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Effect of Naphthalene acetic acid on Biochemical parameters, Growth and Yield of Tomato (*Lycopersicon esculentum* Mill.)

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Abstract: *A pot experiment was performed according to a randomized block design at Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad (Uttar Pradesh) to study the effect of 5 levels of Naphthalene acetic acid spray (10, 20, 30, 40 and 50 ppm NAA) on the vegetative growth, yield and quality parameters of tomato cultivar (Lycopersicon esculentum* Mill*.). Irrespective of its concentration, spray of Naphthalene acetic acid proved beneficial for all parameters.*

Key Words: *Tomato, Lycopersicon esculentum* Mill. *NAA spray, ppm, growth, yield.*

I. Introduction

Tomato (Lycopersicon esculentum L.) belonging to Solanaceae and its origin is the Andean zone particularly Tomato particularly Peru-Ecuador-Bolivian areas but cultivated tomato originated in Mexico. The production of Tomato in India is dominated by Andhra Pradesh which contributes nearly 36% (5926.2 mt/hec) to the total production. Karnataka is the second largest producer contributing 10% (1756.7 mt/hec) to the total production followed by Orissa 8% (1367.2 mt/hec), West Bengal 6% (1063.7 mt/hec), Bihar 6% (1056.2 mt/hec), Gujrat 6% (948.4 mt/hec), Maharashtra 4% (738.0 mt/hec), Chhattisgarh 4% (627.9 mt/hec), Tamilnadu 3% (580.6 mt/hec), Jharkhand 2% (401.6 mt/hec), and others 15% (2330.8 mt/hec) **(Indian Horticulture Database, 2011).** Tomato is one of the most highly praised vegetables consumed widely and it is a major source of vitamins and minerals. It is one of the most popular salad vegetables and is taken with great relish. It is widely employed in cannery and made into soups, conserves, pickles, ketchup, sauces, juices etc. Use of plant growth regulators is a common horticultural practice to improve yield. Plant growth regulators can affect rooting, flowering, fruiting and fruit growth, leaf or fruit abscission, senescence, regulation of some metabolic processes and plant resistance to temperature or water stresses. The plant growth regulators are known to enhance the source sink relationship and stimulate the translocation of photo assimilates thereby helping in better retention of flowers and fruits. Besides this, the growth regulators have the ability to cause accelerated growth in plant.

Naphthalene acetic acid is synthetic plant hormone in the Auxin family.it is known to stimulate cell division, cell elongation, elongation of shoot, photosynthesis, RNA synthesis membrane permeability and water uptake also involved in many physiological processes like prevention of pre harvest fruit drop, flower induction, fruit set, delayed senescence and prevention of bud sprouting, leaf chlorophyll content, and increased yield in fruit crops etc

Realizing the significance of this experiment with the objective of to study the effect of Naphthalene acetic acid on growth, quality and yield of tomato.

II. Materials and Methods

The experiment was carried out during Rabi season 2014, Department of Biological Sciences, SHIATS, Allahabad (U.P.). The experiment consisted one tomato variety – Golden, five levels of naphthalene acetic acid arranged in randomized block design with three replications and six treatments (T0 – Control, T1- NAA @ 10 ppm, T2- NAA @ 20 ppm, T3- NAA @ 30 ppm, T4- NAA @ 40 ppm and T5- NAA @ 50 ppm). The required weight of PGRs was taken using electronic sensitive balance and solution was prepared by dissolving in 1 mg L^{-1}. The solution was directly sprayed on the plants three times at 20, 40 and 60 days after transplanting. Spraying was performed early in the morning to avoid rapid drying of the spray solution, due to transpiration. The collected data includes average plant height (cm), number of leaves per plant, number of fruit per plant, fresh fruit weight (kg/plant), total chlorophyll, fruit protein content (mg/gm) and lycopene content (mg/100gm).

III. Result and Discussion

3.1 Growth parameters

3.1.1 Plant height (cm)

Treatments	Plant height (cm)			Number of leaves		
	20 DAT	40 DAT	60 DAT	20 DAT	40 DAT	60 DAT
T0	18.0	26.2	36.1	13.6	20.4	31.1
T1	19.0	30.6	42.0	14.6	24.9	33.2
T2	21.8	33.0	45.2	14.7	27.1	36.5
T3	26.9	38.0	52.1	15.4	37.3	46.0
T4	24.7	36.8	50.5	15.3	36.1	44.3
T5	27.2	42.3	60.5	16.6	43.2	50.1

At 20 DAT maximum plant height was found in T5 (27.2) and minimum was found in (18.0), At 40 DAT maximum plant height was found in T5 (42.3) and minimum was found in (26.0). At 60 DAT maximum plant height was found in T5 (36.1) and minimum was found in (60.5), Similar result was found by **Kannan *et al.* (2009)** in paprika.

3.1.2 Number of leaves/plant

At 20 DAT maximum number of leaves/plant was found in T5 (16.6) and minimum was found in (13.6), At 40 DAT maximum number of leaves/plant was found in T5 (43.2) and minimum was found in (20.4). At 60 DAT maximum number of leaves/plant was found in T5 (50.1) and minimum was found in (31.1),Similar result was found by **Gabal *et al.* (1999)** in Tomato and **Kannan *et al.* (2009)** in paprika

3.2. Biochemical parameters

3.2.1 Total Chlorophyll (mg/gm)

At 60 DAT maximum chlorophyll was found in T5 (5.69) and minimum was found in (3.80), Similar result was found by **Chandra and Shivraj (1972)** in chilli and **Chandal *et al.* (2004)** rice and mustard and **Hemantaranjan *et al.* (2000)** in soybean in also significant.

3.3 Quality Parameters

3.3.1 Protein content (mg/gm)

At 60 DAT maximum protein content was found in T5 (2.3) and minimum was found in (0.9). Similar result was found by **Ghanem *et al.*, (2008).**

3.3.2 Lycopene (mg/100gm)

At 60 DAT maximum lycopene was found in T5 (3.8) and minimum was found in (2.0)' Similar result was found by **Chang and Liu ., (2008)**

3.4. Yield Parameters

3.4.1 Number of fruits/ plant

At 60 DAT maximum number of fruit per plant was found in T5 (19.1) and minimum was found in (9.0), Similar result was found by **Khuarana *et al.* (2004)** and **Choudhary *et al.* (2006).**

3.4.2 Fruits weight (kg/plant)

At 60 DAT maximum fruit weight was found in T5 (1.5) and minimum was found in (0.9),Similar result was found by **Gelmesa *et al.* (2010)** in tomato. **Sumiati (1987)** and **Edison (1991)** in tomato and **Chandra and Shivraj (1972)** in chilli.

Table 1. Effect of NAA on vegetative growth parameters.

Table 2. Effect of NAA on quality parameters.

Treatments	Number of fruits/ plant	Fruits weight (kg/plant)	Chlorophyll (mg/gm)	Protein content (mg/gm)	Lycopene (mg/100gm)
	40 DAT	60 DAT	60 DAT	60 DAT	60 DAT
T_0	9.0	0.9	3.80	0.9	2.0
T_1	12.2	1.1	4.52	1.7	2.2
T_2	15.0	1.2	4.74	2.0	2.5
T_3	16.0	1.3	5.10	2.3	3.2
T_4	16.0	1.3	5.47	2.2	3.4
T_5	19.1	1.5	5.69	2.3	3.8

IV. Conclusion

Based on the results, it can be concluded that, Naphthalene acetic acid had significant influence on growth, quality and yield of tomato, especially the treatment with the application of NAA @ 50 ppm and NAA @ 30 ppm.

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