Varietal Response of Tomato (*Solanum lycopersicon*) to Transplanting at Different Seedling Age

Modupeola, T. O., Dixon, H. G., Olomide, O. A. K., Oladosu, B. O. and Adebiyi, O. E.

National Horticultural Research Institute, P.M.B. 5432, Idi-Ishin, Ibadan.
Corresponding Author: topemodupeola@gmail.com

Abstract
Field trial was conducted at the experimental field of National Horticultural Research Institute, Ibadan, Nigeria to assess the response to transplanting at different seedling ages on growth and yield of four selected tomato varieties. The treatments consisted of four seedling ages (2, 3, 4 and 5 weeks after sowing) and four tomato varieties- Tropimech (V1), Alahausa (V2), Cobra (V3) and Roma VF(V4). The trial was a 4 x 4 factorial laid out in a randomized complete block design and replicated three times. Data were collected on growth and yield parameters and analyzed using analysis of variance (ANOVA) and treatment means compared with least significant difference at 5% probability level. The results showed that the highest plant height was obtained from Tropimech tomato variety (52.43cm) at 5weeks seedling age. The highest dry matter and fruit weight was obtained from Alahausa tomato variety at 4weeks seedling age. Therefore, Alahausa tomato variety transplanted at 4weeks seedling age gave the highest fruit weight which is a good index for yield output for further research.

INTRODUCTION

Tomato (*Solanum lycopersicum*) is one of the most important vegetables worldwide belonging to the *Solanaceae* family. It is grown outdoors or indoors because of its wide adaptability and versatility. In Nigeria, tomato crops are grown during both the wet and dry seasons although they attract higher profits during the dry season when the demand is higher than the supply (Olaniyi, 2007). Tomato fruit contains lycopene, an antioxidant compound that reduces the risk of cancer (Miller *et al*., 2002). The fruits are eaten raw or cooked and can be processed into soup, juice, sauce, ketchup, puree, paste and powder (Olaniyi and Ajibola, 2008).The average yield of tomato in Nigeria is about 7.0 t/ha (FAOSTAT, 2005) where, it is widely cultivated in guinea savanna throughout the year using irrigation facilities. Tomato production at a given location depends on the potential of the genotype used and timely availability of resources (Isah *et al.,* 2014). Farmers in Nigeria obtained very low yield (7 t/ha) compared to global yields, that could be attributed to cultural practices adopted by the farmer (FAOSTAT, 2005).

Tomato growers in the tomato industry have mostly been found to possess inadequate or lack of knowledge on improved agronomic practices and production techniques such as seedling age before transplanting and cropping pattern, which place higher constraints on tomato production (Grassbaugh and Bennett, 1998). It is therefore necessary to determine the effect of seedling age on tomato varieties commonly grown in south western Nigeria.

MATERIALS AND METHOD

The field trial was carried out during the April – July rainy season of 2016 at the experimental field of the National Horticultural Research Institute, Ibadan located in the forest savanna zone of south–west Nigeria with Latitude 7^{O} 23' and 7^{o} 25'N and longitude 3^{o} 50' and 3^{o} 52'E. The treatment consisted of four varieties of tomato namely: *Tropimech* (V1), *Alahausa* (V2), *Cobra* (V3), and *Roma VF* (V4) and four seedling ages before transplanting. Tomato varieties were sown in the nursery

ISSN 978-978-54729-6-7
THEME: ''Horticulture for Improved Food Security, Sustainable Environment and National Economic Growth
18th – 22nd November, 2018

at the Institute screen house in trays filled with sterilized top soil.

The seedlings were later transplanted at 2, 3, 4 and 5 weeks after sowing (WAS) into a well-drained raised seedbed of 2 x 2m at a spacing of 50 x 50cm per plant on a plot. The 4 x 4 factorial combination of the treatments were arranged in randomized complete block design with three replicates. Organic manures were used during planting and pests were controlled using plants extracts such as onion extract, neem extract and pepper spray at 1000ml/15litres of water; all at different stages of tomato growth. Data were collected on plant height (cm), number of leaves (count), stem girth (cm), leaf area (cm^2), plant dry matter and fruit weight (g). All data generated were subjected to statistical analysis of variance (ANOVA) using (Genstat 7.2 Discovery Edition 3, 2007) and significant means separated using least significant difference (LSD) at 5% probability level.

