

**FAO
ECONOMIC
AND SOCIAL
DEVELOPMENT
PAPER**

102

Manual on fertilizer statistics



**FOOD
AND
AGRICULTURE
ORGANIZATION
OF THE
UNITED NATIONS
Rome, 1991**

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M-77 ISBN 92-5-103074-X

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FOREWORD

The preparation of a Manual on Fertilizer Statistics has been recommended at various FAO meetings. This manual is intended to give a broad description of the fertilizer market and to serve as a guide concerning the statistical methodology for the collection, compilation, processing and analysis of national statistics on mineral fertilizers.

It is hoped that the manual will be of use to national statistical offices and will contribute to the improvement of the quality and availability of fertilizer statistics in the various countries. It should be seen as a reference document for the training of national staff, in seminars, workshops, etc.

The Statistics Division of FAO and the Regional Office for the Near East collaborated in producing this document. It is based on material prepared by Mr. C. Sahai, Chief Statistician, The Fertilizer Association of India, which was further reviewed and prepared for publication by Mr. K. Isherwood, International Fertilizer Industry Association (IFA), Paris. The Manual was also reviewed by the members of the FAO/FIAC Working Party on Fertilizer Statistics.

Users of this Manual are kindly invited to communicate their comments and suggestions for the improvement of subsequent editions, to the Director, Statistics Division, FAO, Via delle Terme di Caracalla, 00100 Rome, Italy.

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I. INTRODUCTION

1. Audience and objective

The manual is addressed to people responsible for assembling national statistics relating to mineral fertilizers, with the aim of improving these statistics.

The manual gives guidelines on the compilation of fertilizer statistics and the basic information necessary for an understanding of the fertilizer market. Each country's situation is different and it is impossible to give precise instructions suited to every condition. The general principles described in the manual need to be adapted to different circumstances. The underlying objective is to establish and maintain a reliable record of the supply, distribution and use of the plant nutrients, from the manufacturer or importer to the farm.

Other FAO publications giving more detailed information on certain of the subjects covered are referred to at the end of the relevant chapters.

The main contents are arranged as follows:

The Introduction (I) includes a brief review of the importance of mineral fertilizers and the need for fertilizer statistics.

Chapter II gives the basic definitions, classifications and terminology on fertilizers.

Chapter III concerns the collection of statistics on the production capacities and production of the different fertilizers and their raw materials and intermediates. The precautions to be taken to avoid double counting are explained.

Chapter IV deals with the import and export of fertilizers and their raw materials.

Chapter V concerns the collection of statistics on fertilizer consumption and stocks.

Chapter VI considers statistics on the use of fertilizers in agriculture, on the different crops.

Chapter VII is concerned with statistics relating to fertilizers prices.

Chapter VIII deals with the short-term and long-term forecasting of fertilizer demand.

2. The importance of fertilizers

"Fertilizers have become a 'sine qua non' of agricultural production over much of the developing countries and will become so in most other areas before the end of this century. They are no longer used exclusively for those few cash crops grown historically for exports, though this situation still predominates in some African countries". ("World Agriculture toward 2000", FAO, 1988). In India, for example, mineral fertilizers probably accounted for only 2 % of food grain output in the early 1960's but by early 1980's the figure reached some 35 %t. Today it is no doubt even higher.

In the early 1960's the developing countries (including China) accounted for 14 % of world fertilizer consumption. By 1970/71 their share had increased to 20%. By 1988/89 the developing countries share of the total, which had more than doubled since 1970/71, had reached 42%. By the year 2000 it is estimated that their share will reach 52%.

The area of land suitable for agriculture is limited and the increasing populations of the developing countries can be fed adequately only through a more intensive use of mineral fertilizers. Field trials indicate that one tonne of fertilizer nutrients can be expected to produce, on average, 10 tonnes of grain. Efficient fertilizer use is fundamental to the well-being of developing countries.

3. The importance of fertilizer statistics

Statistics are required to record the development of production capacities, production, imports, exports, deliveries, stocks, use in agriculture and prices.

