Effects of ascorbic acid against salt stress on the morphological and physiological parameters of *Solanum melongena* (L.)

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Abstract
The recent research was done to find out the role of ascorbic acid on morphological and physiological parameters of *Solanum melongena* during salt stress. The experiment was carried out in pots in which the effect of salt and ascorbic acid was measured on a range of morphological and physiological parameters. In this study, ascorbic acid was applied in two ways viz. as a foliar spray on leaves or through roots in the soil at two levels 100 ppm and 200 ppm to the plants grown under control, 60mM and 100mM NaCl. After sixty days of treatments it was determined that fresh and dry biomass was decreased considerably under salinity stress. Overall, it was observed that salt stress significantly down effect the morphological and physiological parameters. Decrease in the vegetative and reproductive parameters was improved with the application of ascorbic acid. The best result was obtained with the 200 ppm ascorbic acid which significantly improved the morphological and physiological parameters of plants in both control and salt stress treatments suggesting that ascorbic acid mitigate the negative effects of salt stress.

Keywords: Ascorbic acid; Foliar spray; Morphological; Physiological; Salt stress

Introduction
Salinity refers to the presence of different kinds of salts in soil which inhibits the normal growth of plants. Salinity becomes a concern when more than normal amount of soluble salts occurs in the soil [1]. Worldwide, more than sixty million hectares of irrigated lands have been affected by salinity [2]. About 50% of the irrigated area of the world is affected by salinity and their problems are more severe in arid areas [3]. Salt stress is one of the major constraints responsible for less agricultural yield in Pakistan and all over the world. A loss of about twenty million rupees per year decrease has been reported in agriculture sector due to salinity.

*Solanum melongena* is the member of family *Solanaceae* and is an annual herb. The fruits are fleshy and have a meaty texture having less than 3cm diameter. The fruits are technically called as berry which having numerous smaller seeds and are edible having bitter in taste and are 35 to...
156 cm in height with large coarsely lobed leaves that are eight to 18 cm long and 4 to 12 cm broad. Their flower is whitish to purple having five-lobed corolla and yellowish stamens [4].

Ascorbic acid is growth regulator known to provide protection against a number of abiotic stresses [5] because it can influence a range of processes in plants, including seed germination [6] stomatal closure [7] ion uptake and transport [8] membrane permeability [9] photosynthetic and growth rate [10]. It also accumulates in plants under saline conditions and are known to have a vital role in salt tolerance. For example, salt-tolerant tomato cultivars had higher levels of ascorbic acid than salt-sensitive cultivars [11]. Similarly, pre-treatment with ascorbic acid counteracted the inhibitory effects of salt stress on growth and photosynthesis of Pisum sativum [12]. Ascorbic acid showed improvement in growth, cell division and cell enlargement of various crops [13]. However ascorbic acid is also known to induce salt tolerance through signal transduction pathways, but the factors involved in the ascorbic acid signal-transduction pathways remain to be elucidated yet [14]. Thus ascorbic acid potentially involved in counteracting salt stress. The current study was designed to analyze the effect of ascorbic acid in mitigating the effect of salinity in solanum melongena.

Materials and methods

Soil preparation & salinity treatments

Seeds of solanum melongena were grown in pots containing 4 kilogram of soil in each. Sixty pots divided into 5 sets were used in the experiment. Each set consisted of three treatments of NaCl (1) control (without salt) (2) 60mM (3) 100mM. Each treatment was replicated 4 times forming a total of 12 pots for overall set.

Ascorbic acid treatment

In the first set of pots no Ascorbic acid was applied while in the 2nd and 3rd sets of pots 100 ppm and 200 ppm ascorbic acid was applied respectively by mixing it in soil. However, in the 4th and 5th sets of pots again 100 and 200 ppm ascorbic acid was applied using foliar spray methods. Doses of the ascorbic acid were refreshed in each month for all sets. Electrical conductivity for each treatment in each set was calculated.

Seedling’s analysis

Three seedlings were grown in each pot which was irrigated with tape water. After establishment of seedlings, all pots were irrigated with 1.5 L of tape water after every three days. Different morphological and physiological parameters were noted at the time of harvest. Electrolytic Leakage was determined as described by [15] with few modifications.

Relative water content was measured using the method described by [16].

\[
RWC = \frac{(FW-DW)}{(TW-DW)} \times 100
\]

Leaf water loss was determined as described by [17].

\[
LWL(\%) = \frac{W_1-W_2}{W_1}
\]

Root weight ratio, shoot weight ratio, leaf weight ratio, shoot root ratio, Leaf area ratio and Specific leaf ratio was determined as described by [18].

Results and discussion

Plant height

Plants of the set-I showed non-significant decrease in 100mM salt stress as compared to control. Similarly, set-II and -III, showed non-significant increase at 60mM salt stress as compared to control. Set-IV resulted non-significant decrease in saline media as compared to control however it was more prominent in 60mM salt stress. Set-V, 60mM salt stress resulted reduction as compared to control. Juxtaposition of set-II and set-III, set-II resulted slight increase in control while a prominent increase in 60mM salt stress as juxtaposition with set-III. Juxtaposition of set-I, set-II resulted increase and set-III resulted decrease in control and 60mM salt stress as juxtaposition with set-I. Juxtaposition between set-IV and set-V resulted that set-IV resulted slight increase in control while a prominent increase at 60mM salt stress as juxtaposition with set-V. When both sets
were juxtaposition with set-I, set-IV resulted increase and set-V results decrease in control and 60mM salt stress as juxtaposition with set-I (Table 1; Figure 1) which agrees with the earlier work of [19].

