FERTILIZER CONSUMPTION BY FARM SIZE IN DISTRICT SWABI

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ABSTRACT
The present study was conducted during August, 2003 in two villages of District Swabi NWFP, Pakistan to investigate the consumption of various fertilizers. Our study revealed that, small growers, in general, used higher levels of different types of available fertilizer than medium and large size farms. Small landholders used 102.29 nutrients kg acre$^{-1}$ of nitrogenous fertilizer, while medium and large farms used 36.82 nutrients kg and 70.79 nutrients kg less acre$^{-1}$, respectively than the small farms. In the case of phosphatic fertilizer, small growers used 55.67 nutrients kg acre$^{-1}$ while medium and large farms consumed 27 and 35 nutrients kg acre$^{-1}$ less, respectively. Similarly, in case of potash fertilizer, small growers used 22.62 nutrients kg acre$^{-1}$, while medium and large growers applied 15.41 and 19.14 nutrients kg acre$^{-1}$ less than small farms.

INTRODUCTION
Fertilizer, in broad sense, includes all those organic and inorganic materials that are added to the soil to provide elements essential for the growth of plants (Foth, 1984). The term chemical fertilizer usually refers to manufactured fertilizer, which contain the nutrient elements in ionic form (not in elemental form) that plant can absorb. Fertilizers are of two types i.e. organic and inorganic fertilizers based on types of chemical composition (Fink, 1982).

Organic fertilizer are mostly mixtures of a number of organic compounds e.g. the natural organic fertilizer such as manure, peat and compost. While inorganic fertilizer (mineral fertilizer) consists of one or more inorganic compounds (salts, oxides etc). Inorganic fertilizer also include some organic compounds (According to their chemistry), that rapidly convert into mineral substances (inorganic) in the soil e.g. urea (Fink, 1982).

Fertilizer have been in the forefront in the quest to increase world food production more than any other input, is largely responsible for the success that has been attained in this regard. Soil fertility is one of the important factors that influence soil productivity. Nutrient deficient soil is less productive. Thus in order to cover this deficiency of essential nutrients, responsible for high crop yields, application of chemical fertilizer has become vital for optimizing crop production.

Fertilizer use began in Pakistan in 1952-53. The off-take was only 1000 tonnes of nitrogen. Phosphorus was introduced to farmers in 1959-60 with an initial usage of 1000 tonnes. Potash fertilizer off-take started in 1966-67 with a volume of 120 tonnes. In 1992-93, the off-take of fertilizer crossed the figure of 120 million tonnes. This trend in fertilizer usage emphasizes the importance and the role that fertilizers play in the economy of Pakistan (NFDC, 1993).

Scope and Justification
This study is undertaken with the objective to estimate fertilizer consumption on the basis of farm size in the study area, using econometric techniques.

It is anticipated that the findings of the study will be of great importance for a number of reasons. Firstly, it can be helpful in providing information about the factual position of fertilizer use. Secondly, information and data of this study will assist further research in the area. Finally, it will be of immense importance to fertilizer companies, farmers and all those who are involved in fertilizer’s business for their respective interests.

MATERIALS AND METHODS
The study was conducted in August, 2003 in two villages of District Swabi. This section includes introduction about the determination of sample size, data collection procedures and econometric techniques used for estimating fertilizer use on the basis of farm size in the study area. The detailed procedures being adopted to reach the final conclusion are explained below.

Determination of Sample Size
Fertilizers were used in every village of District Swabi. Due to time and financial constraints, it was not possible to select all the villages. Therefore, this study was purposely carried out in two main agricultural villages of district Swabi i.e. Yar Hussain and Dagi. About 10% of the fertilizers users (60) were randomly selected and interviewed for this study from both villages.

Data Collection
This study was based on primary data. Interview schedule was used as a research instrument for the collection of primary data. Interview schedule was prepared in such a way to cover all the relevant

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information needed for the study. The interview schedule was pretested and modified according to the feedback from the farmers.

