Integrated Organic Nutrient Management for The Production of Salanum Macrocarpon in Southern Benin, West Africa

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ABSTRACT

An experiment was conducted at the market gardening site SCOMASK (Société Coopérative des Maraîchers de Sèmè-Kraké) in BENIN West Africa to evaluate the influence of mixed poultry manure with inorganic fertilizers (NPK 17-17-17; Urea-N) on the leaves and seeds productivity of *Solanum macrocarpon.* There were three levels of growth media. Media (A) poultry manure + NPK and media (B) poultry manure + Urea-N. Growth media (C) was the control (no fertilizers). The results showed that the vegetative attributes were significantly improved in growth media B while the reproductive growth increased to a maximum in media A as compare to control (growth media C).

Keywords: Organicfertilizer, Inorganicfertilizer,growth media, sustainable agriculture.

INTRODUCTION

These days, the sustainable agriculture through integrated nutrient management is important to ensure the foods security and human well-being as well as the environment protection. However horticultural crops play an important role in human nutrition. As per the population is growing throughout the world, it is important to increase the production of vegetables in order to satisfy the needs. *Solanum macrocarpon* is perennial plant belonging to solanaceae family. It is perishable in nature and one of important leafy vegetable among horticultural crops. It is mostly cultivated by southern Benin growers. *Solanum macrocarpon* is rich in vitamins A, B, C, protein, calcium, carbohydrate and mineral salts (Minh, 2022). It needs adequate irrigation and suitable fertilization for better growth and development. Its demande is high in centre and south of Benin, especially in economical capital city (Cotonou) and is used in nutrition for children and pregnant women (Tohouenou and Margaret, 2019). But unfortunately in Benin the growers are facing some problems in the production such as unavailability of seeds and soil infertility. Therefore to increase the productivity, they are using intensive inorganic fertilizers. Thus these practices (intensive and successive use of inorganic fertilizers) resulted in exhaustion of soil. Broadly, it is a serious threat to agriculture sustainability. The application of organic and inorganic fertilizers in combination is an integrated agricultural practice approach which can improve plant growth, yield and soil health. It could also extend the crops post-harvest life and improve seeds germination rate. In additional, there was a limited research study conducted on efficacy of combined effect of organic and inorganic fertilizers on leaf and seed production of *Solanum macrocarpon.* Keeping in view the potential effect of the combination organic and inorganic fertilizers and importance of *Solanum macrocarpon,* an experiment was carried out at the market gardening site ofSCOMASKin 2020 to investigate influence of poultry manure in combination with inorganic fertilizers on leaves and seed productivity of local gboma (Togan) *Salanum macrocarpon.*

MATERIALS AND METHODS

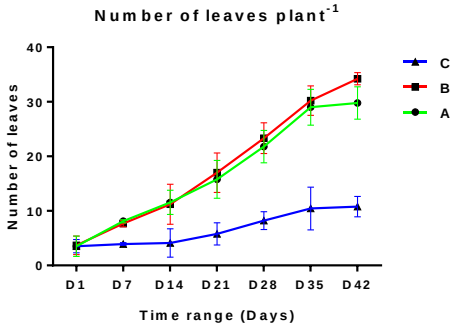
The research was conducted at SCOMASK gardening site, Benin during the year 2020. The experiment was laid out in Randomized Complete Block Design (RCBD) with one factor, three replications and 9 elementary plots. There were three levels of growth media. Media (A) was composed of 10T/ha of OM (poultry manure) i.e. 4.5kg/4.5m² + 400 kg of NPK (17-17-17)/ha or 180g/4.5m². /kg), while media (B) on the other hand has been prepared with 10T/ha of OM (poultry manure) i.e. 4.5kg/4.5m² + 75kg/ha of urea-N, i.e. 33.75g/4.5m². Growth media (C) was the control (0kg of poultry manure, 0kg of NPK and Urea). During the test, careful observation was done for data collection. The frequency of observations adopted in data collection was as follows: day1 (D1), day7 (D7), day14 (D14), day21 (D21), day28 (D28), day35 (D35) and day42 (D42) after transplanting. Nine (09) random plants were selected and monitored. Thirty (30) seeds from each treatment after fruit harvesting were sown and germination rate was evaluated at the end of experiment.

