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Effect of fertilizer levels through inorganic fertilizers and bio-fertilizers on growth and yield of tomato (*Solanum lycopersicum* L.)

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Abstract
The investigation was carried out during 2021 and 2022 for evaluation of the effect of inorganic fertilizers along with bio fertilizers on vegetative and yield characters of tomato. At 30 DAT, maximum plant height was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus). At 60 DAT, maximum plant height (110.85 cm) was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus). At 90 DAT, again maximum plant height (159.42 cm) was recorded under treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (153.86 cm). At 120 DAT, maximum plant height was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recording a plant height of 180.84 cm. This was followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recording a plant height of 175.28 cm. During the next year of experiment (2022), at 30 DAT, maximum plant height of 89.27 cm was recorded in treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus). At 60 DAT, maximum plant height of 112.02 cm was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus). At 90 DAT, again maximum plant height of 162 cm was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (156.44 cm). At 120 DAT, similar trend was observed and maximum plant height (182.02 cm) was recorded in treatment T_8 followed by treatment T_{12} (176.46 cm) whereas minimum plant height was recorded in control (129.54 cm).

Keywords: Growth, yield, biofertilizers, inorganic fertilizers

Introduction

The tomato (*Solanum lycopersicum* L.) is a member of the family Solanaceae. The number of chromosomes in tomato is 2n = 24. It is one of the most popular fruit vegetable, rich in vitamins A, B6, C, and K; nutritional value. It contains a variety of nutrients including dietary fibre, molybdenum, copper, potassium, and manganese. Production varies by region due to factors such as variety, season, weather, planting time, management tactics, and soil qualities. Tomatoes can be grown in both the summer and winter. (Nandwani, 2014) [7].

Biofertilizers including *Azospirillum*, *Azotobacter*, and *Phosphobacteria* have been identified and deployed to commercial tomato production, revealing the crucial function of biofertilizers in today's high-yield farming. These bio-fertilizers, either alone or in conjunction with inorganic fertilizers, enhance the vegetative growth, productivity, and fruit quality of the tomato. Tomatoes are an important vegetable since they can be used in so many different ways. Fruits like tomatoes are more nutritious and cost less than other vegetables. For tomatoes to produce at their highest potential, an adequate supply of nutrients in an appropriate ratio is crucial. Because manures and fertilizers can be expensive and occasionally unavailable, most farmers are unable to apply them in an adequate quantity. Since almost all farmers rely on commercial fertilizers to produce lucrative yields, our soil does not accumulate as much organic matter as it formerly did. When applied continuously over time, mineral fertilizers change the soil's physical characteristics and may make it more difficult to increase yields (Zia *et al.*, 2000) [10].

Materials and Method

In order to study the "Effect of fertilizer levels through inorganic fertilizers and bio-fertilizers on growth and yield of tomato(*Solanum lycopersicum* L.)." a field experiment was conducted at Horticulture complex, Faculty of Agriculture Science and Technology, Mansarovar Global University, Bilkisganj Sehore (M.P) during *rabi* season of 2021-2022 and 2022-23. The experiment will be conducted as per the plan given below:

Factor A: Biofertilizers

Application method of *Azotobacter*

A carrier-based inoculum of *Azotobacter* @ 1 kg/ ha is dissolving in water to prepare slurry. Seedling uproot from the nursery and after then dip in slurry for 30 min. then they transplant to the main field.

Application method of *Azospirillum*

A carrier based inoculum of *Azospirillum* @ 1 kg/ ha is dissolving in water to prepare slurry. Seedling uproot from the nursery and after then dip in slurry for 30 min. then they transplant to the main field.

Application method of *Phosphobacteria*

A carrier-based inoculum of Phosphobacteria @ 1kg/ ha is dissolving in water to prepare slurry. Seedling uproots from the nursery and after then dip in slurry for 30 min. then they transplant to the main field.

