Advances in Environmental Biology, 5(4): 683-685, 2011
ISSN 1995-0756

This is a refereed journal and all articles are professionally screened and reviewed

**ORIGINAL ARTICLE**

# Effect of Organic Manures and Inorganic Fertilizers on Biochemical Constituents of Tomato (Lycopersicon Esculentum)

**A. Handoo Irshad**

7th April University, Zawia, Libya.

A. Handoo Irshad: Effect of Organic Manures and Inorganic Fertilizers on Biochemical Constituents of Tomato (Lycopersicon Esculentum)

**ABSTRACT**

Tomato is one of the most important vegetable crops from nutritional as well as consumptional point of view. It tops the list of canned vegetables. In this study tomato plants were treated with organic manures (F.Y.M, Sewage sludge) and inorganic fertilizers (N.P.K, Zn, S) were analysed for biochemical composition. T.S.S, lycopene, carbohydrate, vit. C, acidity, oxalic acid and carotenoid content exhibited an increase at all the test concentrations and were found maximum in sewage sludge treated along with N.P.K ($T_7$).

***Key words:*** Constituents, inorganic fertilizers, organic manures, Lycopersicon esculentum.

## Introduction

Tomato (Latin-juicy wolf peach) is a popular, versatile, easily grown plant with a great tasting fruit. Originally cultivated during prehistoric times by the Indians in South America, they were long believed to be poisonous. But now tomato is the favourite of home vegetable gardeners and is widely cultivated and used throughout the world. It is one of the most important vegetable crops from nutritional as well as consumptional point of view. It tops the list of canned vegetables.

F.Y.M improves the soil tilth, aeration, water holding capacity of the soil and stimulates the activity of micro-organisms in the soil that make the elements readily available to the crops [1]. On dry weight basis, sewage sludge contains 3 to 6 % N, 2 % $P_2O_5$ and 1% $K_2O$ and can become readily available when applied to the soil. Mineral elements like N.P.K, S and Zn too can increase the biochemical composition of tomato.

## Materials and methods

Present investigation was carried out with crystal HYB-$F_1$ variety of tomato. The crop was raised in the field of Biochemistry Department. Twelve treatments, replicated thrice were tested in randomized block design. F.Y.M and sewage sludge @ 5 kg/plot (2 x 1 sqm, having 8 plants) were applied before 20 days of transplanting. All inorganic fertilizers viz; N.P.K (108: 214: 33 g), Zn (4.761 g) and sulphur (1.332 g) were given as basal doses.

Biochemical estimation of tomato fruits

TSS, acidity and oxalic acid content was estimated by [2]. Lycopene and carotenoid content by [3].Carbohydrate was estimated by [4] and is based on the property that polysaccharides get hydrolyzed into simple sugars by an acidic solution. Vitamin C was estimated by [5] method and is based on the reduction of the DCIP by an acidic solution of vitamin C which in turn gets oxidized into dehydro ascorbic acid.

## Results and discussion

All the biochemical parameters shown in the table 1 were increased by different treatments as compared to the control. Highest percentage of T.S.S, lycopene and carbohydrate was found in $T_7$ (16.23,

**Corresponding Author**

A. Handoo Irshad, 7th April University, Zawia, Libya.
E-mail: handoo_senior@rediffmail.com

139.88, 31.14%) followed by $T_{11}$ (16.05, 128.53, 28.41%). Whereas, the lowest increase of TSS value was observed in $T_8$ (2.09%), $T_9$ of lycopene (9.14%) and $T_4$ of carbohydrate (5.46%) respectively, as compared to the control. These results are in accordance with [6] who reported that NPK application has increased the T.S.S, lycopene and carbohydrate content of tomato fruits. Maximum retention of vit. C content was observed in $T_7$ (82.69%). The next effective treatment was $T_9$ (76.44%) and the least effective treatment was $T_{11}$ (15.38%) over control.

**Table 1:** Effect of F.Y.M, sewage sludge, N.P.K, Zn and sulphur on T.S.S, lycopene, carbohydrate, vit. C, acidity, oxalic acid and carotenoid content in tomato fruits

