us out later on the basis of the latest survey done by WAPDA, Master Planning. I guess that contradicts the findings of the NFC, so we need to take a careful note of this conclusion.

Amir Muhammad : What exactly is the conclusion that the speaker is referring to? Is it with respect to the second part, I mean, the amounts of fertilizer use or something else?

Bashir Ahmad : Yes, rates of application. One thing which I have noticed throughout the study is that we are comparing the fertilizer uses at two different points. And coming to the conclusion that the improvement or increase in fertilizer use has been tremendous and deriving a policy conclusion that we should continue with the existing policies. This is something which I cannot support. I think we are comparing the existing level of use with the potential and our requirements of the use level in the high performance countries around the world. We should work hard and review our distribution policies as well as the processing policies to accelerate the fertilizer use. Let me give just one figure. Existing rate of application in Pakistan as compared with some of the high performance countries. These data are for 1975-76. The figures are in Kg/ha of agricultural land. For Pakistan the figure is 22, for Egypt it is 173, for Japan it is 296 and for Korea it is 355. When I thrash these figures I do not find any reason to continue these policies.

Let me talk about the distribution policy. We all know that to develop real efficient marketing/distribution organization you need a lot of time. It is not possible to switch off and on while setting of these organizations. I find that there have been frequent changes in the fertilizer distribution policies so far as public and private sectors are concerned. From the improvement view point, I find that whenever there is abundant stock of fertilizer in the country a policy decision is taken in case of involving the private sector because we think that the public sector cannot handle the large supplies. When the shortage is developed, black-marketing appears and policy decisions come that this blackmarketing is due to the private sector, therefore, let us bring the public sector in. A firm policy decision should be taken so that any agency which you involve in fertilizer distribution is fully developed.

Another point, which I would like to emphasize is that we know that there is one price throughout the country; whether it is a district headquarters, a tehsil headquarters, a 'mandi' town or a village. Now the question is how to ensure the movement of fertilizer right up to the village level. The only handle you have is that of incidentals when fertilizer moves from Karachi to provinces, from the district headquarters to the main storages and to the retail shops. There are incidentals which are provided to enable the dealer to move fertilizer

to the next level. But these all get exhausted in the urban areas and below the 'mandi' level there is no specific incidental which will allow you to move fertilizer from the 'mandi' town to the villages. Secondly, you cannot charge it locally. So if there is no price differential and no incidental differentials, then how can you ensure the development of village level dealership which is so important for spreading the use of fertilizer. I think we should give a hard look to the pricing of the fertilizers as well as to the share of the incidentals. If we want to see that the fertilizer should reach the village level and promote the use of fertilizer then it has been suggested that profitability of fertilizer affects its use. Well, there can be no doubt about this. But I do not subscribe to the recommendation that we should continue the policy of reducing the price of fertilizer. You have seen in the morning the figure of the subsidy burden which just in one year went up by 50%. Now if you go on reducing or keeping the prices at a low level the subsidy burden and the budgetary constraint will be such that will limit the total availability. Now if you lower the price, and supply is not enough to meet the increased demand at that low price what happens we all know that. There is mixing of fertilizer. There is blackmarketing in the fertilizer prices. So I do not subscribe to the policy of continuously keeping the prices at a lower level because that adds to the budgetary burden and therefore reduces the availability.

I feel that we should emphasize that the fertilizer use should be profitable. But there are non-price factors which we tend to ignore. It is very easy to recommend a lower price and manipulate it and it is very difficult to work on these non-price factors. Non-price factors in my view are very important, i.e., the profitability of, say, fertilizer will improve, if you ensure availability of improved seed. The studies show that there is a strong inter-action between the quality of the seed and the fertilizer. If we use two in combination, then you get the results which are much more than the individual results of the two inputs. Fertilizer alone can give you something, seed can give you something, but if you put them together then the total output will be more than the total output of these individual inputs. The third non-price factor could be the knowledge of fertilizer use, knowledge about the timing, about the quantity which could improve the profitability of fertilizer use.

It has come out that water is a very significant factor as Afzal mentioned in the morning session and the NFC study also indicated the water availability. I only want to emphasize that when water is available e.g., in the case of tubewell water, it is not possible to fully utilize the available water unless you supplement the farm power. Therefore, alongwith water, farm power augmentation is essential and there are studies which support this. Further, so far as my knowledge goes, the research on wheat has been concentrated on evolving varieties which could give optimum response by high doses of water. Now if we restrict our research and genetic research aimed at evolving the varieties which give the

optimum response at relatively low level of water and that is one way in which we can solve this water constraint.

Lastly, about credit there is a full session on it. I will just make a very small observation. We consider credit as a problem of loan supply, but there is something on the demand side also. As Dr. Amir Muhammad mentioned that there will be social inhibitions, but I want to mention another point when we consider the demand. It is the cost of the credit which is important. When we consider the cost of credit we generally have only the interest rate in mind but there is another very important factor which the farmer has to bear in getting access to credit. This is known as the transaction cost. If interest plus transaction cost is high, this may be inhibiting farmers' demand when farmer goes to non-institutional sources. This is not an irrational decision for two reasons; one is that the non-institutional credit particularly friends and relatives, it is without interest and secondly, even if there is interest rate it is at a very low rate as compared to institutional. The transaction cost is zero. There are studies which indicated that transaction cost may be as high as 40-60% on bank credit. So in that case it is not the interest but the other costs which farmers have to bear which inhibit their demand for credit. I think we should give a hard look to the demand side of the credit. Thank you.

Amir Muhammad : Thank you Dr. Bashir for really covering a large number of factors. Tusneem, would you like to respond in the end?

M. E. Tusneem : That would be better.

Amir Muhammad : I would like to quickly mention about wheat research business. There is no doubt that all the research done on crops in Pakistan emanated from the Punjab Agricultural College and Research Institute which is now University of Agriculture, Faisalabad. The college was established only for irrigated agriculture primarily. So all the focus of the agricultural research in Pakistan has been essentially on irrigated agriculture, not considering the water a constraint. This factor is now becoming very obvious. I may mention that we, in our wheat programme, are trying to see the performance of different wheat varieties under drought conditions or low water availability conditions.

One thing which struck me was that from your data on information about fertilizer' shows that we could almost wind up the extension department. If I were making policy it would mean to me that we should put that money into radio which we are spending on our extension. Now what happens to the field plots and trials? Have they got any effect on fertilizer use?

M. E. Tusneem : I think perhaps they are categorised under fellow farmers because trials/demonstrations are laid out at farmers' field anyway.

Amir Muhammad : What were the average yields of various classes of land holdings? If this is true that all classes of land holdings are using fertilizer to about the same level then I think their yield level should also be the same. In fact, it has been mentioned I think in the World Bank Report that the small farmers have a higher productivity as compared to the large farmers. I would like to know about it.

M. E. Tusneem : Unfortunately, we got no data on yields in the present report but the Follow-on Study which is currently under way does have data on this aspect. In fact the preliminary data that had come out, seems to indicate that yields are also in the same order as the fertilizer use among farmers of different size categories.

Amir Muhammad : Another factor which you have totally crossed over is that when you talk of a two acres farmer he probably does not use much fertilizer if he has got three buffaloes and a pair of bullocks he is probably getting enough quantity of fertilizer or if he has got a flock of sheep he is putting it there. He probably does not use too much of chemical fertilizer. Now these are added variables which probably were not collected in your study. Let us now move on to Dr. Sharif for his contribution to this session.

M. Sharif : Thank you Mr. Chairman. I know that the time is short, so I would not be taking much of your time. I would compliment NFC and Dr. Tusneem for really an excellent job that has been done by them. I am happy to note that Dr. Goldman has verified the credibility of the investigation through figures. I am equally happy to find that even from Government's point of view the results of the investigations are extremely satisfying. In this way, the Government has a very strong instrument with it to take policy decisions based on some factual data.

Purely from farmers' point of view it is equally satisfying to us in more than several ways. Uptil now it has been the thinking that the large farmers are the centre of all sort of benefits. They are the exploiters of the modern technology and take away all the inputs that have been made available in the country. The investigation tells us once for all that it is not only the bigger farmer who is taking advantage of modern technology and using bigger chunk of fertilizer but it is also the smaller farmer who is going along with him.

One question which I was unable to reconcile myself is from the Chairmans' comment regarding tenants. I would concede that the situation in Punjab and Frontier is slightly different than probably in Sind where we have a large segment of bigger owners. They are the main suppliers of chemical fertilizer. All the fertilizer that is being used by the tenants is actually supplied by the owner. I would pose that question to Dr. Tusneem to try to verify if there is no duplication of the figures with the fertilizer.

One other important factor which the Chairman has referred to is that the progressive or the bigger farmers in addition to doing something for themselves have also demonstrated a very effective educational role in spreading the modern technology. If we take fertilizer as the key input which is really the most effective input to increase production, the major source of fertilizer use, as the table indicated earlier, has been the farmers who have been using the fertilizer. I would not say that it's the extension department. The extension department could play the role effectively if they guide the farmers in using proper balanced fertilizer.

Another question relates to credit facilities which are being enlarged tremendously from year to year. Government has been trying to do its best, but only 9% of the credit has come from the institutional sources. I recall an earlier study carried out in Comila almost about 15 years ago. This was the first study of its kind where they tried to determine farmers' credit requirement. The report indicated that only 11% of the credit requirements of the farmers were being met from the institutional sources. This investigation has revealed that only 9% of farmers' requirement is being met by institutional credit. What really we have to see is, whether the credit facilities are available to 9% farmers or there are some bottle-necks. As a farmer I would see that there are large number of obstacles. An average farmer does not go to a credit institution. He does not have the time to make the repeated trips in order to obtain small amounts of credit.

On the question of subsidy raised by Dr. Goldman and Dr. Bashir, I fully agree that subsidies are building up and they are adding to our expenditure. Huge amounts are being spent from year to year. But we have to consider this question not in isolation. I cannot link it with price, the price that the farmers get. We all know that the farmers do not have enough of their resources to buy all inputs, therefore, either he could have the resources and those resources can only come up if his total income gives him saving to buy the inputs, or the other alternate is that the inputs have to be cheaper. I would just recall one instance. In 1965 we made a small study on wheat and we found out that in East Punjab, India the price of wheat at that time was Rs. 45 per maund, whereas, here in Pakistan the price was Rs. 17, even which was later on reduced to Rs. 15. The cost of production in the two regions was almost the same. This can give you some idea that if that particular crop becomes economical for the farmer and the farmer feels that he is going to get a just return from that particular crop surely he would devote more time and try to put in larger amounts of inputs and then get better returns. Then he is saving to buy the inputs. So we have to think in terms of reducing subsidies and as a farmer I am for it. I think the time has come when all the subsidies should be removed, but we have to keep in view the question of price.

In the end I would say that study is really very meaningful both to the Government and the farmer. I feel that the investigation has brought out some very important points which should be kept in view in formulating future policies.

Amir Muhammad : The next speaker is Mr. Mansur Hussain.

Mansur Hussain : Mr. Chairman, Ladies and Gentlemen. When we start talking about fertilizer distribution, how to channelise it, how to get it to the farmers, the problems remain the same. If at this stage we could not regularise the 'Atta' supply how can we regularise fertilizer? In no time so many difficulties will crop up if we give it to the private sector. All of a sudden the Government makes a policy decision that it should be reverted back to the public sector. Then there is a new approach and that will be the cooperative. All sort of experiments are continued.

We see the surveys are giving us real insight into the problem. The problem is, have we changed our economic conditions? We say that we are deficient in wheat and we should use more fertilizer, more water, more credit etc. and then we can meet the food sufficiency, but the question is why are we deficient in wheat?

Amir Muhammad : Tusneem, would you like to respond to the various comments made by the panel.

M. E. Tusneem : Just quickly, I'll go over the points raised by Dr. Bashir. He disagreed with survey results on fertilizer application rates primarily based on 1970 study which would be little unfair to compare with 1976 statistics. A rapid development has taken place in the fertilizer consumption during these 6 years. The fertilizer consumption in fact has doubled during the period 1970-1975. So the extra fertilizer had not only gone to large farmers but also to small farmers. If we compare 1975-76 statistics with our 'Follow-on-Study' (1977-78), essentially in the same universe, with the same methodology, with slight improvement here and there, the preliminary findings confirm the results of 1976 data in terms of the fertilizer application rates among different farm sizes and tenurial classes. Also data of Quaid-e-Azam University on the subject can be quoted. Although it gives some regional variations, like small farmers use more fertilizer in NWFP, and large farmers use more in Sind, yet we aggregate these data on a national level, differences among different farmers size categories are insignificant.

There was a mention of village level supply which would be dealt in the distribution session tomorrow, so I would not talk about it. One thing however, I would like to point out that the farmers' door step is a relative thing. It is not as important as we think. For instance, in 1975-76 a farmer travelled on an

average about 4 miles to get the fertilizer supplies, while in 1977-78 he travelled 6 miles to get the fertilizer supplies, although the fertilizer consumption in the country was much higher in later year. So if the availability is adequate, farmer will get at a lesser distance. If it is a short supply situation he has to travel more. But it appears once he is addicted to fertilizer use he would use it any way.

Regarding comment on fertilizer prices, the study made no recommendation to lower fertilizer prices. The recommendation is to rationalize the crop-fertilizer-price relationship, and this was pertinent in 1975-76 when the price of wheat was Rs. 37 and price of urea was Rs. 75.

Now regarding Chairmans' comments on average yield of different farmers, data of our 'Follow-on-Survey' is in the process of analysis. This would answer a lot of your questions because we have gone into detailed analysis on relationship between fertilizer use and productivity among farmers of different sizes and tenancy.

Regarding Dr. Sharif's observation on tenants versus owners, there was no duplication as far as the sampling procedure was concerned. Information about the fertilizer application rate regarding tenant was collected directly from the tenants and that of owner from the owner himself or his farm manager.

On farmers' credit requirement, we must be careful in interpreting the 9% figure. There is a strong relationship between non-institutional credit and fertilizer use which has to be looked into while relating institutional credit with fertilizer use.

Summarising in the end, there are primarily three recommendations which emanate from this study. Firstly, improving water use efficiency both in the irrigated and 'barani' areas. Secondly, improving the effectiveness of information source particularly radio which is the most frequent source for majority of the farmers and the extension worker on which we are investing a lot, but return is not commensurate. Thirdly, improving fertilizer availability which is primarily a question of supply. Thank you, Mr. Chairman.

M. S. Kakli : Having heard Tusneem, Goldman and Bashir, it seems to me that one of the most important findings of this study is that there is no significant difference in the per acre use of fertilizer by the small and large farmers. This is a very important finding having far reaching policy implications. Our future policies should flow from this finding.

Dilawar Ali Khan : My question goes to Dr. Goldman. I think either my data is

wrong, or calculations are wrong. I have worked on the same statistics that you have done. As I see looking to Punjab and I think that Punjab compared to Sind and NWFP must be better in fertilizer use. In 'barani' Punjab we have 2 nt. lbs. per acre and you are giving something like 27 nt. lbs for wheat. And the most productive areas of Punjab comprising the districts of Sahiwal, Faisalabad and Multan, the highest dose in 1975-76 is at 40 nt. lbs. per acre. I have the figures. They range from 12 to 32 nt. lbs. I do not see that we are able to see NFC data to come out with an estimate that could give us the national picture. It is a substitute and it must be realised that the sample was not basically designed to be blown up to get a national picture.