Table 1. Anova for different growth parameters in Solanum melongena grown in different NaCl levels and ascorbic acid doses

| Source                        | Plant height | Root length | Number of leaves | Leaf area | Fresh Biomass | Dry Biomass |
|-------------------------------|--------------|-------------|-----------------|-----------|---------------|-------------|
| Application                   | Ns           | Ns          | Ns              | Ns        | Ns            | Ns          |
| Ascorbic acid                 | Ns           | Ns          | Ns              | Ns        | Ns            | Ns          |
| Salinity                      | Ns           | P<0.001     | P<0.05          | P<0.01   | Ns            | P<0.05     |
| Application x Ascorbic acid   | Ns           | Ns          | Ns              | Ns        | Ns            | Ns          |
| Application x salinity        | Ns           | P<0.01      | Ns              | Ns        | Ns            | Ns          |
| Ascorbic acid x salinity      | Ns           | Ns          | P<0.05          | Ns        | Ns            | Ns          |
| Application x Ascorbic acid x salinity | Ns     | Ns          | P<0.05          | Ns        | Ns            | Ns          |

Figure 1. Effects of Ascorbic acid and different NaCl concentrations on plant height (cms) of Solanum melongena. Set-I: Without ascorbic acid, Set-II: 0.25 ppm ascorbic acid applied through roots in soil, Set-III: 0.50 ppm ascorbic acid applied through roots in soil, Set-IV: 0.25 ppm ascorbic acid applied as a foliar spray, Set-V: 0.50 ppm ascorbic acid applied as a foliar spray

**Root length**

Plants in set-I resulted significant (P<0.001) increase in saline media viz.60mM salt stress as juxtaposition with control. In set-II salt stress resulted significant (P<0.001) increase as juxtaposition with control. Plants in set-III resulted significant (P<0.001) decrease in 60mM salt stress as juxtaposition with control. Set-IV and set-V resulted significant (P<0.001) decrease in both salt stress as juxtaposition with control. Juxtaposition of set-II and set-III, set-II resulted decrease in control and 60mM salt stress as juxtaposition with set-III. Juxtaposition of set-II and set-III with set-I both sets resulted increase in 100mM salt stress as juxtaposition with set-I. Juxtaposition of set-IV and set-V resulted that Set-IV resulted increase in all
treatments as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted increase in control and set-V resulted significant decrease in saline media as juxtaposition with set-I (Table 1; Figure 2) which agrees with the earlier work of [20].

**Figure 2. Effects of Ascorbic acid and different NaCl concentrations on root length (cms) of Solanum melongena.** Set-I: Without ascorbic acid, Set-II: 0.25 ppm ascorbic acid applied through roots in soil, Set-II: 0.50 ppm ascorbic acid applied through roots in soil, Set-IV; 0.25 ppm ascorbic acid applied as a foliar spray, Set-V: 0.50 ppm ascorbic acid applied as a foliar spray.

**Number of leaves**

Plants of set-I resulted significant (P<0.05) decrease in 60mM and 100mM salt stress as juxtaposition with control. Set-II grown under 60mM salt stress resulted significant (P<0.05) increase as juxtaposition with control. Set – III resulted significant (P<0.05) increase in 100mM salt stress treatment as juxtaposition with control. Set-IV resulted significant (P<0.05) reduction in saline media as juxtaposition with control. Set-V, 60mM salt stress resulted increase while 100mM salt stress exhibited decrease as juxtaposition with control. This result was statistically significant (P<0.05). Juxtaposition of set-II and set-III, set-II resulted increase in control and 60mM salt stress as juxtaposition with set-III. Juxtaposition of set-II and set-III with set-I, Set-II resulted increase in 60mM salt stress and set-III resulted increase in both salinity levels 60mM and 100mM salt stress treatments as juxtaposition with set-I. Juxtaposition of set-IV and set-V results that Set-IV resulted increase in control and in high salinity treatment viz. 100 mM salt stresses as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted increase in control and 60mM salt stress and set-V resulted increase only at 60mM salt stress as Juxtaposition with set-I (Table 1; Figure 3).
Figure 3. Effects of Ascorbic acid and different NaCl concentrations on number of leaves (ems) of *Solanum melongena*. Set-I: Without ascorbic acid, Set-II: 0.25 ppm ascorbic acid applied through roots in soil, Set-II: 0.50 ppm ascorbic acid applied through roots in soil, Set-IV: 0.25 ppm ascorbic acid applied as a foliar spray, Set-V: 0.50 ppm ascorbic acid applied as a foliar spray

**Leaf area**
Plants grown in set-I and set-II resulted a prominent significant (P<0.01) increase in 60mM salt stress and a prominent significant (P<0.01) decrease in 100mM salt stress as juxtaposition with control. Set-III grown under 60mM salt stress resulted significant (P<0.05) increase as juxtaposition with control. Set-IV resulted significant (P<0.05) reduction in saline media as juxtaposition with control. Set-V, 60mM salt stress resulted non-significant increase as juxtaposition with control.

Juxtaposition of set-II and set-III, set-II resulted increase only in control and 60mM salt stress as juxtaposition with set-III. Juxtaposition of set-II and set-III with set-I, Set-II resulted increase in all treatments and set-III in 100mM salt stress as juxtaposition with set-I. Juxtaposition of set-IV and set-V resulted that Set-IV resulted increase in control as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted increase in control and 100mM salt stress and set-V in 100mM salt stress as juxtaposition with set-I (Table 1; Figure 4) which agrees with the earlier work of [21].

**Fresh and dry biomass**
Plants of set-I resulted significant (P<0.05) decrease in saline media as juxtaposition with control. Set-II and III resulted significant (P<0.05) increase in 60mM salt stress as juxtaposition with control. Set-IV and V resulted significant (P<0.05) decrease in 60mM salt stress as juxtaposition with control. Juxtaposition of set-II and set-III, set-III resulted slight increase in all treatments as juxtaposition with set-II. Juxtaposition of set-II and set-III with set-I, Set-II resulted decrease in all treatments and set-III in control and 60mM salt stress as juxtaposition with set-I. Juxtaposition of set-IV and set-V resulted that Set-IV showed increase in control and 60mM salt stress as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted increase in control and set-V in control and 100mM salt stress as juxtaposition with set-I (Table 1; Figure 5 & 6).
Figure 4. Effects of Ascorbic acid and different NaCl concentrations on leaf area (cms) of *Solanum melongena*. Set-I: Without ascorbic acid, set-II: 0.25 ppm ascorbic acid applied through roots in soil, Set-II: 0.50 ppm ascorbic acid applied through roots in soil, Set-IV: 0.25 ppm ascorbic acid applied as a foliar spray, Set-V: 0.50 ppm ascorbic acid applied as a foliar spray.

