

Effects of ammonium sulphate on the growth and yield of different tomato (*Lycopersicon esculentum*) plant in the city jahrom

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ABSTRACT: To study the effects of ammonium sulphate on the growth and yield of tomato, an experiment was conducted in a completely randomized design with three replications. Ammonium sulfate at levels of 50, 100, 150 and 200 mg per kg of soil was used. Factors examined included: number of flowers and fruit yield, vitamin C, total acid, plant height, days to flowering, plant dry weight and chlorophyll index. Results indicated that the use of ammonium sulfate fertilizer more impact on the growth of tomato plants had increased so much weight, total acid, vitamin C and 150 to 200 nitrogen fertilizer levels were lowered desired Factors.

Keywords: tomato, ammonium sulfate, yield.

INTRODUCTION

Ammonium sulfate as a nitrogen fertilizer

If we combine ammonia with sulfuric acid, ammonium sulfate fertilizer is produced from the best fertilizer for alkaline and calcareous soil conditions are. Cody is a very good and suitable for acid soils of Iran. As mentioned Ammonium sulfate of ammonia and sulfuric acid is obtained, but the fertilizer by-product coking industry also. Asydz Ammonium sulfate is added to the soil when the soil pH is acidic (Ejraei, 2007). The best fertilizer nitrogen as fertilizer for alkaline soils, and Iran is known as the Asydz lime and sulfur, which is also an element of your food. Because nitrogen fertilizer, Ammonium is then placed into the lower levels of soil exchangeable soil particles are washed. Ammonium sulfate is approximately 21% nitrogen and 24% sulfur and nitrogen unit price of nitrogen fertilizers is one of the most expensive. However, the benefits are due to the substantial amount of it is consumed. A small amount of ammonium sulfate is produced as a byproduct of the steel industry and the lack of it comes out (Malakoti, 2008). Excellent flowering tomato plants, order of a split, the family is *Lycopersicon Solonaceae* and sex. Tomatoes (in Farsi Afghan Eggplant Roman) is the scientific name *Lycopersicon esculentum* and juicy red fruit. This plant is native to Central and South America during the Spanish colonial period, was transferred to the rest of the world (Khoshkhoy *et al*, 1989). Different types of plants are grown in the world today. Tomatoes are rich in vitamin C and lycopene. The fruit is now various ways, either as a raw material for the preparation of food, sauces and beverages consumed and an important part of the diet of people in many countries to form. According to FAO statistics, in 2011, Iran ranked fifth in production, cultivation ranked sixth in the standings in the yield per hectare is the thirty-eighth category. Ranking in acreage, China, India, Turkey, Nigeria, Egypt, Iran, Cameroon, United States of America, Russia and Italy, respectively, to the first category, I have to (FAO, 2011). Ramynal *et al* (1995) Soil and Water Engineering Group at the University of the Punjab, India, the effect of irrigation and fertilizer - irrigation on yield of greenhouse tomatoes, the 0.5Epa found that drip irrigation with fertilizer - irrigation with 100% nitrogen is recommended Leading to increased fruit yield of 5/59% over control in greenhouses And 2/116 percent control over the outside of the greenhouse and drip irrigation in greenhouse crops in addition to significantly improve the quality characteristics of the tomato. Akhtari *et al* (2012) Effect of Nitrogen Fertilizer on the quantity and quality of radish plants and found increased levels of nitrogen significantly increased tuber yield so that up to 250 kg N ha increased tuber yield, but the treatments were 375 kg ha yield loss. Babai *et al* (2010) in the management of Egyptian broomrape in tomato

using nitrogen fertilizers , urea , ammonium nitrate and ammonium phosphate and 300 kg ha each in quantities of 150 and ammonium sulfate at doses of 250 and 500 kg ha treatment and found that the treatments were applied as ammonium sulfate, ammonium phosphate , 250 and 150 kg ha had the best performance tomato and Orobanche control were not significantly different . Maximum shoot and root dry weight of ammonium phosphate and urea at 150 and 250 kg ha ammonium sulphate and ammonium nitrate lowest root dry weight was 150 and 300 kg per hectare . Ammonium sulfate 250 kg ha significant impact on reducing Orobanche attachment and growth as well as improved yield and tomato compared to the control of broomrape.