The second thing goes to Dr. Tusneem. I think this is the problem of aggregation. You should represent something along the regional lines, the provincial lines particularly when we are talking about the use level on different tenancy categories and farms. As Dr. Sharif very rightly pointed out that the tenant in Sind who is not making any decisions by himself has a landlord doing this. I doubt if you were able to by-pass the landlord and had access to the tenant to get information.

I think when you were talking about fellow-farmers as the source of information and in this way discredited the extension, I think there was a little bit of mis-calculation involved there. From whom did they learn when they stated so? Fellow-farmer is an out-come of the effort of somebody, could be radio, or could be the extension worker.

Then we are saying landlord as a source of credit, we are saying you must qualify for which category of owners or only tenants. Thank you.

Amir Muhammad : Have you any response quickly to this?

M. E. Tusneem : I think the basis of your (Dilawar) calculations is wrong. I am confident that Dr. Goldman's calculations are correct, as there is a way to cross-check these. You are trying to compare application rate per cropped acre with fertilizer use rate given in the survey which are per fertilized wheat acre. These are not supposed to be the same.

R. H. Goldman : Let me just clarify what we did. We built up the sample step by step. We could all do it again and see it. I may inform you (Dilawar) you made mistakes. We did the calculations and compared it with national consumption and came out with the conclusion that the NFC under-estimated the total amount of fertilizer used in 1975-76. But as I have already mentioned that NFC data did not include sugarcane and maize which accounted a good deal for the under-estimate. Now what you have done Dr. Dilawar and I find your

figures are not correct, you have taken some Punjab information and some information about total availability of the Punjab and divided that by crop acreage and you have come out with lower fertilizer use per cropped acreage, and compared it with NFC figures which are for fertilizer acreage only. You had not reconciled with their (NFC) analysis. Taking data about availability at provincial level and comparing it with NFC data on national level is another anomaly in your calculation. Thank you.

Amir Muhammad : Thank you Dr. Goldman. This has been a very exciting session. I am thankful to Tusneem, panel discussants and the participants for making this important session fruitful.

TABLE 1
 Characteristics of the Sample Tehsils/'Talukas'

Tehsil	Source of water	Major crops	Distribution of Farms by Size (Percentages)				Percentage Farms Operated by		
			1-4.9	5-12.5	12.6-24.9	25 and above	Owner	Owner-cum-tenant	Tenant
Charsadda	Irrigated	Wheat Maize Sugarcane	60	31	7	2	34	18	48
Hangu	Partly Irrigated	Wheat Maize	68	27	4	1	70	16	14
Abbottabad	Rainfed	Wheat Maize	74	22	4	-	84	12	4
Gujar Khan	Rainfed	Wheat Maize	35	45	15	5	60	36	4
Campbellpur	Rainfed	Wheat Coarse Grains	39	36	17	8	45	34	21
Dipalpur	Irrigated	Wheat Cotton Fodder	25	36	23	16	31	17	52
Rajanpur	Irrigated	Wheat Cotton Fodder	20	37	25	18	24	20	56

T.T. Singh	Irrigated	Wheat Fodder Sugarcane Cotton	31	45	19	5	44	33	23
Hafizabad	Irrigated	Wheat Rice Fodder	16	40	28	16	37	24	39
Isa Khel	Partly Irrigated	Wheat Pulses	20	25	27	28	36	43	21
T.A. Yar	Irrigated	Wheat Cotton Fodder	9	55	26	10	21	8	71
Gambat	Irrigated	Wheat Cotton Fodder	35	44	14	7	48	22	30
Mirpur Sakro	Irrigated	Pulses Rice Barley	22	52	18	8	28	12	60
Kambar	Irrigated	Rice Pulses Wheat	34	52	12	2	26	14	60
Matli	Irrigated	Wheat Rice Sugarcane Cotton	9	50	31	10	28	7	65

85

Source : Agriculture Census 1972

48

TABLE-2

Number and Percentage of Farmers Using and Not Using Fertilizer

Farm size/ Tenurial status	Users		Non-users		Standard Error of Proportion
	No.	%	No.	%	
Irrigated Areas : All Farm Size (Acres)	519	79.6	131	20.4	1.6
1 – 5	138	79.2	36	20.8	3.1
6 – 12	203	78.6	55	21.4	2.6
13 – 25	123	79.1	31	20.9	3.3
26 and above	55	85.7	9	14.3	4.4
Tenurial Class					
Owner	171	79.3	41	20.7	2.8
Owner-cum-tenant	97	79.0	26	21.0	3.7
Tenant	251	79.9	64	20.1	2.3
Barani Areas : All Farm Size (Acres)	103	45.3	129	54.7	3.2
1 – 5	62	46.0	75	54.0	4.2
6 – 12	28	43.9	36	56.1	6.1
13 – 25	9	45.0	12	55.0	11.1
26 and above	4	45.4	6	54.6	15.0
Tenurial Class					
Owner	74	49.0	80	51.0	4.0
Owner-cum-tenant	21	38.9	33	61.1	6.6
Tenant	8	36.0	16	64.0	9.6

TABLE 3

Percentage of Farmers Applying Nitrogenous (N) and Phosphatic (P)
Fertilizer to Wheat, Rice and Cotton*

.....Percentages

Farm Size/ Tenurial Status	CROP					
	Wheat		Rice		Cotton	
	N	P	N	P	N	P
Irrigated Areas : (All) Farm Size (Acres)	78	30	63	17	78	21
1 – 5	76	27	65	17	72	20
6 – 12	75	30	60	19	81	22
13 – 25	81	28	64	12	73	14
26 and above	92	43	71	17	91	39
Tenurial Class						
Owner	81	38	63	16	78	34
Owner-cum-tenant	80	28	65	14	79	18
Tenant	76	26	62	18	78	15
Barani Areas : (All) Farm Size (Acres)	29	3				
1 – 5	29	0				
6 – 12	28	0				
13 – 25	23	12				
26 and above	37	11				
Tenurial Class						
Owner	33	3				
Owner-cum-tenant	21	1				
Tenant	26	4				

- * Farmers who applied compound fertilizers such as DAP and Nitrophos are credited with having applied both N and P to the crops.

TABLE 4

**Average Application Rates of Nitrogen (N) and Phosphorus (P) to,
Wheat, Cotton and Rice by Farmers Using Some Fertilizer**

.....Nt. Lbs.

Farm size/Tenurial Status	CROPS					
	Wheat		Rice		Cotton	
	N	P	N	P	N	P
Irrigated Areas:(All) Farm Size (Acres)	55.1	16.8	47.0	7.4	58.5	12.5
1 – 5	58.8	17.9	53.0	8.8	69.9	12.5
6 – 12	54.6	17.3	46.7	9.2	58.7	13.4
13 – 25	50.0	12.2	43.5	5.2	50.0	6.0
26 and above	60.4	22.9	42.4	1.5	60.3	23.1
Tenurial Class						
Owner	59.6	20.6	47.2	6.9	65.0	19.4
Owner-cum-tenant	50.2	16.3	42.9	4.6	52.1	8.3
Tenant	54.0	14.2	48.4	8.7	56.9	9.8
Barani Areas : (All) Farm Size (Acres)	27.2	2.3				
1 – 5	36.0	N.A.				
6 – 12	15.9	N.A.				
13 – 25	22.1	7.7				
26 and above	21.1	10.3				
Tenurial Class						
Owner	31.9	2.0				
Owner-cum-tenant	19.6	3.9				
Tenant	15.1	0.3				

TABLE 5

Percentage of Farmers Classified by Tenorial Class Using Fertilizer

..... Percentages

Year	All Farms	Owner Operated Farms	Owner-cum-tenant Farms	Tenant Farms
1972	52	45	52	59
1976	70	66	67	77

TABLE 6

Percentage of Farmers Classified by Farm Size Using Fertilizer

..... Acres

Year	All Farms	1-5	6-12	13-25	26 and above
1972	52	44	54	58	51
1976	70	64	72	75	80

TABLE 7

Number and Percentage of Farmers Using Fertilizer Credit

Farm Size/Tenurial Status	Credit Users		Standard Error of Proportion
	No.	%	
Irrigated : (All) Farm Size (Acres)	248	48	2.2
1 – 5	60	44	4.1
6 – 12	116	57	3.5
13 – 25	57	47	4.5
26 and above	15	28	6.1
Tenurial Class			
Owner	41	25	3.4
Owner-cum-tenant	41	42	5.0
Tenant	166	66	3.0
Barani : (All) Farm Size (Acres)	25	23	4.2
1 – 5	15	23	5.3
6 – 12	9	31	8.6
13 – 25	0	0	N.A.
26 and above	1	20	17.9
Tenurial Class			
Owr.er	18	23	4.8
Owner-cum-tenant	4	19	8.6
Tenant	3	33	15.7
All Farmers	273	44	2.0

TABLE 8

Percentage of Farmers Borrowing for Fertilizer Classified by Source of Fertilizer Credit

Farms Size/Tenurial Status	Institutional		Non-Institutional					All Non-Institutional	Percentage
	Bank/Cooperative	Friends or Relatives	Land-lord	Commission Agent	Shop-keeper	Agricultural Processor	Others		
Irrigated: (All) Farm Size (Acres)	9	12	65	5	3	3	3	91	91
1 - 5	7	20	58	12	3	0	0	93	
5 - 12	7	9	72	2	2	3	5	94	
13 - 25	11	9	63	6	4	7	0	89	
26 and above	29	14	43	7	0	7	0	71	
Tenurial Class									
Owner	23	20	13	13	8	15	8	77	
Owner-cum-tenant	18	18	51	5	5	3	0	82	
Tenant	4	8	80	4	1	1	2	96	
Barani: (All)	28	52	4	0	0	16	0	72	

TABLE 9

Percentage of Farmers in Irrigated and Barani Areas Receiving Information
About Fertilizer from Various Sources

..... Percentages

Area	Information Sources						
	Agricultural Extension Staff	Radio	Newspapers	Other Farmers	Relatives	Fertilizer Dealers	Others
Irrigated	8	35	3	39	11	1	3
Barani	6	21	4	38	29	-	2

- NIL

TABLE 10

Farmers' Reasons for Not Using Fertilizer

Percentage of all Responses

Area	In-sufficient water	Too Expensive	Lack of Funds	Source too far away	Un-availability	Lack of Knowledge	Water logged	Others
Irrigated	18	22	18	8	12	7	6	9
Barani	33	25	10	12	4	8	-	8

- NIL

TABLE 11

Reasons for Discontinuation of Fertilizer Use

Area	REASONS															
	Too expensive/Not profitable		Sale outlet Far away		Not Available		No Funds		Insufficient water		No Interest		Others		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Irrigated	12	19	5	8	5	8	19	29	10	16	6	9	7	11	64	100
'Barani'	11	32	3	9	—	—	8	24	9	26	2	6	1	3	34	100
TOTAL	23	24	8	9	5	5	27	28	19	19	8	8	8	8	98	100

— Nil

Table 12

Regression Coefficients, F – Statistic and Levels of Singificance of Variables Related to the Probability of Farmers' Use of Nitrogenous Fertilizer on Wheat in Bzrani and Irrigated Areas

Independent Variable	Unstandardized Regression Coefficient	F – Statistic	Level of Significance
Use of irrigation	0.449	135.54	0.001
Distance to fertilizer source	(–) 0.018	24.72	0.001
Farmer's education	0.020	16.38	0.001
Farm size	0.002	4.51	0.05
Ratio of 'pacca' to total miles	0.075	3.63	0.10
Farmer's age	(--) 0.001	0.26	N.S.
Farmer's tenurial status	() 0.003	0.01	N.S.

N.S. – Not Significant

Third Session

INSTITUTIONAL CREDIT SURVEY

Chairman

Mr. A. Jamil Nishtar
Chairman,
Agricultural Development Bank of
Pakistan, Islamabad.

Panel Discussants

- 1. Mr. Saeed Ahmed Qureshi**
Chairman,
Planning and Development Board,
Government of the Punjab,
Lahore.
- 2. Mr. I. D. Junejo**
Member,
Pakistan Banking Council,
Karachi.
- 3. Mr. Muhammad Yusuf**
Managing Director,
Federal Bank of Cooperatives,
Islamabad.

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INSTITUTIONAL CREDIT SURVEY*

Objectives

The study was intended to explore a number of agricultural credit issues of interest to the Government and the banking community. Particular emphasis was placed on assessing the bank's performance in reaching farmers of various farm sizes and tenorial statuses including small operators. Also examined closely was the comparative repayment history of different groups of farmers borrowing under various collateral arrangements.

Specific questions addressed were as follows :

- 1) Have small farmers and tenants received an equitable share of production credit supplied by the banks? How has this varied by region and bank?
- 2) How quickly have institutional lenders processed production loan applications? How has this varied by collateral? By bank?
- 3) What has been the comparative repayment history of small versus large farmers? Owners versus tenants? Loans secured against personal security versus Pass-Book secured and land-secured loans.
- 4) What are the characteristics of the supply of production credit?

Universe

Data were collected from the same 15 sample tehsils/'talukas' under GFI.

Unit of Study

The unit of study was a bank branch extending agricultural production credit in areas surveyed during fiscal year 1975-76. Banks from which data were obtained were :

- 1) Agricultural Development Bank of Pakistan (ADBP).
- 2) National Bank of Pakistan (NBP).
- 3) National Bank of Pakistan (Agricultural Credit Programme).
- 4) Habib Bank Limited (HBL).
- 5) United Bank Limited (UBL).
- 6) Muslim Commercial Bank Limited (MCB).
- 7) Allied Bank of Pakistan Limited (ABL).

Mrs. Fauzia Najam, General Manager (Finance), Pak-Arab Fertilizers Limited, Lahore.

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Sample Distribution

Table 1 gives sample distribution bankwise and indicates that out of the total 408 bank branches, 166 were extending agricultural production credit.

Information was not collected from the agricultural cooperatives because of the difficulties of getting reliable data in the required form.

All bank branches providing any kind of agricultural credit in the sample areas were included in the survey. As Table 1 shows, 166 of 408 branches in the 15 tehsils/'talukas' (41 per cent) reported disbursing agricultural credit in 1975-76. However, only 19 branches in 'barani' areas (11 per cent) made agricultural loans as compared to 147 in the irrigated areas (61 per cent).

MAIN FINDINGS

Production Credit Supply Characteristics

1. Short-term production lending made up a much larger part of the banks' agricultural credit programmes in irrigated than in 'barani' areas surveyed :

While 61 per cent of the bank branches provided some agricultural production and/or development credit in irrigated areas, only 11 per cent did so in 'barani' areas.

All banks made production loans in the irrigated tehsils/'talukas', but only the ADBP and the NBP's ACP provided more than a negligible number in 'barani' areas.

Both the average number of loans per branch extending production credit and the average size of a loan were significantly greater in irrigated than in 'barani' areas (81 versus 55 loans per branch and Rs. 2,382 versus Rs. 607 per loan, respectively).

Thirty-one per cent of total agricultural credit disbursements financed seasonal inputs in irrigated areas and only 7 per cent in 'barani' areas.

2. The relative amount of stress given to production lending (as opposed to development lending) varied widely between banks :

ABL and the NBP's ACP provided 80 and 78 per cent of their agricultural lending respectively, in the form of production credit, ADBP and MCB only 12 and 14 per cent respectively.

