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EFFECT OF MYCORRHIZAL FERTILIZER ON TOMATO (LYCOPERSICON ESCULANTUM MILL) GROWTH

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ABSTRACT:
The study was mainly aimed to investigated the response of potted grown tomato plants to inoculation with AMF as well as the application of organic and inorganic fertilizers. This experiment was carried out during 2016/2017.The experiment was arranged for selected 5 localities of Parner Tehsil rhizospheric and non rhizospheric soil with 3 replicants for each locality. Result indicated that vegetative growth parameters viz, plantheight, leafarea, number of leaflets, number of flowerbuds, number of fruits etc.

Key words- Rhizospheric, Non rhizospheric, Organic, Inorganic, fertilizers, AMF etc

INTRODUCTION:

Tomato (*Lycopersicon esculantum* Mill.) is a member of family solanaceae (nightshade) family. It is one of the major vegetable crops grown worldwide. Tomato is the second most widely grown vegetable crop in the world other than potato (Hanson etai.2001) Tomato is considered as an important cash generating crop for smallholders and medium-scale commercial farmers providing employment (Naika etal 2005).

To overcome low soil fertility, Farmers usually apply high amount of chemical fertilizers to enhance crop growth and increase productivity per unit area (Mahadeen,A.Y.2009,AlKaraki,G.N.2002).Organic manure application can serve as an alternative practice for soil fertilizing due to its high nutritional value and enhancement effect on soil properties in order to provide essential minerals (Mahadeen,A.Y.2009);include organic matter, water holding capacity, soilstructure, enhance soil biological activity and promote soil aggregates(Edwards,C.A.&J.R.Lofty,1982),(Al-Karaki,G.N.2006) hence improve crop yields.

Soil microorganisms play a vital and significant role in regulating the dynamics of organic decomposition and the availability of plant nutrients. One of the important beneficial microorganisms that can be used as a biological fertilizer is Arbuscular mycorrhizal Fungi,(AMF).Mycorrhizal fungi are an alternative biofertilizer for enhancing vegetative growth and yield.(OudaB.A.&A.Y.Mahadeen,2008);(Charron G.V.Furlan,M.Bernier-Cordou&G.Doyon,2001);(Al-Karaki,G.N.&R.B.Clark,1998).

This study aimed that the application of mycorrhizal fertilizer enhances the growth of tomato plant, as well as the large number of flowers and fruit setting takes place.

MATERIALS AND METHODS :

Experimental sites and design:

The experiment was conducted at the 5 selected localities of Parner Tehsil Viz, Takali dhokeshwar, Wasunde, Khadakawdi, Padali Terfe Kanhoor Pathar & Hiware Korda.

The soil samples were collected at the depth of from such localities with respect to rhizospheric and non-rhizospheric.

The analysis of soil was carried out by Agricultural Department with respect to some physical as well as chemical parameterslikePH,salinity,organiccarbon,phosphorous,potassium,copper,iron,zink&manganese etc.in 2015-2016.

Experimental treatments:

Abhinav variety of tomato was used in this study. Tomato seeds were grown in polystyrene trays under green house conditions.peatmoss and perlite mixture at a ratio of 3:1 were used as a growth medium.2-3 week old seedlings were transplanted into plastic pots(20cm in diameter) containing 5 kg of soil. The seedlings were transplanted on 28/11/2016.The following treatments were performed during the study for each rhizospheric &non-rhizospheric soil.

Control-No use of any chemical fertilizer or biofertilizer for such pots.

Chemical fertilizer treatments- Chemical fertilizer (N-P-K-12.5-12.5-12.5-TE) were used at the rate of 10 gm for each pot. They were applied2, 4&8 weeks post transplanting.

Mycorrhizal Treatments-Mycorrhizal fertilizers Rutoz.Ms.S.biofertilizer was used at the time of seed sowing in the trays and also was used at the rate 10 gm for each pot. They were applied 2, 4&8 weeks post transplanting.

Vegetative Growth Measurement-

Vegetative growth parameters like height, number of leaves, number of leaflets per pair, number of flowers, number of fruits, total leaf area etc. from all conditions like control, chemical and mycorrhizal fertilizers.

DISCUSSION :

The influence of mycorrhizal fertilizer on tomato was assessed on the basis of parameters like seedling height, number of flower buds, flowers, and number of fruits etc.Mycorrhizal treatment showed positive effect on seedling height, number of flowers and number of fruits.

In present study the seedling height increased significantly along with application of mycorrhizal fertilizer treatment. The highest seedling height 64.9cm compare to control 59.1 cm and 63 cm in the application of chemical fertilizer.

It is well established that mycorrhizal fertilizer improves the growth and yield of plant.(EI-Amri et al.2013).Lenin et al. 2010) noted increase in growth parameter of four vegetable crops Lycopersicon, Solanum, Capsicum and Abelmoschus with the application of mycorrhizal fertilizer. According to Sharifi et al. (2007), the increase in growth parameters can be resulted from the effect of AM fungi on better absorption of various nutrients.

