EFFECT OF MICRO ORGANIC FERTILIZER ON GROWTH AND YIELD OF THREATENED *MELIENTHA SUAVIS* PIERRE SPECIES IN THAI NGUYEN PROVINCE, VIETNAM

ABSTRACT

The experiment was conducted at Thai Nguyen province to evaluate the response of micro-organic fertilizeron growthof vegetative and yield of *Melienthasuavis* Pierre species in the spring and summer season 2023. The experiment included four treatments was designed in Randomized Complete Block Design with three replications. The characteristics include height of plant, diameter of trunk, leaf number, leaf size and yield were measured. The results indicated that applying the T3 treatment greatly in response enhancing height of plant, diameter of trunk, leaf number as well as leaf size compared to untreated control. Furthermore, application of the T3 treatmenthave the best results in yield of 380.0 kg/ha and 313.3 kg/ha in the spring and summer season, respectively. Therefore, the result could recommend applying micro-organic fertilizer can be practical tool for increasing growth of vegetative as well as yield in *Melienthasuavis*pierre under field conditions.

Keywords: *Melienthasuavis Pierre;* vegetative growth; yield; micro-organic fertilizer

1. INTRODUCTION

"Melienthasuavis Pierre (*M.suavis*) with local name as Ngot rung, Phac Van which has been distributed at Lao Cai, Cao Bang, Bac Kan, Lang Son, Quang Ninh, Bac Giang, NinhBinh, Thanh Hoa, Nghe An, Ha Tinh, Hue and Thai Nguyenprovince of Vietnam.*M.suavis*species known as withhigh nutrients as well as commercial value" [1];[4]; [9]; [11]. Recently, the individual plantsnumberof *M.suavis* species decreased seriously caused byhabitatdestruction like loss by deforestation and overexploiting of flowers. According to Ban et al. 2007 [2] the *M. suavis*was identified threatened speciesvulnerable locallyin the Red List of Threatenedin Viet Namincluding Thai Nguyenprovince

The mineral fertilizers applied inagricultural production markedly responseharmful to the yield, quality of products,environment, quality of soil, water and also reduced vitamins contents, minerals contents and other useful compounds [3]; [10]. "However, the use micro-organic fertilizer in agriculture not only enhancing the physical and chemical of soil, improving growth of the plants and increasing biological properties but also very most useful in safe for the environment, animals and human. Furthermore, micro-organicfertilizers also consider have a goodway to decrease use of chemical fertilizers in agriculture production caused by microorganisms have definite beneficial roles in the fertility of the soil rhizosphere and the growth of the plants" [[6]; [7].

Additionally, the information about vegetative growth performance and yield of *M.suavis* species under the application of micro-organic fertilizer so farlacking. Therefore, the aims of this work to measure response of micro-organic fertilizer on vegetative growth and yield of *M.suavis* species under field conditions.

2. MATERIALS AND METHODS

2.1. Plant Materials and Experiment Treatments

The experiment was conducted from January 2023 to December 2023 at NaKhao's garden, Trung Hoi commune, Dinh Hoa district, Thai Nguyen province. The experimentconsist of four treatments including T1: control treatment (without micro-organic fertilizer), T2: 3 kg micro-organic fertilizer/tree; T3: 5 kg micro-organic fertilizer/tree; T4:7 kg micro-organic fertilizer/tree. The experimentwas laid out in Randomized Complete Block Designwith three replications and three uniform plants was taken as an experiment unit.

2.2. Data Collection

Plant height (cm) was evaluated from ground level to the tip of an opened leaf. The trunk diameter (mm) was determinedabove the ground surfacewith the help of digital Verniercalipers and the average was calculated. The leaf number per shoot was determined by counting and the averageleaf numberwas calculated. The leaf length (cm) and leaf width (cm) wasmeasuredwith the help of a Vernier calliper. The shootsnumber per tree was measured by choosing randomly three trees, and the number of shoots was counted. Thetotal shoots harvest was weighing to calculate yield per treatment

