ENVIROM HOLDING AFRICA LTD REPORT

THE EFFECT OF LIQUID FERTILIZER CBX ON CARROTS YIELD EITHER APPLIED THROUGH SOIL OR ON FOLIAGE WHEN COMPLEMENTING PRIMARY GRANULAR FERTILIZERS &POULTRY MANURE

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ABSTRACT

This research was carried out to assess the effect of organic liquid fertilizer Envirom CBX applied on soil and foliage (N, Ca, Mg, Fe, Mn, Zn, Cu, Mo, B, Co, FA and HA) on yield of carrot production in Rwanda when complementing other current soil applied fertilizers.

The experimental design used was Randomized Complete Bloc Design, with seven treatments replicated twice:

T0=nofertilizers,T1=poultrymanure+N17P17K17(200kg/ha)+Urea(100kg),T2=CBX alone,T3=Poultrymanure(PM)+CBX(10L/haonce)$_{soilapplied}$,T4=Poultrymanure(PM)+N17P17K17(120kg/ha)+Urea(60kg)+CBX(10L/haonce)$_{soilapplied}$,T5=poultrymanure(PM)+N17P17K17(120kg/ha)+Urea(60kg)+CBX(1.25L/ha once)$_{foliar\ applied}$,T6=Poultry manure(PM)+CBX(1.25L/ha once)$_{foliar\ applied}$ Organic liquid CBX fertilizer contained macronutrients, micronutrients, humic and fulvic acid .The data collected and analyzed during this research, parameters were , carrot diameter, length and carrot yield per parcel. Statistical data analysis was done by using SPSS16.0 software and Processed by EXCEL for data presentation. The findings showed that application of CBX (soil and foliage) on carrot plant revealed that the use of CBX either on soil or through foliar application increase significantly the number of carrot diameter, length and yield per parcel compared to controls.

Keywords: Poultry manure, N17P17K17, Urea, CBX soil and foliar applied and carrot yield.

INTRODUCTION

Carrot (*Daucus carota* L.) is an important vegetable crop in Rwanda grown well in sandy soil. With growing population of the world in general and the developing countries in particular, demands are overwhelmed for enhanced food production. Besides emphasizing on main crops and vegetables, various pulses also play an important role to satisfy the growing human food demands. Carrot (*Daucus carota* L.) is the most economically important vegetable crop in the world, among the top-ten vegetables in terms of both area of production and market value (Simon PW et al;2008). Carrot is an essential root vegetable and best source of carotene; a precursor of vitamin A (Zeb A, Mahmood S.; 2004). Minerals and nutrients are present in sufficient quantities in carrot (Nicolle C et al; 2004). Carrot is consumed uncooked in salads, steamed or boiled in vegetables, and may also be used in the preparation of soups and stews (Anjum MA, Amjad M; 2002).

Macronutrients as well micronutrients are of primary importance in our agriculture system but due to illiteracy and unawareness of our farmers, they usually overlook the importance of applying micronutrients which are becoming deficient in our soils. Boron is one of those micronutrients which are rapidly becoming deficient in soils (Tahir M et al; 2009). Boron (B) is an important mineral nutrient because of the important role that it plays in physiological processes like carbohydrates metabolism, translocation and development of cell wall and RNA metabolism (Siddiky MA et al;2007 and Herrera- Rodriguez MB et al;2010). Boron has been found to play a vital role in pollen tube growth, pollen germination, plasma membrane stimulation, floret fertility, anther development and development of seed (Oosterhuis DM;2001 and Wang Q;2003).

Reduction in leaf photosynthetic rate, plant height, number of reproductive structures during squaring and fruiting stage and dry matter production is caused by boron deficiency Zhao D, Oosterhuis DM; 2003.Different micronutrient like Zn, Mn, Cu, B and Mo are becoming deficient in soil with increasing cropping intensity (Malakouti al. 2009).

Stimulation of root and shoot growth by humic acid was also reported in corn 1976 Lee, Y.S. and R.J. Bartlett. They reported an increase in branching and root hair development of corn roots when plants were grown in a nutrient solution containing humic acids. Similar results were reported on tobacco roots 1976 Lee, Y.S. and R.J. Bartlett. Mylonas A V and BC McCants 1980a. Root proliferation is a benefit from applications of humic and fulvic acids at low concentrations. These stimulatory effects also have been directly correlated with enhanced uptake of nitrogen, phosphorus, sulfur, zinc, and iron.

