



Potential of *Moringa oleifera* as nutrient-agent for bio-fertilizer production

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ABSTRACT

The results of this research reveal *Moringa oleifera* to be an effective nutrient-agent for bio-fertilizer production. Herein, plant analysis data indicate *Moringa* to be a good nutrient carrier of elements that can enhance effective and productive cultivation of crops, while in-turn maintaining soil fertility status.

Keywords: Biofertilizer, Maize germination, Nutrient agent, Crop Production, Biotechnology

1. INTRODUCTION

Bio-fertilizer has been viewed by several researchers to be living or latent cells of strains of microorganisms, which is immobilized on a carrier, by their interactions in the root zone, enabling crops to take up nutrients. Advantages of bio-fertilizer over mineral fertilizer include eco-friendliness, including amenability, especially to smallholder farmers. International Federation of Organic Agriculture Movement (IFOAM, 2005) concluded that bio-fertilizer can be applied for organic farming.

The quality of material is an important factor in determining the potential of any input in a bio-fertilizer program. Research experiments of Somasegaram and Hoben (1994) point-out: availability in adequate amounts and being inexpensive, non-toxic to inoculant bacteria strain and plants, good moisture absorption capacity and amenability of processing and sterilization.

Numerous types of materials, including agricultural by-products have been reported by researchers as nutrient agent material for bio-fertilizer production. Plant material, such as *Moringa oleifera* are available in reasonable quantity in many developing countries. *Moringa oleifera*, known with common name as drum stick, is native to parts of Africa and Asia, the multipurpose tree native to the foothills of the Himalayas in northwest India. The tree has been found useful in herbal medicine, nutritional, including its utilization in the area of biotechnology. *Moringa* has the potential to improve nutrition, boost food security, foster rural development, and support sustainable soil nutrient.

Research findings of presented *Moringa* can be used to increase soil fertility. *Moringa* leaves have been reported as the most nutritious part of the plant. Vitamins, Manganese including protein have been investigated to be among the nutritional value of *Moringa* leaves. *Moringa* tree can easily be seen in various locations in Africa, including Nigeria, especially where the weather conditions are conducive the tree.

Being abundant, with little economic value in many developing countries, *Moringa oleifera* meets some basic requirements to be used as a nutrient-agent for bio-fertilizer production. This study was conducted to confirm the potential of *Moringa oleifera* as a nutrient-agent for bio-fertilizer production.

2. MATERIALS AND METHODS

Study Location

The study was carried out in Obubra, location of the Faculty of Agriculture and Forestry, Cross River University of Technology (CRUTECH), Nigeria. Obubra is on latitude 6° 06' N and longitude 8° 18' E in the rainforest zone of Nigeria. The study was conducted in 2013 and 2014. Obubra is characterized by a mean annual rainfall distribution at 2250 mm – 2500 mm with annual temperature range at 25-27 °C. Plant analysis of *Moringa* leaves was carried out in the biochemistry laboratory at CRUTECH.

Carrier Materials

Fresh *Moringa* leaves were obtained from different locations within Obubra Communities. The leaves were grinded lightly, then sterilized by autoclaving. Curing was carried out at room temperature for 7 days to allow microbes to act on the material.

Chemical Composition Analysis of Carrier Material

Analysis of *Moringa* leaves was done using procedures for plant analysis as described by Ryan *et al.* (2001)

Carrier Materials

Bio-fertilizer produced after curing was dried at 40 °C to moisture content of 18%, then stored at room temperature for the entire duration of this study. Viability of the bio-fertilizer was tested by germinating maize seed (Ikom Local White) after 5 days in a medium containing the bio-fertilizer and laboratory soil (tested to be too low to support crop germination).

3. RESULTS AND DISCUSSION

The results of the experiment (**Table 1, Figure 1**) show *Moringa oleifera* has been active, effective, and productive as a nutrient-agent in bio-fertilizer production. Nitrogen (N), Phosphorus (P), including Sodium (Na) content of the material seem sufficient for the material to be used as a bio-fertilizer material in the field of soil fertility management and crop production. Organic Carbon (Org. C) and Carbon-Nitrogen ratio (C:N) of the material also presented the material as adequate for soil fertility improvement.

Table 1. Nutrient Composition of *Moringa oleifera* Leaves in Obubra.

<i>Moringa oleifera</i> Leaves	N (%)	P (%)	K (%)	Ca (%)	Mg (%)	Na (%)	Org. C (%)	C:N
	4.02	1.17	1.80	12.3	0.10	1.16	11.1	2.8

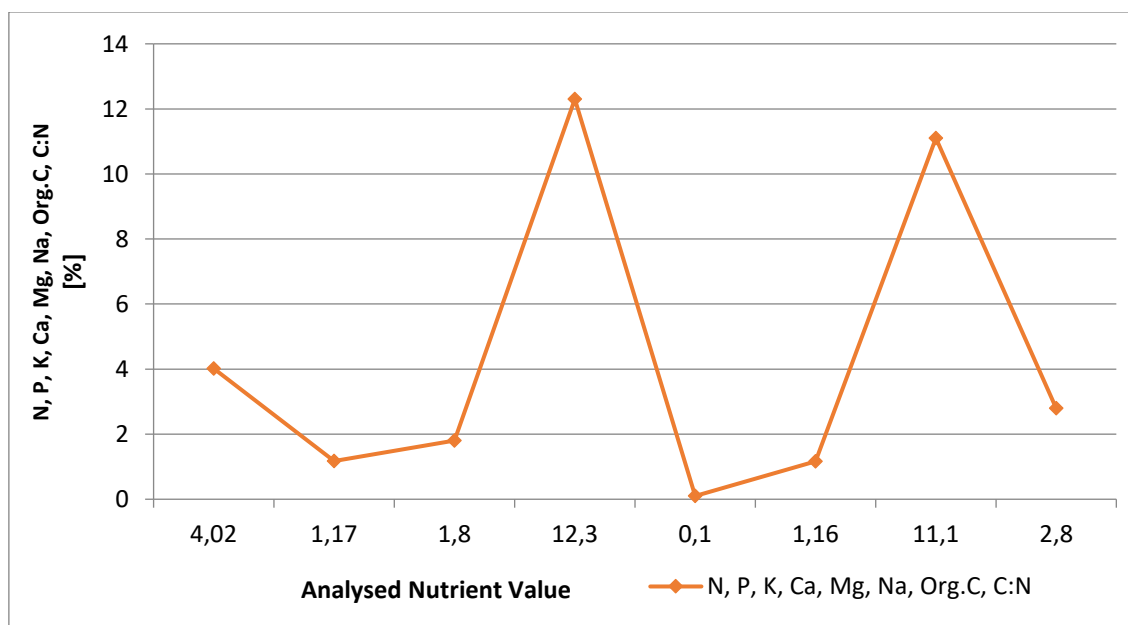


Figure 1. Nutrient Analysis of *Moringa oleifera* Leaves in Obubra, Nigeria

The ability of the material to aid the crop germination proves the produce bio-fertilizer to be effective, presenting that the material can be used efficiently as a bio-fertilizer material, with the experimental findings where their various experiments present *Moringa* as effective when used to seek for soil fertility improvement and increase crop growth.

The effectiveness of *Moringa* leaves as a potential nutrient-agent for bio-fertilizer production as represented in Figure 1 indicated that as a measure to increase soil fertility and increase crop growth/production, *Moringa oleifera* leaves can be utilized in production of bio-fertilizer.

4. CONCLUSION

Result of the experiment proves *Moringa oleifera* has been effective nutrient-agent for bio-fertilizer production, hence, increasing crop growth, while improving soil fertility status.

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