Shrihari and Shrinivasa (1998) evaluated the effect of AM by using 0-100gm mycorrhizal soil and they reported the optimum dose was 70gm mycorrhizal soil. At this dose they reported that plant phosphorous concentration increases significantly. Arisha and Baradisi (1999) reported that the organic fertilizers activates many species of living organisms, which realse phytoharmones and might stimulate the plant growth,absoption of nutrients and photosynthesis.

The result of present study are supported by the results of AI-Momamy (1987),who reported that inoculation of tomato, eggplant and hot pepper plants with VAM endophytes increases plant vegetative growth. These results agreed with those obtained by Kim et al.(1997),who reported that tomato seedlings inoculated with mycorrhiza produce higher biomass than non-mycorrhizal plants under normally irrigated conditions. Subramanian et al.(2006) found that AMF increases the shoot dry weight of tomato plant than non-mycorrhizal plant.

According to the current results, applying higher level of inorganic fertilizer significantly reduced root colonization as compared to the lower level. These results agreed with the general observation that AMF root colonization levels are greater at low P levels.

From the above observations the morphological characters like the height of the seedling and the flowering, fruiting of the plants were comparatively more by the application of mycorrhizal fertilizer as compare to control and chemical fertilizers.

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Seedling Length, Flowering and fruiting

Sr.No.	Date of Observation	Location	Type of Soil	Control cm	Mycorrhizal Fertilizer cm	Chemical Fertilizer cm
1	**04/12/2016**	Takali Dhokeshwar	a)Rhizospheric b)Non-Rhizospheric	14.3 14	19.3 15	15.7 14.8
2		Wasunde	a)Rhizospheric b)Non-Rhizospheric	15.2 14.2	16.6 15.7	17.1 15.6
3		Khadakawdi	a)Rhizospheric b)Non-Rhizospheric	15.6 13.2	18 15	16 13
4		Padali Terfe Kanhoor Pathar	a)Rhizospheric b)Non-Rhizospheric	14 13.1	16.4 13.5	17.1 13
5		Hiware Korda	a)Rhizospheric b)Non-Rhizospheric	15 13	18.4 14.7	16.2 15
1	**09/12/2016**	Takali Dhokeshwar	a)Rhizospheric b)Non-Rhizospheric	19.5 18.2	20.3 18.7	19.7 18.5
2		Wasunde	a)Rhizospheric b)Non-Rhizospheric	18.8 16.4	19.3 15.4	18.9 16.7
3		Khadakawdi	a)Rhizospheric b)Non-Rhizospheric	16.9 14.3	20.2 17.3	18 14.7
4		Padali Terfe Kanhoor Pathar	a)Rhizospheric b)Non-Rhizospheric	17.7 14.8	18.3 15.2	19.8 16.3
5		Hiware Korda	a)Rhizospheric b)Non-Rhizospheric	18 16.3	20.6 17.2	19.3 17.6

Seedling Length, Flowering and fruiting

Sr.No	Date of Observation	Location	Type of Soil	Control cm	Mycorrhizal Fertilizer cm	Chemical Fertilizer cm
1	**15/12/2016**	Takali Dhokeshwar	a)Rhizospheric b)Non-Rhizospheric	22.3 20.2	23.2 20.7	22.7 20.4
2		Wasunde	a)Rhizospheric b)Non-Rhizospheric	21.2 18.4	23.1 19.4	22.2 19.3
3		Khadakawdi	a)Rhizospheric b)Non-Rhizospheric	18.2 17.1	23.4 19.3	21.3 18.5
4		Padali Terfe Kanhoor Pathar	a)Rhizospheric b)Non-Rhizospheric	19.2 16.1	22.4 18	22 17.6

5		Hiware Korda	a)Rhizospheric b)Non-Rhizospheric	21 18	24 19	21 19.4
1	**21/12/2016**	Takali Dhokeshwar	a)Rhizospheric b)Non-Rhizospheric	30.5**(3buds)** 30**(3buds**)	30.8**(4buds)** 30.2**(3buds**)	30.4**(4buds)** 29.4**(2buds)**
2		Wasunde	a)Rhizospheric b)Non-Rhizospheric	29.7**(3buds)** 28.2**(2buds)**	31.2**(4buds)** 29**(3buds**)	29.9**(3buds**) 28.3**(3buds)**
3		Khadakawdi	a)Rhizospheric b)Non-Rhizospheric	29**(2buds)** 28.1**(2buds)**	32.1**(4buds)** 28.4**(3buds**)	30.1**(3buds)** 29.1**(3buds)**
4		Padali Terfe Kanhoor Pathar	a)Rhizospheric b)Non-Rhizospheric	30.1**(4buds)** 28.9**(3buds)**	35.3**(5buds)** 31.1**(3buds)**	33.1**(5buds)** 30**(3buds)**
5		Hiware Korda	a)Rhizospheric b)Non-Rhizospheric	30.4**(5buds)** 29.4**(4buds)**	34.7**(5buds)** 32**(5buds)**	34**(5buds)** 30.2**(4buds)**