2.3. Statistical analysis

TheSAS 9.1 statistical software using to analysedthe data obtained from the study. The least significant difference was calculated following a significance F-test (at p≤ 0.05)

3. RESULTS AND DISCUSSION

3.1. Effect of micro-organic fertilizer on vegetative growth of *M.suavis*species

Form the Figure 1A and 1B, the T3 treatment application has the highestheight of plant with value of 173.9 cmin the springseason and 175.4 cmin thesummerseason, followed by the other treatments. In contrast the lowest height of plant was observed to control treatment with a value of 135.9 cm in the spring season and 137.1 cm in the summer season, although there was not statistically significant difference at p<0.05. For the trunk diameter, it was observed that the higher trunk diameter was obtained at the T2, T3 and T4 treatments. In contrast the minimum trunk diameter with value of 1.97 cm and 1.98 cm in the spring and summer seasons, respectively was found in untreated control, although there was not statistically significant difference at p<0.05 Figure 1A and 1B).For the tree canopy, the lowest value at 66.8 cm in the spring season and 69.2 cm in the summer was recorded in untreated control. Whereas the maximum tree canopy was found in the T3 treatment at 95.2 cm and 102.7 cm in the spring and summer seasons, respectively. These results are in agreement with former work reported byKhehra and Bal, (2014) [8]

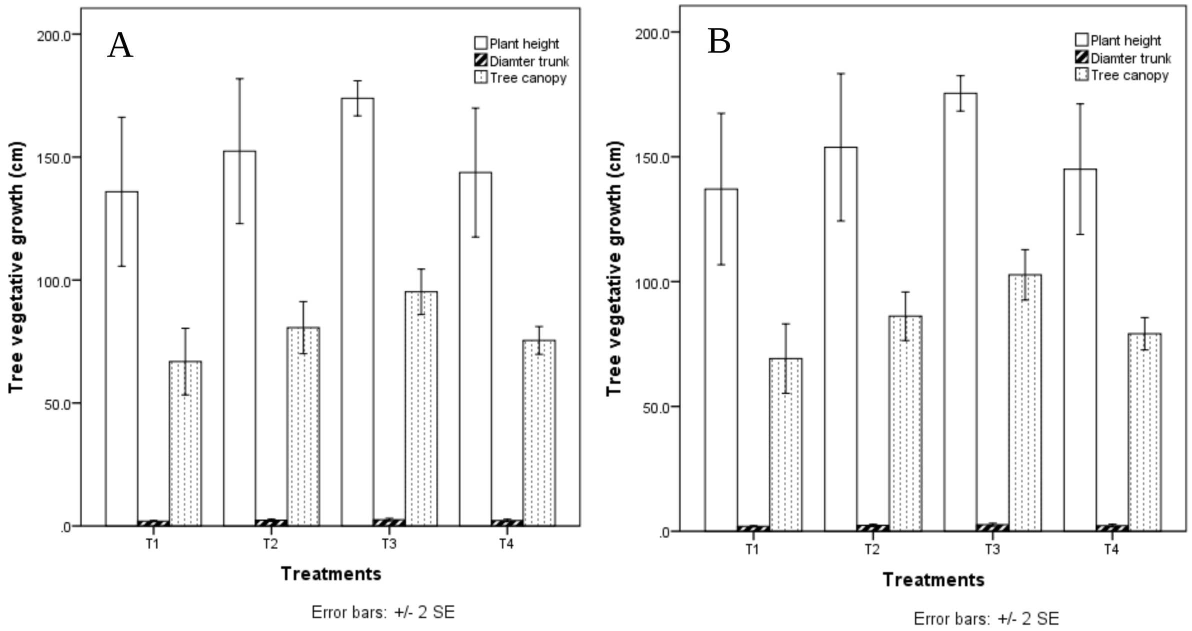

Figure 1. Effect of micro-organic fertilizer on plant height, diameter trunk and tree canopy of *M.suavis*species (*A: spring season 2023; B: summer season 2023*).

