International Journal of Agriculture Innovations and Research
Volume 10, Issue 2, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy):
Received: 07/07/2021 | Accepted on: 06/10/2021 | Published: 21/10/2021

Growth Pattern and Productivity of Exotic Tomato (*Solanum lycopersicum*) Seedlings

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Abstract **– Several factors are responsible for agricultural productivity and output of both household home gardens and commercial farming practices. These include ecological, environmental and genetic factors among others. There could be single factor, but sometime, it can also be a combination of factors that determines productivity. This work examines the productive outcome of exotic tomato seedlings in a home garden setting for 3 months. The results obtained from the outcome in this home stead experiment showed that Plant numbered 7 gave the best yield with harvested number of fruits totalling 42. This was followed by Plant numbered 4 with 23 fruits and Plant numbered 2 with 12 fruits in that order. Plants 6,5 and 1 gave 3,2 and 1 number of fruits respectively, while plant numbered 3 did not yield any fruit. Hence the Plants labelled 4 and 7 gave the best fruiting performance in terms of the number of fruits produced and then are recommended for commercial production and farming practices. Further work on this species of exotic Tomato is achievable.**

Keywords **– Tomato, *Solanum lycopersicum*, Nursery, Performance, Exotic.**

I. INTRODUCTION

Tomato, (*Solanum lycopersicum*) is a flowering plant, which belongs to the nightshade family (Solanaceae), which is cultivated essentially for its edible fruits. Labelled as a vegetable for its nutritional purposes (Harold C. Passam, 2007), tomatoes are a good source of vitamin C and the phytochemical Lycopene, which is very good for vision. When analysed using (AOAC, 2005), it revealed more essential nutrition importance. The tomato fruits can also be eaten raw, as commonly used in some salads, however, it can also be served as a cooked vegetable, used as an ingredient of various prepared dishes, and pickled. Additionally, a large percentage of the world's tomato crop is been processed into products. Some of which includes canned tomatoes, tomato juice, ketchup, puree, paste, and "sun-dried" tomatoes or dehydrated pulp. The tomato plant requires relatively warm weather and much sunlight; it is grown chiefly in hothouses in cooler climates. Tomatoes are usually staked, tied, or caged, in other to keep the stems and fruits off the ground, and consistent watering is very necessary to avoid blossom-end rot and cracking of the fruits. The plants are susceptible to a number of pests and diseases, including bacterial wilt, early blight, mosaic virus, Fusarium wilt, nematodes, and tomato hornworms. However many of these problems can be controlled with crop rotation, the use of fungicides and pesticides, and the planting of resistant tomato varieties. The tiny currant tomato (*S. pimpinellifolium*) is a closely related species and has been used by breeders to hybridize several pest- and disease-resistant tomato varieties, due to the possession of several tolerant genes.

Fig. 1. A mature growing **Tomato** (*Solanum lycopersicum*) plant.

Nutritional benefits of Tomato (Solanum lycopersicum)

Despite the fact that botanically Tomato (*Solanum lycopersicum*) is considered a fruit, however it is generally eaten and often prepared like a vegetable. Tomatoes are the major dietary source of the antioxidant lycopene, which has been linked to many health benefits, including reduced risk of heart disease, cancer and above all enhances vision (Catherine Ross et. al., 2013). They are also a very great source of vitamin C, potassium, folate, and vitamin K. The tomato fruit, which is usually red when mature, however, comes in a variety of colours, including yellow, orange, green, and purple. Also, there exist many sub-species of tomatoes with different shapes and flavour. The water content of tomatoes is around 95%. The other 5% consists mainly of carbohydrates and Fiber. On the average, 100-gram raw tomato contains: Calories: 18, Water: 95%, Protein: 0.9 grams, Carbohydrate 3.9 grams, Sugar: 2.6 grams, Fiber: 1.2 grams, Fat: 0.2 grams, hence nutrient - dense like an under-utilised Bambara groundnut (Atoyebi, et.al., 2015).

Tomatoes are also a good source of several vitamins and minerals: **Vitamin C.** which is an essential vitamin nutrient and antioxidant (Harold C. Passam, 2007). One medium-sized tomato can provide about 28% of the Reference Daily Intake (RDI). It is also a good source of **Potassium, which is an** essential mineral, beneficial for blood pressure control and heart disease prevention. More so, it contains **Vitamin K1, which is also** known as phylloquinone and important for blood clotting and enhances a good bone health. It also contains **Folate (vitamin B9), which** is an important vitamin for normal tissue growth and proper cell functioning. This vitamin is particularly essential and important for pregnant women.

