

PDF - ASSESSMENT OF ORGANIC LIMING MATERIAL AND FERTILIZER IMPROVED SOIL
CONDITIONS IN SUPPORT OF HIGHER YIELDS OF YAM DIOSCOREA ROTUNDATA - researchcub.info
CHAPTER ONE

1.0 INTRODUCTION

Increasing demands for food and other socio-economic crops have intensified the quest for higher yields of crops. The low fertility of soils is a hindrance to sustained agricultural productivity in Nigeria. Thus, the use of lime and fertilizers remains critical for soil improvement and increases in crop yields (Asadu et al., 2012).

Liming is an important strategy in the management of acidic soils. In using it to increase the pH of acid soils and to eliminate the deleterious effects of high concentrations of micronutrients farmers also indirectly supply the nutrients Ca and Mg which are contained in the lime. The degree to which a given amount of lime per unit of soil (volume) will increase soil pH depends on soil properties such as the clay and organic matter contents and the cation exchange capacity (CEC) of the soil. Soils with low CEC will show a more marked pH increase than soils with high CEC (Turner, R. C. and C. Cleark, J. S., 1996).

Acidity in the soil is usually controlled by the application of amendments that have basic ions for easy neutralization of H^+ and Al^{3+} . The most common amendments for effective increase of soil pH are limestone ($CaCO_3$) and dolomite [$CaMg(CO_3)_2$]. Other suggested liming materials include, palm bunch refuse (PBR), wood ash, industrial lime and oyster shells (Brady et al., 2002). Apart from reducing acidity, liming also increases the availability of several plant nutrients and enhances the activity of soil micro organisms which function in the release of phosphorus and sulphur from soil organic matter (Amos, 2001).

In recent years, attention has shifted from dependence on inorganic liming materials to inclusion of organic ones. Materials such as PBR and wood ash are known to be rich in Ca, Mg and K, and thus can be effective as liming material.

Obighesan (1983) and IITA/NENRI (1999) summarized several field experiments on the nutritional requirements of yam in different agro-ecological zones of Nigeria. Their report indicated that yams performed best in soils of low acidity that are also rich in K and Ca. Other tuber crops equally perform better when acidity is low and the basic materials high.

In South Eastern Nigeria soils derived from coastal plains and parent material are highly weathered, coarse textured in the surface horizon, and of low contents of organic matter, nitrogen and exchangeable bases. They may be low or high in content of available phosphorus. Being highly leached, due to much rainfall, the soils are strongly acid and therefore require both liming and fertilization (Ogban et al., 1998). Reports on specific studies to determine optimum rates for combined or integrated applications of both a liming material and a fertilizer are scarce. The purpose of this study is to assess which combinations of an organic liming material (palm bunch refuse, PBR) and a fertilizer such as NPK15:15:15 improved soil conditions the most in support of higher yields of yam (*Dioscorea rotundata*).

Specific Objectives

- (1) To assess the effects of palm bunch refuse (PBR), NPK15:15:15 (NPK) and PBR+NPK combination on selected soil properties.
- (2) To evaluate the potentials of PBR as a liming material.
- (3) To assess the effects of sole and combined applications of the two materials on the tuber yield of yam on this type of soil.

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