MATERIALS AND METHODS

JAHROM city of Fasa city north of the city Firoozabad West and South-East of the city of Darab, Shiraz city from the northwest to the southeast of the city of Lar is limited. City jahrom at longitude 53 degrees 33 minutes latitude 28 degrees 30 minutes and has a height of 1050 meters above sea level. These experiments were jahrom in the city. In this study, the effect of ammonium sulfate on the growth and flowering time Kljy tomato varieties were studied in a calcareous soil. To do this, first select the 60 pot and poured into a 5 kg of soil Pour the tomatoes were planted two seeds in each pot. Then treated with the desired levels of zero, 50, 100, 150 and 200 mg N per kg of soil from each of ammonium sulfate was added to each pot individually. In addition to providing 80 mg of potassium, phosphorus, potassium and phosphate and triple super phosphate and potassium sulphate per kg of soil were added to the pot equally. After four leaf emergence and the strongest seedling in each pot was removed and the other left. The amount and duration of irrigation water during the growing season, so The water is not removed from the pots and soil moisture at field capacity was.

Statistical calculations

This research in a completely randomized design with 15 treatments and 3 replications. Treatments consisted of 50, 100, 150 and 200 mg per kg of soil nitrogen, a nitrogen fertilizer (14 treatments) and a control treatment. Statistical analysis using software MSTATC and comparison using Duncan's new multiple range test was performed at 1%.

RESULTS AND DISCUSSION

Results

Number flower

Table 1-1 Results indicate that the highest number of goals in the treatment of 100 mg of N-(6/14 goals) has been a significant increase compared to the control. The least number of goals in the control and 200 mg N (0/5 score, respectively). Ammonium sulfate increases from zero to 100, leading to an increase in the number of goals scored, but was significantly decreased from 100 to 200.

Number fruit

The results in Table 1.1, it comes with the most fruit in the treatment of 150 mg of N-(3/3 fruit) and the lowest levels in the treatment of 200 mg N (0/1 fruit), respectively. Ammonium sulfate increases from zero to 150, leading to an increase in the number of fruit, but the fruit was reduced from 150 to 200. In this regard, a significant difference between the different levels together with ammonium sulfate were observed.

Plant Yield

As can be seen from Table 1-1 Maximum yield 150 mg of N in this treatment (9/252 g), which is a significant increase compared to control. The lowest yield 200 mg of nitrogen in ammonium sulfate (5/89 mg), which was significantly lower than the level of ammonium sulfate is 150. Ammonium sulfate increases from zero to 150 led to a significant increase in yield. This increase was significant from 50 to 100. Yield decreased from 150 to 200.

Vitamin C

As can be seen from Table 1-1, the highest level of vitamin C in 150 and 200 (respectively 23/47 and 87/49 mg), and the lowest levels (23/39 mg) was obtained . Ammonium sulfate levels of vitamin C was increased from zero to 200. This increase was significant from 50 to 100. Also, no significant difference was observed between 150 and 200.

Chlorophyll Index

As can be seen from Table 1-1, the maximum chlorophyll index, 150 (3/53) and the lowest levels (control) and 50 ammonium sulfate (respectively 5/33 and 6/35) were . Ammonium sulfate increases chlorophyll index was increased from zero to 150. The increase from zero to 50 and from 100 to 150 was not significant. From 150 to 200, chlorophyll index was significantly decreased.

Percent increase in plant height in the first stage after fertilization

The results in Table 1-1 showed the greatest percentage increase in plant height in the first stage after fertilization at 50 and 200 mg N in these treatments (respectively 9/198 and 7/191%) and the lowest 150 levels of sulfate Ammonium (5/94%) were obtained. Ammonium sulfate increases from zero to 50 percent, resulting in a significant increase in plant height was increased from 50 to 150, but was significantly decreased. This trend was significant reduction from 150 to 200.