| Treatments | T.S.S (%) | Lycopene (mg/100g) | Carbohydrate (mg/g) | Vit. C (mg/100g) | Acidity (%) | Oxalic acid acid (%) | Carotenoid (mg/100g) |
|---|---|---|---|---|---|---|---|
| $M_0$ ($T_0$) (control) | 5.73 | 3.61 | 3.66 | 20.8 | 0.143 | 0.13 | 7.84 |
| $S_2$ ($T_1$) | 5.86 | 4.23 | 4.26 | 28.2 | 0.146 | 0.21 | 8.31 |
| (Sulphur) | (2.26) | (17.17) | (16.39) | (35.57) | (2.09) | (61.53) | (5.99) |
| $Z_1$ ($T_2$) | 5.90 | 6.10 | 3.93 | 35.2 | 0.196 | 0.20 | 14.81 |
| (Zinc) | (2.96) | (68.97) | (7.37) | (69.23) | (37.06) | (53.84) | (88.90) |
| $N_1$ ($T_3$) | 5.90 | 6.48 | 4.40 | 31.6 | 0.226 | 0.25 | 16.66 |
| (N.P.K) | (2.96) | (79.50) | (20.21) | (51.92) | (58.04) | (92.30) | (112.5) |
| $S_1$ ($T_4$) | 6.40 | 5.24 | 3.86 | 36.6 | 0.180 | 0.17 | 10.16 |
| (Sewage sludge) | (11.69) | (45.15) | (5.46) | (75.96) | (25.87) | (30.76) | (29.59) |
| $S_1$ $S_2$ ($T^5$) | 5.90 | 4.80 | 4.16 | 28.3 | 0.216 | 0.25 | 8.77 |
| (Sewage sludge + sulphur) | (2.96) | (32.96) | (13.66) | (36.05) | (51.04) | (92.30) | (11.86) |
| $S^1$ $Z^2$ ($T_6$) | 6.20 | 6.02 | 35.2 | 4.03 | 0.146 | 0.20 | 14.32 |
| (Sewage sludge + zinc) | (8.20) | (66.75) | (69.23) | (10.10) | (2.09) | (53.84) | (82.65) |
| $S_1$ $N_2$ ($T_7$) | 6.66 | 8.66 | 4.80 | 38.0 | 0.363 | 0.30 | 25.0 |
| (Sewage sludge + N.P.K) | (16.23) | (139.88) | (31.14) | (82.69) | (153.84) | (130.76) | (218.87) |
| $F_1$ ($T_8$) | 5.85 | 5.40 | 4.50 | 28.8 | 0.200 | 0.17 | 14.30 |
| (F.Y.M) | (2.09) | (49.58) | (22.95) | (38.46) | (39.86) | (30.76) | (82.39) |
| $F_1$ $S_2$ ($T_9$) | 5.86 | 3.94 | 4.60 | 36.7 | 0.216 | 0.24 | 8.99 |
| (F.Y.M + sulphur) | (2.26) | (9.14) | (25.68) | (76.44) | (51.04) | (84.61) | (14.66) |
| $F_1$ $Z_2$ ($T_{10}$) | 5.60 | 3.99 | 4.43 | 30.4 | 0.250 | 0.17 | 11.05 |
| (F.Y.M + zinc) | (-2.26) | (10.52) | (21.03) | (46.15) | (74.82) | (30.76) | (40.94) |
| $F_1$ $N_1$ ($T_{11}$) | 6.65 | 8.25 | 4.70 | 24.0 | 0.260 | 0.23 | 19.38 |
| (F. Y.M + N.P.K) | (16.05) | (128.53) | (28.41) | (15.38) | (81.81) | (76.92) | (147.19) |
| C.D (P=0.05) | 0.646 | 0.601 | 0.33 | 7.470 | 0.039 | 0.06 | 0.640 |

Figures in parenthesis indicated %age increase and decrease as compared to the control

These findings are in conformity to the results of [7] who observed that the application of zinc has increased the vit. C content of tomato fruits. Elevated percentage of acidity and oxalic acid was recorded in $T_7$ (153.84, 130.76%) pursued by $T_{11}$, $T_{10}$ (81.81, 74.82%) of acidity and $T_3$, $T_5$ (92.30%) of oxalic acid and the minimum increase was found in $T_1$, $T_6$ (2.09%) of acidity and $T_4$, $T_8$ and $T_{10}$ (30.76%) of oxalic acid respectively, as compared to the control. Our observations are in agreement with [8] who found that potassium application has increased the acidity and oxalic acid content in tomato fruits. Greatest and pursued percentage of carotenoid content was noted in $T_7$, $T_{11}$ (218.87, 147.19%). While as, the least increase was observed in $T_1$ (5.99%) as compared to the control. Our finding correlates with [9] who reported that potassium application has increased the carotenoid content of tomato fruits.

*Conclusion:*

Based on the above results, it is concluded that application of organic manures along with inorganic fertilizers was found more beneficial and improved biochemical constituents in tomato. Hence it is advisable for farmers to use above one in combination form. But, furthermore studies are needed.

## References

1. Adrian, J., 2004. Green manuring, principles and practices. Agrobios, Jodhpur, India.
2. Ranganna, S., 1995. Hand book of analysis and quality control of fruits and vegetable products. Tata McGraw Hill, New Delhi, India.
3. Arya, S.S., 1981. Effect of water activity on storage changes in pigments of Bengal gram. J. Food Sci., 18: 140.
4. Clegg, K.M., 1956. Application of the anthrone reagent to the estimation of carbohydrate in cereals. J. Food Agri., 1: 40-44.
5. Ganai, B.A., A. Masood, A. Zargar, 2005. Experimental biochemistry. Kumar Publications, New Delhi, India.
6. Bangal, S.D., G.A. Shaik, R.N. Adsule, 1989. Influence of different levels of N, P and K fertilizers on the yield and quality of tomato. J. Maharashtra Agri. Univ., 14: 158-160.
7. Shkvaruk, N.M., O.K. Kharitonov, G.D. Shamotienko, 1973. Effect of some minor

elements on tomato yield and quality. Nauchnye-Trudy-Ukrainskoi-Sel's Kokhoz-Yaistvennoi-Akademii., 12: 116-118.
8. El-Sayed, M.M., A.A. Midan, F.A. Ali, 1985. Effect of different N.P.K formulae combined with boron and zinc nutrients on tomato productivity and fruit qualities. Monoufeyah J.Agri. Res., 10: 1049-1076.
9. Anand, N., C.R. Muthukrishnan, 1974. Effect of potassium on growth, yield and quality of tomato. Potash Rev., 27: 8-9.