Figure 5. Effects of Ascorbic acid and different NaCl concentrations on plant fresh biomass (gms) of *Solanum melongena*. Set-I: Without ascorbic acid, Set-II: 0.25 ppm ascorbic acid applied through roots in soil, Set-II: 0.50 ppm ascorbic acid applied through roots in soil, Set-IV: 0.25 ppm ascorbic acid applied as a foliar spray, Set-V: 0.50 ppm ascorbic acid applied as a foliar spray.
Electrolyte leakage

In set-I 100mM salt stress resulted non-significant increase as juxtaposition with control. Set-II resulted non-significant increase in saline media as juxtaposition with control. Set-III viz. 60mM salt stress resulted non-significant increase as juxtaposition with control. Set-IV and set-V resulted significant (P<0.05) decrease in saline media as juxtaposition with set-II. Juxtaposition of set-II and set-III, set-III resulted increase in control and 60mM salt stress as juxtaposition with set-II. Juxtaposition of set-II and set-III with set-I both sets resulted increase at 60mM salt stress as juxtaposition with set-I. Juxtaposition between set-IV and set-V resulted that Set-V resulted increase in all treatments as juxtaposition with set-IV. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted decrease in control and 100mM salt stress and set-V resulted increase in 100mM salt stress as juxtaposition with set-II (Table 2).

Leaf water loss

Plants grown in set-I results a prominent increase in saline media as juxtaposition with control. Set-II resulted significant (P<0.05) increase at 100mM salt stress as juxtaposition with control. Set-III resulted significant (P<0.05) decrease in 60mM salt stress as juxtaposition with control. Set-IV resulted increase in saline media as juxtaposition with control. Set-V resulted significant (P<0.05) decrease in saline media as juxtaposition with control. Juxtaposition of set-II and set-III, set-II resulted increase in all treatments as juxtaposition with set-III. Juxtaposition of set-II and set-III with set-I, Set-II resulted increase in all treatments and set-III resulted increase in control and 60mM salt stress as juxtaposition with set-I. Juxtaposition between set-IV and set-V resulted that Set-IV resulted increase in saline media as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted increase in control and 100mM salt stress and set-V resulted decrease in saline media as juxtaposition with set-I (Table 2).
Relative water content
Plants of set-I exhibited non-significant increase in 100mM salt stress as juxtaposition with control. Set-II resulted non-significant increase at 60mM salt stress as juxtaposition with control. Set-III resulted non-significant decrease at 100mM salt stress as juxtaposition with control. Set-IV resulted non-significant increase in 60mM salt stress as juxtaposition with control. Set-V resulted non-significant increase in 60mM salt stress as juxtaposition with control. Juxtaposition of set-II and set-III, set-II resulted prominent increase in saline media as juxtaposition with set-III. Juxtaposition of set-II and set-III with set-I, Set- II resulted prominent increased at 60mM salt stress and set-III resulted increase in control and 60mM salt stress as juxtaposition with set-I. Juxtaposition between set-IV and set-V resulted that Set-IV resulted increase in 60mM salt stress as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted increase in control and 60mM salt stress and set-V resulted increase in 60mM salt stress as juxtaposition with set-I (Table 2).

Table 2. Anova for effects of ascorbic acid and different NaCl concentrations on relative water content, Electrolyte leakage and leaf water loss of Solanum melongena

| Set-I Without Ascorbic acid | Treatment | Relative water content | Electrolyte leakage | Leaf water loss |
|----------------------------|-----------|------------------------|---------------------|----------------|
| Control, Mean, SE         | 52.226a ±23.726 | 27.062a ±14.918 | 29.414a ±1.711 |
| 60M NaCl, Mean, SE       | 51.376a ±13.502 | 46.076a ±1.458 | 23.156a ±2.923 |
| % (+/-)                   | (-1.627)    | (+70.262)              | (-21.274)          |
| 100M NaCl, Mean, SE      | 79.483a ±18.348 | 35.707a ±6.83 | 33.237a ±16.618 |
| % (+/-)                   | (+52.189)   | (+31.945)              | (+12.997)          |
| LSD0.05                   | 65.716     | 32.91                  | 3.884              |

Table 2……. (Contd)

Set- II= 0.25ppm Ascorbic acid applied through roots in soil

| Treatment | Relative Water Content | Electrolyte leakage | Leaf Water Loss |
|-----------|------------------------|---------------------|----------------|
| Control, Mean, SE | 41.006a ±4.620 | 59.183a ±17.711 | 29.212a ±1.888 |
| 60M NaCl, Mean, SE | 52.333a ±6.633 | 47.243a ±1.102 | 1377.439b ±140.612 |
| % (+/-) | (+27.621) | (-20.174) | (+4615.18) |
| 100M NaCl, Mean, SE | 56.29a ±9.336 | 101.873a ±46.849 | 27.042b ±3.124 |
| % (+/-) | (+37.27) | (+72.131) | (-7.429) |
| LSD0.05 | 24.674 | 100.09 | 281.554 |

Table 2……. (Contd)

Set-III 0.50 ppm Ascorbic acid applied through roots in soil

| Treatment | Relative water content | Electrolyte leakage | Leaf Water loss |
|-----------|------------------------|---------------------|----------------|
| Control, Mean, SE | 51.14a ±11.14 | 41.775a ±1.065 | 43.839a ±6.756 |
| 60M NaCl, Mean, SE | 68.16a ±13.517 | 22.53a ±1.506 | 33.191ab ±0.275 |
| % (+/-) | (+33.281) | (+46.069) | (-24.287) |
| 100M NaCl, Mean, SE | 53.55a ±17.372 | 44.323b ±5.958 | 1.628b ±1.631 |
| % (+/-) | (+4.712) | (-6.098) | (-38.178) |
| LSD0.05 | 49.29 | 12.462 | 13.897 |
Table 2 (Contd)

Table 2 (Contd)

Table 3. Effect of Ascorbic acid and different NaCl concentrations on shoot/root ratio of Solanum melongena.