Percent increase in plant height in the second stage after fertilization

As can be inferred from the results in Table 1-1, the second highest percentage increase in plant height of 200 mg of N fertilization in the treatment (1/526%), respectively that the increase in mean and other surfaces Ammonium there was. It also had the lowest level of nitrogen in the treatment of 150 mg (8/252 percent) was significantly lower than the level of ammonium sulfate is 100. Ammonium sulfate increases from zero to 100 percent increase in plant height was significantly increased, but decreased from 100 to 150. This process significantly increases the level of 150 to 200.

Total acid

As can be seen from Table 1-1, the highest level of acid in the treatment of 200 mg N (046/1 mg) than the control and other levels of ammonium sulfate that showed significant increase. The least amount of acid levels in the control (165/0 mg) was significantly lower than the level of ammonium sulfate is 200. Increasing ammonium sulfate concentration from zero to 200 led to a significant increase in total acid.

Plant fresh weight

Table 1-1 can be inferred from the results that the maximum weight of 150 mg N plant this treatment (60/164 g) than the controls and had significantly increased levels of ammonium sulfate. It also weighs less than zero and 50 per ammonium sulfate (respectively 75/60 and 78/57 mg), which was significantly lower than the ammonium sulfate level is 150. Increasing concentrations of ammonium sulfate from 50 to 150 led to a significant increase in plant fresh weight. It was a non-significant trend of decreasing concentration from zero to 50. Significant reduction in plant fresh weight increased from 150 to 200 ammonium sulfate concentration was evident.

Plant dry weight

As can be seen from Table 4-8 Maximum dry weight of 150 mg of N in these treatments (17/56 g) than the control and other levels of ammonium sulfate have been increased significantly. The lowest level of 50 mg dry weight of nitrogen in the treated (14/19 mg), which had significantly lower levels of ammonium sulfate is 150. Increasing concentrations of ammonium sulfate plant dry weight was increased from 50 to 150. This increase was significant at concentrations of 50 to 100. Plant dry weight decreased with increasing ammonium sulfate concentration from 150 to 200, was clear.

Table 1. Comparison of different levels of ammonium sulfate on the traits

Ammonium sulfate levels	Control	AS 50	AS 100	AS 150	AS 200
Traits					
Number flower	5/0c	12/2ab	14/6a	9/0b	5/0c
Number fruit	2/0a	3/0a	3/0a	3/3a	1/0a
Yield per plant (g)	114/2c	163/6b	178/6b	252/9a	89/5d
Vitamin C (mg)	39/23b	39/60b	39/60b	47/23a	49/87a
Chlorophyll Index	33/5c	35/6c	49/7a	53/3a	46/9b
Of height 1	146/1b	198/9a	127/2b	94/5c	191/7a
Of height 2	337/8d	405/6b	373/6c	252/8e	526/1a
Total acid (mg)	0/165e	0/431d	0/554c	0/738b	1/046a
Plant fresh weight (g)	60/75c	57/78c	85/83b	164/60a	86/60b
Plant dry weight (g)	20/10b	19/14b	28/43b	56/17a	29/60b

*Means in each column having the same letter, have not significant difference ($P \leq 0.01$) according to DMRT.
AS: Ammonium sulfate

Discussion

Use of nitrogen fertilizer in the form of ammonium sulfate in tomato plants, a significant positive results in studies of many domestic and foreign scholars and researchers has shown. This research is not exempt from the Act and this part of the discussion about the results and conclusions of the study explains.

Number flower

As already mentioned in the discussion of the different levels of ammonium sulfate had a significant effect on the number of goals that increasing the amount of ammonium sulfate increased the number of flowers But at higher levels of 100 mg N shoots declined. It indicates that the increasing use of nitrogen fertilizer to form ammonium sulfate plant reproductive growth is reduced and this results achieved by Mousavi *et al*, (2002) is consistent.