The fact that fertilization solves the problem of low yield, this research was conducted to investigate the effect of use of organic liquid fertilizer CBX applied either on soil or on through foliage when complementing poultry manure and granular fertilizer rich in primary macronutrients on yield of carrot.

envirom green

COMPOSITION OF CBX

CBX is an environmentally friendly biostimulant that is based on nature's own processes. Envirom CBX balances the different biological systems in the soil and increases microbiological activity and growth. Increased microbiological activity creates a soil environment that promotes healthy plant growth and development.

The composition of Envirom CBX can recreate healthy soil in most environments regardless of location, climate or soil type. Healthy soil needs less water, repels pathogens and prevents diseases, requires less tillage and is a more efficient stimulant for plant growth.

The major components of CBX are:

- Macronutrients (N9.4P0.09K0.04Ca0.2C2.9)
- Micronutrients (Fe0.06Zn0.06Mn0.02Co350ppmCu0.41ppmMo86ppmBa
- 0.18ppm
- Humic (0.92%) and Fulvic acids (29.87%)

METHOD AND MATERIALS

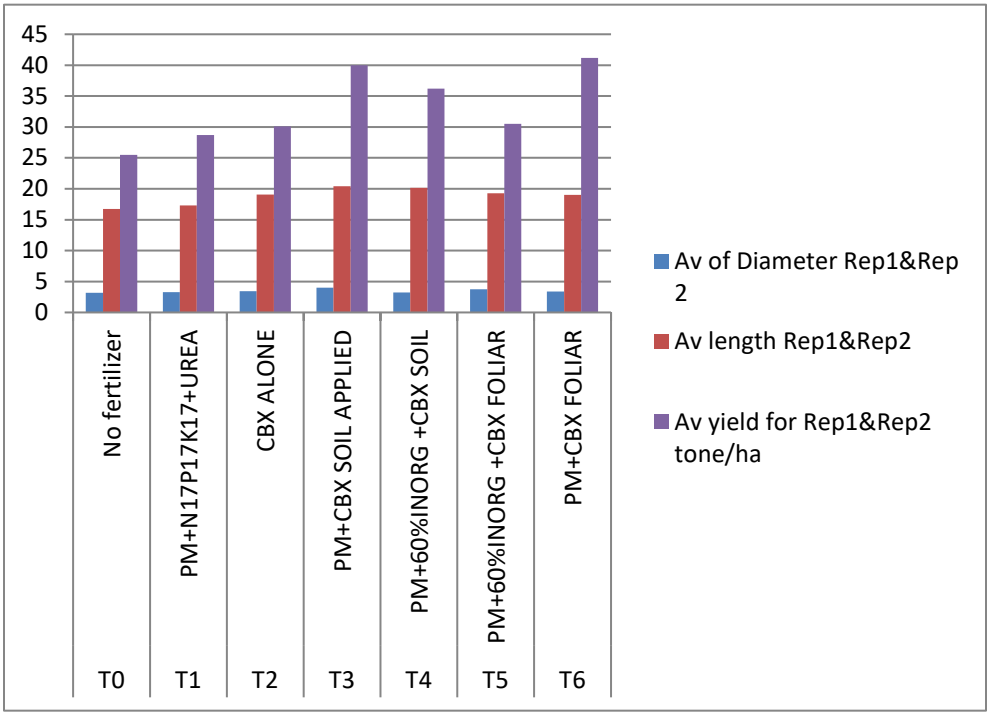
The field experiment was conducted on carrot variety of Nantes in season B 2017, at Gasabo district, Masaka sector, and Gako cell. The physical characteristics of this soil were suited for production in the above district. The experimental design used was randomized Complete Bloc Design, with seven treatments replicated twice.