3.2. Effect of micro-organic fertilizer on the shootsnumberof M.*suavis* species

Table 1. Effect of micro-organic fertilizer on the shoots number of*M.suavis*species

Treatments	Spring shoot number/tree	Summer shoot number/tree
T1	65.7^{c*}	63.0^{c}
T2	106.7^{b}	104.3^{b}
T3	132.0^{a}	130.0^{a}
T4	93.7^{b}	91.0^{b}
P	<0.05	<0.05
Cv%	9.66	8.68
LSD.05	19.21	16.84

*Means followed by different letters are significantly different within columns by Duncan's multiple range Test, $P \leq 0.05$

In the case of spring season, the data in Table 1 indicated that there was a significant difference among treatments onshootsnumber per tree. In terms, the highest spring shoots number (of 132.0 shoots per tree) was obtained withthe T3 treatment application. Whereas the lowest value of 65.7 number of shoots per tree was recorded for control treatment. For the number of summer shoots, the highest shoots number was obtained in T3 treatment application with value of 130.0 shoots per tree, while the untreated control had the lowest value (of 63.0shoots per tree). Moreover, the T2 and T4 treatments also have the higher shoots number per tree as compared to untreated control (Table 1)

3.3. Effect of micro-organic fertilizer characterof shootof *M.suavis*species

In the case of spring season, the data displayed in Table 2 indicated that there was significantdifferenceon shoot length for all treatments as compared to untreated control. In terms, the T3 treatment application had the highest shoot length (18.6 cm), followed by the T2 and T4 treatments with values of 18.0 cm and 17.9 cm, respectively. Whereas the untreated control had the minimum shoot length with value of 16.0 cm. Moreover, the T3 treatment had the maximum shoot length (18.5 cm), while the untreated control had the minimum shoot length with value of 16.1 cm. On the other hand, the T2 and T4 treatment also had the higher shoot length as compared to untreated control (Table 2), which was found in the case of summer season. This results are in agreement with the finding reported by Dahiya et al., (2013) [5]

Table 2.Effect of micro-organic fertilizer on shoot character of *M.suavis*species

Seasonal	Treatments	Shoot length (cm)	Shoot diameter (mm)	Leaf number/ shoot (leaf)	Leaf Length (cm)	Leaf width (cm)
Spring season 2023	T1	16.0^{b*}	1.82^{b}	7.3^{b}	9.6^{c}	3.4a
	T2	18.0^{a}	2.03^{ab}	8.3^{a}	11.2^{ab}	3.6a
	T3	18.6^{a}	2.37^{a}	8.7^{a}	11.7^{a}	3.9a
	T4	17.9^{a}	2.13^{a}	8.2^{a}	10.4^{bc}	3.6a

	P	<0,05	<0.05	<0.05	<0.05	>0.05
	Cv%	4.96	7.25	5.12	5.79	6.9
	LSD.05	1.75	0.3	0.83	1.24	0.5
Summer season 2023	T1	16.1^{b}	1.80^{a}	6.8^{b}	9.4^{b}	3.5^{a}
	T2	17.7^{a}	2.00^{a}	8.2^{ab}	10.8^{a}	3.6^{a}
	T3	18.5^{a}	2.35^{a}	8.8^{a}	11.5^{a}	4.0^{a}
	T4	17.3^{ab}	2.08^{a}	7.8^{ab}	10.7^{ab}	3.7^{a}
	P	<0.05	>0.05	<0.05	<0.05	>0.05
	Cv%	4.37	11.0	8.74	5.98	9.37
	LSD.05	1.51	0.46	1.38	1.27	0.7

*Means followed by different letters are significantly different within columns by Duncan's multiple range Test, P ≤ 0.05

For the shoot diameter, the results in Table 2 showed that the T3 treatment had the maximum diameter of shoot (2.37 mm), followed by the T4 treatment with value of 2.13 mm, whereas the untreated control gave the lowest value of shoot diameter, which was obtained in the case of spring shoot. However, there were no statistically significant among treatment in shoot diameter in the case of summer shoot in this study (Table 2). Similar finding was reported by Dahiya et al., (2013)[5]