Seedling Length, Flowering and fruiting

Sr.No.	Date of Observation	Location	Type of Soil	Control cm	Mycorrhizal Fertilizer cm	Chemical Fertilizer cm
1	**31/12/2016**	Takali Dhokeshwar	a)Rhizospheric b)Non-Rhizospheric	49**(Fruit Setting)** 45**(Fruit Setting)**	50.5**(Fruit Setting)** 49**(Fruit Setting)**	50.2**(Fruit Setting)** 48**(Fruit Setting)**
2		Wasunde	a)Rhizospheric b)Non-Rhizospheric	49**(Fruit Setting)** 48**(Fruit Setting)**	50.1**(Fruit Setting)** 48**(Fruit Setting)**	50**(Fruit Setting)** 48**(Fruit Setting)**
3		Khadakawdi	a)Rhizospheric b)Non-Rhizospheric	**43(Fruit Setting)** **42(Fruit Setting)**	**54(Fruit Setting)** **52(Fruit Setting)**	51**(Fruit Setting)** 49**(Fruit Setting)**
4		Padali Terfe Kanhoor Pathar	a)Rhizospheric b)Non-Rhizospheric	48**(Fruit Setting)** 46**(Fruit Setting)**	55.5**(Fruit Setting)** 49**(Fruit Setting)**	54.1**(Fruit Setting**) 48**(Fruit Setting)**
5		Hiware Korda	a)Rhizospheric b)Non-Rhizospheric	36**(Fruit Setting) Karappa disease** 32**(Fruit Setting)**	42.5**(Fruit Setting)** 40**(Fruit Setting)**	**Death of seedling**

Seedling Length, Flowering and fruiting after Application of Insecticide Chlorodol Dust

Sr.No	Date of Observation	Location	Type of Soil	Control cm	Mycorrhizal Fertilizer cm	Chemical Fertilizer cm
1	**04/01/2017**	Takali Dhokeshwar	a)Rhizospheric b)Non-Rhizospheric	53.5**(Fruiting)** 50**(Fruiting)**	57**(Large Size Fruits)** 53**(Fruiting)**	54.3**(Large Size Fruits)** 52.1**(Fruiting)**
2		Wasunde	a)Rhizospheric b)Non-Rhizospheric	51.9**(Fruiting)** 50.3**(Only Flowering)**	59**(Large Size Fruits)** 55**(Fruiting)**	56**(Fruiting)** 54**(Fruiting)**
3		Khadakawdi	a)Rhizospheric b)Non-Rhizospheric	58.1**(Fruiting)** 55.2**(Fruiting)**	62**(Large Size Fruits)** 58**(Fruiting)**	59**(Only Flowering)** 55.4**(Only Flowering)**
4		Padali Terfe Kanhoor Pathar	a)Rhizospheric b)Non-Rhizospheric	58**(Fruiting)** 54.1**(Fruiting)**	60**(Large Size Fruits)** 54**(Large Size Fruits)**	58.7**(Large Size Fruits)** 54.9**(Large Size Fruits)**
5		Hiware Korda	a)Rhizospheric b)Non-Rhizospheric	**Death of seedling** **Death of seedling**	50.1**(Large Size Fruits**) 48**(Large Size Fruits)**	49.7**(Large Size Fruits)** 48**(Large Size Fruits)**

Seedling Length, Flowering and fruiting after Application of Insecticide Chlorodol Dust

Sr.No.	Date of Observation	Location	Type of Soil	Control cm	Mycorrhizal Fertilizer cm	Chemical Fertilizer cm
1	**15/01/2017**	Takali Dhokeshwar	a)Rhizospheric b)Non-Rhizospheric	55**(Fruit Setting)** 52**(Fruit Setting)**	58.4**(Large Size Fruits)** 55(**Large Size Fruits)**	**Death of seedling** **Death of seedling**
2		Wasunde	a)Rhizospheric b)Non-Rhizospheric	59.1**(Fruit Setting)** 53**(Fruit Setting)**	64.9**(Large Size Fruits)** 64**(Large Size Fruits)**	63**(Large Size Fruits)** 62**(Large Size Fruits)**
3		Khadakawdi	a)Rhizospheric b)Non-Rhizospheric	59**(Fruit Setting)** 57**(Fruit Setting)**	62**(Large Size Fruits)** 60.2**(Large Size Fruits)**	61**(Large Size Fruits)** **Death of seedling**
4		Padali Terfe Kanhoor Pathar	a)Rhizospheric b)Non-Rhizospheric	58.7**(Fruit Setting)** 54.8**(Fruit Setting)**	60**(Large Size Fruits)** 58.4**(Large Size Fruits)**	58.8**(Large Size Fruits)** 57.4**(Large Size Fruits)**
5		Hiware Korda	a)Rhizospheric b)Non-Rhizospheric	**Death of seedling** **Death of seedling**	61**(Large Size Fruits)** 54.3**(Large Size Fruits)**	61**(Large Size Fruits)** 57**(Large Size Fruits)**