3. By far the most important use to which production credit was put was financing of fertilizer :

Ninety-one percent of all loans comprising 77 percent of disbursements were made for fertilizer alone.

When multipurpose loans including some fertilizer credit were added, fertilizer loans made up 99 percent of all loans and perhaps an equal percentage of total disbursements.

4. Most production credit was released against personal sureties :

Eighty percent of all loans were secured against personal sureties; 17 percent with Pass Book; 3 percent against land mortgage.

Allocation of Production Credit Among Farmer Groups

1. Small farmers obtained a significantly smaller share of both loans and loan funds than expected under an equitable lending programme :

Farmers in the survey area with holdings of 12 acres or less operated 74 percent of the farms in the survey area comprising 35 percent of total farm area but received only 39 percent of bank loans and 24 percent of disbursements.

2. Tenants and owner-cum-tenants captured a significantly smaller proportion of both loans and loan funds than expected under an equitable lending programme :

Tenants operating 37 percent of the farms in the survey area and comprising 31 percent of farm area received only 26 percent of loans and 19 percent of disbursements.

Owner-cum-tenants operating 20 percent of the farms in the survey area comprising 25 percent of farm area but received only 14 percent of loans and 11 percent of disbursements.

3. The relative amount of stress given to lending to small farmers, tenants and owner-cum-tenants varied widely between banks :

The NBP's regular branch operation provided 57 percent of its production loans and 51 percent of its disbursements to farmers tilling 12 acres or less; while UBL extended only 20 percent of loans and 9 percent of disbursements to the farmers falling under this category.

The NBP's ACP allocated 24 percent of its loans and 22 percent of its disbursements to tenants; HBL and ABL less than 0.5 percent of both loans and disbursements.

ABL provided 45 percent of its loans and 38 percent of its disburse-

ments to owner-cum-tenants, UBL 19 percent of loans and 8 percent of disbursements.

Loan Processing Time

1. For the sample as a whole, significantly less time was required to process loans secured with personal sureties than those secured otherwise :
 - Eighty-three percent of personal surety loans were processed within 3 days of receipt of the application; 49 percent of those secured with Pass Book; 35 percent of land-secured loans.
 - Six percent of personal surety loans required more than 30 days for processing; 16 percent of those secured against Pass Book; 38 percent of land-secured loans.

2. The general pattern with respect to relationship between loan processing time and type of collateral for all banks was fairly consistent with patterns observed in the operations of individual banks. While significant differences were found in loan processing time by type of collateral for a given bank, personal surety-secured loans were processed more expeditiously than both Pass Book-secured and land-secured loans and Pass Book-secured loans were processed faster than land-secured loans :
 - Four banks processed a significantly greater proportion of personal surety-secured loans than of Pass Book-secured loans within 6 days of receipt of the application.
 - Three banks processed a significantly greater proportion of personal surety-secured loans than of land-secured loans within 6 days.
 - A significantly smaller proportion of personal surety-secured loans than of Pass Book-secured loans required more than 30 days for processing in the case of six banks.
 - A significantly smaller proportion of personal surety-secured loans than of land-secured loans required more than 30 days for processing in the case of three banks.
 - A significantly smaller proportion of Pass Book-secured loans than of land-secured loans required more than 30 days for processing in the case of two banks.
 - No bank processed land-secured loans faster than personal surety-secured or Pass Book-secured loans.

3. In general the banks processed production loans promptly :
 - Seventy-six percent were processed within 3 days and 86 percent

within 6 days.

Four lenders processed 90 percent or more of their loans within 6 days (NBP, NBP (ACP), ABL and UBL). The ADBP, however, processed only 63 percent of its loans within 6 days and required more than 30 days to process 25 percent of its loans.

Loan Recovery Performance

1. The proportion of loans secured against personal sureties recovered within the contractual time limit was significantly greater than that of both Pass Book-secured and land-secured loans and the proportion of Pass Book-secured loans recovered on or before the due date was significantly higher than that of land-secured loans :

Fifty percent of personal surety-secured loans were recovered on or before the due date; 34 percent of Pass Book-secured loans, 16 percent of land-secured loans.

2. A significantly smaller percentage of personal surety-secured loans was unrepaid (overdue) at the end of 1975-76 than that of both Pass Book-secured and land-secured loans and the proportion of Pass Book-secured loans unrepaid was significantly smaller than that of land-secured loans.

Thirty-nine percent of personal surety-secured loans were unrepaid; 47 percent of Pass Book-secured loans; 76 percent of land-secured loans.

3. The relative recovery performance observed for loans advanced under various security arrangements was heavily influenced by differences in lending levels and recovery performance among banks :

The comparatively poor performance for loans secured with land was greatly weighted by the activities of the ADBP, which made 62 percent of these loans, recovered only 7 percent of them on or before the due date and had 91 percent of them unrepaid at the end of the survey year.

The relatively good repayment experience with personal surety-secured loans was to a great extent the result of the large proportion (50 per cent) of all such loans made by the NBP's ACP and its success in recovering most of them (66 percent within the contractual time limit; only 29 percent unrepaid at the end of 1975-76).

4. Variations in loan recovery performance for the sample as a whole were much more closely associated with interbank variations in recovery performance than with differences in the type of collateral supporting the loan :

For individual banks, significant differences by type of collateral in proportions of loans recovered within the contractual time limit were observed only in one case (the ADBP), where a significantly greater proportion of personal surety-secured loans was recovered within the contractual time limit than of both Pass Book-secured and land-secured loans.

For individual banks, significant differences by type of collateral in proportions of loans unrecovered (overdue) were found in the operations of four banks (ADBP, HBL, UBL and MCB). Two of these banks had a significantly smaller proportion of personal surety-secured loans unrepaid than of one (but not both) of the other types of loans; three had a significantly smaller proportion of Pass Book-secured loans unrepaid than of one (but not both) of the other types none had a significantly smaller proportion of land-secured loans unrepaid than of either personal surety-secured loans or Pass Book-secured loans.

5. Overall and irrespective of the type of security supporting the loan, several of the banks experienced severe difficulties in recovering loans fund:

ABL, NBP (regular branch operation) and UBL had 77, 62 and 57 percent of loans unrepaid respectively.

The NBP's ACP had the least problems, but even so, had 28 percent of its loans unrecovered at the end of 1975-76.

6. Farmers operating 12 acres or less repaid a significantly higher proportion of their loans on or before the due date than those managing larger holdings :

Fifty-two percent of farmers operating 12 acres or less repaid their loans within the contractual time limit; 45 percent of those with 13-25 acres, 41 percent of those with 26-50 acres, 35 percent of those with more than 50 acres.

7. Farmers operating 12 acres or less had a significantly smaller percentage of loans unrepaid at the end of 1975-76 than those managing larger holdings :

Farmers operating 12 acres or less had 38 percent of loans unrepaid;

13–25 acres 43 percent 26–50 acres 43 percent; more than 50 acres 41 percent.

8. Owner-cum-tenants repaid a significantly higher proportion of their loans on or before the due date than both owners and tenants and owners repaid a significantly higher percentage of their loans within the contractual time limit than tenants :

Owner-cum-tenants repaid 68 percent of their loans by the due date; owners 47 percent; tenants 36 percent.

9. Owner-cum-tenants had a significantly smaller proportion of loans unrepaid at the end of 1975-76 than both owners and tenants and owners had a significantly smaller percentage of loans unrepaid than tenants :

Owner-cum-tenants had 24 percent of their loans unrepaid, owners 40 percent; tenants 55 percent.

Further Research

The large differences in loan repayment behaviour of owners, owner-cum-tenants and tenants is surprising. The data suggest that owner-cum-tenants are much better risks than either owners or tenants and that tenants are least likely to repay. However, the relative efficiency of the bank making the loan may be as important a determinant of repayment as the tenurial status of the borrower. The NBP (ACP), for example, which had the best overall repayment performance among banks operating in the survey areas, contributed a much greater proportion of all banks' loans to owner-cum-tenants than it did to all banks' loans to owners and tenants. The extent to which tenurial arrangements affect farmers' willingness and ability to repay requires further study.

Discussion :

The discussion on the Institutional Credit Survey session could not be recorded because the proceedings of this session were not available for transcription due to technical problems in the recording system.

TABLE 1

Number of Bank Branches included in the Sample

Bank	AREA				TOTAL	
	Irrigated		Barani		Branches	Branches reporting agri. credit
	Total Branches	Branches reporting agri. credit	Total Branches	Branches reporting agri. credit		
ADBP	11	11	5	5	16	16
NBP	42	21	41	—	83	21
NBP (ACP)	11	11	2	1	13	12
HBL	51	34	34	3	85	37
UBL	54	40	35	9	89	49
MCB	57	24	32	1	89	25
ABL	16	6	17	—	33	6
TOTAL	242	147	166	19	408	166

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Fourth Session

FERTILIZER DEALERS SURVEY

Chairman

**Mr. Manzur Ahmed
Additional Secretary,
Ministry of Food, Agriculture and
Cooperatives, Islamabad.**

Panel Discussants

- 1. Syed Babar Ali
Packages Limited,
Lahore.**
- 2. Col. (Rtd.) M. Shaukat Ali
Managing Director,
PAD & SC, Lahore.**
- 3. Mr. Lars A. Wiersholm
Project Manager,
National Fertilizer Development
Centre,
Islamabad.**
- 4. Mr. J.A. Ward
Marketing Manager,
Fauji Fertilizer Company Limited,
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FERTILIZER DEALERS SURVEY*

OBJECTIVES

The Fertilizer Dealers Survey was designed with the following objectives in view :

1. To study the existing fertilizer distribution system in Pakistan.
2. To collect bench-mark data on the fertilizer dealer network.
3. To study the dealers' costs of handling fertilizer.
4. To identify specific problems faced by public and private fertilizer dealers.
5. To suggest measures for evolving a more effective and efficient fertilizer dealers' network in the country.

Universe

The 15 sample tehsils/'talukas' of Punjab, Sind and NWFP provinces selected for the GFI were taken as the universe of the study.

Unit of Study

The unit of study was a fertilizer retailer selling chemical fertilizer during the survey year, and in at least one prior year, on commercial basis in 'mandi' towns, large 'non-mandi' towns and in villages in 15 sample tehsils/'talukas'.

Sample Stratification

The GFI not only suggested hypotheses concerning fertilizer dealers but also helped in identifying various types of dealers operating in the universe. In order to have an adequately representative sample, the fertilizer dealers of the universe were stratified into the following four major types :

- a) Public sector sale depots operated by salaried staff, e.g., PAD & SC/SASO/ADA Sales depots.
- b) Licensed private dealers located in 'mandi' or 'non-mandi' towns.

* A.M. Shah, Director/General Manager, National Fertilizer Marketing Limited, Lahore.

- c) Licensed commission agents (arties) operating in regulated 'mandi' towns and dealing in fertilizer and other agricultural commodities.
- d) Village shopkeepers selling several kinds of goods in addition to fertilizer.

Sampling Procedure

A complete enumeration of all current and recent past dealers in the tehsil/'taluka' covered by the GFI survey would have been ideal. This approach was not feasible, however, due to cost and time constraints. To ensure representation of all four of the major types of fertilizer dealers in the GFI survey area, the sample approach described below was planned :

- a) Twenty dealers were to be selected in a given tehsil/'taluka' in which twenty or more dealers of all types were identified in the GFI survey.
- b) Fifteen dealers were to be selected from tehsil/'taluka' in which 11 to 19 individual dealers of all types were identified in GFI.
- c) Ten dealers were to be selected from a tehsil in which ten or less dealers of all types were identified in GFI Survey.
- d) Two village shopkeepers were to be selected in a sample tehsil in which no dealers of this category were identified in the GFI survey, subject, of course, to the condition that there were in fact some dealers of this type who had not been identified in the GFI survey.
- e) Three dealers of a given type were to be interviewed in a given sample tehsil in which only one dealer of that type was identified in the GFI survey.
- f) In fixing the aggregate quota for a given tehsil/'taluka', the minimum number for each category of dealers was to be determined first. The difference between the sum of individual quotas and the aggregate tehsil quota was to be allocated proportionately among those categories for which more than the minimum number of dealers were identified in the GFI survey.

Applying the foregoing criteria, the composition of the sample would have been as is shown in Table 1 :

Actual Sample Selection

The number of dealers called for on the above criteria could not be found due to the time constraint faced. In some cases they might not have existed; consequently, the sample finally selected deviated from that which was planned. Fewer dealers were interviewed. Dealers in 'barani' areas were more under-represented than dealers in irrigated areas. The same was true for public as opposed to private dealers.

The procedure finally adopted for selecting the sample was :

- a) To the possible extent all dealers identified in GFI survey were interviewed.
- b) In cases where there were not enough dealers identified in the GFI survey to meet the specified stratification scheme, the field interviewers were asked to search for additional dealers of a specified category within the tehsil/'taluka' for interviewing.

Table 2 gives the distribution of fertilizer dealers actually interviewed.

MAIN FINDINGS

The Sample

The sample contained 189 retail fertilizer sales outlets, 153 private (comprising of 35 village shopkeepers, 25 commission agents and 93 town shop-keeper-cum-specialized fertilizer dealers) and 36 public. About four-fifths of each of the two groups was located in irrigated areas and one-fifth in 'barani'.

Dealers' Profile

Most private outlets in 'barani' areas were very small. These retailers stocked an average of only 84 bags of fertilizer during the peak demand season. A third maintained an inventory of less than 25 bags. During the slack demand period, inventories averaged only 15 bags, with a substantial portion of the outlets stocking no fertilizer at all. The average number of fertilizer bags sold per transaction was also small. For example, 27 per cent of these dealers' customers purchased less than one bag of fertilizer each.

All private outlets in 'barani' areas sold other commodities in addition to fertilizer. In fact, the fertilizer component of the dealer's business was rather insignificant: for two-thirds of the outlets, gross revenue from fertilizer sales accounted for less than 11 per cent of total business receipts. These dealers provided very few services, including advice on fertilizer use, to their customers. None hired additional labour to assist in their fertilizer business, except for the handling of deliveries. In terms of the frequency with which mentioned, they considered inadequate transportation and low commission rates on fertilizer sales as the two most important problems related to their fertilizer business.

Private outlets in irrigated areas were substantially larger than such outlets in 'barani' areas. Individual sales transactions were larger. The fertilizer component of the business contributed more to total business receipts, and these dealers reportedly provided more advice to customers on fertilizer use. In descending order of the frequency with which mentioned, they considered inadequate finances, low commission rates and inadequate transport as their most important business problems.

Public outlets were still larger. They were much more specialized in fertilizer and claimed to have provided substantially more technical advice to their customers on fertilizer use, although the quality of advice is not known. The supervisors of these outlets expressed substantially fewer business problems than private dealers, although the difference may be largely or wholly accounted for by the fact that these supervisors were all salaried employees. They perceived their most important business problem as being the poor quality of fertilizer (torn bags/caked and lumpy fertilizer) delivered to their outlets. On an average, they were much closer to their supply depots than were private dealers.