Set-I= Without Ascorbic acid

| Treatment | Shoot Dry Wt (gms) | Root Dry Wt (gms) | Shoot/Root Ratio |
|-----------|--------------------|-------------------|-----------------|
| Control, Mean, SE | 2.64a ± 0.359 | 3.021a ± 0.42 | 7.254a ± 0.962 |
| 60mM NaCl, Mean, SE | 1.314a ± 0.574 | 2.142a ± 0.518 | 15.71a ± 10.271 |
| % (+/-) | (-50.227) | (-29.096) | (-116.57) |
| 100mM NaCl, Mean, SE | 0.134b ± 0.11 | 0.319b ± 0.173 | 8.172a ± 2.927 |
| % (+/-) | (-94.924) | (-89.44) | (-12.655) |
| LSD0.05 | 1.371 | 1.38 | 21.425 |
Table 3…….. (Contd)

**Set-II= 0.25ppm Ascorbic acid applied through roots in soil**

| Treatment | Shoot Dry Wt (gms) | Root Dry Wt (gms) | Shoot/Root Ratio |
|-----------|--------------------|-------------------|------------------|
| Control, Mean, SE | 1.074a ±0.435 | 1.276a ±0.327 | 50.579a ±47.272 |
| 60mM NaCl, Mean, SE | 0.910a ±0.230 | 1.137a ±0.231 | 4.020 ±0.996 |
| % (+/-) | (-15.27) | (-10.893) | (-92.052) |
| 100mM NaCl, Mean, SE | 0.285a ±0.245 | 0.298a ±0.245 | 22.820 ±19.67 |
| % (+/-) | (-73.463) | (-76.645) | (-54.882) |
| LSD0.05 | 1.099 | 0.964 | 102.314 |

Table 3…….. (Contd)

**Set-III= 0.50ppm Ascorbic acid applied through roots in soil**

| Treatment | Shoot Dry Wt (gms) | Root Dry Wt (gms) | Shoot/Root Ratio |
|-----------|--------------------|-------------------|------------------|
| Control, Mean, SE | 1.241a ±0.532 | 1.376a ±0.472 | 61.103 ±57.407 |
| 60mM NaCl, Mean, SE | 1.142a ±0.071 | 1.398a ±0.062 | 6.265 ±2.979 |
| % (+/-) | (-7.977) | (-1.598) | (-89.746) |
| 100mM NaCl, Mean, SE | 1.891a ±0.523 | 2.05a ±0.597 | 29.826 ±19.404 |
| % (+/-) | (-52.377) | (-48.982) | (-51.187) |
| LSD0.05 | 1.499 | 1.527 | 121.214 |

Table 3…….. (Contd)

**Set-IV= 0.25ppm Ascorbic acid applied as a foliar spray**

| Treatment | Shoot Dry Wt (gms) | Root Dry Wt (gms) | Shoot/Root Ratio |
|-----------|--------------------|-------------------|------------------|
| Control, Mean, SE | 2.435a ±0.527 | 3.278a ±0.759 | 15.549a ±6.696 |
| 60mM NaCl, Mean, SE | 0.717b ±0.213 | 0.915b ±0.262 | 309.149a±193.971 |
| % (+/-) | (-70.554) | (-72.086) | (+1888.224) |
| 100mM NaCl, Mean, SE | 0.12b ±0.07 | 0.158b ±0.106 | 0.661a ±0.381 |
| % (+/-) | (-95.071) | (-95.179) | (-95.748) |
| LSD0.05 | 1.186 | 1.619 | 387.766 |

Table 3…….. (Contd)

**Set-V= 0.50ppm Ascorbic acid applied as a foliar spray**

| Treatment | Shoot Dry Wt (gms) | Root Dry Wt (gms) | Shoot/Root Ratio |
|-----------|--------------------|-------------------|------------------|
| Control, Mean, SE | 1.722a ±0.608 | 2.029a ±0.747 | 8.19a ±4.125 |
| 60mM NaCl, Mean, SE | 0.342b ±0.042 | 0.395b ±0.029 | 7.427b ±2.09 |
| % (+/-) | (-80.139) | (-80.532) | (-9.316) |
| 100mM NaCl, Mean, SE | 0.265b ±0.006 | 0.276b ±0.007 | 23b ±0.059 |
| % (+/-) | (-84.61) | (-86.397) | (+180.83) |
| LSD0.05 | 1.219 | 1.493 | 9.241 |

Means followed by different letters in the same column differ significantly at 95% probability level according to New Duncan’s Multiple Range Test. Figures in parentheses indicate % promotion (+) and reduction (-) over control

**Root weight ratio**

Plants of set-I exhibited a slight increase in 100mM salt stress as juxtaposition with control. Set-II resulted in salt stress concentrations as juxtaposition with control. Set-III resulted increase at 60mM salt stress as juxtaposition with control. Set-IV resulted increase at 100mM salt stress as juxtaposition with control.
stress as juxtaposition with control. Set-V resulted decrease in saline media as juxtaposition with control. Juxtaposition of set-II and set-III, set-II resulted increase as juxtaposition with set-III. Juxtaposition of set-II and set-III with set-I, set-II resulted increase in both saline media and control and set-III exhibited reduction at 100mM salt stress as juxtaposition with set-I.

Juxtaposition between set-IV and set-V resulted prominent increased in 100mM salt stress as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted a prominent increase at100mM salt stress and set-V reduction in saline media as juxtaposition with set-I (Table 4).

Table 4. Effect of Ascorbic acid and different NaCl concentrations on root weight ratio of Solanum melongena.

Set-I= Without Ascorbic acid

| Treatment          | Total Root Dry Wt (gms) | Total Plant Dry Wt (gms) | Root Weight Ratio |
|--------------------|-------------------------|--------------------------|-------------------|
| Control, Mean, SE | 0.381a ±0.075           | 3.021a ±0.42             | 0.124a ±0.014     |
| 60mM NaCl, Mean, SE | 0.196ab ±0.055         | 2.142a ±0.518             | 0.112a ±0.043     |
| % (+/-)            | (-48.556)               | (-29.096)                | (-9.677)          |
| 100mM NaCl, Mean, SE | 0.075b ±0.72          | 0.319b ±0.173             | 0.155a ±0.072     |
| % (+/-)            | (-80.314)               | (-89.44)                 | (+25)             |
| LSD$_{0.05}$       | 0.225                   | 1.38                     | 0.171             |

Table 4……… (Contd)

Set-II= 0.25ppm Ascorbic acid applied through roots in soil

| Treatment          | Total Root Dry Wt (gms) | Total Plant Dry Wt (gms) | Root Weight Ratio |
|--------------------|-------------------------|--------------------------|-------------------|
| Control, Mean, SE | 0.201a ±0.109           | 1.276a ±0.327             | 0.248a ±0.178     |
| 60mM NaCl, Mean, SE | 0.226a ±0.006         | 1.137a ±0.231             | 0.214a ±0.04     |
| % (+/-)            | (+12.437)               | (-10.893)                | (-13.709)         |
| 100mM NaCl, Mean, SE | 0.0127a ±0.0002       | 0.298a ±0.245             | 0.213a ±0.132     |
| % (+/-)            | (-93.681)               | (-76.645)                | (-14.112)         |
| LSD$_{0.05}$       | 0.219                   | 0.964                    | 0.451             |