The main plant compounds found in tomato, (*Solanum lycopersicum*) are **Lycopene, which is a** red pigment and an important antioxidant, especially useful to enhance vision (Atoyebi, et. al., 2017). Other important compounds are **Beta carotene, which is an** antioxidant that often gives foods a yellow or orange colour, which is often converted into vitamin A (the active form) in your body. Tomato also contains **Naringenin, f**ound in tomato skin and is a flavonoid, which has been shown to decrease inflammation and protect against various forms of diseases. Other important compounds found in tomato includes **Chromogenic acid, which is a** powerful antioxidant compound having the ability to lower blood pressure in people with elevated levels. More so, it contains Chlorophylls and carotenoids like lycopene, which are responsible for the rich colour of its fruits. When the ripening process starts, the chlorophyll (green) is degraded and carotenoids (red) are synthesized. Other importance includes alleviates heart attacks and strokes. This was the results of a study on selected middle-aged men linked low blood levels of lycopene and beta-carotene to increased risk of heart attacks and strokes. More so, increasing evidence from clinical trials also suggests that supplementing with lycopene may help lower LDL (bad) cholesterol and also useful to prevent against inflammation and markers of oxidative stress. They also serve to show protective effects on the inner layer of blood vessels and may decrease your risk of blood clotting. It also proffers beneficial and protective effects for the skin and against sunburns.

There exists different varieties of tomatoes, the common types are: Determinate tomatoes, which is also known as “bush” varieties and it grows 2 to 3 feet tall. These varieties tend to provide numerous ripe tomatoes at one time and do not put on much leaf growth after setting the fruits and it tends to fruit for a brief period of time. They are generally productive earlier than the vining varieties, and not in the latter part of the growing season. Determinate tomatoes do not necessarily have to be staked or caged, but they are ideal for containers and small spaces. Most paste tomatoes are determinate (which works well for making sauce and canning). The

other major type is the indeterminate tomatoes, which is the vining varieties. This produces the largest types of mid to late season type of slicing tomatoes, existing all summer and until the first frost. Because indeterminate tomatoes often experience more leaf growth, hence their production tends to spread more evenly throughout the season. However, staking is required for maximum productivity of this type of tomatoes. They are also, ideal in large gardens. Most beefsteak and cherry tomatoes belongs to this type and comes in a wide range of flavours as well as colours and sizes, from tiny grape sized types to giant beefsteaks. The choice of tomatoes for planting, also depends on the use of this versatile fruit in the kitchen. For example, Roma tomatoes varieties are not usually eaten fresh out of hand, but are preferred for sauces and ketchups.

Fig. 2. Characterised **Tomato** (*Solanum lycopersicum*) plant at 2 months on the nursery bed.

II. MATERIALS AND METHODS

Exotic tomato seed packet was purchased from the Songhai Integrated farms at Porto-novo, Benin republic during a field trip visit. They were first sprouted in a small plastic tray for 3 weeks, before they were transplanted, with a spacing of 30cm apart, in an already prepared nursery bed (100cm x150cm). Approximately 150g of inorganic poultry waste was applied to each tomato stand at the 4th week and growth parameters and data was taken at (2) two weeks interval up till the twelfth week of planting.

III. RESULTS

The results obtained from the observable agronomic and characterisation data showed certain abnormal growth anomalies among these seedlings of Tomato (*Solanum lycopersicum*), despite the fact that they originated from the same packet of seeds purchased. Hence, these preliminary results showed that the environment also has a lot of influence and affects the growth of seeds and plants generally. Other factors that might affect the homogenous seeds include embryo status, germination or viability percentage or level of the seeds and the storage pattern or mechanism and /or how long has it been harvested e.t.c.

Table 1. Showing the height performance (cm) of **Tomato** (*Solanum lycopersicum*).

	Plant 1	**Plant 2**	**Plant 3**	**Plant 4**	**Plant 5**	**Plant 6**	**Plant 7**
6th Week	-	-	-	-	-	-	-
8th Week	36	54	17	48	20	22	63

	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Plant 7
10th Week	55	70	25	75	50	47	85
12th Week	58	85	30	90	85	82	92

Table 2. Showing the number of fruits found on **Tomato** (*Solanum lycopersicum*).

	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Plant 7
6th Week	-	-	-	-	-	-	-
8th Week	-	-	-	-	-	-	8
10th Week	-	3	-	10	-	-	16
12th Week	1	9	-	13	2	3	18

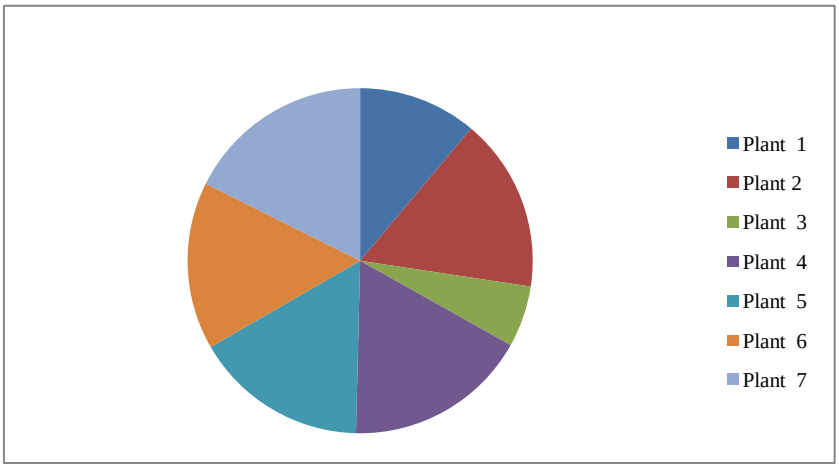

Fig. 1. Pie chart representing height performance of the seven plants at twelfth week.