The soil application fertilizers used were poultry manure (10tones/ha), N17P17K17, UREA, and liquid CBX. The top-dress fertilizer was liquid CBX and UREA. Treatment plot were: T0= no fertilizers, T1=poultry manure(PM)+N17P17K17 (200kg/ha),UREA(100kg),T2=CBX alone,T3=Poultry manure(PM)+CBX(10L/ha once)$_{\text{soil applied}}$, T4=Poultry manure (PM)+N17P17K17(120kg/ha)+Urea(60kg)+CBX(10L/ha once)$_{\text{soil applied}}$,T5=poultry manure (PM)+N17P17K17(120kg/ha)+Urea(60kg)+CBX(1.25L/ha once)$_{\text{foliar applied}}$,T6=Poultry manure (PM)+CBX(1.25L/ha once)$_{\text{foliar applied.}}$

CBX$_{\text{soil applied}}$ was made twice on recommended treatments, i.e. 10L/ha*2=20L/ha, while CBX$_{\text{foliar applied}}$ was made four times, respectively twice at vegetative stage (start spray two weeks after germination & second spray after 14 days) and at reproductive stage (tuber Initiation& tuber bulking with interval of 14days) i.e 1.25Lha*4=5L/ha. The dilution for CBX$_{\text{foliar applied}}$ was 5ml in 1L of water while CBX$_{\text{soil applied}}$ was 1liter in 20l of water. The application of liquid CBX$_{\text{foliar}}$ was always used in late evening and shaken well before use.

The materials used were: hoes, scale, jerrycan for fetching water, knapsack for spraying foliar fertilizer, measuring tape, and bags (packages) for transportation and balance for measuring carrot weight. Statistical data analysis was done by using SPSS16.0 software and processed by EXCEL for presentation.

RESULTS AND DISCUSSION



The above figure shows the response of carrot on treated plots with organic liquid fertilizer CBX applied either on soil or through foliage, the alarming observation in crop nutrition was obtained in all data taken (carrot diameter, carrot length, and carrot yield) whereby all treated plots prove great difference compared to untreated plots (T0 and T1). The highest treatment in carrot diameter was obtained in T3=4.02cm, followed by T5=3.76cm, then T2=3.41cm, T6=3.38cm, T1=3.26cm, T4=3.20cm and the last was T0=3.10cm.

The highest carrot length was obtained in T3=20.41cm, followed by T4=20.15cm, then T5=19.30cm, T2=19.07cm, T6=18.99cm, T1=17.28cm and the last treatment was T0=16.75cm The highest carrot yield per hectare was obtained in T6=41.20tones, followed by T3=40.00tones, then T4=36.20tones, T5=30.50 cm, T2=30.09tones, T1=28.70tones and the lowest yield was obtained in T0=25.5tones. The above findings are supported by Hartwigsen and Evans who

reported an increase in root fresh weight of horticultural crops when 2500 ppm humic acid was used while Lee and Bartlett reported the optimum concentration for corn was 5 ppm humic acid. Results of studies conducted by Rasaei et al. (2012), with regard to the physiological effects of application of humic acid on green peas, indicated that use of humic acid showed significant effect on value of chlorophyll A and B and content of relative water of leaf as well as value of solution sugars in leaf than those plants that did not use humic acid. In other words, humic acid showed significant effect on plants while those plants without humic acid did not grow better.

Kohraee et al. (2011) explained that micronutrients are essential materials for growth and used in small quantities compared to the major nutrients N, P, K and they play an important role in cells division and the development of Almost tissue, metabolism, respiration increased maturity speed. Alloway (2004) pointed that the use of fertilizers containing Zinc element lead to increasing the quantity and improving the quality of potato tubers when Zinc activates enzymes and the representation of carbohydrates and proteins manufacturing.
Manganese enters as a major component in the synthesis of enzymes affecting the photosynthesis process and in redox reaction and other reaction, deficiency leads to a lack of efficiency of the process of photo-synthesis (Heckman.2000). Jawad T. M. Al – Fadhly, 2016. revealed that spraying (Zn + Mn) on potato plants significantly increased mean weight of tuber, mean tuber yield per plant and total tuber yield.

Application of (Zn + Mn) mixture during vegetative growth stage caused to enhance mean weight of tuber, mean tuber yield per plant and total tuber yield. Results also showed interaction between sprayed mixture (Zn + Mn) and date of application. Production of potato tuber yield can be improved by application of (Zn + Mn) mixture during vegetative growth stage.

CONCLUSION AND RECOMANDATION

It can be concluded that liquid organic fertilizer CBX application either through foliage or through soil application may increase carrot diameter, length and yield per parcel when complementing poultry manure or granular fertilizer rich in primary macronutrients.

For economic analysis in terms of yield, foliar application of organic fertilizer CBX can be recommended for use on carrot than soil application.

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