RESULTS AND DISCUSSION

The plant height of tomato increased gradually with the plant age. The interaction of tomato variety and seedling age was significant ($P<0.01$) at 10 and 13 WAS respectively. The results reveal in Table 1 that *Tropimech* (V1) transplanted at 5weeks seedling age (S1) gave the tallest plant (52.43cm) while the shortest plant height(12.07cm) was recorded from *Cobra* (V3) transplanted at 2weeks seedling age (S4).This observation was in line with (Orzolek, 2004) and Schrader (2000) who reported that vegetables transplanted at their older age develop faster. The interaction of tomato variety and seedling age had no significant on stem girth at 10 and 13 WAS. *Alahausa* (V2) at 2weeks seedling age (S4) produced the widest stem of 1.82cm while the least value of stem girth (0.18cm) was obtained from Roma VF (V4) at 5weeks seedling age(S1) (Table 1). The number of leaves increased gradually with the increase in plant age. The interaction of tomato variety and seedling age was significant ($P<0.05$) at 10WAS while no significant effect was observed at 13WAS. The highest number of leaves (11.10) were obtained with *Alahausa*(V2) at 4weeks seedling age (S2) while the least number of leaves (2.83) were obtained from *Tropimech*(V1) at 5weeks seedling age (S1). The leaf area increased gradually with the increase in plant age. The interaction of tomato variety and seedling age had no significant effect at 10WAS while significant ($P<0.05$) effect was observed at 13WAS (Table 1).The highest leaf area ($423cm^2$) was obtained from *Roma VF* (V4) at 4weeks seedling age(S2) while the least leaf area ($43cm^2$) was obtained from *Roma VF* (V4) at 5weeks seedling age(S1). From Figure 1, plant dry matter yield(g/plant) were shown, it was observed that *Tropimech* at 4 weeks seedling age (V1S2) had the highest dry matter while *Alahausa* at 5weeks seedling age (V2S1) had the lowest dry matter yield. From figure 2 , it was observed that *Alahausa* at 4weeks seedling age (V2S2) had the highest fruit weight among all the treatment which is in line with the findings of Ademiluyi (2011), who recommended that plants with better growth rate were obtained at seedling age at 4weeks after sowing. Also, NIHORT (2016), reported that tomato can be transplanted between 4-5 weeks after sowing. V2S3 was the next in fruit weight to V2S2 while V4S3 shows the lowest fruit weight (Fig.2).

In conclusion, Alahausa tomato variety at 4weeks seedling age gave the highest fruit weight which is a good index for yield output for further research.

REFERNCES

ISSN 978-978-54729-6-7
THEME: "Horticulture for Improved Food Security, Sustainable Environment and National Economic Growth
18th – 22nd November, 2018

Ademiluyi, B.O. (2011). Study of effect of age of seedling transplant on the performance of tomato (*Lycopersicon lycopersion*) in South western Nigeria location. *Journal of Agricultural Science and Technology*, 5(3):. 321-381.

Food and Agricultural Organization of the United Nations (FAO). (2005). FAOSTAT. *Available: http://faostat.fao.org/.*

Grassbaugh, E. M. and Bennett, M. A. (1998). Factors affecting vegetable stand establishment. *Sci. agric. vol.55.http://dx.doi.org/10. 1590 /S0103 90161998000500021.*

Genstat. (2007). GENSTAT Release 7.2 DE, Discovery Edition 3, Lawes Agricultural Trust, Rothamsted Experimental Station.

Isah, A. S., Amans, E. B., Odion, E. C. and Yusuf, A. A. (2014).Growth Rate and Yield of two Tomato Varieties (*Lycopersicon esculentum Mill*) under Green Manure and NPK fertilizer Rate Samaru Northern Guinea Savanna. *International Journal of Agronomy,* Article ID 932759, 8 pages http://dx.doi.org/10.1155/2014/932759.

Olaniyi, J.O. (2007). Propagation of horticultural crops. Ogbomoso: Iyanda Binding and Printing Press.116p.

Olaniyi, J. O. and Ajibola, A. T. (2008). Effects of inorganic and organic fertilizers application on the growth, fruit yield and quality of tomato (Lycopersicon lycopersicum). *Journal of Applied Biosciences*. 8: 236-242.

Orzolek, M. (2004). Evaluating vegetable transplants. *Vegetable, small fruit and specialty crops. Virginia Cooperative Extension.* 3 (3), 9.

Miller, E.C., Hadley, C.W., Schwartz, S.J. , Erdman, J.W., Boileu, T.M.W., Clinton, S.K. (2002).Lycopene, tomato products, and prostate cancer prevention. *Pure Appl. Chem*. 74(8):1435-1441.

National Horticultural Research Institute, (2016). Production guide for tomato. No2.

Schrader, W.L.(2000). Using transplant in vegetable production. Univ. Calif. Div. Agr. Natural Resources. Publ. 8013.

ISSN 978-978-54729-6-7

Table 1: Effect of growth parameter on seedling age of tomato varieties.

		Plant height(cm)		Stem girth(cm)		Leaf area(cm^2)		Number of leaf	
		Weeks After Sowing(WAS)							
Variety	Seedling Age(weeks)	10	13	10	13	10	13	10	13
V1	S1	41.18	52.43	1.31	1.63	115.5	398	7.67	7.83
	S2	38.65	39.25	1.28	1.56	93.7	309	8.28	10.17
	S3	30.83	32.84	1.10	1.12	52.0	253	6.78	7.87
	S4	30.30	34.60	1.31	1.61	88.1	310	6.38	6.73
V2	S1	16.37	30.05	0.75	1.32	47.5	140	4.15	5.22
	S2	40.42	43.78	0.94	1.57	115.9	371	10.90	11.10
	S3	32.43	40.43	0.98	1.79	100.2	357	7.33	7.58
	S4	30.65	33.23	1.12	1.82	102.3	300	6.72	7.15
V3	S1	17.48	35.53	1.06	1.17	32.9	243	4.68	5.58
	S2	31.58	38.73	0.94	1.31	69.5	322	7.50	9.42
	S3	22.28	36.12	1.12	0.72	57.9	264	5.02	5.45
	S4	10.63	12.07	0.87	1.28	69.0	322	5.57	6.55
V4	S1	21.09	40.02	0.56	0.18	9.2	43	2.47	2.83
	S2	21.09	40.02	0.64	0.91	74.5	423	6.27	6.60
	S3	20.10	35.52	0.54	0.94	60.3	330	5.22	5.63
	S4	19.14	32.02	0.64	0.86	68.2	416	5.68	6.12
Significant		**	**	NS	NS	NS	*	*	NS
$L.S.D._{0.05}$		8.83	29.11	0.73	1.74	64.62	216.2	2.73	3.27