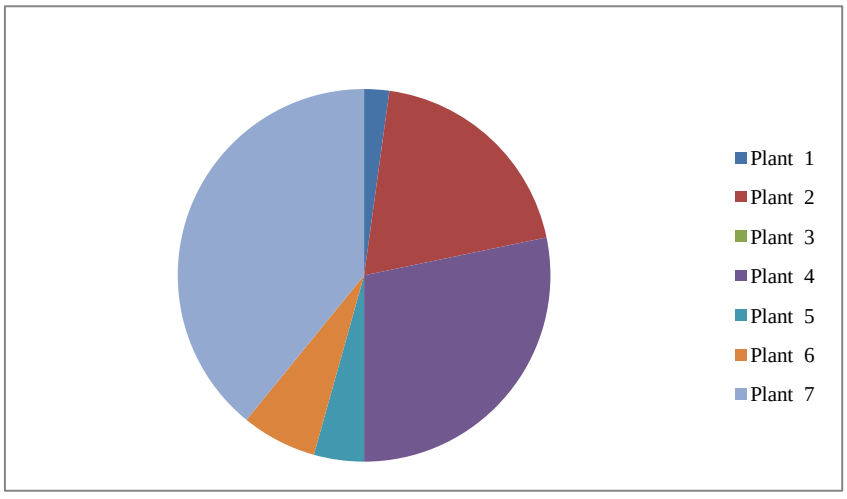

Fig. 2. Pie chart representing number of fruits of the seven plants at twelfth week.

IV. DISCUSSION

There are more than 400 varieties of tomato, including hundreds of speciality and heirloom types that can be suited for growth in our home gardens (Tracey L. Parnell et. al., undated), however, it remains for us to be able to choose the best type to suit our environment for a maximum harvest. More so, selecting a tomato seedling of choice require several necessary information including the sweetness and acidity required by the personnel

making the choice. Also nutritional preferences also exist, especially in the case in which information are available on the important micro minerals such as vitamin c and lycopene. Another important factor is the ripening time of the harvested tomatoes from the home garden. Some authors (Tracey L. Parnell et. al., undated), however believed that tomatoes harvested with 60 to 80 percent of the full colour can be ripened in the kitchen, but asserted that the best or optimal method that can be used is to place the harvested tomato fruits in a ripening dome or a paper bag, without access to direct ray of light or sun shine, so as to maintain a right sense of humidity balance.

The above results presents some interesting details above the potential tendency for the productivity of tomato seedlings purchased from Porto-Novo, Benin Republic. Even though, it is expected to have the same vigour, being seedlings of the same packet / source, yet their respective output and productivity were different. Hence environmental effects played a role here, versus gene by environment interaction, as there is diverse number of fruits observed. In most agricultural practices and commercial farming, the productivity in terms of the number of fruit is crucial, not only in domestic use, but for economic gains in commercial farming practices. In this work, it was observed that the harvested tomato fruits stay well on the table, as it does not get rotten on time. Sometimes it can stay on the table for up to 7 to 10 days before getting rotten, without refrigeration. This seems to be another important characteristic of this species of tomato, as it possesses enhanced durability and shelf life. Hence, it might be recommended to be a good produce for commercial purposes, even though the sizes are quite smaller as compared to other conventional tomatoes consumed. The results showed that Plant numbered 7 gave the best yield with harvested number of fruits totalling 42. This was followed by Plant numbered 4 with 23 fruits and Plant numbered 2 with 12 fruits in that order.

However, the results above tallies with the work of Dennis R. Pittenger, (Publication 8159), University of California) who says that home gardens could experience disappointing results when growing tomatoes because the plants and the fruits are susceptible to several common abiotic disorders, as well as attacks by diseases and pests. These abiotic disorders could results from some non-living causes, which can be attributed to environmental or cultural factors, or simply can be due to the plants genetic make-up.

V. CONCLUSION

The growth performance and the fruiting of the dwarf Tomato (*Solanum lycopersicum*) plant changed immediately after the application of the poultry manure. Especially observed was from the third week of its application, in which the growth performance of these dwarf short plants showed comparable patterns with the other taller Tomato (*Solanum lycopersicum*) plants. The results showed that Plant numbered 7 gave the best yield with harvested number of fruits totalling 42. This was followed by Plant numbered 4 with 23 fruits and Plant numbered 2 with 12 fruits in that order. Hence the Plants labelled 4 and 7 gave the best fruiting performance in terms of the number of fruits produced and then are recommended for commercial production and farming practices. However, the genetic make-up and environmental factors also has a good influence in the yield and this must be taken also into consideration during cultivation.

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