Table 4……… (Contd)

Set-III= 0.50ppm Ascorbic acid applied through roots in soil

| Treatment          | Total Root Dry Wt (gms) | Total Plant Dry Wt (gms) | Root Weight Ratio |
|--------------------|-------------------------|--------------------------|-------------------|
| Control, Mean, SE | 0.135a ±0.064           | 1.376a ±0.472             | 0.145a ±0.07     |
| 60mM NaCl, Mean, SE | 0.255a ±0.077         | 1.398a ±0.062             | 0.181a ±0.053     |
| % (+/-)            | (+88.888)               | (+1.598)                 | (+24.827)         |
| 100mM NaCl, Mean, SE | 0.158a ±0.073       | 2.05a ±0.597              | 0.063a ±0.024     |
| % (+/-)            | (+17.037)               | (+48.982)                | (-56.551)         |
| LSD$_{0.05}$       | 0.248                   | 1.527                    | 0.183             |
Table 4 (Contd)

Set-IV= 0.25ppm Ascorbic acid applied as a foliar spray

| Treatment                        | Total Root Dry Wt (gms) | Total Plant Dry Wt (gms) | Root Weight Ratio |
|----------------------------------|-------------------------|--------------------------|-------------------|
| Control, Mean, SE                | 0.197a ±0.049           | 3.278a ±0.759            | 0.074a ±0.034     |
| 60mM NaCl, Mean, SE              | 0.037a ±0.036           | 0.915b ±0.262            | 0.031a ±0.029     |
| % (+/-)                          | (-81.218)               | (-72.086)                | (-58.108)         |
| 100mM NaCl, Mean, SE             | 0.307a ±0.163           | 0.158b ±0.106            | 5.263a ±4.115     |
| % (+/-)                          | (+55.837)               | (-95.179)                | (+70.162)         |
| LSD0.05                          | 0.350                   | 1.619                    | 0.451             |

Table 4 (Contd)

Set-V= 0.50ppm Ascorbic acid applied as a foliar spray

| Treatment                        | Total Root Dry Wt (gms) | Total Plant Dry Wt (gms) | Root Weight Ratio |
|----------------------------------|-------------------------|--------------------------|-------------------|
| Control, Mean, SE                | 0.307a ±0.012           | 2.029a ±0.029            | 0.151a ±0.046     |
| 60mM NaCl, Mean, SE              | 0.053a ±0               | 0.395b ±0.007            | 0.141a ±0         |
| % (+/-)                          | (-82.736)               | (-80.532)                | (-6.622)          |
| 100mM NaCl, Mean, SE             | 0.011a                  | 0.276b                   | 0.041a            |
| % (+/-)                          | (-96.416)               | (-86.397)                | (-72.847)         |
| LSD0.05                          | 0.328                   | 1.493                    | 0.328             |

Means followed by different letters in the same column differ significantly at 95% probability level according to New Duncan’s Multiple Range Test. Figures in parentheses indicate % promotion (+) and reduction (-) over control.

**Stem weight ratio**

Plants of set-I and set-II results increase in saline media as juxtaposition with control. Set-III and set-V resulted decreased in saline media as juxtaposition with control. Set-IV resulted decrease in 60mM salt stress as juxtaposition with control. Juxtaposition of set-II and set-III resulted a slight increase in saline media as juxtaposition with set-III. Juxtaposition of set-II and set-III with set-I, Set-II resulted increase in 60mM salt stress and set-III in control as juxtaposition with set-I. Juxtaposition between set-IV and set-V resulted that Set-IV showed a slight reduction in 60mM salt stress as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, both of these sets resulted increase in 60mM salt stress and control as juxtaposition with set-I (Table 5).

**Table 5. Effect of Ascorbic acid and different NaCl concentrations on Stem weight ratio of Solanum melongena.**

**Set-I= Without Ascorbic acid**

| Treatment                        | Total stem dry Wt (gms) | Total plant dry Wt (gms) | Stem Weight Ratio |
|----------------------------------|-------------------------|--------------------------|-------------------|
| Control, Mean, SE                | 1.073a ±0.131           | 3.021a ±0.42             | 0.358a ±0.024     |
| 60mM NaCl, Mean, SE              | 1.044a ±0.258           | 2.142a ±0.518            | 0.486a ±0.008     |
| % (+/-)                          | (-2.702)                | (-29.096)                | (-35.754)         |
| 100mM NaCl, Mean, SE             | 0.232b ±0.11            | 0.319b ±0.173            | 0.781c ±0.051     |
| % (+/-)                          | (-78.378)               | (-89.44)                 | (-118.156)        |
| LSD0.05                          | 0.2                     | 1.38                     | 0.115             |
Table 5 (Contd)
Set-II= 0.25ppm Ascorbic acid applied through roots in soil

| Treatment                | Total stem dry Wt (gms) | Total plant dry Wt (gms) | Stem Weight Ratio |
|--------------------------|-------------------------|--------------------------|------------------|
| Control, Mean, SE        | 0.259a ±0.156           | 1.276a ±0.327            | 0.178a ±0.11     |
| 60mM NaCl, Mean, SE      | 0.656a ±0.227           | 1.137a ±0.231            | 0.55ab ±0.078    |
| % (+/-)                  | (-153.281)              | (-10.893)                | (-208.988)       |
| 100mM NaCl, Mean, SE     | 0.279a ±0.242           | 0.298a ±0.245            | 0.732b ±0.159    |
| % (+/-)                  | (-7.722)                | (-76.645)                | (-311.235)       |
| LSD0.05                  | 0.734                   | 0.964                    | 0.418            |