**Data Analysis**

To make the analysis easy, the sample respondents were categorized in small (5 acres and below), medium (5-10 acres) and large (above 10 acres) categories in the study area.

To determine the level of significance of differences in the use of fertilizer among the above three categories, “Dummy variable approach”, an econometric techniques, was used (Gujrati, 1995). This technique shows the quantity by which two variables differ from each other.

The general form of the model was specified as follows:

$$Q = B_0 + B_1 DM + B_2 DL$$  \(a\)

Where Q is the fertilizer consumption acre\(^{-1}\) and DM and DL are the dummy variables for medium and large growers, respectively. The dummy variables carry the following values:

- DM=1 for medium growers
- DM=0 otherwise
- DL=1 for large growers
- DL= 0 otherwise

In the estimated Model, \(B_0\) would give the average use of fertilizer by small growers and \(B_1\) and \(B_2\) would respectively, give the magnitudes by which the use of fertilizer of medium and large growers differ from the small one, represented by \(B_0\). The statistical significance of difference \(B_1\) and \(B_2\) were tested on the basis of respective t-ratios.

**RESULTS AND DISCUSSION**

There were 43.33% respondents who had less than 5 acres holding, 35% had 5 to 10 acres and 21.67% had above 10 acres holding.

The empirical results obtained from model \(a\) are provided in Table reveal that small landholders used 102.29 nutrients kg acre\(^{-1}\) of nitrogenous fertilizer while medium and large used 36.82 nutrients kg acre\(^{-1}\) and 70.79 nutrients kg acre\(^{-1}\) less than the small ones, respectively. \(T\)-ratio of respective differential intercepts is statistically significant at 5% significance level.

Estimated model \(a2\) indicates that small growers used 55.67 nutrients kg acre\(^{-1}\) of phosphatic fertilizer while the medium and large consumed 27 and 35 nutrients kg acre\(^{-1}\) less, respectively. Decreases by medium and large growers are statistically significant on the basis of respective t-ratios.

Estimated model \(a3\) reflects that small growers used 22.62 nutrients kg acre\(^{-1}\) of potash fertilizer. While medium and large ones use less by 15.41 and 19.14 nutrients kg acre\(^{-1}\) respectively. \(T\)-ratios of differential intercepts are again significant at 5% significance level. The results are in agreement with the information provided by Salam, (1978).

**CONCLUSION AND RECOMMENDATIONS**

The findings reveal that small growers, in general, used higher dozes of all types of available fertilizer than the owners of medium and large farms.

The small landholders used 102.29 nutrients kg acre\(^{-1}\) of nitrogenous fertilizer, while medium and large farms respectively, used 36.82 nutrients kg acre\(^{-1}\) and 70.79 nutrients kg acre\(^{-1}\) less than the small ones. Small growers used 55.67 nutrients kg acre\(^{-1}\) of phosphatic fertilizer while the medium and large farms applied 27 and 35 nutrients kg acre\(^{-1}\) less, respectively. Small growers used 22.62 nutrients kg acre\(^{-1}\) of potash fertilizer, while medium and large farmers
ones used less by 15.41 and 19.14 nutrients kg acre$^{-1}$, respectively.

The finding of a difference in fertilizer use acre$^{-1}$ across different farm sizes suggests incompleteness in various factor markets in Swabi. If the technology and land quality is similar among farmers of different sizes, our results indicate that the marginal product of fertilizer is higher on larger farmers (too small usage of fertilizer) and lower on smaller farmers (too large usage of fertilizer). More research is needed to clarify the sources of the market incompleteness so that a concrete policy proposal can be derived to achieve the optimal use of fertilizer.

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<th>Table</th>
<th>Consumption of fertilizer by farm size (Result of model a).</th>
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<td>Fertilizer (Dependent)</td>
<td>Variables (Independent)</td>
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REFERENCES


