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EFFECT OF DIFFERENT FERTILIZERS ON YELLOW PASSION FRUIT (*PASSIFLORAEDULIS*) SEEDLING GROWTH IN SANDY REGOSOL

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ABSTRACT

The yellow passion fruit is widely cultivated in Sri Lanka and production of passion fruit seedlings for commercial orchard is common among producers. The experiment was carried out at the Crop farm, Eastern University, Sri Lanka to evaluate different fertilizers on the production of yellow passion fruit seedlings growth in sandy regosol. The experimental design was Completely Randomized Design. The treatments consisted of recommended inorganic fertilizer as basal (T1), and different organic fertilizers such as, cow dung as basal (T2), compost as basal (T3) and Farm Yard manure as basal (T4).Passion seeds were extracted from fruit which was obtained from same mother plant and sown in polybags. After seeds germinated, uniform seedlings were transplanted to polybags and fertilizers were applied according to the treatments. Parameters viz., plant height, fresh weights of shoot and root, dry weights of shoot and root, number of leaves were measured at weekly intervals and data was analyzed by using statistical software. The study revealed that compost applied seedlings (T3) increased the plant height, number of leaves and fresh and dry weights of shoots of yellow passion fruit seedlings in sandy regosol compared to other tested treatments.

Key words: Compost, Cow dung, Inorganic fertilizer, Farm yard manure, Passion,

INTRODUCTION

The passion fruit is a member of the family *Passifloraceae* which contains 12 different genera and around 500 species. Fruits are enriched in vitamin C. It is mainly used for juice production. Its juice is used as refreshing drink, flavoring sherbets, and for making jams, jellies and ice creams. Passion fruit culture has high commercial demand in Sri Lanka. Seedlings for commercial orchards are specially developed through seeds. Success in germination and seedling emergence, in turn, is influenced by several soil and environmental factors. Germination and consequently seedling emergence is a process of continuing metabolic activity of the embryonic axis, finishing in radicle emergence. Suitable techniques for seedling formation, such as microclimate improvement, container volumes, substrates, irrigation and nutrition are vital to promote healthy and vigorous plants for orchard formation (Costa *et al*., 2011). Further, Carvalho and Nakagawa (2000) stated that the production and physiological seed quality are influenced by the availability of nutrients to plants, by affecting the formation of the embryo and reserve organs, as well as the chemical composition and, consequently, metabolism and force.The soil properties, climate, genetic composition and cultural management practices are broad factors that affect the yield and quality of passion fruit. The variation of these factors is

more specific component variables that influence yield and quality of crop under site or soil specific conditions (Naominida *et al*., 2017).

The passion fruit seedlings must be of good quality, thus contributing to the growth and development of the plants in the field (Laredo, 2013) with a shorter production time, aiming at reducing the costs of inputs and labor (Minami, 1995). One of the possible limiting factors of the percentage, speed and uniformity of germination of yellow passion fruit seeds is the availability of water (Marcos, 2005). The water is directly linked to the whole productive process of the passion fruit, not being different in relation to the production of its seedlings in nursery, where it directly influences the quality of the seedlings (Morais, 2012). Application of organic fertilizers to agricultural soils is an important practice for increasing crop yield. It supply plant nutrients including micronutrients improve soil physical properties like structure, water holding capacity, increase the availability of nutrients, carbon dioxide released during decomposition acts as a CO2 fertilizer and plant parasitic nematodes and fungi are controlled to some extent by altering the balance of microorganisms in the soil. The organic manure generates improved substrate drainage and porosity, as well as increased water storage capacity, nutrient levels, and microbial population, assisting in the root development. Objective of this study is to evaluate passion fruit (*Passifloraedulis*) seedling growth in different fertilizer in sandy regosol.

MATERIALS AND METHODS

An experiment was conducted at the Crop Farm, Eastern University, Sri Lanka during March to June 2018 to assess the influence of different fertilizers on seedling growth of passion fruit (*Passifloraedulis*).in sandy regosol. The experiment site is situated between 81° 34' latitude and longitude and 7° 48' longitude which come under the agro ecological zones of low country dry zone. This experiment was conducted in green house, in poly bags which laid out in a Completely Randomized Design (CRD).Different fertilizers were applied as basal. Treatments were, inorganic fertilizer applied as basal (T1), cow dung (T2), compost (T3) and farm yard manure (T4) were applied as basal. Passion seeds were extracted from fruit which was obtained from same mother plant and sown in polybags. After seeds germinated, uniform seedlings were transplanted to polybags, which had treatments. The following parameters viz., plant height, fresh weights of shoot and root, dry weights of shoot and root, number of leaves were measured at 7^{th}, 14^{th} and 21^{st}days after transplanting. Recorded data were analyzed statistically by using statistical packages.

