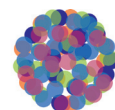


F1 FERTILISERS

WHAT ARE FERTILISERS?



**CHEMICAL
INDUSTRIES**
RESOURCE PACK

Introduction

A fertiliser is a substance applied to soil to enhance its ability to produce plentiful, healthy plants. Fertilisers are natural and manufactured chemicals containing nutrients known to improve the fertility of soils. Nitrogen, phosphorus, and potassium are the three most important nutrients for crop growth; some plant scientists think sulfur is also a major nutrient because of its benefit to plant health and growth.

These and other nutrients are found naturally in soils. Soils used for agriculture, however, become depleted in these nutrients and frequently require fertilising before the soils can be used successfully again. The most efficient way to produce fertiliser is through mining or industrial processes.

This material was obtained from the United States Geological Survey Fact Sheet 155-99. Learners - if you use any part of it you need to write it in your own words and include the following in your reference list: Jasinski, S. M.; Kramer, D. A.; Ober, J. A.; Searls, J. P. 1999. Fertilisers - Sustaining Global Food Supplies. [Online]. Available: <http://pubs.usgs.gov/fs/fs155-99/fs155-99.html> [1 July 2010].



Healthy fruit on a tree

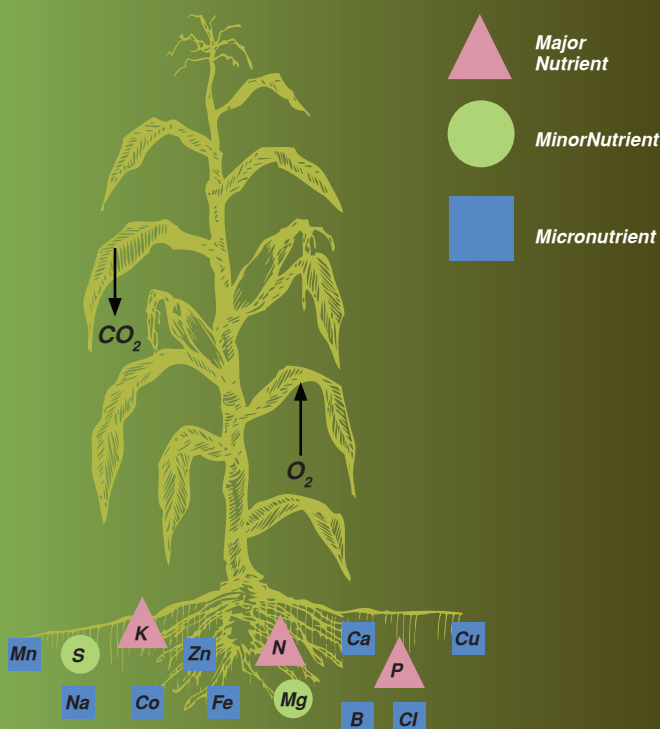
DID YOU KNOW?

A nutrient is a substance that is used in an organism's metabolism or physiology and which must be taken in from the environment.

Organic fertilisers refer to fertilisers made from natural products, for example manure. Inorganic fertilisers refer to those containing industrially synthesised components.

Source: Wikipedia

Plants require many different elements for optimum growth.



Source: International Fertiliser Industry Association

Why do we use fertilisers?

Like all living organisms, plants are made up of cells. Numerous metabolic chemical reactions occur within these cells and are responsible for growth and reproduction. Since plants do not eat food like animals, they depend on nutrients in the soil to provide the basic chemicals for these metabolic reactions. The supply of these components in soil is limited, however, and as plants are harvested, it dwindles, causing a reduction in the quality and yield of plants.

Fertilisers replace the chemical components that are taken from the soil by growing plants. However, they are also designed to improve the growing potential of soil, and fertilisers can create a better growing environment than natural soil. They can also be tailored to suit the type of crop that is being grown.

This material was obtained from the website www.madehow.com. Learners - if you use any part of it you need to write it in your own words and include the following in your reference list: Madehow.com. 2010. Fertiliser. [Online]. Available: www.madehow.com/Volume-3/Fertiliser.html [1 July 2010].

Why do we need fertilisers?

The global population increased from 2,5 billion people in 1950 to more than 6 billion people today. Even if the average diets remained the same, the global food output would have to become more than twice as large in just two generations - a challenge unprecedented in human history. With the population predicted to increase to 7,7 billion by the year 2020 there is an ever increasing need to produce more food, and do so more efficiently.

