

# Fertilizer use by crop in Brazil



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**Land and Plant Nutrition Management Service  
Land and Water Development Division**

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The background photograph is from the FAO Mediabase (FAO/19379/R. Jones) and the other photographs were provided by B.E. van Wik (sugar cane) and J. Fléme! (coffee). The source of these photographs is EcoPort (Portal to Ecology Management) and Pioneer.com Web site for soybean.

## Abstract

Brazil has almost 50 million hectares under annual and permanent crops, with in addition a large reserve of land with agricultural potential. Brazil is the world's largest producer of coffee, sugar cane and citrus and the second largest producer of soybeans. It has the world's second largest cattle population.

There is a close relationship between the consumption of fertilizers and crop production in Brazil. Between 1970 and 2001 agricultural production in Brazil, represented by the sixteen most important crops, increased by 3.4 times and the consumption of fertilizers increased by 4.4 times. During this period the cropped area increased only 1.5 times, rising from 36.4 million ha to 56.2 million ha.

On the one hand advanced production technologies are widely used for the production of export crops (coffee, sugar cane, citrus and soybeans). These technologies include not only appropriate rates of fertilization but also the implementation of a series of other agronomic recommendations.

On the other hand, the average yields of food crops for domestic consumption compare unfavourably with those of countries with advanced agricultural technology, although some farmers achieve yields that are substantially higher than the average. The problem of low average yields is therefore due not to a lack of agricultural technologies but to the poor implementation of these technologies, including inappropriate mineral fertilizer application. In the case of subsistence farming, which is practised in the poorer areas of the country, especially in the Northeast region, practically no mineral fertilizers are used. The use of fertilizers on food crops is constrained by their relatively low prices. The prices of rice, beans and maize, for example, fell by about 20 percent in terms of US dollars between 1993 and 2002.

Brazil is characterized by the co-existence of large estates with a large number of small farms. Almost half the 4.8 million farms are of less than 10 ha and 89 percent have less than 100 ha, occupying one fifth of the agricultural area. However, apart from sugar cane, and to a lesser extent soybean, rice and citrus, agricultural establishments possessing less than 100 ha are responsible for a substantial proportion of the agricultural production of the country.

Since the 1970s the government has promoted the settling of the Centre West region, known as the *Cerrado*, whose total area amounts to 207 million ha. This area was once considered to be marginal for agricultural production. However, today the

*Cerrado* accounts for 43 percent of the Brazilian production of beef cattle, 23 percent of the coffee, 34 percent of the rice, 59 percent of the soybeans and 29 percent of the maize. This has been made possible by research in different agronomic science disciplines, including the development of appropriate fertilization and soil amendment systems.

Another important development is that of “no-till” systems. It is estimated that no-till systems are currently applied on almost 40 percent of the grain area in Brazil, or about of 25 million hectares.

In general, the fertilizer nutrient balance in the Brazilian agriculture is unsatisfactory. The quantities of nutrients removed are higher than the quantities supplied. Thus soils are being progressively depleted of nutrients. This represents a threat to long-term agricultural sustainability. As regards the ratio between the nutrients, by international standards the use of nitrogen is low in relation to phosphate and potash. Concerning the types of fertilizers, Brazil has an unusually high proportion of nutrients, over 80 percent, applied in the form of compound fertilizers. It is also one of the few countries where the use of single superphosphate has increased in recent years, partly due to the demand for this fertilizer for use on soybeans, owing to its sulphur content.

In Chapter 10 of this publication suggestions are made concerning measures that might be taken to help to remedy certain major agricultural and social problems. The transformation of subsistence agriculture into profitable family farms is needed for the alleviation of rural poverty. However, a survey in 1995/1996 revealed that only 4.1 percent of the farmers in the Northeast region, where the largest number of small farms in the country is concentrated, had some kind of advice from the official rural extension service.

## Preface

The Food and Agriculture Organization of the United Nations (FAO) commissioned this study. It is one of a series of publications on fertilizer use on crops in different countries.

The aim of the series is to examine the agro-ecological conditions, the structure of farming, cropping patterns, the availability and use of mineral and organic plant nutrients, the economics of fertilizers, research and advisory requirements and other factors that have led to present fertilizer usage. The reports examine, country by country, the factors that will or should determine the future development of plant nutrition.

During the past two decades, increasing attention has been paid to the adverse environmental impact of both the under use and the over use of plant nutrients. The efficient use of plant nutrients, whether from mineral fertilizers or from other sources, involves the shared responsibility of many segments of society, including international organizations, governments, the fertilizer industry, agricultural research and advisory bodies, traders and farmers. The publications in the series are addressed to all these parties.

Fertilizer use is not an end in itself. Rather it is a means of achieving increased food and fibre production. Increased agricultural production and food availability can, in turn, be seen as an objective for the agricultural sector in the context of contributing to the broader macroeconomic objectives of society. A review of the options available to policy-makers is given in the FAO/IFA 1999 publication entitled *Fertilizer Strategies*.

The contents of the studies differ considerably from country to country, in view of their different structures, histories and food situation. But in each case the aim of the study is to arrive at a better understanding of the nutrition of crops in the country concerned.

## Abbreviations and symbols

ABCAR	Associação Brasileira de Crédito e Assistência Rural
AENDA	Associação das Empresas Nacionais de Defensivos Agrícolas
ANDA	Associação Nacional para Difusão de Adubos
Embrapa	Empresa Brasileira de Pesquisa Agropecuária
FAO	Food and Agriculture Organization of the United Nations
FEBRAPDP	Federação Brasileira de Plantio Direto na Palha
GuiaNet	Guia Internet Brasil
IBGE	Instituto Brasileiro de Geografia e Estatística
UFLA	Universidade Federal de Lavras
ha	hectare
AMM	Ammonium
AN	Ammonium nitrate
AS	Ammonium sulphate
DAP	Diammonium phosphate
MAP	Monoammonium phosphate
NPK	Compound fertilizers containing N, P <sub>2</sub> O <sub>5</sub> and K <sub>2</sub> O
NK	Compound fertilizer containing N and K <sub>2</sub> O
SSP	Single superphosphate
TSP	Triple superphosphate
N:	Nitrogen
P <sub>2</sub> O <sub>5</sub> or P:	Phosphate*
K <sub>2</sub> O or K:	Potash*

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\* Phosphate and potash may be expressed as their elemental forms P and K or as their oxide forms P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O. Nitrogen is expressed as N. In this study phosphate and potash are expressed in their oxide forms.