Customer Characteristics

Two-fifths of the private dealers in 'barani' and one-fourth in irrigated areas indicated that most of their customers were located in the same village/town as that of the dealer. Other than this, there was no tendency for the customers of the 189 retailers to be concentrated by village/town, or by caste. Most dealers' customers came from neighbouring villages. On dealers' estimates, their customers travelled an average of almost six miles (one-way) to purchase fertilizer. Very few travelled more than 15 miles but almost 15 percent travelled more than 10. A substantial number of dealers' customers were not regular customers. Thus, one-third of all dealers indicated that only a fifth or less of their customers were regular customers. The average number of bags purchased per customer was the same whether procured with pass-book, credit or with cash.

Farmers tended to identify the fertilizer wanted by brand name (NFC, Engro, Bubber Sher) rather than by type (e.g., urea, DAP); and according to dealers, farmers clearly preferred domestically produced fertilizer to foreign. Familiarity with local brand names was the most frequently given reason for this preference, although 'freshness' was almost as important overall. Only seven percent of all dealers said their customers preferred imported to domestic fertilizer the main reason being familiarity with such brands. No one expressed a preference for imported fertilizer because of its 'freshness'

Adequacy of Fertilizer Supplies

Relatively few public dealers (14%) indicated they had experienced difficulties in obtaining sufficient amounts of fertilizer in the year 1975-76. The same was true for private dealers in 'barani' areas, where only 13 percent expressed such difficulties. However, 31 percent of all private dealers in irrigated areas (and 25% of all private dealers in all areas) complained of difficulties in getting sufficient supplies. At the 10 percent level of significance, one would conclude that supply difficulties were related to both the kind of dealer (public vs. private) and the location of the dealer (irrigated vs. 'barani' areas); that relatively more private dealers experienced supply problems than did public and relatively more dealers in irrigated areas than in 'barani'. At the 5 percent level of significance, however, the hypothesis of independence is not rejected.

Private dealers in irrigated areas experienced more shortage of urea than of any other fertilizer. Inadequate supplies of urea were reported by at least one such dealer in all months except April. In no month was the reported number exceptionally large, however, with the highest being 8 percent in January, followed by 7 percent in both June and December. DAP presented the next greatest supply problem to private dealers in irrigated areas. Five percent of these dealers reported shortages of this fertilizer during October and November and lesser percentages in six other months. Incidentally, these shortages of urea and DAP coincided with the peak consumption season for these two fertilizers.

At least one private dealer (irrigated area) experienced a shortage in at least one month of at least one kind of fertilizer (Urea, DAP, NP, AS, AN, SSP) during the year. In no month, however, did more than 11 percent of these dealers report shortages in any kind of fertilizer. Given this, plus the fact that over 85 percent of all public dealers and private dealers in 'barani' areas reported adequate supplies, inadequate fertilizer supplies may be marginally significant if at all as a factor in limiting fertilizer sales.

Condition of Fertilizer Upon Arrival at Sales Outlet

Almost two-fifths of the sample dealers stated that fertilizer rarely ever reached their sales outlets in 'good' condition. Slightly over a fourth indicated that it usually arrived in 'good' condition and 35 percent said it always arrived in 'good' condition. Statistically, the condition of the product upon arrival was independent of whether the dealer was public or private and also whether located in 'barani' or irrigated area.

The two major defects identified were torn bags and caked/lumpy fertilizer, with 31 percent of all dealers identifying the former and 29 percent the latter. Underweight bags were identified by 16 percent and restitched bags by

10 percent. Only 2 percent of the dealers identified adulteration as a defect in the product.

Statistically, the torn bag defect was independent of both the kind of dealer and his location. The caked/lumpy bags defect was independent of whether the dealer was public or private. However, the proportion of 'barani' dealers experiencing the defect was twice that of the dealers in irrigated areas. A possible explanation for this is that 'barani' dealers were allocated a large proportion of imported fertilizer. Such fertilizer, according to dealers, was more likely to be caked/lumpy than domestically produced fertilizer.

Adequacy of Arrangements with Suppliers

Dealers dissatisfaction with their supplies arrangement went beyond difficulties in obtaining adequate supplies, although the latter was the dominant complaint. Inadequate supplies (due to deliveries being too slow and to supplies simply not being available) accounted for two-thirds of the complaints of public outlets about their supply arrangements. However, only 19 percent of the public dealers, but 41 percent of the private, expressed dissatisfaction with their supply arrangement due to any reason, including inadequate supplies.

While the complaints of private dealers were more diverse, almost two-thirds of their complaints were also related to inadequate supplies (due to deliveries being too slow and to transport and supplies not being available). However, high transport costs accounted for 22 percent of private dealers' complaints.

The most common suggestion given by dealers for improving the supply system was that sufficient supplies be provided when needed. Of the private dealers expressing dissatisfaction about a fourth believed that the supply arrangement could be improved by the supplier transporting fertilizer all the way to the retail sales outlets. And 13 percent would have depots established in villages to improve the system. An important reason for dissatisfaction of private dealer with supplies was their poor stocking capacity (4 tons maximum in 'barani' and 21 tons/dealer in irrigated areas) and high customer demand during peak consumption months.

Technical Advice Provided to Customers

Seventy percent of all fertilizer dealers indicated they provided guidance to customers on some aspects of fertilizer use. The advice fell into four major classes which, in descending order, were: how, what kind, when and how much fertilizer to apply.

A higher percentage of dealers in irrigated areas than in 'barani' offered advice, although the difference was small (71 vs. 67%) and certainly not significant. However, the relative number of public dealers who claimed to provide advice to customers (89%) was substantially larger than the 65 percent of private dealers who did so. This difference is highly significant. Furthermore, public dealers reportedly advised on a larger number of technical areas (how to apply fertilizer, what kind to apply, etc.) than did private dealers, the average number of areas being two for the former and one for the latter. And the average number of areas that private dealers in irrigated areas advised on was almost half again as large as the corresponding number private dealers in 'barani' areas.

The public dealer apparently offered substantially more advice to his customers than did the private dealer. We do not know, however, anything about the quality of the advice. Neither are we confident about the quality of data as our earlier survey on G.F.I. identified dealer as insignificant source of information on fertilizer use to the farmers.

Source of Dealers' Technical Information

The information which dealer extended to farmers on the use of fertilizer came from a number of different sources. The largest single source (37% of all dealers) was suppliers. Radio agricultural programme was next (22%), closely followed by progressive farmers as a source (19%), and then by dealers own experience (13%).

Overall, newspapers and the agricultural extension service were not important sources. Still, the importance of different sources varied among dealer classes, and for some classes, newspapers and agricultural extension were fairly important. That one source of information was important to one class of dealers but not to another is illustrated by the fact that 43 percent of the dealers in irrigated areas were the recipients of information from suppliers, but only 11 percent of the dealers' in 'barani' areas. This relative neglect by suppliers of 'barani' retail outlets is likely explained by the latter's small size and low level of interest.

Other Services Provided by Dealers

Forty two (41 Private and 1 Public) all in irrigated areas out of all dealers indicated they provided over-night lodging and meals for some customers. Other than this, dealers provided very few services to their customers in addition to technical advice and their outlets as a place for farmers to procure fertilizer. Fifteen private dealers claimed they sold fertilizer on credit and seven other such dealers stated they provided very short term loans (i.e., for a few days). However, no information was collected on the amount of the credit extended

and very little on the terms. The provision of services was independent of whether the dealer had formal technical training in agriculture and also whether the dealer classified himself as a farmer.

Dealers Expressing Business Problems

Thirty-nine percent of all public but 68 percent of all private dealers acknowledged business problems. The difference is highly significant. However, some of the difference is obviously accounted for by the fact that public dealers are salaried employees. There are thus problems with the responses collected from public dealers. Relatively more dealers in 'barani' areas (72%) expressed problems with their fertilizer business than did dealers in irrigated areas (60%), although the difference is not significant.

Most Important Business Problems

The most frequently identified business problem by the public dealer was poor quality, i.e., torn bags and caked/lumpy fertilizer. This problem was identified by 17 percent of all public dealers in the sample but by only five percent of the private dealers, a highly significant difference. This is not necessarily inconsistent with the earlier statement under, "Condition of Fertilizer Upon Arrival at Sales Outlet", that the condition of the product upon arrival was independent of whether the dealer was public or private. Some dealers may have considered these defects as unimportant business problems.

For private dealers, the single most important problem in terms of the frequency with which mentioned, was inadequate finance. Twenty-six percent of all private dealers identified this problem. This was followed by low commission rates (20%) and then by transport problems (18%) and inadequate fertilizer supplies (18%). The first two problems were identified by private dealers in both 'barani' and irrigated areas, although relatively fewer dealers in 'barani' areas experienced financial difficulties and relatively more complained of low commission rates. In neither case, however, is the difference significant. Relatively few private dealers (13%) in irrigated areas complained of inadequate transport facilities, but 40% of such dealers in 'barani' areas so complained. This difference is highly significant.

In terms of the frequency with which mentioned, inadequate transport facilities was the single most important business problem identified by (40%) of all private dealers in 'barani' areas. This was followed by low commission rates (23%) and then inadequate finances (16%). The corresponding problems of private dealers in irrigated areas were inadequate finances (26%), inadequate fertilizer supplies (21%), low commission rates (19%) and inadequate transport (13%).

Measures Suggested by Dealers to Improve Business

Overall, the suggestions by dealers on how to improve the health of their enterprises mirrored the perceived problems. Consequently, the recommendation that credit be made available to them clearly dominated, appearing two-thirds of the suggested measures. Higher commission rates appeared the next most frequently, followed by the provision of transportation by suppliers from supply depots to sales outlets. The provision of adequate supplies was next, than well-packed, fresh supplies of fertilizer and more and closer supply depots.

Measures Suggested by Dealers to Encourage Fertilizer Use

Dealers were asked what measures should be taken to encourage farmers to use more fertilizer. The sale of fertilizer under simplified credit procedures was the response of two-thirds of all dealers. Substantially, more dealers gave this response than a reduction in fertilizer price. The latter was suggested by 45 percent of the dealers and 42 percent suggested public information programmes on fertilizer.

Credit

Thirty percent of all private dealers used credit during the survey year to finance their fertilizer operations. Banks, the most common source of credit, provided loans to about half of all those that borrowed. Friends and relatives were the next most frequently used source and then wholesalers.

A large proportion (41%) of private dealers who were using bank credit complained of a "shortage of money" than did any other class of private dealers. Also a large proportion of dealers with bank credit (32%) recommended that fertilizer be provided under supplier credit than did any other class. In contrast, those dealers receiving supplier credit apparently were adequately financed, for none indicated that money or credit was a problem. There was, however, only 5 dealers receiving supplier credit indicating that suppliers may have been very selective in the dealers to whom credit was advanced.

Further Studies

Of particular interest would be a study relating to the provision of credit by dealers to their customers. The survey inquired into the number of dealers who were making some credit sales to their customers. However, no information was obtained on the number of customers to whom credit was advanced, the amount advanced, how dealers financed the loans, the terms of the loans, experience in collection, willingness to expand such activity, characteristics of

the clients and relationships between dealer and clients . Neither was any information obtained from the recipients regarding the adequacy of the credit. A study to investigate the foregoing aspects would be very useful, especially by providing information helpful in assessing the viability of a scheme which would provide bank credit to dealers enabling the latter to finance credit sales of fertilizer to customers.

Another study which appears to us of special significance is the analysis of functional and economic aspects of fertilizer dealership and the assessment of minimum incentive dealer commission to ensure aggressive salesmanship and participation of dealers in imparting technical know-how to farmers.

Discussion

Manzur Ahmed : Now I turn over to the principal discussant Syed Babar Ali who will make some observations on the points raised by the speaker, particularly the problems faced by the dealers. He (speaker) has, of course, dismissed the public dealer as being a dealer at all. I hope you will be able to comment on that also.

Syed Babar Ali : I am not really going to answer any question or make any judgement. I am going to ask questions myself. So far as the dealer is concerned he is not an isolated institution. He is a part of the fertilizer network. You cannot isolate him as somebody who is to be all by himself. In fact, he is the most important individual in the whole chain. The dealer is the man who has to serve the end user (farmer). He is an important link and you have to make him worth while. Fertilizer business should be in competition with anything else. So you have to provide him with an income which is competitive. You cannot fix the rate of commission on the basis of the calculations made on any particular data. This has to be constantly adjusted, based on the economic factors which are varying from day to day.

My other suggestion is that the question of public sector distribution is very delicate. I think the study should have done some thing on it. My rough guess is that over a 100 crores of rupees have gone down the drain in this country by setting up of public sector fertilizer supply corporations. I went to the Chief Minister of the Punjab and told him, "Do not touch this area. You cannot do it. You have no party to man 400 stores all over the province." I was involved in management of 9 cooperative stores in Lahore falling in Punjab and there was an inventory loss of Rs. 45 lacs in one year. If Government could not monitor 9 cooperative stores in the city of Lahore how 400 stores spread all over the province could be monitored by an organization sitting in Lahore? It is just not possible. So I would suggest that if the study has not taken into account the performance of the public sector distribution network, something should be done about it. I think it should be brought to the notice of the Government that this has been a failure. The sooner we bury this monster, the better it is. We are too poor a nation to make these blunders and then try and cover them up. The PAD & SC in Punjab has not served any purpose at all.

Other question relates to fertilizer shortage problem. Does this study point out, whether the farmer has been getting fertilizer at the right price? It is the farmer who should know that what the right price is. He should also know that he is getting the fertilizer that he is paying for. I have heard that NP was being sold as DAP. I mean the farmer was paying for something but was getting a

cheaper product. These are factors which the study must point out and there must be some way of educating the farmer.

I am just raising these issues because I am too much emotionally involved with the success of the fertilizer industry in this country. I am not being critical because I am out of the industry. I am very much in it. What the NFC does today will reflect the work that I have put in. If the fertilizer industry does better today that is a merit to my services.

A. M. Shah : Syed Babar Ali said that public sector dealer has not been considered. No, he has been considered. In this survey, public sector dealer was a person operating the sale outlet on full time salaried basis. We cannot consider him as the typical dealer while we are talking about dealers. However, the report contains a comprehensive analysis of public dealers. Syed Babar Ali has said that the dealer is a part of the organization. That is correct. The farmer is important as a customer while the dealer is the backbone of the marketing organization. They have their own importance. I do not think any marketing company could run its business without dealers and farmers.

Regarding the farmer, whether he knows the price of fertilizer this has been brought out in the farmers' survey. The present survey is limited to dealers only. I will not talk about this.

Col . Shaukat Ali : Nobody can deny the importance of the dealer whether in public sector or in private sector, he is the main link between the farmer and the main suppliers. The problem is not so simple. It has many aspects. There are a few points the survey has made, but I would like to point out that there are certain characteristics of each agency. For instance, let us see the characteristics of fertilizer marketing itself. It is a seasonal enterprise. During slack period somebody has to store it, and during peak period somebody has to sell it. Since it is a seasonal product, no dealer will carry on this business the year round. He must sell something else alongwith the fertilizer which generally is the case. 'Arhti' is a man dealing with agricultural products and dealing with fertilizer. The 'Arhties' constitute the main dealers' class.