Factor B: Inorganic fertilizers

1. Nitrogen + Phosphorus (Source: Urea and SSP).

Treatment detail

B_0 – No bio-fertilizer
B_1 – *Azotobacter* 1 kg/ha
B_2 – *Azospirillum* 1 kg/ha
B_3 – *Phosphobacteria* 1 kg/ha
F_0 – No inorganic fertilizer
F_1 – 40 kg Nitrogen + 20 kg Phosphorus
F_2 – 80 kg Nitrogen + 40 kg Phosphorus
F_3 – 120 kg Nitrogen + 60 kg Phosphorus

Table 1: Treatment combination

Treatment Symbol	Treatment details
T_1	B_0F_0 (No bio-fertilizer + No inorganic fertilizer)
T_2	B_0F_1 (No bio-fertilizer + 40 kg Nitrogen + 20 kg Phosphorus)
T_3	B_0F_2 (No bio-fertilizer + 80 kg Nitrogen + 40 kg Phosphorus)
T_4	B_0F_3 (No bio-fertilizer + 120 kg Nitrogen + 60 kg Phosphorus)
T_5	B_1F_0 (*Azotobacter* 1 kg/ha + No inorganic fertilizer)
T_6	B_1F_1 (*Azotobacter* 1 kg/ha + 40 kg Nitrogen + 20 kg Phosphorus)
T_7	B_1F_2 (*Azotobacter* 1 kg/ha + 80 kg Nitrogen + 40 kg Phosphorus)
T_8	B_1F_3 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus)
T_9	B_2F_0 (*Azospirillum* 1 kg/ha + No inorganic fertilizer)
T_{10}	B_2F_1 (*Azospirillum* 1 kg/ha + 40 kg Nitrogen + 20 kg Phosphorus)
T_{11}	B_2F_2 (*Azospirillum* 1 kg/ha + 80 kg Nitrogen + 40 kg Phosphorus)
T_{12}	B_2F_3 (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus)
T_{13}	B_3F_0 (Phosphobacteria 1 kg/ha + No inorganic fertilizer)
T_{14}	B_3F_1 (Phosphobacteria 1 kg/ha + 40 kg Nitrogen + 20 kg Phosphorus)
T_{15}	B_3F_2 (Phosphobacteria 1 kg/ha + 80 kg Nitrogen + 40 kg Phosphorus)
T_{16}	B_3F_3 (Phosphobacteria 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus)

Results and Discussion

Growth characters

Data pertaining to plant height and number of leaves at different days after transplanting is presented under Table 1 and table 2. A keen observation of the data reveals that application of inorganic fertilizers and biofertilizers had a significant effect on plant height in tomato on all the observation intervals.

During the first year of experiment (2021), at 30 DAT, it was observed that maximum plant height was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) where plant height of 88.21 cm was recorded. This was followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recording a plant height of 82.65 cm. All other treatments also had a significant impact on the plant height in tomato. Minimum plant height at 30 DAT was recorded under the treatment T_1 (No bio-fertilizer + No inorganic fertilizer) where a plant height of 35.73 cm was recorded. At 60 DAT, the growth trend of the tomato plants continued and treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recorded maximum plant height (110.85 cm) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) where plant height of 105.29 cm was recorded. Minimum plant height of 58.37 cm was recorded under treatment T_1 (No biofertilizer + No inorganic fertilizer). At 90 DAT, again maximum plant height (159.42 cm) was recorded under treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (153.86 cm) whereas minimum plant height was recorded under the treatment T_1 (106.94 cm). At 120 DAT, maximum plant height was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recording a plant height of 180.84 cm. This was followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recording a plant height of 175.28 cm. Minimum plant height was recorded in control (T_1) with a plant height of 128.36 cm.

During the next year of experiment (2022), at 30 DAT, maximum plant height of 89.27 cm was recorded in treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) with a plant height of 83.71 cm. Minimum plant height at 30 DAT was recorded under control (36.79 cm). At 60 DAT, maximum plant height of 112.02 cm was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) with a plant height of 106.46 cm. At 90 DAT, again maximum plant height of 162 cm was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (156.44 cm). At 120 DAT, similar trend was observed and maximum plant height (182.02 cm) was recorded in treatment T_8 followed by treatment T_{12} (176.46 cm) whereas minimum plant height was recorded in control (129.54 cm).

During the first year of experiment (2021), at 30 DAT, it was observed that maximum number of leaves was recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) and T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) where seven (7) number of leaves were recorded. This was followed by treatment T_{16} (*Phosphobacteria* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recording 6.5 number of leaves. All other treatments also had a significant impact on the plant height in tomato. Minimum number of leaves at 30 DAT were recorded under the treatment T_1 (No bio-fertilizer + No inorganic fertilizer) where 3.6 number of leaves were recorded. At 60 DAT, similar trend in number of leaves in tomato plants continued and treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recorded maximum number of leaves (22.43) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) where 22.39 number of leaves were recorded. Minimum number of leaves (19.03) were recorded under treatment T_1 (No bio-fertilizer + No inorganic fertilizer). At 90 DAT, again maximum number of leaves (49.91) were recorded under treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (49.88) whereas minimum number of leaves were recorded under the treatment T_1 (46.51). At 120 DAT, maximum number of leaves were recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recording 72.41 leaves. This was followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) recorded 72.31 number of leaves. Minimum number of leaves (69.01) was recorded in control (T_1).

