GRADES OF INORGANIC FERTILIZERS FOR COCONUT

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The majority of coconut growers use inorganic fertilizers to maintain a healthy plantation with sustainable production. Today, fertilizers are very expensive and it has become the major component of the cost of production of coconut in Sri Lanka. Although farmers are familiar with the effective use of chemical fertilizers, they are hesitant in the selection of required fertilizer at the time of purchase, due to inadequate knowledge regarding fertilizers. To overcome this situation one must be acquainted with the types and properties of fertilizer. This article is aimed at educating the farmer/purchaser on coconut fertilizer under the following headings.

1. Steps to be followed at the time of purchase.
2. Common fertilizer terminology used in agriculture.
3. Types of fertilizer.
4. Inorganic fertilizers used in coconut plantations.

1. Steps to be followed at the time of purchase.

According to the existing rules in the fertilizer trade, it is compulsory for the fertilizer trader or supplier to mark or label the following items legibly on the packages or containers of fertilizer.

a. Name of the mixture in capital letters.
b. "Fertilizer Grade" (percentage nutrient by weight)
c. Name and address of the manufacturer.
d. Registered trade mark.
e. Net weight in kilograms
f. Date or month and year of manufacture.

At the time of purchase one must carefully check the above markings. The most important of these is the "Fertilizer Grade" and a detailed account of this is given at the end of this article.

The following diagram shows the appropriate markings on a fertilizer bag.

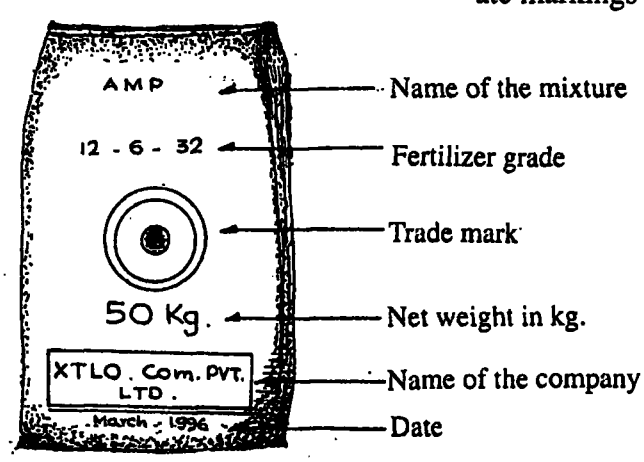

Table 1. Major Plant Nutrients used in coconut

Name of plant nutrient	Symbol used	Standard method of expressing the active ingredient in fertilizer	Form in which the plant absorbs the nutrient
Nitrogen	N	N	NH_4^+, No_3^{--}
Potassium	K	K_2O	K^+
Phosphorous	P	P_2O_5	$H_2PO_4^{--}$, HPO_4^{---}
Magnesium	Mg	MgO	Mg^{++}

2 Common fertilizer terminology used in agriculture.

The plant foods are called plant nutrients and the major plant nutrients used in coconut and their basic terms are given in Table 1.

The terms K_2O, P_2O_5 and MgO are not physically found in chemical fertilizer, but it is the standard or accepted international norm of expressing the nutrient concentration in fertilizers.

The last column shows the actual form in which plant absorb each nutrient when inorganic or even organic fertilizer is added to the soil.

3. Types of fertilizer.

There are three types of fertilizers.

a. Straight fertilizer.
b. Fertilizer mixtures or multinutritional fertilizer.
c. Complex fertilizer.

a. Straight fertilizers:

A fertilizer which contains only one nutrient source such as Nitrogen, Phosphorus or Potassium is commonly known as a staight or simple fertilizer.

eg. Urea, Rock phosphate, Muriate of potash.

b. Fertilizer mixtures or multinutritional fertilizers.

Fertilizer which contains two or more nutrients are called fertilizer mixtures. These are produced by throughly mixing all the ingredients(straight fertilizer) in dry state either mechanically or manually.

e.g. APM, ACM, YPM

c. Complex fertilizers.

Fertilizer which contains two or more nutrients in one granule and are free flowing (not presently available for coconut in Sri Lanka)

4. Inorganic fertilizers used in coconut plantations.

. There are four kinds,

a. Nitrogenous fertilizers
b. Phosphatic fertilizers
c. Potassic fertilizers
d. Magnesium fertilizers

Table 2. The properties of fertilizers.