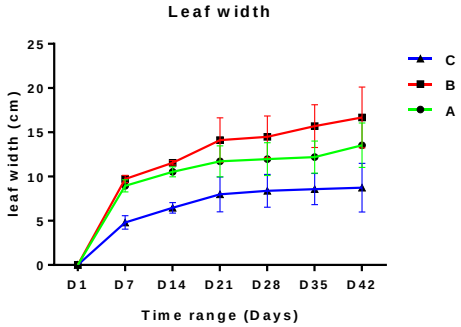
The information on plant development such as number of leaves per plant, leaf length and width per plant, Plant height, number of branches per plant, number of flowers per plant, number of fruits per plant, fruits yield (t/ha),leaf yield (t/ha), seed germination rate were regularly collected. The data collected during the experiment were entered into the EXCEL sheet. SPSS 17 software was used to determine the descriptive statistics (Average and Standard Error) as well as for the analysis of variance (ANOVA).

RESULTS AND DISCUSSIONS

Statistical analysis showed that the study parameters were found significant at ($P \leq 0.05$). The results regarding number of leaves per plant, leaf length and width per plant, Plant height, number of branches per plant were significantly greater in growth media B (**Graph 1**) while maximum number of flowers per plant, number of fruits per plant were increased to a maximum in growth media A (**Graph 2**) as compare to control (growth media C). The findings demonstrated highest fruits yield (t/ha)in plants which were grown in media A while the greatest leaf yield (t/ha) was recorded in plants cultivated in media B rather than control. The results are in line with those revealed by Agbede *et al*. (2008) and Habimana *et al*. (2014) who reported respectively that better growth, development and maximum yield in yam and carrot were recorded in response to application of poultry manure with NPK. This might be due to the nutrient management efficiency and soil properties improvement. The mixture of poultry manure and urea enhanced vegetative attributes *in amaranthus cruentus* (Shiyam *et al*., 2011) and therefore increased the productivity. The application of poultry manure in combination with urea could extend the vegetative period in various crops (Shiyam *et al*., 2011).

At the end of the experiment the germination rate of the seeds collected from each treatment was evaluated. As a result, the control (media C) produced the highest germination rate of seeds followed by media A however, the lowest seed germination rate was found in media B.