During the next year of experiment (2022), at 30 DAT, maximum number of leaves (7.4) were recorded in treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) along with treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus). Minimum number of leaves (4.0) at 30 DAT were recorded under control. At 60 DAT, maximum number of leaves (22.43) were recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) with 22.39 number of leaves. At 90 DAT, again maximum number of leaves (51.16) were recorded under the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (50.89). At 120 DAT, similar trend was observed and maximum number of leaves (74.05) were recorded in treatment T_8 followed by treatment T_{12} (73.89) whereas minimum number of leaves were recorded in control (70.65).

The creation of more chlorophyll with the inoculation of nitrogen fixers is what causes this increase in plant height. The creation of plant growth regulators by bacteria in the rhizosphere, which are absorbed by the roots, may also be the cause of the enhanced vegetative growth. Moreover, increased hydrogenase, phosphate, and nitrogenase enzyme activity in the rhizosphere was noted (El- Tantawy and Mohamed, 2009) [5]. The increased biological nitrogen fixation may be the cause of the higher vegetative growth. Improved root system growth and potential production of plant growth hormones such IAA, GA, and cytokinins. Plant growth characteristics may have increased directly as a result of biofertilizers. Moreover, the improvement in growth traits might result from PSB's stimulative effect on P solubilization, which would enhance P availability and plant absorption. These results are in conformity with the findings of (Poonia and Dhaka, 2012) [8].

Yield Characters

Data pertaining to average yield per plot (kg) and total yield are presented in Table 3. Average yield per plot was affected by the average fruit weight per plant and was significant in all the treatments as compared to the control treatment.

In the first year of the experiment, it was observed that maximum average yield per plot was recorded in the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) with an average yield of 33.14 kg per plot followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) with an average yield of 31.93 kg. This was followed by treatment T_{16} with an average yield per plot of 29.77 kg. Minimum average yield per plot was recorded in the treatment T_1 (15.06 kg).

During 2022, again similar trend was observed and maximum yield per plot was recorded in the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) with a yield of 33.25 kg followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) with an average yield per plot of 32.18 kg. Minimum average yield per plot was observed in the treatment T_1 (15.21 kg).

The pooled estimates also revealed similar trend in average yield per plot with maximum yield being recorded in the treatment T_8 (33.20 kg) followed by T_{12} (32.06 kg) and T_{16} (29.31 kg). Minimum average yield per plot was recorded in T_1 (15.14 kg).

These results are consistent with those of Wange *et al*. (1998) [11] who found that applying *Azotobacter* and PSB increased strawberry yield. While nitrogen fixers and phosphorus solubilizers boosted the availability of nitrogen and phosphorus to the plants as well as their transfer from root to flower through plant foliage, the rise in yield may be attributable to an increase in fruit set per plant (Singh and Singh, 2009) [12]. Similar findings in safflower and tomatoes were reported by Mirzakhani *et al*. (2009) [13] and Poonia and Dhaka (2012) [8], respectively. Baba *et al*. (2018) [14] also confirmed similar findings and reported that application of *Azotobacter*-3 + PSB (PS6) + 100% NPK application resulted in the highest fruit output (1.50 kg plant-1) ever.

During the first year of the study (2021), it was observed that maximum yield of 409.13 q per hectare was recorded in the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} (*Azospirillum* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) where a total yield of 394.22 q per hectare was recorded. This was significantly superior to the yield obtained in all other treatments. Minimum yield of 185.97 q per hectare was recorded in T_1 (Control).