Type of fertilizer	Common name	Chemical formula	Nutrient concentration	Colour and texture	Equivalent * Acidity	Cost per Kg ** fertilizer /Rs.	Cost/ Kg nutrient /Rs.
Nitrogenous	1 Urea	$Co(NH_2)_2$	46% N	White crystalline	80*	6.10	13.26
	2 Ammonium Sulphate	$(NH_4)_2 SO_4$	21% N 23.7 % S	White or Brownish crystalline	110*	10.20	49.00
Phosphatic	1 Saphos Phosphate or Rock Phosphate		27.5% P_2O_5	Light grey or	Neutral	7.00	25.00
	2 Eppawela Apatite		30-32% P_2O_5	Brown	Neutral	4.10	13.60
Potassic	1 Potassium chloride or Muriate of potash (MOP)	KCl	60% K_2O 48% Cl	White to red Crystalline	Neutral	12.25	20.42
Magnesium	1 Epsom salt	$MgSO_4 7H_2O$	16% MgO 13% S	White Crystalline	-	14.50	90.60
	2 Kiesarite	$MgSO_4 H_2O$	24% MgO 23% S	Off white Crystalline	-	11.95	49.79
	3 Dolomite	$MgCO_3 CaCO_3$	20% MgO 30% CaO	White powder	-	2.00	10.00

* The equivalent acidity is the number of Kg of Calcium Carbonate required to neutralize 100 Kg of fertilizer.
** The prices as on 01 January 1998

Some specific properties of fertilizers are given in the Table 2.

Urea :

Absorbs moisture quickly and requires packing in moisture proof bags. Contains highest amount of nitrogen (46%). This is an advantage in storage, transport and handling cost, per unit weight of nitrogen. The mixtures containing urea should be prepared only just prior to use.

Ammonium Sulphate :

Will not absorb moisture and has excellent physical properties and keeps well during storage and transport. It also contains about 23.7% sulphur, preferably for use in alkaline and sulphur deficient soils.

Muriate of Potash :

In mixtures containing urea it tends to get moist and may form lumps, if stored for long time. On very light textured (sandy) soils or high rainfall areas the chance of leaching is high. Therefore it would be better to apply in split doses.

Saphos Phosphate and Eppawela Appatite:

Both are rock phosphates and have very low solubility. Saphos phos phate is imported and has a slightly higher solubility.

Magnesium Fertilizer :

Epsom salt and kieserite are readily soluble and subject to leaching. It is very expensive and should be used only to correct acute magnesium deficiency.

Dolomite is insoluble and will not leach in the soil. Dolomite should be used regularly to prevent magnesium deficiency.

"FERTILIZER GRADES"

Fertilizer mixtures provide more than one nutrient, are readily available and they have made an impact on the fertilizer use of farmers. Normally fertilizer mixtures containing three nutrients are prepared and its composition is marked on the container and the composition read from left to right always denotes the percentage of N, P_2O_5 and K_2O in the fertilizer. This composition is termed as the "Fertilizer Grade".

Thus "Fertilizer Grade" refers to the guaranteed minimum percentages of total nitrogen (as N), phosphorus (as P_2O_5) and soluble potassium (as K_2O) contained in the fertilizer Grade".

eg. 100 kg of APM (grade 12-6-32) fertilizer contains 12 kg of N, 6 kg of P_2O_5 and 32 kg of K_2O (a total of 50 kg of plant food). It is worth mentioning here that the total contents of plant food in any mixture is less than 100 and the rest constitute other chemical compounds.

Another term used in the fertilizer trade is the "Fertilizer ratio" which refers to the ratios of the three nutrients.

eg. APM Fertilizer Grade 12-6-32
Fertilizer ratio 2-1-5.3

Table 3 "Fertilizer Grade" of the mixtures when different proportions of straight fertilizers are mixed.

Type of mixture	Amount used to make 100 Kg mixture			"Fertilizer Grade"
	Urea 46% N	Rock Phospate 27.5% P_2O_5	Muriate of Potash 60% K_2O	
Two component mixtures	50	50	-	32-14-00
	50	-	50	23-00-30
	0	50	50	00-14-30
Three component mixtures	33 1/3	33 1/3	33 1/3	15-09-20
	50	25	25	23-07-15
APM	26.6	20	53.3	12-06-32
YPM	28.6	42.8	28.5	13-12-17

In a fertilizer mixture if a forth nutrient is included it is usually magnesium.

e.g. A C M - N - P_2O_5 - K_2O - MgO

O - 6 - 32 - 5

Table 4.The "Fertilizer Grade" of the mixtures presently recommended by the Coconut Research Institute.

Age of the palm	Name of the mixture	Fertilizer Grade
Adult or bearing palms	Adult palm mixture (APM)	12-06-32
	"Adult Coconut" mixture (ACM)	00-06-32-05
Young palms	Young Palm mixture (YPM)	13-12-17