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DUOFOS PHOSPHATE – ALTERNATIVE SOURCE OF P FERTILIZER FOR SUGARCANE *

Natural phosphate is a rock deposit that contains 12-30% P as P_2O_5 and can be found in different areas of the world. Known world reserves of rock phosphate are about 100 billion tons (Armstrong and Andersen 1991). The Philippines is rich in phosphate deposit, which in Negros Occidental alone more than 500,000 M metric tons phosphate reserves are available. Negros Oriental has 7,000 metric tons phosphate deposit (Jagolina 1976 as cited by Escarilla and Barril, 1980).

Rock phosphates are raw materials for the production of phosphorus containing commercial fertilizers. It differs widely in its fertilizing value depending on their elemental components and percentage P_2O_5. Hard crystalline apatite is very insoluble and almost useless as fertilizer material. The soft phosphate rock from North Africa and elsewhere may be used as fertilizer under particular condition (Mengel and Kirby 1976).

Gerardino and Tahum (1994) reported that the P fertilizing value of imported rock phosphate from Christmas Island was comparable with di-ammonium phosphate. Likewise, Gerardino et al (1998) reported that local rock phosphate applied once during the first cropping and supplemented with 18-46-0 at every cropping for 5 years gave comparable results with the recommended rate per hectare of di-ammonium phosphate.

Phosphorus is one of the macronutrients that is very important for the normal growth of sugarcane and eventually for high production. It could be added to the soil in the form of water-soluble phosphate fertilizer, but application of inorganic P is not a guarantee that the entire amount maybe available to the plants. The availability of P in the soil is influenced by many factors like soil pH, soluble iron, aluminum, and manganese, or the presence of available calcium and calcium minerals. Unlike the inorganic P fertilizer, natural phosphate is not easily fixed because the release is slow and constant.

Duofos phosphate which contains 22 % total P_2O_5 was claimed as the only natural phosphate that reacts quickly as chemical phosphate therefore its efficacy test on sugarcane was conducted using the following treatments;

TREATMENTS	NPK (kgs/ha)
Control (0 fertilizer & 0 Duofos phosphate)	0
RR (Recommended rate of inorganic fertilizer based on soil analysis)	105-140-200
4 bags/ha 18-46-0 + NK (RR)	105-92-200
3 bags/ha Duofos phosphate + NK (RR)	105-13.2-200
6 bags/ha Duofos phosphate + NK (RR)	105-26.4-200
9 bags/ha Duofos phosphate + NK (RR)	105-39.6-200

Duofos phosphate as source of P fertilizer for Phil 94-0913 gave comparable TC/Ha and LKg/Ha with the application of 18-46-0. Both fertilizer sources were significantly higher than the unfertilized control (Table 1).

Although the amounts of P_2O_5 on the different rates of Duofos phosphate were lower compared with 18-46-0 treatments, yields were not affected. The steady supply of P to the sugarcane plants, due to the readily available plus the slow and constant release of P from Duofos phosphate is one of the reasons why yields did not decline.

Table1. Sugar rendement (LKg/TC), tonnage (TC/Ha), and sugar yield (LKg/Ha) of Phil 94-0913.

Treatment	LKg/TC	TC/Ha	LKg/Ha
Control (0 fertilizer + 0 Duofos phosphate)	2.33	76.17b	182.48b
RR (Recommended rate of inorganic fertilizer based on soil analysis)	2.46	112.76a	276.20a
4 bags/ha 18-46-0 + NK (RR)	2.40	127.14a	304.80a
3 bags/ha Duofos phosphate + NK (RR)	2.46	113.96a	279.77a
6 bags/ha Duofos phosphate + NK (RR)	2.37	117.47a	277.54a
9 bags/ha Duofos phosphate + NK (RR)	2.38	113.15a	269.79a
CF	2.32ns	5.84**	5.20**
CV(%)	2.7	13.10	14.00

*ns – not significant * *- significant at 1 % level*
In a column, means followed by the same letter are not significantly different by DMRT

Table 2. Fertilizer cost of every treatment and savings per hectare by using Duofos phosphate as P source for sugarcane
(Fertilizer costs as of April 2, 2008)

Treatment	Fertilizer cost (Php)	Saving/ha vs RR	% Saving
No fertilizer	0		
Fert. Rec. rate (RR) kgs NPK/ha	27,555.16		
4 bags/ha 18-46-0 + NK (RR)	22,561.00	4,994.16	17.91
3 bags/ha Duofos phosphate + NK (RR)	14,139.72	13,415.44	48.69
6 bags/ha Duofos phosphate + NK (RR)	15,339.72	12,215.44	44.33
9 bags/ha Duofos phosphate + NK (RR)	16,539.72	11,015.83	39.98

** - Original paper was presented during the PHILSUTECH 53rd Annual National Convention, Waterfront Hotel, Lahug, Cebu City. Aug. 2-4, 2006*

Duofos phosphate can therefore replace the inorganic 18-46-0 fertilizers as source of P_2O_5 because it is easily available to the plants and release slowly & constantly for root absorption.

In comparison with the recommended rate of 18-46-0, highest saving per hectare in the amount of Php 13,415.44 was obtained with the application of 3 bags Duofos phosphate. This is equivalent to about 48.69% saving in terms of fertilizer input (Table 2).

Application of Duofos phosphate is more economical than the inorganic fertilizer 18-46-0 because minimal amount is needed without substantial decrease in sugar yield.

Available soil P analysis of the soil samples after harvest were comparable, with the unfertilized plot therefore it is recommended that Duofos phosphate will be applied every cropping, to provide the phosphorus requirement of the sugarcane plants.

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