Similarly, if you go down the line there are sub-dealers. The problem is, do they get something or not? To my mind they do not and I agree with Mr. Shah that they do not get the return of their investment. In this characteristic of the fertilizer marketing there are few other constraints too. For instance, the preference of the brand. Somebody wants NP and other wants DAP. Somebody wants Bubber Sher urea and the other wants ESSO (EXXON) and still others want imported urea. If a dealer has not got all the varieties available with him,

he is not a successful dealer. Yesterday, Mr. Wiersholm said there were 6000 dealers. I say that there may be 6000 dealers in number, but actually they are about 2000. They are the agency holders of both public and private sectors. Whether they get it in one name or another is a different case. The constraint of fertilizer quality is like this. Some says that Bubbar Sher urea is fresh, while imported urea is old. It is a question of perception. How far it is correct I leave it to you.

There are certain characteristics of the consumers. They have confidence in a brand. Their knowledge of the application and doses are not known. Hardly, 10% of the farmers really know what to use and when to use. The customer goes to the dealer and says give me one bag of urea, or he says NP is Rs. 50, SSP, is 18 or AS 29. So he says give me SSP. Many times it has happened that SSP has been used as nitrogenous fertilizer.

There are management characteristics. Syed Babar Ali mentioned about the public and the private. They have their own characteristics. For instance public agency is service oriented. The employees' attitude is naturally negative. He feels that the extension work is done by the agriculture extension staff. I am sorry to say he does not make any effort with the consumer.

Now coming to the private sector. There is principal agent, then there are the 'mandi' town agents, the 'non-mandi' town agents, then the village shopkeepers and the cooperatives. Their concept is a bit different, they are all business oriented as compared to the public sector. They have to see that what is the margin of their profit.

Now coming to public sector vs. private sector agent, both cannot be compared. Personally, I feel that this market should be with the private sector. Public sector cannot undertake that burden of the losses. As Syed Babar Ali has said in nine cooperative stores they had that huge loss, but in our case in Punjab we have about 53 bulk depots at the tehsil level. The management is very difficult but the problem is that who is going to store that large inventory which is imported? We have no control over the imports and shipment scheduling of the imports. Will the private sector take over the stocks of the fertilizer during slack period? This is the point worth going into.

There is a flow of supplies which is said to be inadequate. Here the problem is that we have been in this trade for about the last 20 years but nobody has given thought to it that the important thing is the storage at various levels. The problem is there, when at a time about 70 ships wait outside the port. The demurrage charges are a strain on the national exchequer. If we had storage capacity at Karachi these could be unloaded, stored over there and then pushed out at the time of need, so that it avoids over-inventory and under-inventory. I agree that surplus is an economic offence but, at the same time, shortage is

tragic. I may say that in Punjab due to over-inventory huge losses have been incurred right from 1973 till 1978. It is only in 1978 that inventory has gone down to a manageable level.

The last point is about the survey. It is a thought provoking study. The survey has pointed out that the private dealers have said the inadequacy of finance, low margin of profits, inadequacy and uncertainty of supplies, inadequate transport facilities, underweight packing and adulteration are the main problems. In public sector, dealers pointed out only one thing and that was the poor quality of fertilizer, lumpy, caked and wet cargo. You must be knowing why lumpy caked and wet cargo comes? Would private sector take the defective fertilizer? Public sector had to take it. You could not throw it in the Arabian Sea. It is lying there and no one buys it. Naturally, it costs to store. It shows that the public sector is not profit-oriented. They are not concerned with the finances. But we spent sleepless nights for the losses. We work exactly on the same incidentals as provided to the private sector. We do not get any grant and there is no provision to write off our losses. There is no provision to write off even wet cargo which is consigned to us at full price.

J. A. Ward : I would briefly discuss the various constraints which were identified by Mr. Shah this morning and some of them came out in farmers' survey yesterday. At the top of all is the accessibility of fertilizer. I think we must all agree that the farmer has a right to be able to get fertilizer. I think the accessibility alone could perhaps double the fertilizer use. At this stage, I would make a reference to the door step concept which I talked about many years ago. I am not quite sure what that means. If door step means the farm, well I do not think that is the case. Traditionally, purchasing of farm inputs in developing countries means places where the produce is sold. If door step means this, I would imagine many of the marketing systems are, in a position, in Pakistan to cater for that need. Certainly, the marketing system in which I have been involved here had a very clear objective of making the fertilizer available to the farmer where he wants it. If he wants it at the centre where he trades, it is there.

I noticed in the farmers' survey yesterday that there were certain percentage of farmers quoting non-accessibility of fertilizer as a reason for non-use of fertilizers. And I just wonder what inaccessibility means. Whether it is because there was no sale point within a reasonable distance or whether there was a sale point not stocked with fertilizer or whether inaccessibility is an economic proposition. Some farmers are getting fertilizer very easily. I can quote many farmers whom I saw when I worked in the North of England, who sit on the hill top, could have the access to the fertilizer very easily and the fertilizer industry has geared itself to spend money, a lot of money on taking fertilizer to a very

small proportion of people. In this case this survey identified the need for improving the distribution system in order to rectify the deficiency identified by farmers who have said they did not use fertilizer because they could not get it. I do not know whether Mr. Shah is in a position to throw any light on it.

Another point was on financing the dealers and the rate of commission. In this country attempts have been made to devise a system for channeling the credit to the dealer, which is one of the most effective ways of overcoming the credit needs of the farmer. I do not think this system has really got going yet. I would like to see that this is progressing. This is a way to increase fertilizer use and filling the gap between dealer's capacity to sell and his capacity to buy. I noticed the survey made recommendations that the banks could be a little more positive in their approach to this problem.

The survey also covers the possibilities that the manufacturers may wish channeling credit through banks to the dealers rather than the dealers directly. I think surely a lot more work could be done on this aspect. Dealer's commission is rather small and it should be periodically reviewed. The commission given to the fertilizer dealers in other countries is higher than in Pakistan. Planning Division in Pakistan has requested the fertilizer manufacturers to increase commission reconciling the primary requirement of the World Bank. The business is not really an attractive proposition. I would fully support Col. Shaukat's views that fertilizer selling is not really a viable proposition. I think this is what the industry needs. I would be very happy, if every dealer handles the pesticides, seeds and other agricultural inputs.

The final point I would like to make relates to supply constraints which the survey has identified. Ships at Karachi Port make it a very difficult job for any organization in the distribution chain to ensure regular supplies to the farmer. When the country is self-sufficient in nitrogenous fertilizers, regular supply will again be a big problem for the fertilizer industry not from the irregular arrival of the ships, but in the movement from the plants to the consuming areas. Lastly, the desirability of any one dealer handling all these brands and varieties is not normally done. I firmly believe that it will be the competition with which the manufacturer can promote his own brand.

L. Wierholm : The industry is in a very fortunate position because there is a continuous demand of fertilizers. We will be self-sufficient in nitrogen in two years. But we have to start promoting the fertilizer which means we have to start training the dealers. One out of the 30 dealers had displayed the pamphlets. I think that the fertilizer industry has a great task really to train the dealers to be prepared for the situation which we will be facing in the near future. Many of the dealers had no idea that demonstration is one of the major tools

in promoting fertilizer. Dealer does not know that the agronomist from the same company is travelling in the area.

Another thing I want to comment is on the commission. Well, today dealer is getting Rs. 2 per bag as commission. If you start travelling and visiting the dealers in the Punjab you run into 'Arhti' system and fertilizer business is just a small part of his business. When the dealer gets fertilizer by truck, he pays 15 to 25 paise per bag, for unloading. If you go to the Frontier lot of the dealers pick up the fertilizer from the railway station that immediately increases their cost. A dealer pays 60 to 80 paise per bag depending on the distance from the railway station to the outlet. If he had two rupees commission well he has already spent 60-80 paise on it.

If the dealer has own storage, he does not look at that investment and does not count interest on it. Dealership today is very fine, we can manage that at two rupees. But let us look into the future. We expect the dealers to provide storage because if we do not get a regular shipment of fertilizer from the factories to those places and store it, we are in trouble. This means the people will have to invest in storage. So we have to keep a very close look at the dealers' commission. When we go into more effective marketing and sale of fertilizer, I do not think that two rupees per bag is sufficient. When we ask the dealer how much can you sell, he says, "I can sell as much as I can have." If they have higher commission rate, they have an incentive to take the fertilizer off season. Today, the suppliers are very fortunate.

I do not know what kind of assistance we can give to the dealers. If we can give some special terms for loans and credit for storage development. They can have money to purchase more fertilizer. But we know if the consumption is increasing, the rate we have now, there is no way that the dealer is confined to this business in the future. So we have to pay closer attention to the credit availability for the dealers. It is through the suppliers, or manufacturers, or through the banks that the credit is directed to the dealers.

Let me also briefly mention about transport. Fortunately, now the logistics cell is doing well, but under normal situation, transportation of fertilizer is a continuous headache. Trucks are not available during peak season. We need the intermediate storage and intermediate trucking. Who is going to pay for this intermediate storages and trucking? Some people say that the Government should do it. I think the private industry should do it and be responsible for the operation. Government can provide some funds, some credit to develop those intermediate storages. I think there is a great advantage if the private industry also takes the responsibility to pay for the intermediate storages. It has been very convenient for you to use the 'Arhti' as your dealer as farmers are coming to him. I want to ask a question. Do we want in the future to suffer through the 'Arhties'? Don't we want to develop some specialised dealers handling fertilizers/insecticides? I know the argument that the 'Arhti' is a 'Godfather'

and has to do everything for the farmer. But let us take secularism in the long run. Would it not be more advantageous for us to try specialized dealership both private and public. I have the highest respect for my friend Col. Shaukat Ali and I heard so much about the problems with the PAD & SC and SASO.

My question is what is the purpose of public distribution? Is it to compete with the private distributors? If that is the purpose, then let them run the business on profit basis. If the purpose is to serve areas where the private business is not able to reach the farmer, that is fine. It will cost money but I am surprised when I go into many of these places, I find 3 to 4 private dealers and also a lot of public sale points. I do not see the point. I think we should take a close look in it.

A. M. Shah : In fact, I have hardly any observation to make. The panel has more or less agreed to the study and I am here only to defend the study. One point Mr. Ward did make, was that they can never supply every farmer. It is true. I agree with him, but in terms of dealers, I said at a nominal cost. The study recommends that the distributor should try to supply every dealer and every sub-dealer. Most of the scholars and participants agreed with the study and have just made their own observations about fertilizer marketing.

Manzur Ahmed : Quite a bit emphasis has been laid on low commission. I want to know to what extent did the study make a cross check that whatever is taken by the dealer is in fact correct. This study was carried out about two years ago. Since then there has been increase in the commission. In fact we discussed it about a few months ago. There was a very frank discussion with manufacturers' representatives. We found that this year there has been no problem. There has been increase in the supply of fertilizer at the rate of 25%. Fortunately, phosphatic fertilizer has grown at the rate of 36% for the past six months. So dealers' commission has not been a hinderance in the rapid and accelerated use this year. Of course, the commission should always be kept under review and the situation does demand that it is not becoming a constraint in the supply of fertilizer to the farmers. So I wanted to know, from the author, whether in the study, some kind of cross check was made or merely their statement was recorded.

A. M. Shah : Primarily dealers' statements were taken. They put more emphasis on this point. But you must recall this survey was taken at the time the commission was much low.

Syed Babar Ali : I would just like to ask a question as an elaboration of this. The question of commission being low is only relevant if you know that the

fertilizer is being sold at the price at which it should be sold. Do we have any cross check to find out what percentage of fertilizer is sold at the control price? My own hunch is that the dealer will always make a commission. He will make the extra price out of the farmer. He will not sell it at a control price.

A. M. Shah : As you know very well it is a matter of supply and demand. If dealer has lot of fertilizer he will sell even on a reduced commission and will lose some money out of the commission allowed. On the other hand, in case of short supply, dealer will not sell at the regular price which has been happening in the past years.

Syed Babar Ali : We have been in a short supply situation and I think for the next many years we will be in that short supply situation. So I am not personally worried about the dealers' commission at all.

A. M. Shah : True. We are talking about the time when we will have the proposed factories on stream and with sufficient production and face a different situation.

Manzur Ahmed : I think the second point that I wanted to raise was the question of education. Whether it should be the responsibility of the fertilizer dealer to tell the farmer 'what to use', 'when to use', and 'how to use', or is it the responsibility of the extension worker? In fact, we are introducing a new system in a phased manner in which the extension worker will have nothing to do but to tell the farmer 'what to use', 'when to use', and 'how to use' fertilizer and other agricultural inputs.

A. Salam : Just like the shortage of fertilizer, the time has been in short supply in this seminar. There are different varieties sold at different rates. Fertilizer names are written in English. Most of our farmers cannot read them. Farmers pay the price for the best variety but get the lowest quality. If we could print some brand names on the bag in Urdu our farmers can read and recognise varieties. In this way, we could do them a service.

Yesterday, it was said that the dealers are not an important source of information for the farmers, but this study does point out that the dealers are an important source of information for the farmers. I think there is some discrepancy which needs to be checked.

Iqbal Chaudhry : This discrepancy is self-evident and logical, because the first study, General Farmers' Investigation refers to farmers response i.e., what percentage of farmers received technical advice from dealers. Whereas, in Dealers' Study, it is dealers' perception about what percentage of the dealers gave the

technical advice to the farmers. Thus, both the responses cannot be reconciled with one another.

A. Salam : But this information should be valid.

Iqbal Chaudhry : Information from both sources is valid. The reality of the fact lies in between the two extremes. Farmers' opinion is on the one extreme and the dealers' response on the other. However, farmers are on the receiving end, I would consider G.F.I. information as reliable and valid.

Syed Sabar Ali : I would suggest that the NFC people who have prepared the report should not enter into debate. Let us invite comments from others. We are at the receiving end of this debate and you take note of these points so that your next study is a better one.

Saeed Qureshi : I would like to clarify, first of all, that the survey is very good so far as its goals are concerned. But in a forum like this we are here to evaluate the findings and find out its relevance for policy formulation. I think our basic task is to find out the relevance of survey findings with reference to time. What will happen three years from now. I think there is going to be a structural change in the situation. We shall move from a period of shortage to a period of ample supplies and the entire network will undergo a considerable strain.

The second problem with this survey is that it is limited to dealers' perception, but there are other factors relevant to the distribution arrangement which are equally vital. The pricing and the incidentals policies are also important from the point of policy formulations and may be we should give some thought to these problems.

The third aspect refers to the question of storage. It is not enough to say that in future dealers will have storages. I think we have to have some sort of definite policies, how much of the storage responsibilities could be put on the manufacturers, the main distributors and the dealers, so that we do not land ourselves into a tense situation because of our own short vision. We have not been able to foresee this before.

Finally, the myth of uniform price all over the country had very serious repercussions. Some unattractive outlets have to be formed in the public sector. May be those outlets cannot really sustain. For public commitment it has not been possible to have a two-tier price : one for the 'mandi' towns and the other for the lower level in the interior. We have to recognise this problem sooner or later and we have to evolve a framework which takes care of the problem.

Col. Tayyub : Firstly, it is said that dealers' commission is not adequate but

the recent increase is not sufficient to cater for dealers' commission. Many other items can be passed on to the dealer.

Secondly, why don't distributors pass on that interest to the dealer which Government pays to the distributors? I do not know what things are lying at the railway station. They get Rs. 25 for it, Rs. 23 for storage, Rs. 5 for unforeseen over and above per ton. Why do they just restrict it to Rs. 40/- for the dealer? I ask the private sector if they want to promote it, part with it now. We should take the private sector into confidence. They must create a storage capacity. We will not be doing a good job unless we create a storage capacity. So parts of the incidentals should go to storages. This is very important keeping in view the future demand.