Number fruit

With increasing levels of ammonium nitrogen in fruit number increased but this increase was not significant. Most of the fruit used in the lowest level of 150 mg N and 200 mg ammonium sulfate was observed. With the increasing use of nitrogen fertilizer in the form of sulfate and reproductive growth of the plant is reduced, leading to a reduction in the number of fruit. The results obtained by the Manavifard *et al* (2010) is consistent.

Pelant yeild

With increasing levels of ammonium nitrogen increased the yield increase was significant. Increased from 50 to 150 at all levels of sulfate fertilizer to increase yield, but the yield decreased from 150 to 200. Considering the factor of 100 to yield increased levels of sulfate reducing yield such results can be provided The excessive use of nitrogen fertilizer, ammonium sulfate to form a negative impact on plant reproductive growth and yield of the leaves was negative and that the results obtained by Delshad *et al* (2000) and Babai *et al* (2010) is consistent.

Vitamin C

Ammonium sulfate resulted in increased levels of vitamin C And this confirms that the problem of ammonium sulfate fertilizer to increase the level of vitamin C in the tomato plant are effective. This is the result obtained by Heravi *et al* (2005) is consistent.

Chlorophyll Index

In this regard, ammonium sulfate, only 50 were not significantly different from controls. Increased levels of ammonium sulfate increased from 50 to 150 in the chlorophyll index, this indicates that the ammonium form of nitrogen fertilizer on tomato plant growth and GREENS are effective in increasing levels of ammonium sulfate chlorophyll increases. The results obtained by the pyvast *et al* (2007) is consistent.

Percent increase in plant height in the first stage after fertilization

Based on the results presented in the previous discussion, 100 ammonium sulfate treatment was significantly different from controls and from this it can be concluded that these Ammonium sulphate fertilizer increases plant height and vegetative tomato plant, which will have positive effects with results obtained by this pyvast *et al* (2007) is consistent.

Percent increase in plant height in the second stage after fertilization

In this regard, all treatments were significantly different from control. Increasing the ammonium sulfate concentration decreased from 50 to 150 percent increase in plant height at this point. The use of ammonium sulfate from 50 to 150 percent reduction in plant height was increased from 150 to 200. This indicates that the ammonium sulfate fertilizer on tomato plant growth are not effective with results obtained by the pyvast *et al* (2007) is consistent.

Total acid

As already noted in the discussion of all treatments were significantly different from controls. Increased levels of acid was increased at all levels of ammonium sulfate can be therefore concluded that these Different levels of fertilizer ammonium sulfate are effective in increasing the acidity of the ammonium form of nitrogen fertilizer increased the total acidity increases. The results with the results obtained by Delshad *et al* (2000) do not match.

Plant fresh weight

As mentioned earlier in the thread, significantly different from the control treatment, ammonium sulfate, 50. Increased from 50 to 150 at all levels will lead to increased plant fresh weight, plant fresh weight was reduced to 200 from 150, but it also indicates that it is The use of nitrogen fertilizer in the form of ammonium sulfate up to 150 mg per kg of soil, the growth of tomato plants are And increase the fresh weight of tomato plants that provide it with the results of Babai *et al* (2010) is consistent.

Plant dry weight

Dry weight of plants treated with ammonium sulfate 150 was significantly different from controls. Increased from 50 to 150 at all levels, resulting in increased plant dry weight, plant dry weight, but decreased from 150 to 200 From these results it can be concluded that the ammonium form of nitrogen fertilizer up to 150 mg per kg of dry weight of tomato plants are Provide vegetative growth of tomato plants. The results obtained by Babai *et al* (2010) is consistent.

The results we conclude that the form of ammonium nitrogen fertilizer on growth has a greater impact than reproductive growth rate increased from 150 mg to 200 Navtlvby effects on growth and yield of tomato can be.

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