NB: V1=Tropimech, V2= Alahausa, V3= Cobra, V4=Roma VF S1= 5weeks, S2= 4weeks, S3= 3weeks, S4= 2weeks

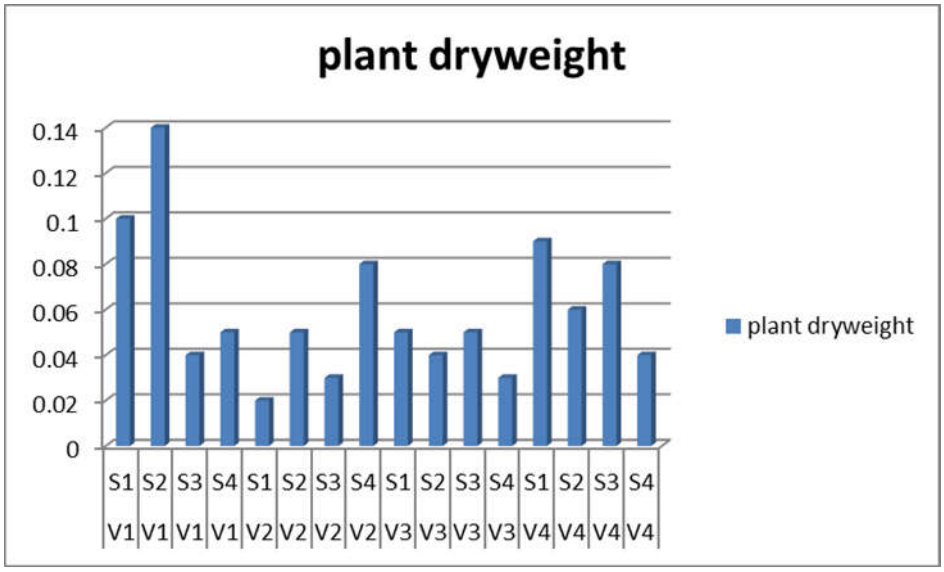

Fig. 1: **Effect of seedling age on dry matter yield of tomato varieties.**

ISSN 978-978-54729-6-7
THEME: "Horticulture for Improved Food Security, Sustainable Environment and National Economic Growth
18th – 22nd November, 2018

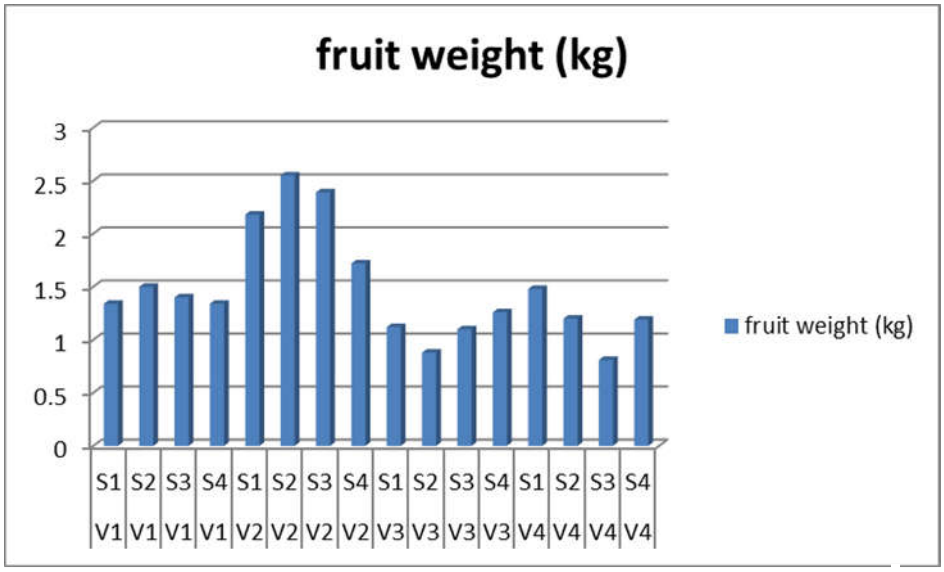

Figure 2: Effect of seedling age on fruit weight varieties of tomato.

ISSN 978-978-54729-6-7
THEME: "Horticulture for Improved Food Security, Sustainable Environment and National Economic Growth
18th – 22nd November, 2018