Chaudhry Iqbal : (Dawood Hercules) The survey has pointed out the problems of inadequacy of finances, low commission, transport and inadequate supplies. I think if we could solve these problems we can achieve more consumption of fertilizer. Survey also indicates that the dealers in 'barani' areas have not been keeping enough stocks particularly during the off season. That is another problem we need to look into as to why they are not keeping stocks during off season. What can we do to encourage them to keep the stock during off season? In 'barani' areas if you buy a truck load of fertilizer, say urea, it costs you more than Rs. 12,000/-. You can sell it in a month. If you buy one truck during off season, you cannot dispose it off in less than two months. Dealer has to block that investment for two months, when gross return is Rs. 400/- only, which is a very poor and inadequate return on that investment. I think we can overcome this problem of the dealer by increasing dealers' commission. This would also help availability of fertilizers even in the off season. As for transport problem, it involves shifting of fertilizer from Karachi to bulk depots and from bulk depots to the sale outlets. When there will be field warehouses built by fertilizer manufacturers, the problem of transportation of fertilizer to retail outlets will remain as it is. This problem again can be solved, to a great extent, by increasing incidentals. Similarly, the credit problem can be solved if we give more commission to the dealer. In this way, the dealers will be able to get money from the banks when needed and pay interest to the banks out of their commission.

Khurshid Haider : A little while ago a statement was made, which has created doubt in my mind. It was said that the results of this survey are going to be invalid after three years. This leads to another question. What time are we looking at? While formulating recommendations for a policy, I hope we are looking at least three years ahead if not more, because it takes time to formulate policies and implementing them. If you are only looking at six months or a year ahead then our policies are not going to be a very great help. So we must be quite clear on the time.

The second point that I want to make is about problem of storage. There was a remark made earlier that more storage burden will be passed on to the private sector. At the moment, public sector is carrying burden of storage and more of it will be passed on to the private sector. I think Government will have to take its part in it. In other words, provide some basic infrastructure on which storage facilities can be built. I agree with Mr. Wiersholm that this is handled by the private sector but some basic infrastructure must be there. Perhaps storage buildings could be built by the central agency and leased out to the private operators. If private operators are required to build these facilities, then some time must be allowed to them. I am sorry to say that some of the feedback I got from the previous transportation committee meeting, this problem was brushed aside casually that no private stock operators will have to provide all the facilities.

Syed Babar Ali : It should be the survival of the fittest. It would be the only way this industry will be able to survive in the long run. Whether it is in private or public sector, they must all bear in mind when they are working out their projections that uncle GOP is not coming to the rescue. They will have to stand on their own feet. We are too poor a nation to support one sector of industry.

Manzur Ahmed : The study raised dealers' inadequate finances, low commission, transport problems and inadequate supplies. The study only showed the existing position as it was prevailing at that time. Now in policy formulation we have to feel inspired by whatever existing data and the knowledge of the current factors.

The question of intermediate storages has come up. I think it is too much to expect dealers to have any storage. Increasing the commission would not help unless, of course, there is a formula under which we see that so much storage is maintained by the dealer. It should be the out-come of the incidentals of the manufacturers or the suppliers. The incidentals do take into account the fact that fertilizer business and storage has to be seasonal. In fact NFC has already taken lead in this respect. They have come up with a project which is already under consideration of the Government.

Regarding inadequate finances, the question is who should help the farmer or the dealer. The present position is that the dealer is not maintaining any inventories. The inventories are either being maintained by the local manufacturers or by the public sector distributors. In fact, these days fertilizer is selling like hot cakes.

Something has been said about public vs. private sector. Government has decided in principle, that there should be a rapid shift to the private dealership. There is a third sector, namely, the cooperative department. In fact in the

Punjab one of the reasons for this accelerated rate of increase in the use of fertilizer has been the injection of this third sector. Incidentally, I am told that they are taking fertilizer at farmers' door step. They are getting four rupees a bag. Cooperatives can play an important role in 'barani' areas, which this survey has revealed. At the moment, 'barani' areas are not receiving much attention, partly because of the general impression that the fertilizer is not going to do anything good in 'barani' areas. If there is no rain then probably the fertilizer investment will be wasted. Here again a lot of burden will fall on the extension worker who have to reach the farmers in a more effective manner as to when, why and how this fertilizer is to be used.

Transport problem has been mentioned. Of course, this emergency programme which has been launched with the help of the National Logistics Board takes care not only of the railways but also the trucks. Inadequate supplies was a problem during the last three years but now of course there were no reserves this year. In future, by the grace of God! supplies would not be a problem. What will be a problem, as Mr. Saeed Qureshi has pointed out is that there will be a gradual transfer now to an era of surplus, particularly in the nitrogenous fertilizers. The whole philosophy of distribution would have to be changed. The main burden would naturally fall on the main distributors who have to think of it as to what is to be done in order to dispose of these surpluses. And with these remarks I would like to conclude this session.

TABLE 1

Fertilizer Dealer Sample Stratification

Tehsil/'Taluka'	Public Dealers	Private Dealers			Total
		Village Shop-keepers	Com-mission Agents	Town Shop-keepers	
IRRIGATED	37	31	32	84	184
Charsadda	2	4	4	10	20
Dipalpur	3	3	3	11	20
Hafizabad	4	2	5	9	20
Isakhel	4	2	2	5	13
Kamber	3	3	2	7	15
Matli	3	3	3	6	15
Mirpur Sakro	3	3	2	5	13
Tando Allahyar	3	3	3	6	15
Rajanpur	3	3	2	5	13
Toba Tek Singh	4	2	3	11	20
Gambat	5	3	3	9	20
BARANI	12	17	9	20	58
Abbottabad	3	8	3	6	20
Campbellpur (Attock)	3	3	2	6	14
Gujar Khan	3	3	2	4	12
Hangu	3	3	2	4	12
TOTAL	49	48	41	104	242

TABLE 2

Distribution of the Dealers Sample

Tehsil/'Taluka'	Public Dealers	Private Dealers			Total
		Village Shop-keepers	Commission Agents	Town Shop-keepers	
IRRIGATED	30	21	24	78	153
Charsadda	1	4	3	9	17
Dipalpur	3	2	4	9	18
Isa Khel	3	1	—	3	7
Gambat	2	2	3	9	16
Hafizabad	5	—	4	8	17
Mirpur Sakro	2	3	1	3	9
Matli	3	—	4	5	12
Kambar	1	3	2	5	11
Rajanpur	3	3	—	4	10
Tando Allah Yar	3	2	2	8	16
Toba Tek Singh	4	1	1	15	21
BARANI	6	14	1	15	36
Abbottabad	2	8	1	6	17
Campbellpur (Attock)	3	3	—	6	12
Gujar Khan	1	1	—	1	3
Hangu	—	2	—	2	4
TOTAL	36	35	25	93	189

Fifth Session

INTENSIVE FARMERS' STUDY

Chairman

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Panel Discussants

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INTENSIVE FARMERS' STUDY.

Objectives

The Intensive Farmers' Study (I.F.S.) was designed with the following objectives :

- 1) To verify the findings of General Farmers' Investigation (G.F.I.) at micro level.
- 2) To identify social and economic factors influencing fertilizer use within a given physical environment.
- 3) To explore reasons for non-use, discontinuation of use and low use of fertilizer.
- 4) To suggest policy measures for improving fertilizer use.

Sampling Design

Selection of Tehsils – In I.F.S. four out of the fifteen sample tehsils were selected as study areas. The criteria for the selection of tehsils were : (a) source of irrigation water, (b) annual rainfall, (c) cropping pattern and (d) past use of chemical fertilizer. Eventually, Abbottabad (District Hazara – N.W.F.P.), T.T. Singh (District Lyallpur (now Faisalabad) – Punjab), Rajapur (District D. G. Khan – Punjab) and Campbellpur (District Campbellpur (now Attock) – Punjab) tehsils were selected for study. The Sind province could not be covered due to election and political abnormality at the time of study.

Selection of Villages – In each tehsil one village, from the six surveyed in the G.F.I., was selected. The village chosen was representative of the tehsils (a) cropping pattern, (b) pattern of farm size and land tenure, (c) located at an intermediate distance from tehsil headquarters, and (d) had at least 200 households or 2000 residents living in a compact form of settlement.

Village Bagnother (Abbottabad), Chak No. 319 G.B. (T. T. Singh), Sikhaniwala (Rajapur) and Dakhnair (Campbellpur) were selected for the in-depth study.

Selection of Households – Through a census of village households and with the help of key village informants such as the 'Numberdar' and the revenue 'Patwari', a list of the heads of all agricultural households based on size of

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holding and tenancy was prepared. This list was used for drawing a stratified proportionate random sample of 20 – 30 households in each village. The random number table was used to draw sample. The size of the sample, by village, is given in table 1.

The Interviewing Guide

An interviewing guide was developed for the investigation after pretesting it in the Provinces of Punjab, Sind and North West Frontier. The first part of the interviewing guide provided an outline of information to be collected on village physical and social infrastructure. The remaining parts provided an outline of information relating to individual farm households. This included :

- a) household biographical data,
- b) agricultural and marketing practices,
- c) fertilizer use and cropping patterns,
- d) credit use and remittance of off-farm earnings,
- e) decision making process as concerning social and agricultural matters, and
- f) communication patterns and respondents' contacts with the outside world (urban orientation).

Collection of Data

Using key village informants the teams collected information about physical infrastructure e.g., electricity, schools, road links, market etc. Together information, the sample households were contacted three to five times by the male and female investigators. Additional information was collected through participant observation on various aspects of the study. The information was recorded on questionnaires, forms and diaries maintained by the interviewers. Data collection started during the last week of December, 1976 and was completed by the middle of March, 1977 in all four villages.

Villages under Study

The agro-climatic and other details of sample villages is given in table 2.

FINDINGS

Farming Practices

- The level of cropping intensity in four villages showed little variation – ranged between 91 to 119%.

Knowledge and Use of Improved Seeds

- The knowledge of improved seeds except village Bagnother was wide spread, but great discrepancy was found between knowledge and actual practice.

Planting Methods

- Line sowing is practised in irrigated progressive, both line sowing and broadcasting in irrigated backward, broadcasting and 'Thappa' prevalent in 'barani' villages.

Marketing Practices

- Farmers operating less than 5 acres and tenants except irrigated progressive village had negligible or no marketable surplus produce.
- The relative importance of commission agent rather than government procurement centre, located at equal distance, particularly small farmers and tenants in irrigated progressive village refer to dysfunctioning of government procurement centres.
- In backward irrigated and 'barani' villages, 'village beopari'/Shopkeeper was major channel of sale for farm produce.
- Small farmers and tenants in irrigated backward village sold standing crops.

Fertilizer Use Pattern

The detailed information on fertilizer use about the sample villages is given in table 3.

- Use Level of phosphorus lagged behind nitrogen on all crops in four villages particularly by small farmers.
- Tenancy was not significantly related to fertilizer use rate on any crop in four villages.
- These findings are in agreement with G.F.I. results.

Factors Inhibiting Fertilizer Use

The following factors were inhibiting the fertilizer use :

- Absence/inadequate irrigation water.

- Lack of funds.
- High fertilizer price.
- Distant sale outlets.

Sources of Information

- Fellow farmers were major source of technical information for fertilizer use in all villages.

Financing Fertilizer Purchase

- Self reliance for financing fertilizer purchase was inversely related to the degree of development in village infrastructure.

CREDIT

Credit Use Pattern

- There were seventy two % credit users during two years in all villages, of which twenty one % were institutional, 65% non-institutional and 14% both institutional and non-institutional credit users.
- Average amount of institutional credit was higher than non-institutional credit.
- Banking on non-institutional credit and its repayment from off-farm income was inversely related with degree of development of village infrastructure.
- One-third of non-institutional credit was used for the purchase of seeds and fertilizer.
- Recovery performance of non-institutional credit was higher than the institutional credit.
- Complicated procedures and high interest rate inhibit the institutional credit use.

Role of Women

- Agriculture in 'barani' villages was primarily female activity.

- In irrigated villages women assumed secondary role in farming/marketing practices and non-institutional credit use.

Further Research

Further investigation is needed in the following areas :

- Low variations in cropping intensity rates, low and imbalanced fertilizer use rates on all crops and negligible impact of extension worker in all four villages.
- Genuine credit requirement, ways and means to meet credit requirement, status of women in 'barani' extension service, and dysfunctioning of procurement centres in irrigated areas.
- Minimum package of appropriate technology acceptable to an average 'barani' and irrigated farmer.

Discussion

S. M. Waseem : Thank you Mr. Iqbal Chaudhry for your presentation. Now I will request Dr. Dilawar Ali to present his views on the study.

Dilawar Ali Khan : My comments are not to discourage what this hardworking group both in NFC and US AID has done. The purpose of our comments would be to suggest the things that would give us guidance in future undertakings. If we look at the villages under study, Toba Tek Singh village, is located at a place where there are three market points, within reach of 2 miles, 4 miles and 6 miles connected with 'pacca' roads, banks and a progressive community. If we draw some inventories from that community we cannot talk about Punjab. I think the purpose of the Intensive Study was not merely to support the G.F.I. findings, it was to go into more details. When one reads the GFI survey, the methodology, the statistical analysis and everything one feels like taking ahead. While in Intensive Study we are getting a portrait of the villages.

The second thing is when we compare the first village. It is a village with very good irrigation condition connected by a 'pacca' road. This village is to be compared with another village where things are different. Now taking village features, we should have examined the differences in the fertilizer use and convenience of fertilizer information. No effort has been made to correlate the differences with village features that were the subject of the study.

If we had built into this exercise, technical optimum or economic optimum factors for a particular village and then examined chemical fertilizer and farm yard manure use, it would have been better. This is the gap in the study. I think we could have gone more into detail on the constraint phenomenon rather than listing. You had a structured questionnaire. You built in possible answers which are thrown to the respondents and tick yes/no responses. And we got yeses and nos, we aggregate them and come out with something.

The results are presented in the Intensive Survey on size and tenure categories. One improvement would have been that within each size categories tenancy classes could have been classified.

There are facts on credit relating to Toba Tek Singh situation. We have National Bank of Pakistan, Agricultural Credit Programme and other banks. But it has been mentioned that some of the farmers had access, while others did not. Intensive Study has addressed to this question of access, but this topic should have been dealt in detail.

There are certain observations from 'barani' village in Abbottabad. Maize is the only crop while, some grow wheat that was used as fodder. The cropping intensity is 99%. There were 21 acres under maize, of which 4.75 acres were fertilized. I think instead of just giving the application rate as we gave in the GFI survey, we should have asked, why out of 21 acres only 4.75 acres were fertilized, so that a policy implication could follow out of research undertaking. Similarly on wheat one of the respondents is using fertilizer and he is using on only 0.37 acres. What is special about that piece of land?

In Toba Tek Singh village, there is a very interesting observation. All farmers were applying fertilizer to wheat, whereas, only between 44–56% were applying it to cotton, sugarcane and maize. Is it that farmyard manure substitutes the chemical fertilizer in the case of these crops, or there is something else?

Iqbal Chaudhry : You have heard the panel discussants, who were divided into two clear distinct groups. Since the inception, design and planning of the study, I was caught up between the anthropologists on the one extreme and the economists on the other. This prolonged till the final draft was written. I tried to synthesise the two extreme approaches into evolving socio-economic study in which an effort has been made to integrate the disciplines of anthropology, sociology and economics.