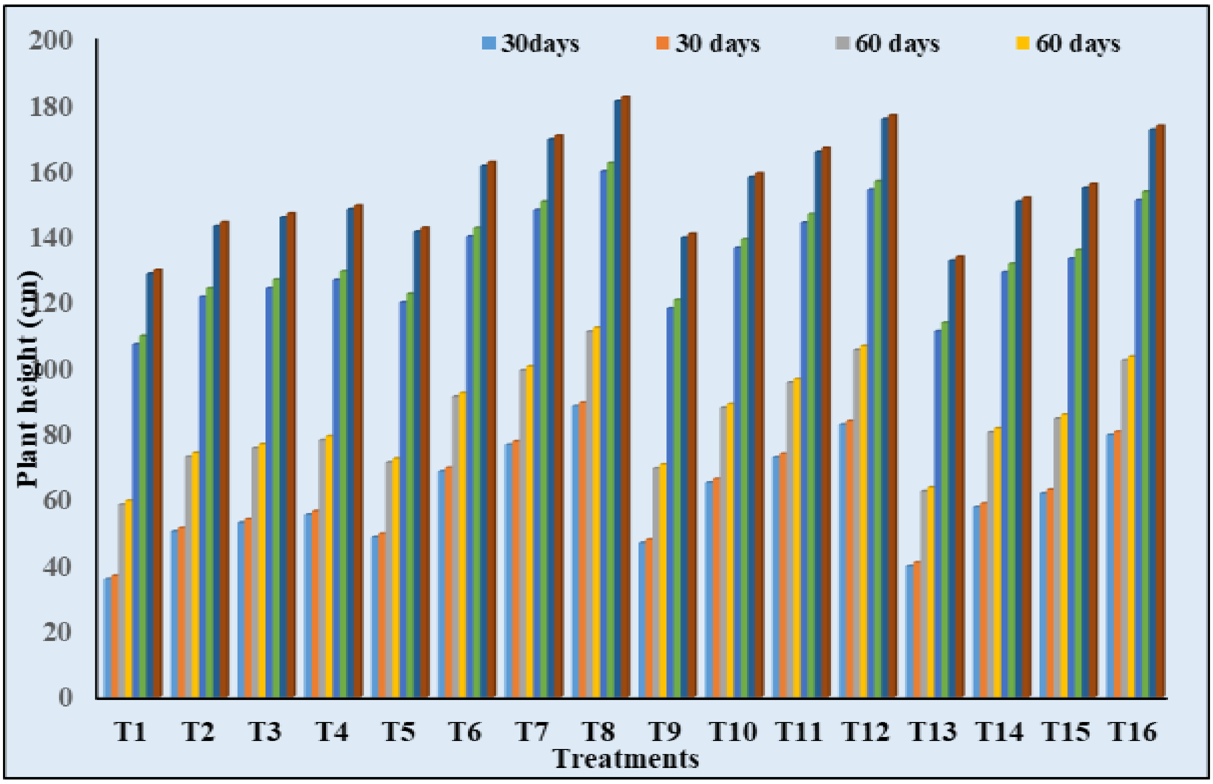
In the next year of the study also (2022), maximum yield of 410.52 q per hectare was recorded in the treatment T_8 (*Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus) followed by treatment T_{12} and T_{16} where a cumulative yield of 397.26 q per hectare and 356.34 q per hectare was recorded. Minimum yield of 187.81 q per hectare was recorded under the treatment T_1 (Control).

The pooled data also revealed similar trends in the cumulative yield of tomato. Maximum cumulative yield of 409.82 q per ha was recorded in the treatment T_8 followed by a yield of 395.74 q per ha recorded in treatment T_{12} and 361.91 q per ha in T_{16}. Minimum yield of 186.89 q per ha was recorded in the treatment T_1 (control).

Integration of biofertilizer (*Azotobacter* and *Azospirillum*) and inorganic fertilizers led to increased growth parameters which led to the strengthening of the photosynthetic area of the plant. This might have led to increased assimilation of the carbohydrates and better assimilate partitioning in the tomato plants which led to increased yield as compared to the control treatment. These findings are in line with the findings of Wange *et al*., (1998) [11] and Tripathi *et al*., (2010) in strawberry, who recorded higher yield with *Azotobacter* and PSB application. The increase in yield might be due to increased fruit set per plant, due to the fact that nitrogen fixers and phosphorous solubilizes not only increased the availability of nitrogen and phosphorous to the plants but also increased their translocation from root to flower through plant foliage (Singh and Singh, 2009) [12]. Similar results were reported by Mirzakhani *et al*., (2009) [13] in safflower and Poonia and Dhaka (2012) [8] in tomato.