For the short-term these statistics are required to ensure that the types of fertilizers required by the farmer are available to him when and where they are needed. If fertilizers arrive too late in the season, they are useless to him, their food production potential is lost and in many cases some of the fertilizer will be lost or damaged before the next season. Statistics on fertilizer usage and stocks are needed for the organization of the acquisition, transport and storage of the supplies required by the farmer. Stock level statistics help the manufacturer to plan his production.

As the use of fertilizers develops, large quantities of material are involved. Fertilizers represent a major investment for the national economy and they must be distributed and used efficiently. They must be supplied where and when required, but at the same time stocks must be minimized. They should be made available at the lowest economic prices, with highly efficient systems for production, transport, distribution and use. This can only be achieved if there are reliable statistics to guide the manufacturer, importer, distributor and those responsible for planning agricultural production.

If a country has to import fertilizers, the cost can be high and it is important to plan the imports as efficiently as possible. This can only be done if reliable production, stock, trade and use statistics are available.

Statistics on the quantities of fertilizers imported and exported, with their country of source/destination, and prices are of crucial importance for the prospective importer/exporter.

Information on fertilizer use at farm level, on the different crops, is important not only for assessing requirements but also for planning advisory and research activities.

Several categories of statistics are required in order to be able to forecast fertilizer demand effectively.

Statistics on fertilizer prices, in particular their relationship with the prices of agricultural products, are required in order to give warning signals to the authorities of imbalances which require correction if fertilizer usage is not to be endangered.

Statistics are important for long-term planning. The fertilizer industry is necessarily international since the raw materials are located in different geographical areas. Both domestic suppliers and exporters require reliable statistics for the planning of their investments in production, storage and transport facilities. New fertilizer plants are expensive and so is the infrastructure required for the distribution of the product. Errors in the appreciation of the market can have disastrous consequences, whether in the direction of over-supply or under-supply, with the poorest countries suffering first.

References:

FAO, 1987, Fertilizer Strategies. Rome

FAO, 1988, World Agriculture toward 2000.

II. DEFINITIONS AND CLASSIFICATIONS

1. Essential nutrients

In common with all living organisms, plants need food for their growth and development. They live, grow and reproduce by taking up water and mineral substances from the soil, carbon dioxide from the air and energy from the sun.

Sixteen elements have been found to be indispensable for plant growth. They are referred to as "nutrients". The essential elements are carbon, hydrogen and oxygen, which are derived from the atmosphere, soil and water, and nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, zinc, manganese, copper, boron, molybdenum and chlorine, which are supplied from the reserves in the soil or through application of manures and fertilizers. Leguminous plants and certain bacteria and algae have the ability to fix atmospheric nitrogen.

Plants use six of the nutrients in relatively large amounts: nitrogen, phosphorus, potassium, sulphur, calcium and magnesium. Nitrogen, phosphorus and potassium are used in large quantities and are often referred to as the "primary" nutrients". Calcium, magnesium and sulphur are required in smaller but appreciable quantities and are classified as "secondary" nutrients. Iron, zinc, manganese, copper, boron, molybdenum and chlorine are required by plants in very small quantities and are referred to as "micronutrients" or "trace elements". This manual deals essentially with the primary nutrients.

A productive ecosystem should provide all the essential plant nutrients in sufficient quantity and in balanced proportions. The nutrients must also be present in an available form before plants can use them. Inadequacy of any one of these elements inhibits plants from growing to their full potential.

Nutrients are lost from the ecosystem as a result of removal in the crops, erosion, leaching, soil fixation, etc. These losses are inevitable even under the most natural conditions. If the losses exceed the natural addition of nutrients (e.g. from rain, dust, floods etc.), the soil nutrient reserves become depleted and plant growth is adversely affected. The nutrient balance is negative in almost all agricultural systems due to the quantities removed in harvested crops, and, in order to maintain and improve plant productivity, nutrients have to be added to the soil in the form of "fertilizers".

Fertilizers may be organic or inorganic. This manual concerns only inorganic or mineral fertilizers. Organic fertilizers, such as animal manure, provide not only nutrients but also organic matter, which improves the condition of the soil. However, the percentage content of nutrients in manures is relatively low and their release is difficult to control. Solid and liquid manures are difficult, unpleasant and comparatively expensive to store, transport and apply, and often there are losses to the environment in

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