RESULTS AND DISCUSSION

The fertilizers which are included in the polybags are used to modify the crop growth rate and growth pattern during seedling stage of a plant. Therefore seedling height was taken as a parameter during initial period to determines the effect of different fertilizers on growth of passion seedlings. Effect of different fertilizers on average seedling heights at 7^{th}, 14^{th} and 21^{st} days after transplanting is shown in Table 1.There were significant effect ($P<0.05$) on plant height at 7^{th}, 14^{th} and 21^{st} day after transplanting. The highest average seedling height was recorded in T1 (4.8 cm), followed by T2 (3.9 cm) and while the minimum average height of seedling was observed in T4 (2.0 cm) at 1 week after transplanting. Tallest seedling in inorganic fertilizer may be due to presence of readily available nutrient from inorganic fertilizers. However, tallest seedlings were noted in T3 (7.0 cm and 10 cm) followed by T2 (6.8 cm and 9.0 cm) at 14^{th} and 21^{st} days after transplanting respectively. It may be due to slow releasing ability of the organic manures. Goat manure provided increment in the height of passion fruit seedlings

(Adailza *et al*., 2016). The benefit of cattle manure, according to Oliveira *et al*. (2010), may be related to the fact that, in proper amounts, it can supply the plants' needs due to the elevation of available levels of N, P, and K, which achieved the greatest contents in the soil.

Table 1: Seedling height at different weekly interval

Treatment	7^{th} day after transplant	14^{th} day after transplant	21^{st} day after transplant
T1	4.8 ± 0.08 a	6.0 ± 0.15 d	7.2 ±0.89c
T2	3.9 ± 0.06 b	6.8 ± 0.23 b	9.0 ±0.69b
T3	2.9 ± 0.03 d	7.0 ± 0.19 a	10.0 ±0.08a
T4	2.0 ± 0.11 c	6.4 ± 0.08 c	7.0 ±0.03d
*	*	*	*

Value represents mean ∓ standard error of four replicates.

F test: P<0.05

Means followed by the same letter in each column are not significantly different according to the Duncan's Multiple Range Test at 5% level

Number of leaves at 7^{th} and 14^{th} and 21^{st}days after planting is shown in Table 2. Organic manures and inorganic fertilizer which have been significantly affected the number of leave is confirmed with *P* value of 0.007and chi square value of 12.More number of leaves were observed in compost (10) applied polybags followed by cowdung (9) at 3 weeks after transplanting. Dantas *et al*. (2012) noted that the use of cattle manure in the substrate promoted positive effects on the number of leaves and in the initial development of yellow passion fruit.

Table 2: Number of leaves at different weekly interval

Treatment	7^{th} day after transplant	14^{th} day after transplant	21^{st} day after transplant
T1	2	6	7
T2	4	7	9
T3	5	7	10
T4	2	6	7
P value	0.007	0.007	0.007
Chi square	12	12	12

Fresh and dry weights of seedling at 3^{rd} week after planting are shown in Table 3. There was significant differences (P<0.05) in fresh and dry weights of shoot and it was high in T3 (1.70g and 1.26 g) while low in T4 (1.35g and 0.94g). Mesquita *et al*.(2015) stated that increasing amount of cattle manure leads to increase linear response for aerial part dry mass production.

Table 3: Fresh and dry weight of seedling at 3rd week after transplanting

Treatment	Fresh weight		Dry weight	
	Shoot	Root	Shoot	Root
T1	1.67 ± 0.03 b	0.46 ± 0.010	1.25± 0.23 b	0.12 ± 0.001
T2	1.53 ± 0.13 c	0.45 ± 0.010	1.09± 0.17c	0.13 ± 0.011
T3	1.70 ± 0.09 a	0.43 ± 0.001	1.26 ± 0.03 a	0.09 ± 0.013
T4	1.35 ± 0.11 d	0.39 ± 0.011	0.94 ± 0.07d	0.09 ± 0.010
F value	*	ns	*	ns

Value represents mean ∓ standard error of four replicates.

F test: P<0.05, ns: not significant

Means followed by the same letter in each column are not significantly different according to the Duncan's Multiple Range Test at 5% level

CONCLUSION

The present study concluded that seedling which was planted in the polybag which contain compost (T3) showed better in plant height, number of leaves and fresh and dry of shoots compared with other tested treatments.

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