Table 1: Effect of inorganic fertilizers and bio-fertilizers on plant height of tomato

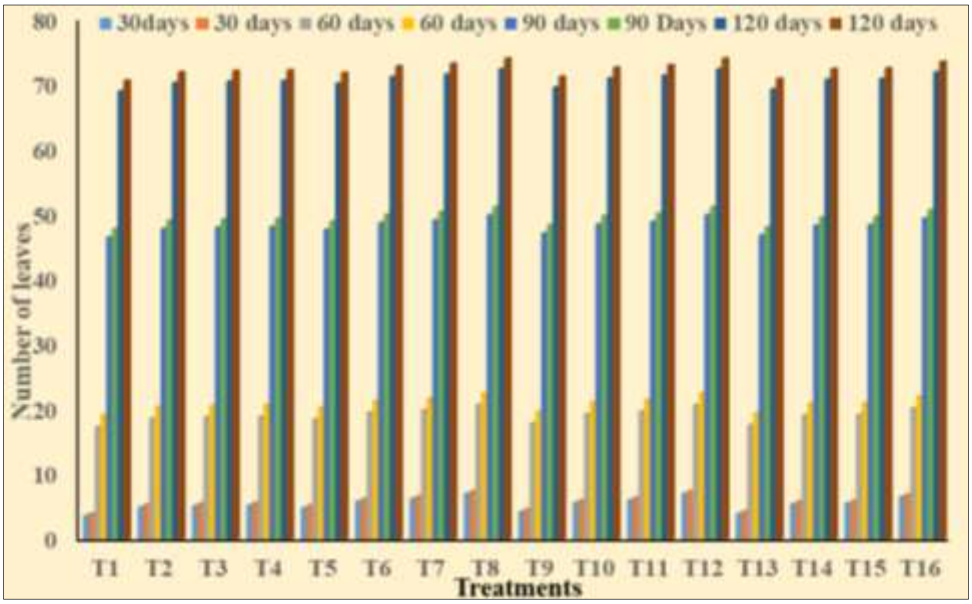
Treatment	Plant height (30 DAT)			Plant height (60 DAT)			Plant height (90 DAT)			Plant height (120 DAT)		
	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled
T_1	35.73	36.79	36.26	58.37	59.54	58.96	106.94	109.52	108.23	128.36	129.54	128.95
T_2	50.23	51.29	50.76	72.87	74.04	73.46	121.44	124.02	122.73	142.86	144.04	143.45
T_3	52.86	53.92	53.39	75.5	76.67	76.09	124.07	126.65	125.36	145.49	146.67	146.08
T_4	55.30	56.36	55.83	77.94	79.11	78.53	126.51	129.09	127.8	147.93	149.11	148.52
T_5	48.50	49.56	49.03	71.14	72.31	71.73	119.71	122.29	121.0	141.13	142.31	141.72
T_6	68.46	69.52	68.99	91.1	92.27	91.69	139.67	142.25	140.96	161.09	162.27	161.68
T_7	76.48	77.54	77.01	99.12	100.29	99.71	147.69	150.27	148.98	169.11	170.29	169.7
T_8	88.21	89.27	88.74	110.85	112.02	111.44	159.42	162	160.71	180.84	182.02	181.43
T_9	46.73	47.79	47.26	69.37	70.54	69.96	117.94	120.52	119.23	139.36	140.54	139.95
T_{10}	65.05	66.11	65.58	87.69	88.86	88.28	136.26	138.84	137.55	157.68	158.86	158.27
T_{11}	72.70	73.76	73.23	95.34	96.51	95.93	143.91	146.49	145.2	165.33	166.51	165.92
T_{12}	82.65	83.71	83.18	105.29	106.46	105.88	153.86	156.44	155.15	175.28	176.46	175.87
T_{13}	39.75	40.81	40.28	62.39	63.56	62.98	110.96	113.54	112.25	132.38	133.56	132.97
T_{14}	57.66	58.72	58.19	80.3	81.47	80.89	128.87	131.45	130.16	150.29	151.47	150.88
T_{15}	61.81	62.87	62.34	84.45	85.62	85.04	133.02	135.6	134.31	154.44	155.62	155.03
T_{16}	79.46	80.52	79.99	102.1	103.27	102.69	150.67	153.25	151.96	172.09	173.27	172.68
S.Em(±)	1.32	1.41		1.09	1.11		0.85	0.82		0.56	0.61	
CD (@5%)	2.69	2.58		2.18	2.21		1.74	1.57		1.08	1.19	



Graph 1: Effect of inorganic fertilizers and biofertilizers on plant height in tomato

Table 2: Effect of inorganic fertilizers and bio-fertilizers on number of leaves in tomato