In response to Dr. Dilawar's questions; it is better to be precisely wrong than vaguely right. I think there is no dispute that valid and reliable information is better than half true facts. This applies to his question of farmyard manure. On this question we had information on it in the study, even our 'follow-on' study. But there was a methodological problem, i.e., how to convert the quantity of farmyard manure into nutrients in the face of wide dispersion in data. There are so many types of farmyard manure, it is wet, dry, semi-wet and so on. There was no uniformity in reporting. Some farmers reported in tractor trolley, others in bullock cart, yet others in donkey load, still others in baskets. This is why we had to restrict to qualitative information on the subject. It is one of the findings that farmyard manure is complementary to chemical fertilizer, but not supplementary to it.

I think Dr. Dilawar misunderstood the objectives of the study. Neither it was an economic investigation nor for developing a village profile. It was essentially a socio-cultural study aimed at considering village physical characteristics as 'given' and locate and explain variation in fertilizer and credit usage among various farm size and tenancy classes. Furthermore, it was one of the objectives to verify the G.F.I. findings at the micro level but not the only objective. The Intensive Study has come up with a number of rich hypotheses in the field of decision making process, role of women, credit and dynamics of farmers behaviour, which G.F.I. could not accommodate.

To his point of rigorous economic analysis between and within categories, the answer is very simple. It is not important to apply certain statistical or econometric techniques to any data to enhance researchers' prestige among his colleagues. We could have introduced antecedent and intervening variables to interpret and explain the data through partial and marginal analyses. I think the important thing is to avoid misapplication of the technique, simple or sophisticated and enter into the dangerous game of over and under-generalization of facts. Think of a situation where there are only 20 responses. If we were to classify data into three tenancy classes and under each class fit in five farm size categories, we would have 15 categories. In that case some of the cells would have remained empty, while frequency in the remaining cells was supposed to be less than five. You can well imagine the appropriateness of the technique and statistical confidence we could have had in our findings.

To the remaining questions put forward by Dr. Dilawar Ali, the text does contain analysis on use and non-use of fertilizer for maize, cotton and sugarcane in village Bagnother and Chak No. 319 G.P.

Agha Sajjad Haider : I have gone through the study in detail. I think there is a need for another look at the study but, at the same time, I would say that this is a good study from the point of view of a teacher and a researcher. I think we have a good starting point. I would like to go back to these villages and restudy them myself. At least, I have something to start with. I think the study has a lot of data which could have been interpreted. Let Universities of Agriculture restudy the villages in Punjab, Tando Jam and Peshawar for their respective provinces. I must say something about Toba Tek Singh village and its representativeness. Our objective is to bring infrastructure to every village in Pakistan as is available in Toba Tek Singh. I think this is all I want to say.

Iqbal Chaudhry : I appreciate Dr. Agha's comments on the study. We would be happy to cooperate individual researchers/organizations particularly the universities to have access to our data. We have a lot of qualitative data in the form of interviewers' diaries, notes, case histories of the respondents written in Urdu. At least our study is a good beginning in having an inter-disciplinary approach to study the complex phenomenon of fertilizer use.

Agha Sajjad Haider : We will be very happy to have a marriage relationship between the NFC and the University of Agriculture on the research side.

Hazrat Pasha : If you are dealing with the prices and we say that the prices have gone up so much. In the analysis we go back to the reasons. Why the price has gone up or gone down? This would then enable the policy makers to take some action. This study is a very good fact gathering exercise but economic analytical effort is not of the level that is required for policy making. Unfortunately, the sample has the limitation that it could not incorporate any village of Sind. The settlement pattern in Sind is so drastically different from that of the Punjab. These findings are not applicable to Sind.

High cost of credit was discussed here. There is a cost to every thing. What do you want to do? You want to subsidize. If there is high cost, is it really high cost in relation to productivity? May be it is 1 : 10, i.e., one pound of nutrient will give you 10 pounds of output. But the recent studies have shown that it is 1:5. May be this is the constraint. You just cannot say that very high cost and complicated procedures inhibit institutional credit. Poor extension is a very great finding of the study.

But if you just look at the micro level, what is the transport available to extension agent? What are his facilities? What are his incentives? What is his training? What are his job opportunities? If you know that the extension is not functioning, I do not think we need a study to find out that. Well, about low marketable surplus, we all know that there is low marketable surplus of small holdings.

Iqbal Chaudhry : Coming to Mr. Pasha's questions. We selected two villages in Tando Allah Yar and Gambat 'talukas' and kept the Sind study team intact. I personally visited that area. Everybody was election oriented and motivated strongly, so we had to drop the idea of field operations mainly because of political uncertainties in March, 1977. Under these conditions I think there was sufficient theoretical justification not to carry out the study and collect vague and invalid data.

To the question of input-output ratio and economic analysis. I would simply add here that it is not enough to apply certain analytical techniques on any data. The important point in research methodology is to avoid application of wrong techniques on right data. This is what we have precisely done, i.e. not to apply quantitative inductive economic methods to qualitative data. Mr. Pasha further observed that the study has not come up with something very special while pointing out that small farmers had little marketable surplus produce. I would say that prior to the study it was his opinion and now it is a fact. I leave it up to Mr. Pasha to differentiate between the two.

Douglas J. Merrey : I would say that the findings of the study are sufficiently reliable to use as a basis for policy or further research. Indeed, on some questions further analysis is needed. I may say and confess that how difficult it is to carry out these kinds of Intensive Studies. I should be a little bit frank about the problems. First of all, I want to object very strongly to call this an anthropological study. It is a small scale study but certainly not anthropological in its usual sense of the term. By anthropological study means, a study of the community using quality data. By quality means data relating to descriptive statements of various attitudes, beliefs and that sort of things elicited by informal interviewing, discussions and observations. This study has certainly qualitative data but not interpreted anthropologically. One example is 'role of women'. It does not give insight into the process of decision making and

women participation, their values, goals, and aspirations.

In the main report data have been broken down by the mere farm size and tenancy as used in the GFI survey. There are too few cases in many of the cells to be significant and still in the main report they attempt to interpret differences and similarities. Some of the cells include peculiar cases. For example, one or two of the tenants in a cell having a very large holdings are still called tenants. Then they have compared the findings with G.F.I. I think they cannot do this because both are independent samples. Furthermore, the purpose of any anthropological study is to present the case study by way of finding out why the differences were there, why certain farmers use more and certain farmers use less?

Regarding the role of women also in the 319 G.B., the discussion of the decision making process is based mainly on the male perceptions. They called on the male respondent who claims that the decision on farming was made by him, because women do not know very much. They do not tell us what women have to say about this. Even there were female interviewers they did not tell us what the female interpretations were. I spent more than a year in a village of small farmers and my wife was also there. Both of us are anthropologists. We discovered that the women have a great deal of influence on decision making even for fertilizer but it is not directly or something that you can find out by asking the male alone.

Again, it has been reported in the study that women participation in the 'baradari' disputes is not favoured by the 48% of the respondents. But I have studied a village where women are very much involved even in 'Baradari' disputes.

On the question of extension as Mr. Pasha pointed out, it is not a new finding. Everyone who has gone a little bit to the fields knows about this. I have another point. This study says that the knowledge of fertilizer is exactly quite high among the farmers so I wonder if they need any extension service. May be you save money by getting rid of the extension service completely or you could integrate the extension worker with the distribution of fertilizer and seeds and give him a percentage of what he could sell to the farmers.

Lastly, I would say that this is a very outstanding study. In fact, anthropological field work is very difficult.

Iqbal Chaudhry : In response to Mr. Merrey's series of questions, who upholds that it is not an anthropological study. I think his conception of the discipline is narrow. In the classical sense, the anthropological techniques are applicable in preliterate isolated primitive tribal communities like Hunza, Kafirstan and

Baltistan. Anthropology like other social sciences is developing these days. It has specialized fields like economic anthropology, social anthropology and even urban anthropology. There is no harm in applying participant observation in an on-going rural society.

He further notes that large operators cannot be tenants. I do not know what is the harm in it. Actually, tenants are supposed to be large operators because they have either to share the produce or rent in a large piece of land in order to make the enterprise viable and profitable. I am very much aware of the subject of anthropology. He has suggested that we should have gathered qualitative information on the family system, beliefs, aspirations, values and goals regarding role of women and decision making processes on fertilizer and credit usage. This suggestion is alright so far as any academic exercise is concerned. The objective of our study was to come up with workable suggestions for implementation. May I pose a counter question? Does anybody have the authority or wisdom to change cultural ethos, religious configurations, value system and social reality of rural population in a democratic way within a few years? The study findings were supposed to be translated into specific programme planning for implementation.

Mr. Merrey has also pointed out that the two samples are not comparable. The findings of the two studies were compared only with respect to the villages under study and in those areas where information was comparable. This has not been the only purpose. The main objective of the Intensive Study was to understand how a farmer in his original socio-economic and physio-graphic environment perceives, evaluates, interprets and relates meaningfully the reality of fertilizer use to himself. This is certainly a major innovation in fertilizer research.

Yet to another question on the role of women in the decision making process, women did participate in 'baradari' matters actively, but their involvement in economic matters was not equal to men-folk. While on 'baradari' matters outside the village or matters where knowledge of women-folk is lesser than men-folk, their participation was meagre.

On his last query, explanation of using more or less fertilizer by different farmers is given in the original report.

Mr. Pasha and Mr. Merrey have said that there is nothing new in saying that extension service was poor. May I say that the genuine research activity is not simply confined to the acceptance or rejection of certain facts. It also verifies, confirms, modifies and rediscovers facts. Very often it ends up with nothing. At least the study confirms at the empirical level what is known to everybody.

M. A. Rauf : Since a lot of ground has already been covered by my friends on this forum, they have come out with interesting observations. I would make a suggestion with an intent to rehabilitate this study which has been slightly belated more from our economist and anthropologist colleagues. Obviously there are certain limitations for any kind of micro level survey. Let us face the fact that four out of fifteen tehsils have been selected. And the selected tehsils are located, one in the NWFP and three in the Punjab. The Sind became a casualty because of the elections and Baluchistan had already been eliminated from this study. Even now we are getting tremendous amount of insight from a micro-level study like this. Let us see how we can suggest to the group to improve the quality in their 'Follow-on' studies. In many cases the anthropological studies are the micro studies. Participant observation is time consuming and requires very intensive rapport with the community. This approach should be used in developing major issues relevant to the problem under study. Once those major issues are identified then it should be followed for the micro-level study. It is difficult to cover certain agricultural and social variables in a micro study.

Participant observation has been applied in the study over a period of two months and three weeks. This period is considered normally inadequate for participant observation, because it does not mean 'living with the people' but 'living like the people' in the villages. It is very time consuming, but that can alone give insight. I doubt very much that this has been applied in this case. The investigators although very well trained and selected, did not 'live like the villagers'. Very few of our graduates want to mix with villagers and gain first hand experience of rural life.

I wanted to invite my colleagues from economics that they test every study with their input-output model. How much input goes and how much output comes out. These are the governing variables, but social variables are normally ignored in economic analysis. That is why they (economists) get very faulty results.

The report says about difficult access to source of credit, complicated procedure, high interest rate and so on. The study has also come out with significant finding on the volume of non-institutional credit, its purpose, its source and repayment performance. Can you say all these while sitting here in Islamabad or Lahore or Karachi?

The GFI and IFS results are in agreement with each other to some extent, des-

pite differences in research design and methodology. This raises the question about the legitimacy of the macro-level studies particularly when the society is heterogeneous. Of course, it emphasizes that micro-level studies can be extremely useful in providing insights. As Mr. Iqbal Chaudhry himself mentioned at the Pakistan Sociological Conference at Lahore, "It also raises the question, is it better to gether small information and get it published earlier than going for lot of data and fighting hard with the computer and ending up with so little after so long?"

We must give credit to this team for making a very good attempt to build up bridges between three major disciplines namely, economics, sociology and anthropology. I think inter-disciplinary projects are very meaningful. You have seen the role of women and decision making process in the study. Similar inter-disciplinary studies should be injected in rural development particularly on use of fertilizer.

Iqbal Chaudhry : Both Dr. Rauf and Mr. Douglas Marrey our anthropologist friends on the panel have suggested that there should have been pure 'participant observation.' I have no dispute on that. Being a good researcher one should also consider the appropriateness of the research technique. I think this is also one of the fundamentals of rural Pakistani society that the young unmarried, educated Muslim girls cannot be put to the task of 'living like the people', which naturally involves living with the family, working with it, eating with it and behaving like the family unit. The interviewers are supposed to think the same way, behave the same way and then come up with the findings in a qualitative way. I can quote one instance. In Sikhaniwala village the study team was staying in the local school. The village landlord got interested in a female interviewer and started making frequent visits. The girls got scared. We had to shift the team headquarters elsewhere. These are the problems we have to face in the field and we have to modify the research techniques accordingly depending upon situation, time, money and manpower resources. The investigators were graduates with rural background and fully conversant with local dialects.

S. M. Waseem : Gentlemen, now the subject is open for general discussion.

Mohammad Ali Chaudhry : Our study at the PIDE, supported, more or less, the findings of this survey. Coming to the points raised by Dr. Dilawar I think what he has said I do not want to understate his observation that the villages were not representative. What I would like to point out is that there are thousands of villages. There are different methods. Whatever you may do and whatever the villages you pick up, people would like to criticise. There would have been solid grounds really to criticise that these are not really representative. So I would support the people who have done the study, but at the same time I do not want to underestimate your observations. As Agha Sajjad Haider has

said, these people have done useful and hard work and there is a lot of information in it for the research scholars and professors at the universities. We should not really have a negative approach. There is nothing perfect in this world. A lot of work has been done and we have a lot of information. We can really pick up some of the findings and on the basis of that we can make recommendations.

Iqbal Chaudhry : These are observations. Thank you.

Zafar Ahmad Vaince : I want to make just one point very briefly i.e., about the rate of fertilizer use for various size categories and tenurial classes. Actually, the study done by NFC relates to one point of time. Similarly, other studies relate to other points of time. Prior to 1965 the literature was supporting the contention that the small farmers were the heavy users. But after the 'green revolution' larger farmers started using higher doses of fertilizer. Now we have come to a stage where the fertilizer use seems to be equal on all sizes and tenurial classes of farmers. So we have to see whether the same conditions are going to hold in the future.

Regarding the analytical techniques and the results of research work, I think this is our weakness that we become so confident of ourselves that we do not encourage wider participation of other people, who might be better informed about some of the analytical techniques or whose advice would have been quite beneficial at the time of designing of the survey and the subsequent analysis. I think comments from my fellow economists (on the panel) on the study were really uncalled for.

Iqbal Chaudhry : Thank you Dr. Vaince for the comments.

A. Salam : I think increased use of fertilizer is not a need of the day. It is just a means to achieve higher productivity at different farms and under different tenurial arrangements. The objectives of this study was to provide a baseline data against future progress both in terms of fertilizer use as well as adoption of the other modern technology. I think it would have been more desirable to measure or to relate the use of fertilizer with the productivity. This is not to criticise the study, but to mention that this could be considered at least in future studies.