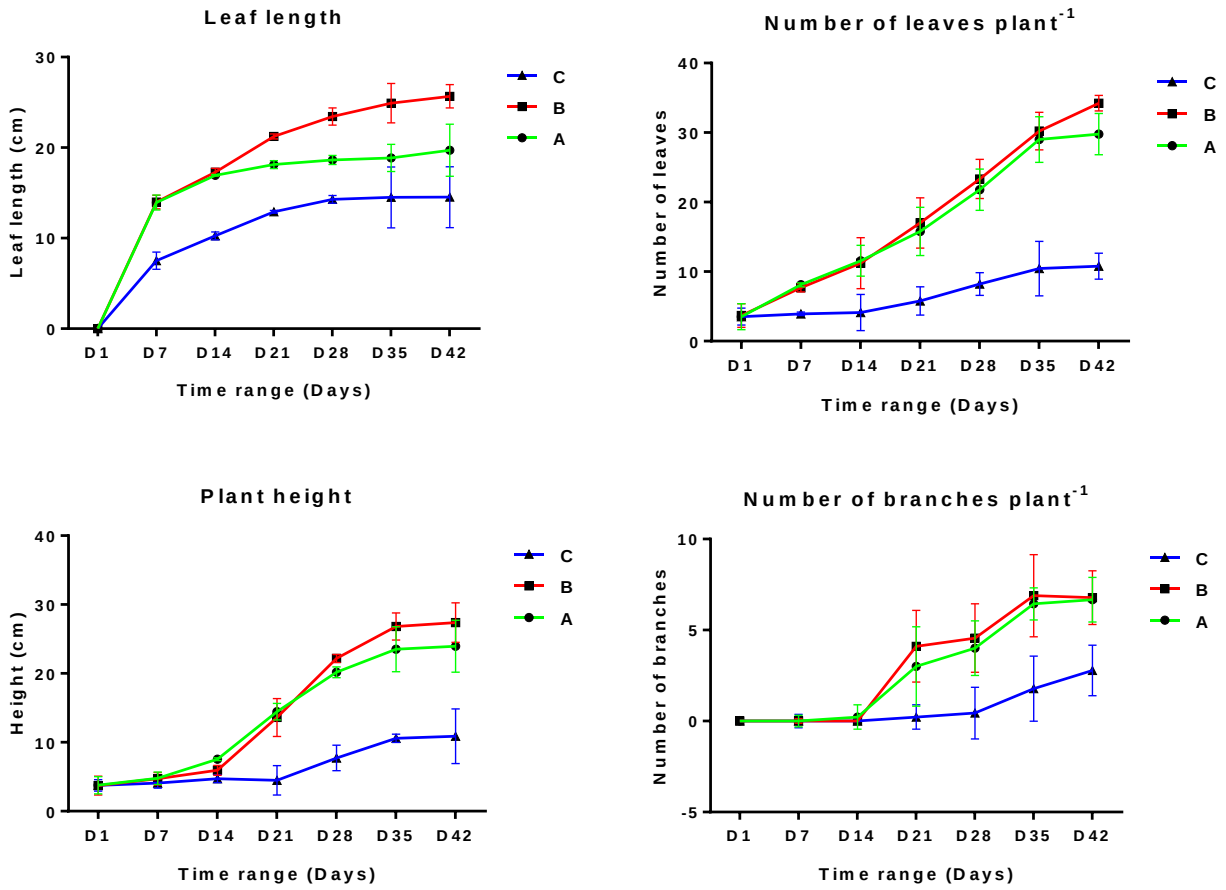


Figure 1. Number of leaves, leaf length, leaf width, plant height, number of branches

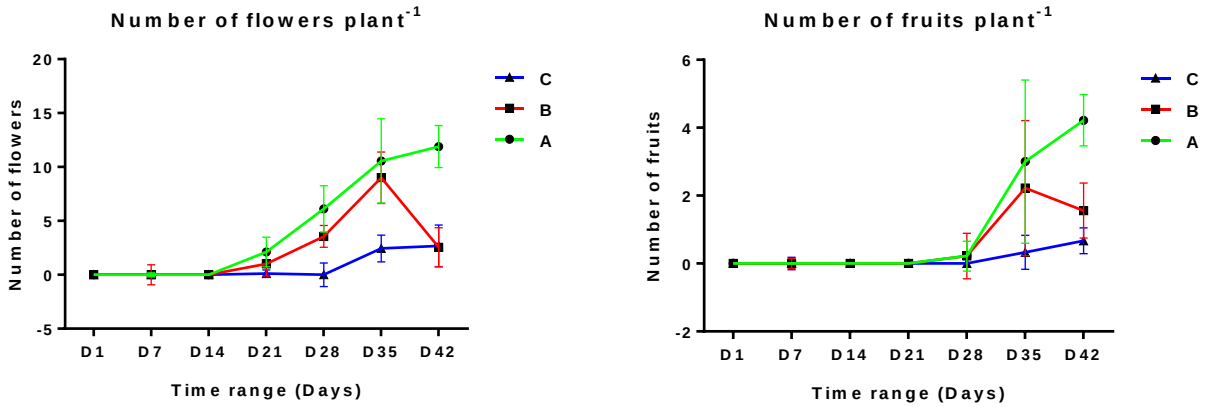


Figure 2. Number of flowers, Number of fruits

CONCLUSION

It can be concluded that for better vegetative growth, treatment B can be recommended to growers/gardeners whereas in case of quality flower, fruit and seed yield, treatment A can be used.

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