Treatment	Number of leaves (30 DAT)			Number of leaves (60 DAT)			Number of leaves (90 DAT)			Number of leaves (120 DAT)		
	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled
T_1	3.6	4	3.8	17.25	19.03	18.14	46.51	47.76	47.135	69.01	70.65	69.83
T_2	4.9	5.3	5.1	18.55	20.33	19.44	47.81	49.06	48.435	70.31	71.95	71.13
T_3	5.1	5.5	5.3	18.75	20.53	19.64	48.01	49.26	48.635	70.51	72.15	71.33
T_4	5.2	5.6	5.4	18.85	20.63	19.74	48.11	49.36	48.735	70.61	72.25	71.43
T_5	4.8	5.2	5	18.45	20.23	19.34	47.71	48.96	48.335	70.21	71.85	71.03
T_6	5.8	6.2	6	19.45	21.23	20.34	48.71	49.96	49.335	71.21	72.85	72.03
T_7	6.2	6.6	6.4	19.85	21.63	20.74	49.11	50.36	49.735	71.61	73.25	72.43
T_8	7	7.4	7.2	20.65	22.43	21.54	49.91	51.16	50.535	72.41	74.05	73.23
T_9	4.2	4.6	4.4	17.85	19.63	18.74	47.11	48.36	47.735	69.61	71.25	70.43
T_{10}	5.6	6	5.8	19.25	21.03	20.14	48.51	49.76	49.135	71.01	72.65	71.83
T_{11}	6	6.4	6.2	19.65	21.43	20.54	48.91	50.16	49.535	71.41	73.05	72.23
T_{12}	7	7.4	7.2	20.65	22.43	21.54	49.91	51.16	50.535	72.41	74.05	73.23
T_{13}	3.9	4.3	4.1	17.55	19.33	18.44	46.81	48.06	47.435	69.31	70.95	70.13
T_{14}	5.4	5.8	5.6	19.05	20.83	19.94	48.31	49.56	48.935	70.81	72.45	71.63
T_{15}	5.5	5.9	5.7	19.15	20.93	20.04	48.41	49.66	49.035	70.91	72.55	71.73
T_{16}	6.5	6.9	6.7	20.15	21.93	21.04	49.41	50.66	50.035	71.91	73.55	72.73
S.Em(±)	0.62	0.67		0.71	0.84		0.81	0.85		0.72	0.75	
CD (@5%)	1.06	1.11		1.41	1.89		1.69	1.89		1.47	1.57	



Graph 2: Effect of inorganic fertilizers and bio-fertilizers on number of leaves in tomato

Table 3: Effect of inorganic fertilizers and bio-fertilizers on average yield and total yield of tomato

Treatment	Average yield per plot (kg)			Total yield (q/ha)		
	2021	2022	Pooled	2021	2022	Pooled
T_1	15.06	15.21	15.14	185.97	187.81	186.89
T_2	21.85	21.37	21.61	269.74	263.78	266.76
T_3	22.66	22.88	22.77	279.74	282.42	281.08
T_4	24.03	23.44	23.74	296.62	289.44	293.03
T_5	20.50	20.49	20.50	253.13	252.95	253.04
T_6	26.24	26.18	26.21	323.91	323.27	323.59
T_7	30.43	29.91	30.17	375.69	369.29	372.49
T_8	33.14	33.25	33.20	409.13	410.52	409.82
T_9	19.59	19.78	19.68	241.80	244.24	243.02
T_{10}	25.90	25.54	25.72	319.76	315.36	317.56
T_{11}	28.58	28.33	28.45	352.80	349.71	351.26
T_{12}	31.93	32.18	32.06	394.22	397.26	395.74
T_{13}	18.14	18.38	18.26	224.01	226.88	225.44
T_{14}	25.21	24.82	25.02	311.22	306.44	308.83
T_{15}	25.19	24.93	25.06	310.94	307.77	309.35
T_{16}	29.77	28.86	29.31	367.48	356.34	361.91
S.Em(±)	2.64	2.19		3.12	3.27	
CD (@5%)	5.21	4.86		5.68	6.04	

Conclusion

From the result obtained during the investigation with different treatment combination of inorganic fertilizers and biofertilizers on growth and yield of tomato (*Solanum lycopersicum* L.). Hans, it is concluded that application of biofertilizers and inorganic fertilizers with the combination significantly increased the height of plant, number of leaves, average yield and total yield per hectare were maximum in *Azotobacter* 1 kg/ha + 120 kg Nitrogen + 60 kg Phosphorus.

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