S. M. Waseem : Would you like to clarify?

Iqbal Chaudhry : In response to Dr. Salam's question of including production variable, we have included in our 'Follow-on-Study'. We had information on production even in the Intensive Study. There was some problem in the quantification of data. Therefore, we dropped the idea of analysing the production data.

My last observation refers to the 'trained incapacity' of the scientists, which has been demonstrated by the panel discussants. It is not their fault. A scientist trained in a particular discipline develops highly selective perception and restricts himself to his own conception of the phenomenon under study. I would consider a valuable contribution made by the study by way of making successful effort in integrating the disciplines of economics, anthropology, sociology and statistics. And even introducing role of women in the field of agriculture. That is all what I have to say.

S. M. Waseem : Gentlemen with this we are almost on the conclusion of this session. Before closing I would like to say a few words by way of observation. Very useful contribution was made by each of the speakers. There have been points for and against the study. Whatsoever comments were made, were all constructive and not with a view to run down the study. As Dr. Agha Sajjad Haider has rightly said, this is a very good study and a very good beginning has been made. The study has created interest for further studies in this field. Dr. Dilawar has made very good contribution by pointing out certain short-comings of the study. Mr. Pasha, Mr. Merrey and Dr. Rauf all made very useful contribution. I agree this was a very good effort. I thank all of you once again for participating in this session.

Table 1
Size of Sample

Village	Tehsil	Households
Chak No. 319 G.B.	Toba Tek Singh	25
Sikhaniwala	Rajanpur	20
Dakhnair	Campbellpur (Attock)	31
Bagnother	Abbottabad	24

Table 2

Agroclimatic and Other Details About Sample Villages

Infrastructure	Village			
	Chak No. 319 G.B.	Sikhaniwala	Dakhnair	Bagnother
Village Type	Irrigated (Progressive)	Irrigated (Backward)	Barani (Backward)	High Rainfall (Backward)
Location	Pacca Road	Katcha Road	Katcha Road	Pacca Road
Climate	Extreme Hot and Cold	Extreme Hot and Cold	Hot and Cold	Mild Hot and Chilly
Annual Rainfall	13"	7"	25"	47"
Terrain	Flat	Flat	Sub-Hilly	Hilly
Land Use/ Cultivated Area	85%	75%	45%	25%
Irrigation	Perennial Canal, 94% Area Supplemented with Tubewells	Non-Perennial Canal 35% Area supplemented with Tubewells	Barani, 4% Area irrigated by wells/kath	Barani, High Rainfall
Cropping Pattern	Wheat, Cotton, Sugar-cane, Maize	Wheat, Cotton, Rice Maize	Wheat, Fodder	Maize, Fodder
Cropping Intensity	119%	106%	91%	99%
Line Sowing	100%	83%	75%	Nil
Improved Implements Used	75%	25%	Nil	Nil
School	Primary	Middle	Primary	High for Bovs

Sub Post Office	•	•	Nil	•
Extension Worker	•	•	Nil	•
Population Planning Officer	•	Nil	Nil	•
Commercial Bank	•	Nil	Nil	•
Cooperative Society	•	Nil	Nil	Nil
Fertilizer Sale Outlet	•	Nil	Nil	Nil
Shops	11	15	20	8
Telephone	Nil	Nil	Nil	•
Seed/Fertilizer/ Procurement Centres/'Mandi'	2 Miles	7 Miles	11 Miles	13 Miles
Electricity	•	Nil	Nil	•
Farm Animals (Sample)	Two Bullocks/ Cows, Three Sheep	Three Bullocks/ Sheep/Goats, 2 Buffaloes	Two Buffaloes/Cows, One Bullock, Six Goats/ Sheep	Less than One Bullock/ Buffalo/ Sheep
Literacy Rate	68%	25%	19%	75%
Tenancy	Owners (68%) Tenants (20%)	Owners (35%) Tenants (45%)	Owners (51%) Tenants (10%)	Owners (95%)
Average Farm Size (Acres)	9	11	9	2
Off-Farm Remittance	32%	10%	35%	50%

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*Stands for yes

Table 3

Use of Fertilizer in Sample Villages

Fertilizer Use	Village							
	Chak No. 319 G.B.		Sikhaniwala		Dakhna		Bagnother	
Incidence	1945 (A.S.)		1950 (Urea)		1961 (A.S.)		1955 (A. S.)	
Current Use	100%		65%		58%		25%	
Past Use	Nil		15%		16%		12%	
Use Rate (Per Acre)	N	P	N	P	N	P	N	P
Wheat	75	47	36	5	8	1	N.A.	N.A.
Cotton	60	33	56	2	N.A.	N.A.	N.A.	N.A.
Rice	N.A.	N.A.	Not Applied		N.A.	N.A.	N.A.	N.A.
Sugarcane	68	32	68	—	N.A.	N.A.	N.A.	N.A.
Maize	71	33	56	—	18	—	8	—
N : P Ratio (All Crops)	2 : 1		13 : 1		11 : 1		N.A.	N.A.

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N.A. — Not Applicable

— NIL

CONCLUDING REMARKS

By

PROF. KHURSHID AHMAD
Federal Minister and Deputy Chairman,
Planning Commission.

In the name of God, the Merciful, the Mercy-Giving. Dr. Amir Muhammad, my distinguished friends and colleagues. I am grateful to Dr. Amir Muhammad and the organizers of this seminar for giving me the opportunity of being with you this afternoon. I think it is a rare opportunity that so many researchers and policy makers have benefitted from one another.

I have not been able to give enough time to you. I congratulate you all, the way you have been analysing, examining and evaluating different aspects of the problem. I think it is a very healthy approach that instead of engaging into simple theoretical discussion, you organized the seminar, in which findings of the survey were discussed.

I have a feeling that one of the areas where we have failed in Pakistan is the field of research particularly agricultural research. You have rightly said some of the results of this survey look quite startling to you and to your colleagues. The very fact that some of the results of this study do not confirm to some of the fundamental assumptions on which our policies have been formulated, is something which must make us realise that our thinking, analysis, policy formulation and decision making should be based upon facts. This is not just once for all. These exercises are something which we must be constantly engaged in. It is not just one survey and I hope there would be follow-up surveys so that some of the mistakes that might have crept into the present study may be identified in future. There are some new points you have discovered or confirmed or refuted in your research. This is what research is meant to be. Pakistan would gain much from the study. In the past we had approached these problems spontaneously rather than by conducting surveys like this.

I am happy that you have spent two days in examining the results of the study. My submission to you would be that, on the one hand, our research institutions should continue from time to time, surveys of the type NFC-US AID have done and, on the other hand, carry out limited but greater 'in-depth' studies and find out how our thinking would begin to approximate the reality. Going through the recommendations I find that you realise the failure of the extension service in Pakistan. I think this is an area which deserves to be examined more carefully. In Pakistan we have tried to improve the agricultural inputs. As

students of research we are bound to ask this question. Do improvements in inputs really reflect any improvement in output? If not, what has gone wrong? Are we emphasising certain single input, neglecting all other supporting or complementary inputs?

This seminar would give us some new insights for 'follow-up' research investigations and policy making. The concluding session like this is to be the most appropriate forum for raising issues. I hope these issues have been discussed in this seminar. I have not been in a position to be with you throughout the seminar. I am not aware as to what areas you have covered. There are a few points which I thought might be worthwhile to be raised at this moment. First point that strikes me, is that we have not realised that Pakistan is basically an agricultural country. Our priorities somehow, consciously or unconsciously, have come from a model country. So far as the reality is concerned it did not approximate to the situation prevailing in Pakistan. With the result, the major problems of agriculture have not been tackled with the earnestness that should have been given to agriculture.

The indigenous resource mobilization has not come forth and even after about 20 years of planning in Pakistan, we are still faced with the first question. It is my firm belief that the battle of Pakistan's survival and her growth is to be fought in the agricultural field. I feel that the researchers in the field of agriculture can make immense contribution in this respect.

Agricultural growth and transformation means development and application of technology appropriate to the situation. I am using the term 'technology' in its wider sense, where it does not merely mean implements but the total complex that transforms a certain area of economic activity. It can be unrealistic even dangerous to put the whole emphasis on any one input in isolation. It is the total mix that has to be kept in view. The appropriate balance of the elements will be examined and taken care of. Fertilizer is a key element in this mix and as such it deserves all the attention we are giving to it. There has been increase in the production and use of fertilizer. Nonetheless, we are still very much behind of what we regard to be the minimum use rate. We hope to be self sufficient in nitrogen by the end of the 5th Plan.

One of the problems that confronts us, is the production and procurement of additional supplies of fertilizers. The second major area is its transportation and distribution so that it reaches the points where it is to be used. At the moment, our problem is that the farmers who are using fertilizer, are not using enough quantities. With the result that crop response is not up to the expectations. Mere availability is not enough as you have said very rightly in your recommendations. This requires educating farmers about fertilizer, its proper use, timings, quantities alongwith supporting inputs. This education cannot be provided

merely by printing books and making manuals. I am against that in a country where written words cannot be followed by over 70% of the population. We have to go for audio-visual means so that we reach and communicate the desired message to farmers. Otherwise, we may be just adding to the un-used stocks of literature.

The training of the extension worker is of very critical importance in this programme. If we want proper use of fertilizer, we will have to launch continuous research and examine the situation again and again. This is something on which work should be constantly done and feedback to the farmers.

I may look a bit conservative but I feel that in our desire to step up use of chemical fertilizer, the farmer must not lose sight of the fact that the traditional form of fertilizer is being used since ages. It might be used as substitution, with the result that you are not really increasing the fertilizer contents. The total switching over from one system to the other has to be examined carefully.

Before I conclude I would thank you for giving me this opportunity to attend this concluding session. Everyone believes that the road to progress passes through researcher's hard work. Thousands of people who have given their lives in research and investigation, their names might not be mentioned anywhere but it is their hard labour which is responsible for some of the progress that mankind has achieved. So if we could be the fertilizer for human progress, we are lucky. You all know fertilizer is important for making the crops grow, but the fertilizer dissolves itself and lets its benefits enjoyed by others. We the researchers perhaps are the fertilizer for the process of human growth and we are responsible for giving some freshness, and some greenery to human life.

Thank you.

Pakistan Paindabad !

VOTE OF THANKS

By

RIYAZ H. BOKHARI

Chairman

National Fertilizer Corporation of Pakistan Limited

It is my proud privilege to thank you for chairing the concluding session. It was, indeed, an honour for all of us to hear views on the importance of fertilizer research and its relevance to policy formulation. I thank Dr. Amir Muhammad, Chairman of the seminar, panel discussants and the delegates, who have spared a lot of their valuable time and have really taken pains in appraising the results of the study.

I think everybody will agree with me that this was one of the seminars where all the participants played an active role in the deliberations right from the inaugural to the concluding session. The credit of keeping the interest in the seminar alive and eventually its success goes to the seminar delegates.

This has been a very fruitful exercise. One of the most important objectives of the seminar was, to coin specific recommendations out of the results of the study, for the Government of Pakistan. I am happy to say that this has been done. It is now upto the appropriate Government agencies to take up these recommendations for their implementation.

Thank you very much once again and that brings us to the conclusion of this seminar.

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GLOSSARY

1. Acre - A unit of land measurement equivalent to 0.405 hectare of land.
2. A. S. - Ammonium Sulphate.
3. Arhti - Commission agent located in a regulated or non regulated market dealing in agricultural commodities.
4. Barani - Rainfed area.
5. Baradari - It is a large group of consanguine relatives of husband or wife, who can trace their blood relations to a common ancestor. Ordinarily it includes many families and there is no geographical limit on the members of a "baradari".
6. Bar harrow - A triangular wooden frame fitted with 12 iron bars meant for weeding and hoeing wheat crop.
7. Beopari - A village trader engaged in purchasing crop produce in a village or an intermediary working on behalf of commission agent.
8. Basti - A sub village.
9. Bubersher/engro - Local brand name of urea.
10. Buzdar - One of the Baluch tribes of Dera Ghazi Khan District.
11. Chak - Colonized village.
12. Chakki - A flour mill driven by mechanical power.
13. Desi-Watni variety - A local variety of native or indigenous origin.
14. D.A.P. - Diammonium Phosphate.

15. **Fastana** – An unspecified part of farm produce given mostly by the big farmers to local revenue official (Patwari) in order to win his goodwill.
16. **Hujra** – Village common place in NWFP.
17. **Katcha road** – An un-metalled road usually used by village bullock carts etc.
18. **Kharif** – A crop season in Pakistan from April to September in which cotton, sugarcane, maize, rice and millet are the major crops.
19. **Kath** – Rain water collected at one place to irrigate fields in 'barani' areas.
20. **Kuli** – Hut or a shelter built of mud and grass straw etc. only occupied by poor and nomadics.
21. **Khokhar, Lashari, Sohantras.** – Names of different tribes.
22. **Markaz** – Centre.
23. **Maund** – A unit of weight in Pakistan about 1/28 of a ton = 37.32 Kilos.
24. **Mandi** – A grain or livestock market.
25. **Numberdar** – Village headman responsible for collection of land revenue and other taxes from farmers on behalf of Government.
26. **Pacca road** – Metalled (surfaced) road.
27. **Pun chakki** – A flour mill driven by water power.
28. **Patwari** – An official of revenue department responsible for maintaining village land record and revenue assessment.
29. **Patti** – Demarcation of area under the jurisdiction of a Numberdar.
30. **Private dealer/
sale outlet.** – A person trading in fertilizer on commercial basis whether a licensed fertilizer dealer of a Producer or Distribution

Agency or unlicensed town/village shop-keeper.

31. Public dealer/
sale outlet. — Public fertilizer sale depot operated by full time salaried employees of provincial public sector fertilizer distribution agencies i.e., Punjab Agricultural Development & Supplies Corporation in Punjab, Sind Agricultural Supplies Organization in Sind and Agricultural Development Authority in NWFP.
32. Rabi. — A crop season in Pakistan from October to March in which wheat, grain, oilseeds and lentil are the major crops.
33. Rajput (Jats, Awans,
Arains, Baluch,
Muslim Sheikh). — Different castes/'baradaries' in Pakistan.
34. Rayra — A two wheeled vehicle driven by a bullock or buffalo.
35. Saim — Water logging.
36. Saees — A person responsible for taking care of horses.
37. Saipy — A system of payment in kind to village functionaries (blacksmith, carpenter, barber) for providing services to farmers.
38. Sardar — Village headman in Baluch tribe.
39. S.S.P. — Single Super Phosphate.
40. Taccavi — Interest free loan given by land revenue department.
41. Taluka — Administrative unit in Sind Province consisting part of administrative district corresponding to tehsil in Punjab.
42. Tehsil — An administrative unit of a district in Punjab and NWFP Provinces.
43. Thappa — A method of sowing maize in 'barani' areas in which seed is put into the soil with a hand tool, named 'kharpa'.

- 44. Thur — Salinity (salinization).
- 45. Tirphali — A triple pronged implement for hoeing cotton sown in rows.
- 46. Tonga — A two wheeled vehicle driven by a horse.
- 47. Town shopkeeper — Dealer located in mandi or sub-mandi town.
- 48. Village Shopkeeper — Dealer located in a village who trades in other consumer goods in addition to fertilizer.
- 49. Zarai — Agricultural.
- 50. Zarait Nama — Fortnightly Agricultural Newsletter published by the Agriculture Department, Government of Punjab.