Table 5 (Contd)
Set-III= 0.50ppm Ascorbic acid applied through roots in soil

| Treatment                | Total stem dry Wt (gms) | Total plant dry Wt (gms) | Stem Weight Ratio |
|--------------------------|-------------------------|--------------------------|------------------|
| Control, Mean, SE        | 0.516a ±0.148           | 1.376a ±0.472            | 0.409a ±0.118    |
| 60mM NaCl, Mean, SE      | 0.537a ±0.052           | 1.398a ±0.062            | 0.386a ±0.044    |
| % (+/-)                  | (+4.069)                | (+1.598)                 | (-5.623)         |
| 100mM NaCl, Mean, SE     | 0.841a ±0.314           | 2.05a ±0.597             | 0.374a ±0.0626   |
| % (+/-)                  | (+62.984)               | (+48.982)                | (-8.557)         |
| LSD0.05                  | 0.702                   | 1.527                    | 0.282            |

Table 5 (Contd)
Set-IV= 0.25ppm Ascorbic acid applied as a foliar spray

| Treatment                | Total stem dry Wt (gms) | Total plant dry Wt (gms) | Stem Weight Ratio |
|--------------------------|-------------------------|--------------------------|------------------|
| Control, Mean, SE        | 1.6 ±0.452              | 3.278a ±0.759            | 0.484a ±0.047    |
| 60mM NaCl, Mean, SE      | 0.465b ±0.155           | 0.915b ±0.262            | 0.546ab ±0.122   |
| % (+/-)                  | (-70.9375)              | (-72.086)                | (+12.809)        |
| 100mM NaCl, Mean, SE     | 0.049b ±0.038           | 0.158b ±0.106            | 0.258b ±0.04     |
| % (+/-)                  | (-96.9375)              | (-95.179)                | (-46.694)        |
| LSD0.05                  | 0.958                   | 1.619                    | 0.274            |

Table 5 (Contd)
Set-V= 0.50 ppm Ascorbic acid applied as a foliar spray

| Treatment                | Total stem dry Wt (gms) | Total plant dry Wt (gms) | Stem Weight Ratio |
|--------------------------|-------------------------|--------------------------|------------------|
| Control, Mean, SE        | 1.391a ±0.67            | 2.029a ±0.747            | 0.601a ±0.147    |
| 60mM NaCl, Mean, SE      | 0.197a ±0.021           | 0.395b ±0.029            | 0.514a ±0.101    |
| % (+/-)                  | (-85.837)               | (-80.532)                | (-14.475)        |
| 100mM NaCl, Mean, SE     | 0.131a ±0.003           | 0.276b ±0.007            | 0.476a ±0         |
| % (+/-)                  | (-90.582)               | (-86.397)                | (-20.798)        |
| LSD0.05                  | 1.341                   | 1.493                    | 0.357            |

Means followed by different letters in the same column differ significantly at 95% probability level according to New Duncan’s Multiple Range Test. Figures in parentheses indicate % promotion (+) and reduction (-) over control.
Leaf weight ratio

Plants of set-I and set-II results decrease in saline media as juxtaposition with control. Set-III and set-IV exhibited increase in 100mM salt stress as juxtaposition with control. Set-V resulted increase in saline media as juxtaposition with control. Juxtaposition of set-II and set-III, set-II resulted increase in control as juxtaposition with set-III. Comparison of set-II and set-III with set-I, Set-II resulted increase in control and set-III exhibited increase in saline media as juxtaposition with set-I. Juxtaposition between set-IV and set-V resulted that Set-V showed increase in 60mM salt stress as juxtaposition with set-IV. Juxtaposition of set-IV and set-V with set-I, both of these sets resulted increase in 100mM salt stress and control juxtaposition with set-I (Table 6).

Table 6. Effects of Ascorbic acid and different NaCl concentrations on leaf weight ratio of Solanum melongena.

Set-I= Without Ascorbic acid

| Treatment | Total leaves dry Wt (gms) | Total plant dry Wt (gms) | Leaf Weight Ratio |
|-----------|--------------------------|--------------------------|------------------|
| Control, Mean, SE | 1.566a ±0.268 | 3.021a ±0.42 | 0.517a ±0.035 |
| 60mM NaCl, Mean, SE | 0.901a ±0.316 | 2.142a ±0.518 | 0.4a ±0.042 |
| % (+/-) | -42.464 | -29.096 | -22.630 |
| 100mM NaCl, Mean, SE | 0.012b ±0 | 0.319b ±0.173 | 0.062b ±0.021 |
| % (+/-) | -99.233 | -89.440 | -88.007 |
| LSD0.05 | 0.829 | 1.38 | 0.119 |

Table 6…….. (Contd)

Set-II= 0.25ppm Ascorbic acid applied through roots in soil

| Treatment | Total leaves dry Wt (gms) | Total plant dry Wt (gms) | Leaf Weight Ratio |
|-----------|--------------------------|--------------------------|------------------|
| Control, Mean, SE | 0.8147a ±0.38 | 1.276a ±0.327 | 1.277a ± 0.150 |
| 60mM NaCl, Mean, SE | 0.253ab ±0.054 | 1.137a ±0.231 | 0.235b ±0.060 |
| % (+/-) | -68.945 | -10.893 | -81.597 |
| 100mM NaCl, Mean, SE | 0.006b ±0.003 | 0.298a ±0.245 | 0.053b ±0.027 |
| % (+/-) | -99.263 | -76.645 | -95.849 |
| LSD0.05 | 0.769 | 0.964 | 0.329 |

Table 6…….. (Contd)

Set-III= 0.50ppm Ascorbic acid applied through roots in soil

| Treatment | Total leaves dry Wt (gms) | Total plant dry Wt (gms) | Leaf Weight Ratio |
|-----------|--------------------------|--------------------------|------------------|
| Control, Mean, SE | 0.725a ±0.42 | 1.376a ±0.472 | 0.445a ±0.148 |
| 60mM NaCl, Mean, SE | 0.604a ±0.034 | 1.398a ±0.062 | 0.432a ±0.011 |
| % (+/-) | (-16.689) | (+1.598) | (-2.921) |
| 100mM NaCl, Mean, SE | 1.05a ±0.209 | 2.05a ±0.597 | 0.562a ±0.087 |
| % (+/-) | (+44.827) | (-48.982) | (+26.292) |
| LSD0.05 | 0.941 | 1.527 | 0.297 |
Table 6 …… (Contd)

**Set-IV= 0.25 ppm Ascorbic acid applied as a foliar spray**

| Treatment                  | Total leaves dry Wt (gms) | Total plant dry Wt (gms) | Leaf Weight Ratio |
|----------------------------|---------------------------|--------------------------|------------------|
| Control, Mean, SE          | 0.831a ±0.217             | 3.278a ±0.759            | 0.266a ±0.051    |
| 60mM NaCl, Mean, SE        | 0.252b ±0.149             | 0.915b ±0.262            | 0.229ab ±0.128   |
| % (+/-)                    | (-69.675)                 | (-72.086)                | (-13.909)        |
| 100mM NaCl, Mean, SE       | 0.071b ±0.032             | 0.158b ±0.106            | 0.625b ±0.131    |
| % (+/-)                    | (-91.456)                 | (-95.179)                | (+134.962)       |
| LSD0.05                    | 0.533                     | 1.619                    | 0.381            |

Means followed by different letters in the same column differ significantly at 95% probability level according to New Duncan’s Multiple Range Test. Figures in parentheses indicate % promotion (+) and reduction (-) over control.