From the results showed in Table 2, it was observed that leaf number from untreated control was lower as compared to the other treatments in the case of spring shoot. In term, the highest leaf number (8.7 leaves/shoot) was obtained in the T3 treatment application, whereas the lowest leaf number with value of 7.3 leaves/shoot was observed in untreated control. Moreover, the T2 and T4 treatments had the higher leaf number per shoot as compared to untreated control (Table 2). Moreover, the leaf number in the case of summer season was displayed in Table 2. In terms, the highest leaf number (of 8.8 leaf/shoot) was obtained in the T3 treatment application, whereas the lowest leaf number (6.8 leaves/shoot) was observed in the control treatment. These results are by the findings of Ennab, (2016) [6].

Furthermore, the results displayed in Table 2 indicated that there wassignificantlydifferencesamong treatments concerning leaf length (p<0.05). In terms, the T3 treatment gave the highest leaf length with values of 11.7 cm and 11.5 cm, whereas the control treatment had the lowest leaf length with values of 9.6 cm and 9.4 cm in the spring and summer seasons, respectively. However, there were no statistically significant differences among treatments concerning leaf width in both spring and summer seasons (p<0.05).

3.4 Effect of micro-organic fertilizer on yield of *M.suavis*species

The results displayed in Figure 2 indicated that the maximum yield (380.0 kg/ha) was obtained in the T3 treatment application, whereas the control treatment had the minimum yield with value of 300.0 kg/ha, which was observed in the case of the spring season. Moreover, the results in Figure 2 also indicated that the maximum yield (313.3 kg/ha) was obtained in the T3 treatment application, whereas the control treatment had the minimum yield (226.7 kg/ha cm).

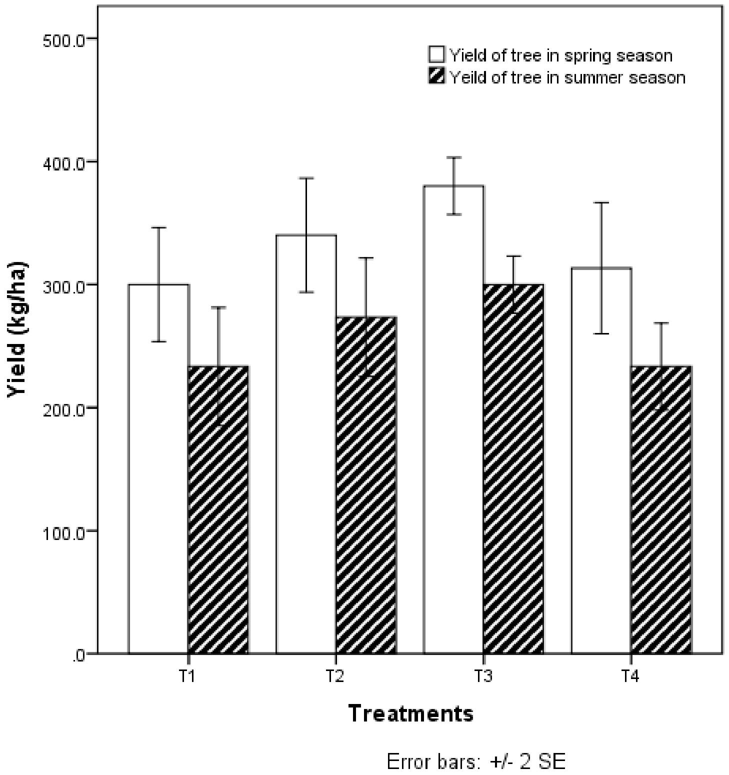

Figure 2.Effect of micro-organic fertilizer on yield of *M.suavis*species.

CONCLUSIONS

In conclusion, the T3 treatment with 5 kg micro-organic fertilizer/tree application greatly improving vegetative growth parameters, shoot length, diameter, number of leaves per shoot, as well as yield. Hence, we recommended the application of 5 kg micro-organic fertilizer/tree gave the best practical tool for enhancing vegetative growth and yield of *Melienthasuavis*pierre species under field condition in Thai Nguyen province.

Conflict of interest: Authors do not have any conflict of interests to declare.

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