



## FERTILIZING IS ESSENTIAL

Plants require 17 elements (nutrients) to grow and function especially for commercial production of crops. Three of these - Carbon, Hydrogen and Oxygen come from water and the atmosphere, while the other fourteen (14) are provided by the soil and added fertilizers. Six of these are termed major elements, in that they are used in the greatest quantity by the crop. The other eight are termed minor elements and are required in much smaller quantities.

Of the six major elements Nitrogen, Phosphorus and Potassium are the primary nutrients required for crop production. These nutrients are supplied in forms available to plants as follows:-

*Nitrogen in the form of Ammonium ( $NH_4^+$ ) or Nitrate ( $NO_3^-$ ); Phosphorus in the form of Phosphoric Oxide ( $P_2O_5$ ) and Potassium as Potash ( $K_2O$ ).*

**Nitrogen (N)** is one of the main building blocks of proteins. Nitrogen is responsible for growth, expansion of green leaves and stalks, essential for photosynthesis and sugar production. When Nitrogen is deficient, the growth of the entire plant is affected. Stalks will be thin and stunted and leaves turn light green to yellow. Excessive applications of Nitrogen however, will result in high levels of amino acids in the stalk, prolonged growing periods and lower sucrose content.

**Phosphorus (P)** is essential for the formation of strong and vigorous root system and plays a role in photosynthesis and many other bio-chemical processes. Phosphorus fertilizer is produced by treating mined phosphatic rocks with acids to obtain superphosphate, triple superphosphate, diammonium phosphate or monoammonium phosphate. Plants absorb most of their phosphorus from the soil solution as phosphate ( $PO_4^{3-}$ ) ions.

**Potassium (K)** is essential for plant growth and photosynthesis by being involved in chlorophyll development. Potassium helps the plant to use other nutrients and water more efficiently. Potassium fertilizers are usually mined from the earth, lakes or sea. Dunder, a distillery waste, is also rich source of potassium.

### Water and Nutrient Uptake

Water is the single most limiting factor in plant growth and crop production. Without water the real benefits of fertilizers will not be realised. Water provides the plant with the hydrogen needed for producing the

essential carbohydrates (sugars) as well as providing the internal transportation medium for the entire plant. Water is essential to the movement of all nutrients throughout the plant.

### Why use Fertilizers?

Fertilizers perhaps more than any other input can have dramatic impact on yield and profitability. For good growth and high sucrose yield, sugar cane requires a balanced supply of nutrient elements from the soil. Each crop that is harvested removes large amounts of these nutrients. Unless these are returned by fertilizing after each harvest, cane yields will become less and less each year.



Vigorous plants, the result of adequate use of fertilizer

Low cane yields result in low profitability or no profit at all. Plant residue, trash and other organic material do return some nutrients to the soil after decomposition. However, the amount of nutrients will not be enough to produce the yield required.

### Why use Fertilizers?

Nitrogen fertilizers are manufactured from different types of raw material. Chief among these are Ammonium Nitrate, Ammonium Sulphate, Diammonium Phosphate and Urea. Some blends of fertilizers contain various combination of one or more of these sources to supply the required nutrient formulation. If the soil is acidic, ammonium fertilizer is not the best choice.

Urea however has become a popular choice, in that it is by far the cheapest source of nitrogen available in the market place these days. However, **when urea is used large losses of nitrogen can occur** due to volatilization to the atmosphere. As more and more blends contain mainly urea source of nitrogen, specific management techniques should be employed to get the best results.

## Management of Urea based Fertilizers

To avoid high losses of Nitrogen when urea is used, the following should be observed. In burnt cane harvest fertilizer should be buried in the soil in a band on each side of the cane row. In green-cane trash blanketed situation there are three (3) ways of applying urea based fertilizers:-

- Fertilizer can be applied directly on cane rows soon after harvest in rainy season or if overhead irrigation greater than 15-20mm is applied soon after fertilizer application
- Urea is buried in a band on each side of the cane row. This is difficult with trash, but may also be done behind a coulter to a depth of 70-100 mm
- Urea may be applied in a surface band along the row when the cane canopy is being formed and plants are approximately 0.5 metre high or roughly 20 inches. The canopy provides some shelter, reduces wind flow and volatilisation.

Without the facility to irrigate, urea based nitrogen applied in drought condition can result in huge loss of Nitrogen if not buried in the soil or covered immediately by moulding.

## Know Your Fertilizer Blends

A bag of fertilizer weighs 50kg or 112lbs (1cwt). It contains predominantly Nitrogen (N), Phosphorus (P) and Potassium (K) indicated by the numbers on the bag. For example 16-9-18 means 16% Nitrogen, 9% Phosphorus as  $P_2O_5$  and 18% Potassium as  $K_2O$  (NPK).

A bag of 17-0-17 contains 17% Nitrogen, zero Phosphorus and 17% Potassium. A bag of Sulphate of Ammonia contains 21% Nitrogen and will not supply any other nutrient to the plant.



## SIRIs Recommendation

SIRI recommends a fertilizer application rate of 500-700 kg/ha for sugarcane production. This is equivalent to 10-14 bags/ha or (4 to 5.5 bags/ac) of the recommended blends.

Fertilizer containing Phosphorus is best applied at planting to stimulate early root formation and gives the

plant a vigorous start. A recommendation of 5 - 7 bags of 14-28-14/ha applied in the furrow below the seed cane at planting is best for **plant canes**. This should be followed by 5 - 7 bags of any of the following:- 17-0-17, 17-0-20 or 17-0-23 etc. at 8-10 weeks after planting. **Ratoon canes** should be fertilized as soon as possible and this is preferable within 2 weeks after harvesting.

Late application of fertilizer is costly. It starves the plant of the nutrients needed for growth, delays maturity, lowers sucrose levels and affects cane price.

Always remember the following:

- use the correct blend of fertilizer,
- use adequate quantities,
- apply fertilizer during the early growing period of the crop.

## What is in the Bag?

Blended fertilizers contain ingredients other than the three (3) primary nutrients as stated on the bags. These nutrients cannot be used in their pure state and are carried as compounds. Usually other nutrients are also present in the bag. In mixed fertilizer there is often a difference between the weight of the raw material required to furnish the nutrients in a tonne of a given analysis. The difference is made up with material known as fillers or 'make weight'. Several kinds of fillers are used in blends but the more popular types used are limestone and sand. Not all blends however require the use of a filler. For instance a tonne of 10-10-10 require some 1666 lbs of raw materials carrying the nutrients and some 334 lbs of limestone to make the tonne. On the other hand a blend of 15-15-15 can be formulated without the use of a filler by simply changing one of the raw material. A combination of, or availability of the raw material often determines whether filler is necessary in the blend.

## Coping with Increased Prices

Despite the relatively high price for fertilizers, sugarcane growing remain attractive as the price of sugar holds good. Growers are therefore being urged to continue using the recommended blends and rates of fertilizers.

The problem however has been the low cane yields obtained by many growers, making the business marginal and unprofitable. Target yield of 75 tc/ha is the minimum required to cope with the increased costs. In fact, the missing tonnages are the yield required to compensate for the increase.

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