**Specific leaf area ratio**

Plants of set-I and set-II results increase in 100mM salt stress as juxtaposition with control. Set-III resulted increase in control as juxtaposition with saline media. Set-IV resulted prominent reduction in control as juxtaposition with saline media. Set-V resulted increase in 60mM salt stress as juxtaposition with control. Juxtaposition of set-II and set-III, set-II resulted increase in saline media as juxtaposition with set-III. Comparison of set-II and set-III with set-I, Set-II resulted increase in both salinity treatments and control while set-III exhibited decrease in 100mM salt stress as juxtaposition with set-I. Juxtaposition between set-IV and set-V resulted that Set-IV resulted increase in 100mM salt stress as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, both sets resulted increase in control and 60mM salt stress juxtaposition with set-I (Table 7).

Table 7. Effect of Ascorbic acid and different NaCl concentrations on leaf area ratio of *Solanum melongena*.

**Set-I= Without Ascorbic acid**

| Treatment                  | Leaf Area (mm2)     | Total plant dry Wt (gms) | Leaf Area Ratio |
|----------------------------|--------------------|--------------------------|----------------|
| Control, Mean, SE          | 76.84a ±40.535     | 1.566a ±0.268            | 46.216a ±22.694|
| 60mM NaCl, Mean, SE        | 76.442a ±14.062    | 0.901a ±0.316            | 134.204b ±29.299|
| % (+/-)                    | (-0.517)           | (-42.464)                | (-190.384)        |
| 100mM NaCl, Mean, SE       | 23.881a ±11.134    | 0.012b ±0               | 276.561b ±819.04 |
| % (+/-)                    | (-68.921)          | (-99.233)                | (-589.481)       |
| LSD0.05                    | 88.56              | 0.829                    | 163.03           |
Table 7 ……..(contd)

**Set-II= 0.25 ppm Ascorbic acid applied through roots in soil**

| Treatment            | Leaf Area (mm²) | Total plant dry Wt (gms) | Leaf Area Ratio |
|----------------------|-----------------|--------------------------|-----------------|
| Control, Mean, SE    | 85.669 ±12.234  | 0.8147 ±0.38             | 173.546 ±91.862 |
| 60mM NaCl, Mean, SE  | 149.675 ±37.748 | 0.253ab ±0.054           | 700.95b ±261.396 |
| % (+/-) (-74.713)    |                 | (-68.945)                | (+303.898)      |
| 100mM NaCl, Mean, SE | 38.44b ±17.229  | 0.006b ±0.003            | 658.717b ±572.763 |
| % (+/-) (-55.129)    |                 | (-99.263)                | (+369.372)      |
| LSD0.05              | 86.43           | 0.769                    | 127.18          |

Table 7 ……..(contd)

**Set-III= 0.50 ppm Ascorbic acid applied through roots in soil**

| Treatment            | Leaf Area (mm²) | Total plant dry Wt (gms) | Leaf Area Ratio |
|----------------------|-----------------|--------------------------|-----------------|
| Control, Mean, SE    | 68.981 ±22.263  | 0.725a ±0.42             | 187.787a ±112.687 |
| 60mM NaCl, Mean, SE  | 82.238 ±10.212  | 0.604a ±0.034            | 137.260a ±20.543 |
| % (+/-) (+19.218)    |                 | (-16.689)                | (-26.906)       |
| 100mM NaCl, Mean, SE | 60.344a ±30.22  | 1.05a ±0.21              | 47.98a ±23.965  |
| % (+/-) (-12.52)     |                 | (+44.827)                | (-74.45)        |
| LSD0.05              | 77.717          | 0.941                    | 233.805         |

Table 7 ……..(contd)

**Set-IV= 0.25 ppm Ascorbic acid applied as a foliar spray**

| Treatment            | Leaf Area (mm²) | Total plant dry Wt (gms) | Leaf Area Ratio |
|----------------------|-----------------|--------------------------|-----------------|
| Control, Mean, SE    | 122.999a ±37.023| 0.831a ±0.217            | 144.693a ±4.906 |
| 60mM NaCl, Mean, SE  | 57.197a ±28.65  | 0.252b ±0.149            | 1487.466a ±139.11 |
| % (+/-) (-53.497)    |                 | (-69.675)                | (+928.015)      |
| 100mM NaCl, Mean, SE | 48.298a ±5.193  | 0.071b ±0.032            | 1016.960a ±371.27 |
| % (+/-) (-60.733)    |                 | (-91.456)                | (+602.839)      |
| LSD0.05              | 94.098          | 0.533                    | 2878.557        |

Table 7 ……..(contd)

**Set-V= 0.50 ppm Ascorbic acid applied as a foliar spray**

| Treatment            | Leaf Area (mm²) | Total plant dry Wt (gms) | Leaf Area Ratio |
|----------------------|-----------------|--------------------------|-----------------|
| Control, Mean, SE    | 76.441a ±15.902 | 0.33a ±0.062             | 228.998a ±13.44 |
| 60mM NaCl, Mean, SE  | 79.088a ±2.349  | 0.144b ±0.064            | 1792.209a ±1402.785 |
| % (+/-) (+3.462)     |                 | (-56.363)                | (+682.63)       |
| 100mM NaCl, Mean, SE | 50.717a ±5.772  | 0.133b ±0.003            | 378.318a ±34.351 |
| % (+/-) (-33.652)    |                 | (-59.696)                | (-65.205)       |
| LSD0.05              | 34.124          | 1.799                    | 280.474         |

Means followed by different letters in the same column differ significantly at 95% probability level according to New Duncan’s Multiple Range Test. Figures in parentheses indicate % promotion (+) and reduction (-) over control

