

The Effectiveness of *Moringa oleifera* Leaf Extracts on The Growth and Yield of Tomato (*Solanum lycopersicon*)

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ABSTRACT

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The experiment was conducted at the Department of Agricultural Technology Research and Teaching Farm in Ramat Polytechnic Maiduguri to determine the effect of *Moringa oleifera* leaf extract on the growth and yield of tomatoes (*Solanum lycopersicum L.*) in the semi-arid environment of Maiduguri, Borno State. Parameters measure include, leaf number, plant height, number of fruit and weight of fruits. The result obtained shows that there was significant difference in plant height per plant among the treatment at 4 and 8 WAT, while number of plant leaves per plant was recorded highest in Treatment three (T3) between other treatment. This study suggests the application of *Moringa oleifera* leaf extract at critical growth stages for better growth and yield of performance of tomatoes production in Maiduguri is the best as it gives highest yield and highly profitable when compared to other source of plant extract.

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I. INTRODUCTION

Tomato (*Solanum lycopersicum L.*) is a member of the family *Solanaceae* which comprises short-lived perennial herbaceous plants. It is one of the most popular vegetable crops widely grow for its edible fruits, high nutritive values and also for its diversified uses (Afroz et al., 2008). It is also an important vegetable crop in Nigeria accounting for about 18% of daily consumption of vegetables which averages 50.6g per person (Kataria and Mittal, 1994). Tomatoes are grown for home consumption in the backyard of almost every homestead across sub-sahara Africa. They are important source of vitamins and important

cash crop for both small holders and medium scale commercial farmers (Ana et al., 2003). Tomato fruit is utilized by human in the preparation of soups, stews and fresh slice in salads (Wilbur, 1998). Tomato is a healthy food with low fat, cholesterol free and a good source of fibre and protein. Despite the human need of tomato, its yield in both smallholders and medium scale commercial cropping systems are generally far below the potential of the crop (Vimala et al., 2001). Its lower yields as a result of disease infestation as well as huge amount of post-harvest losses incurred during transportation and storage by rot fungi has been source of serious concern. Moringa contains zeatin, a plant hormone derived from the purine

adenine. It is a member of the plant growth hormone family known as cytokinins (Soliman & Shanan, 2017). These plant hormones help cell division, differentiation, and growth, protect against oxidation and help in nutrient assimilation (Hwang et al., 2012). Tomatoes has high level of acceptability by the people in daily life activities in this region. The objective of the study is to determine the effectiveness of the *Moringa oleifera* leaf extracts on the growth and yield of tomatoes.

II. MATERIAL AND METHOD

Experimental Site

The experiment was carried out in Research farm of Department of Agricultural Technology Research and Training Farm in Ramat Polytechnic Maiduguri, Borno state, Nigeria. Maiduguri lies within the latitudes 11.83°N and longitude 13.15°E. The State shares common border internationally with T-chad, Niger and Cameroon Republic Maiduguri metropolitans' council has since growth rapidly with a population exceeding 1m according to 2006 census before the crises invaded the state (Barnaby 2011).

Experimental Design/Treatment

The experimental was laid out in Complete Randomize Design with a total land area of 6m the area were divided into three (3) treatment and three (3) replications plots with a size of 1.5m*1.5m and 0.5m*0.5m intervals.

Source of Seed

The variety used was Roma VFN and UTC, those seed were obtained from Maiduguri Monday Market Borno State.

Land Preparation

The experimental plot was prepared before planting, all stumps, straws, volunteer crops, stones, broken binds pieces of cement bricks, weeds and other unwanted materials were cleared removed from the site, the experimental plot was then prepared into a

fine till to ensure uniform distribution of mixture temperature regime and plants root penetration as well as uniform leveling to avoid side water logging and affect seed. The ploys were then marked out with adequate path spaces between and within rows using farm tools such as tape, hoe, rope, rake etc.

Sowing: - was done accurately in December 2019 during dry season.

Transplanting

Transplanting was done in 18-january,2020 establishment of irrigation water were drill methods were made at a depth of 2-3cm using hoe and 2-3 seedling per hole were sown per drill at a spacing n= 30cm *30cm and covered shall owing top soil.

Data Collection

Samples were collected from Five plants that are randomly selected in the rows and tagged in each plot at Two, Four and Eight weeks after transplanting (2WAT, 4WAT and 8WAT) respectfully where plant height, number of leaves, number of branches, number of fruit and fruit weight were recorded using a ruler meter, manually hand pick transferred to the Laboratory for examination under digital weighting scale to determine the effect of *Moringa oleifera* leaf extract on growth and yield of tomatoes.

Treatment details

T1= Control (foliar spray with water), T2= MLE sprayed only at tillering stage, T3= MLE sprayed after flowering and T4= MLE sprayed only at heading stage.

PARAMETER MEASURED

Plant Height (cm)

The length of the plant was measured at 2WAT, 4WAT and 8WAT from each five plant in plot using ruler to determine the effect of *Moringa oleifera* leaf extracts on the growth and yield of tomatoes.

Number of leave per plant plot.

The number of leave per plant were counted manually and recorded from each of the five sampling plant in plot to determine the effect of *Moringa oleifera* leaf extracts on the growth and yield of tomatoes.

Number of Branches per plant plot.

Number of branches was counted in each plot at 2, 4 and 8 weeks after transplanting (i.e 2WAT, 4WAT and 8WAT) and the average mean were recorded to determine the effect of *Moringa oleifera* leaf extracts on the growth and yield of tomatoes (Olfati et al., 2012).