The results of fertiliser use are more fertile soil, higher crop yields and communities that are self-sufficient for food. Research has shown that typically, organic agriculture at its most efficient can produce around 200 kg of protein per hectare. By contrast, the most productive fields, fertilised with large amounts of inorganic nitrogen can yield 800 kg of protein per hectare. Because fertilisers increase soil fertility, farmers can increase their yields without expanding the area under cultivation. In 1960, farmers harvested about 1,4 billion hectares worldwide. In the 1990's, there were still less than 1,45 billion hectares under cultivation, but the food and feed supplies had doubled.

This material was obtained from a publication written by Prof Vaclav Smil. Learners - if you use any part of it you need to write it in your own words and include the following in your reference list: Smil, V. 1999. Long-range perspectives on Inorganic Fertilisers in Global Agriculture. [Online]. Available: <http://www.vaclavsmil.com/wp-content/uploads/docs/smil-article-1999-hignett-lecture.pdf> [1 July 2010].

What's inside fertilisers?

Typically, fertilisers are composed of nitrogen, phosphorus, and potassium compounds. They also contain trace elements that improve the growth of plants. The primary components in fertilisers are nutrients which are vital for plant growth. Plants use nitrogen in the synthesis of proteins, nucleic acids, and hormones. When plants are nitrogen deficient, they are marked by reduced growth and yellowing of leaves.

Plants also need phosphorus, a component of nucleic acids, phospholipids, and several proteins. It is also necessary to provide the energy to drive metabolic chemical reactions. Without enough phosphorus, plant growth is reduced. Potassium is another major substance that plants get from the soil. It is used in protein synthesis and other key plant processes. Yellowing, spots of dead tissue, and weak stems and roots are all indicative of plants that lack enough potassium.

Calcium, magnesium, and sulfur are also important materials in plant growth. They are only included in fertilisers in small amounts, however, since most soils naturally contain enough of these components.

This material was obtained from the website www.madehow.com. Learners - if you use any part of it you need to write it in your own words and include the following in your reference list: Madehow.com. 2010. Fertiliser. [Online]. Available: www.madehow.com/Volume-3/Fertiliser.html [1 July 2010].

NPK ratio

Fertilisers are graded by using a series of numbers that represent the amount of nutrient that is available to the plant. The content of each nutrient is expressed as a percentage by weight of fertiliser product. Usually three numbers appear on the fertiliser bag that indicates the percentages of N, P and K in order. The number in brackets indicates the percentage by mass of N, P, and K in the fertiliser. (38% in this case)

For example, N P K
 3 1 5 (38%)

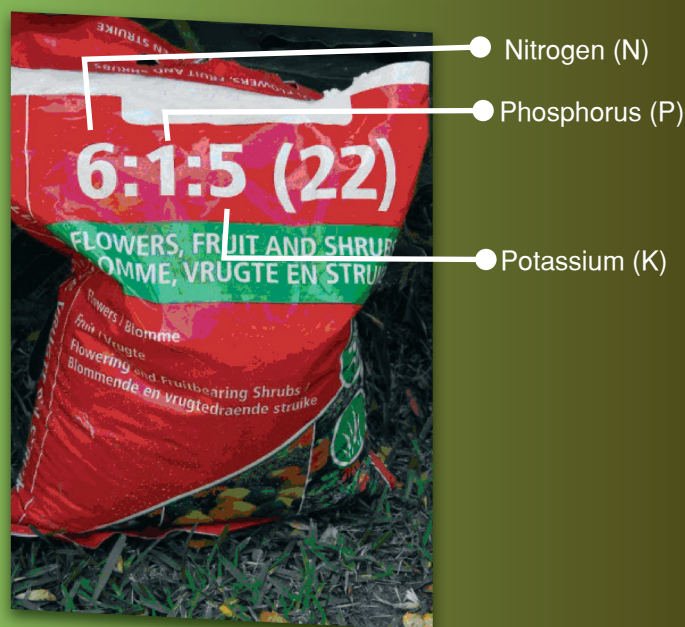
%N: 3 in every 9 parts of the 38% contain nitrogen.
%P: 1 in every 9 parts of the 38% contains phosphorus
%K: 5 in every 9 parts of the 38% contain potassium

Some countries express the phosphorus content as P_2O_5 and the potassium content as K_2O . South Africa expresses the NPK ratio in terms of the elements present, as indicated above.

The balance of the fertiliser (62%) is made up of fillers, such as gypsum, lime and sand. Other micronutrients are often added to the blend. Fertiliser companies can blend specific compounds for specialised crop needs.

This material was supplied by Sasol Group Services. Learners - if you use any part of it you need to write it in your own words and include the following in your reference list: UCT Chemical Engineering Schools Project. 2010. Chemical Industries Resource Pack. Cape Town.

A bag of fertiliser



The Grade or Analysis of a fertiliser is designated by three numbers which are always listed in the same order. Additional nutrients may be listed elsewhere, but are not typically considered part of the grade.

Photograph: Elvera Viljoen