**Leaf area ratio**

Plants of set-I and set-V resulted prominent increase in 100mM salt stress as juxtaposition with control. Set-II resulted decrease in control as juxtaposition with salt stress. Set-III resulted prominent increase in control as juxtaposition with salt stress. Set-IV resulted prominent increase
in 60mM salt stress as juxtaposition with control. Juxtaposition of set-II and set-III, set-II resulted in control as well as in saline media as juxtaposition with set-III. Juxtaposition of set-II and set-III with set-I, Set-II resulted reduction in 60mM salt stress, while set-III resulted increase in control as juxtaposition with set-I. Juxtaposition between set-IV and set-V resulted that Set-IV resulted increase in control and in 60mM salt stress as juxtaposition with set-V. Juxtaposition of set-IV and set-V with set-I, Set-IV resulted increase in control and in 60mM salt stress and set-V showed increase both in control and salinity treated plants as juxtaposition with set-I (Table 8).

**Table 8. Effect of Ascorbic acid and different NaCl concentrations on specific leaf area of Solanum melongena.**

**Set-I= Without Ascorbic acid**

| Treatment                  | Leaf Area (mm²) | Total leaf dry Wt (gms) | Specific Leaf Area |
|----------------------------|----------------|-------------------------|--------------------|
| Control, Mean, SE          | 76.84a ±40.535 | 3.021a ±0.42            | 231.947a ±116.921  |
| 60mM NaCl, Mean, SE        | 76.442a ±14.062| 2.142a ±0.518           | 728.255a ±351.33   |
| % (+/-)                    | -0.518         | -29.096                 | 213.975            |
| 100M NaCl, Mean, SE        | 23.881a ±11.134| 0.319b ±0.173           | 1416.216a ±565.7   |
| % (+/-)                    | -68.921        | -89.441                 | 510.577            |
| LSD₀₀₅                     | 88.56          | 1.38                    | 135.79             |

**Set-II= 0.25 ppm Ascorbic acid applied through roots in soil**

| Treatment                  | Leaf Area (mm²) | Total leaf dry Wt (gms) | Specific Leaf Area |
|----------------------------|----------------|-------------------------|--------------------|
| Control, Mean, SE          | 85.669a ±12.234| 1.276a ±0.327           | 3064.291a ±279.801 |
| 60M NaCl, Mean, SE         | 149.675ab ±37.748| 1.137a ±0.231           | 652.927b ±152.998  |
| % (+/-)                    | 74.713         | -10.893                 | -78.692            |
| 100M NaCl, Mean, SE        | 38.44b ±17.229 | 0.298a ±0.245           | 3047.449b ±139.215 |
| % (+/-)                    | -55.130        | -76.646                 | -0.550             |
| LSD₀₀₅                     | 86.43          | 0.964                   | 127.18             |

**Set-III=0.50 ppm Ascorbic acid applied through roots in soil**

| Treatment                  | Leaf Area (mm²) | Total leaf dry Wt (gms) | Specific Leaf Area |
|----------------------------|----------------|-------------------------|--------------------|
| Control, Mean, SE          | 68.981a ±22.263| 1.376a ±0.472           | 3031.187a ±277.658 |
| 60M NaCl, Mean, SE         | 82.238a ±10.212| 1.398a ±0.062           | 389.377a ±112.151  |
| % (+/-)                    | (+19.218)      | (+1.598)                | (-87.154)          |
| 100M NaCl, Mean, SE        | 60.344a ±30.219| 2.05a ±0.597            | 265.765a ±124.87   |
| % (+/-)                    | (-12.520)      | (+48.982)               | (-91.232)          |
| LSD₀₀₅                     | 77.717         | 1.527                   | 233.805            |

**Set-IV=0.25 ppm Ascorbic acid applied as a foliar spray**

| Treatment                  | Leaf Area (mm²) | Total leaf dry Wt (gms) | Specific Leaf Area |
|----------------------------|----------------|-------------------------|--------------------|
| Control, Mean, SE          | 122.999a ±37.023| 3.278a ±0.759           | 889.056a ±534.48   |
| 60M NaCl, Mean, SE         | 57.197a ±28.644| 0.915b ±0.262           | 45081.317a ±297.78  |
| % (+/-)                    | (-53.497)      | (-72.086)               | (+4970.694)        |
| 100M NaCl, Mean, SE        | 48.298a ±5.193 | 0.158b ±0.106           | 277.699a ±140.81   |
| % (+/-)                    | (-60.733)      | (-95.119)               | (-68.764)          |
| LSD₀₀₅                     | 94.098         | 1.619                   | 287.56             |
Table 8……..(contd)

| Treatment | Leaf Area (mm2) | Total leaf dry Wt (gms) | Specific Leaf Area |
|-----------|-----------------|-------------------------|-------------------|
| Control, Mean, SE | 76.441a ±15.902 | 2.029a ±0.747 | 485.92a ±235.38 |
| 60mM NaCl, Mean, SE | 79.088a ±2.349 | 0.395b ±0.029 | 1656.158a ±358.634 |
| % (+/-) | (+3.462) | (-80.532) | (+240.829) |
| 100mM NaCl, Mean, SE | 50.717a ±5.772 | 0.276b ±0.007 | 4378.633a ±408.992 |
| % (+/-) | (-33.652) | (-86.397) | -801.101 |
| LSD_{0.05} | 34.124 | 1.493 | 280.48 |

Means followed by different letters in the same column differ significantly at 95% probability level according to New Duncan’s Multiple Range Test. Figures in parentheses indicate % promotion (+) and reduction (-) over control.

Conclusion
Salinity has negative effects on plant growth and development which were significantly improved by exogenous and foliar spray applications of ascorbic acid. Ascorbic acid overcomes the destructive effects of salinity and its applications by either way viz. foliar spray and applied through roots in soil mostly led to increase the plant morphological, physiological and biochemical parameters and plants yield. However, the application of ascorbic acid applied in soil was more effective than application through as a foliar spray. This study justifies further work on Solanum melongena plant under a broader range of field conditions to evaluate the possibility of using ascorbic acid for improving their growth.

Authors’ contributions
Conceived, designed and performed the experiments: M Irfan, Analysed the data: Nabeela, Contributed materials, analysis, tools: M Ilyas, Wrote the manuscript: KU Rahman.

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