Number of fruit per plot.

This was counted by counting the number of fruit of five plant samples and the average number recorded to determine the effect of *Moringa oleifera* leaf extracts on the growth and yield of tomatoes (Colla et al., 2017).

Fruit Weight

Total yield from each treatment were measured using a digital scale to the effect of *Moringa oleifera* leaf extracts on the growth and yield of tomatoes (Zheng et al., 2016).

Statistical Analysis

The data recorded were therefore, subjected to analysis of variance (ANOVA) and the difference between treatment means were compared using LSD 5% least significant.

III. RESULT AND DISCUSSION

Effects of *Moringa oleifera* leaf extract on growth parameter of tomatoes

Application of Moringa leaf extract had significant effects on the growth parameters of Tomatoes viz. plant height at 2WAT, 4WAT, 8WAT, Number of leaves / plant and Number of branches / plant respectively in Table 1. The highest values for plant

height (16.46) at 8WAT, Number of Leaves / plant (39.07) and Number of branches / plant (7.81) were recorded from Treatment Three (T3) where Moringa extract was sprayed twice. The lowest values for plant height (8.50), Number of Leaves / plant (18.40) and Number of branches / plant (5.46) were obtained from control treatment (T1) where no Moringa leaf extract was applied. All the growth parameters were increased with the increase of the frequency of Moringa leaf extract application at critical vegetative growth stages. Foidle et al., (2001) revealed that spraying of Moringa leaf extract to many field crops can strengthen plants, promote the vegetative growth and increase the weight of root.

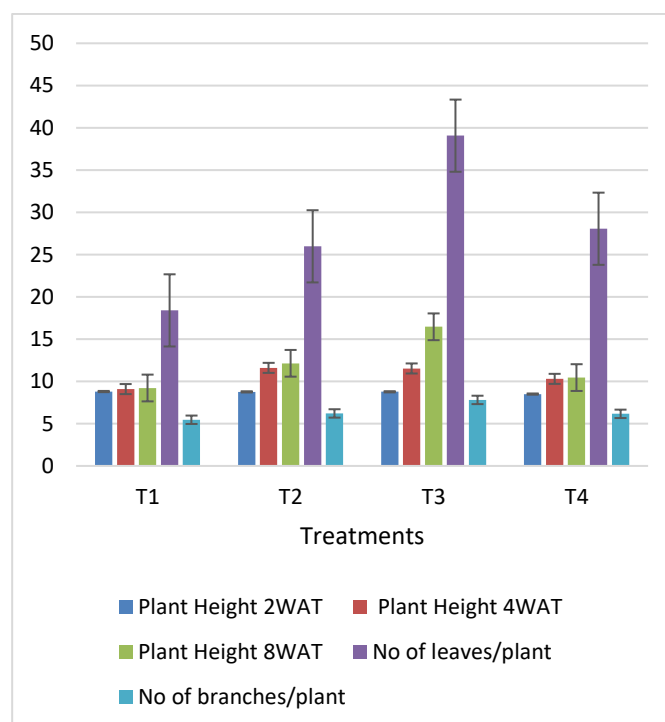


Fig 1. Effects of *Moringa oleifera* leaf extract on growth parameter of tomatoes (*Solanum lycopersicum* L). Treatment details: T1= Control (foliar spray with water), T2= MLE sprayed only at tillering stage, T3= MLE sprayed after flowering and T4= MLE sprayed only at heading stage.

Effects of *Moringa oleifera* leaf extract on yield parameter of tomatoes

Yield components in the Table 1 show that the highest number of fruit was recorded at 8WAT with

10.41 in Treatment Three (T3) and the lowest at 4WAT with 5.55 in Treatment One (T1). Again the highest number of fresh weight per tones was recorded at 5.41 in Treatment Two (2) at 8WAT and the lowest was recorded at 4WAT with 2.77 in Treatment One (T1). Similar with the results for growth parameters, the yield components of

Tomatoes improved with the frequency of applying Moringa leaf extract. For all the yield components, the performance of the control treatment (T1) was poor. *Foidle et al. (2001)* also found the increased fruit weight plant due to application of Moringa leaf extract.

Table 1. Effects of *Moringa olifera* leaf extract on yield parameter of tomatoes

Treatment	Number of fruits		Fresh Weight (tons)	
	2WAT	4WAT	2WAT	4WAT
T1	5.55	10.27	2.77	5.32
T2	6.52	10.30	3.44	5.41
T3	8.81	10.41	4.72	5.10
T4	7.20	10.35	3.65	5.36
LSD	NS	NS	3.143	2.570

Treatment details: T1= Control (foliar spray with water), T2= MLE sprayed only at tillering stage, T3= MLE sprayed after flowering and T4= MLE sprayed only at heading stage.

IV. CONCLUSION

The present study suggests that the use of Moringa olifera leaf extract spray on tomatoes had significant positive effects on growth parameters such as plant height, and Number of Leaves / Plant and Number of branches / plant and it significantly improved various yield components viz. number of fruit and fruit weight. Moringa leaf extract showed a potential in increasing fruit yield of tomatoes under field condition and the highest frequency of Moringa application during critical growth stages of crop (T4) gave the highest yield.

V. RECOMMENDATION

This study suggests the application of Moringa olifera leaf extract at critical growth stages for better growth and yield of performance of tomatoes production in

Maiduguri is the best as it gives highest yield and highly profitable when compared to other source of plant extract. However, more research is required to elucidate the novel effect of Moringa plant for development of sustainable agriculture in Nigeria.

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