

Effect of different soil pHs and potassium concentrations on quantitative and qualitative characteristics of Tomato fruit (*Lycopersicon esculentum* c.v Calji)

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ABSTRACT: Effects of soil pH on adsorption include pH of 6.7 and 8 Nsrptasym on growth and yield of tomato plants scientific name *Lycopersicon esculentum* L. Khaki culture were evaluated. The experimental design was completely randomized with three replications. Nsrptasym at three levels, 40 and 80 mg per kg of soil was used. Potassium nitrate was used as. To provide 200 mg of urea nitrogen was applied evenly to the plants. Factors measured include: Number of flowers, number of fruits per plant fresh weight, total acid, Miran TSS, vitamin C, and the number of days taken to flowering plants is chlorophyll. Experimental results showed that the highest number of goals in potassium levels was observed at pH 6 and at pH 8 and the lowest score was observed in the levels of potassium. The maximum number of levels in fruit pH 6 and 40 milligrams of potassium per kg of soil was And the lowest number of fruit pH 8 at 40 mg per kg of soil potassium was observed. Chlorophyll maximum at pH 8 at 40 milligrams of potassium per kilogram of soil was Syzyh at the lowest pH 6 at 40 mg per kg of soil potassium was observed.

Keywords: Soil pH, potassium, Tomato

INTRODUCTION

Tomato plants with perfect flowers, the dicot order, the family Solonaceae, Lyopersicon is made. Tomatoes (in Persian: Eggplant Roman) (Scientific name: *Solanum lycopersicum*) fruits red and juicy. This plant is native to Central and South America during the Spanish colonial period were transferred to other parts of the world (pyvast, 2006). Different types of plants are grown in the world today. Tomatoes are rich in vitamin C and lycopen. (pyvast, 2006) Tomatoes are rich in vitamins A, B and C, and contains iron, phosphorus and boron minerals are particularly abundant. Potassium is another mineral essential elements needed by the plants that most soils except sandy soil potassium reserves ratio as a whole. Most plants absorb large amounts of potassium and potassium uptake by plants is higher than other nutrients except nitrogen. Desirable when the leaves are about 2% of the value of 5/1 percent less likely to develop symptoms into strips at the edges and margins of the leaves are purple. Potassium activates enzymes are also involved in protein synthesis Dardvdr potassium deficiency and accumulation of amino acids, soluble sugars are soluble in concentrated nitric acid have the hope and the role of potassium in protein synthesis. Potassium is a plant resistance against dehydration and hypothermia. Potassium is the major cation which neutralizes the electrical charge of anions in chloroplasts Sytyvplasm to reduce nitrate accumulation in vegetables and Jat is Shvdbas. Green spot disease (green tomatoes at the end) that is insipid and tasteless, is due to potassium deficiency. Another indicator of the pH of the nutrient uptake is an indicator of acidity and play on medium plants and chemical characteristics, physical and biological soil properties is effective (Salardyny, 1987). According to FAO statistics, in 2011, Iran ranked fifth in production, cultivation ranked sixth in the rankings, the yield per hectare is ranked thirty-eighth. Ranking in acreage, China, India, Turkey, Nigeria, Egypt, Iran, Cameroon, United States of America, Russia and Italy, respectively, the first class I have to. (FAO, 2011).

Potassium: increases the resistance of plants against environmental stress and is effective in improving the quality of tomatoes. If this element is lacking, the slower growing tomatoes hive is dark bluish-green color .Young

leaves are completely wrinkled and the deficiencies that have been affected most often become brittle and brown shiny color Narjy and eventually die. Branches of hard wood, the roots will not grow well and stay slim majority (Khogrv et al., 2000). Tomatoes, fresh virgin soil in the ground that has to be done, but must be sufficiently decayed animal manure in a hectare of land to be played back soil and In the spring of 1200 kg of fertilizer 2 weeks before planting, fertilizing mixture of 4 parts per Dvsvd nitrate, sulfate Dvptas 2 episode 6 part are super into the soil and mix it with the soil, instead of super bone powder can be consumed (Daryani Zadeh, 2007). Soil pH should be appropriate. Each plant will tolerate a range of appropriate pH if the soil pH is too low or impairing plant growth and production. Ornamental plants and flowers are no exception to this rule but they are more sensitive to soil pH. Important role in controlling the solubility of soil nutrients in the soil pH is in other words the ability to absorb nutrients is highly dependent on soil pH. Nutrients at different pH, different Hlalythay further increase the pH of the nutrient solubility Mylybdvn falls. One of the problems that exist in Iranian soil pH is alkaline, the pH above 7. Having a dry climate and low precipitation in the accumulation of exchangeable bases in the soil and thus progress towards the alkaline soil. Another problem, of calcareous soil, increasing soil pH (Salardyny, 1987).

(Chapagyan et al .,2003) Asrkarbrd potassium to form potassium chloride and potassium nitrate on yield and quality of tomato under greenhouse conditions with controlled environment Dadndv test results showed that a significant amount of potassium chloride in the treatment of firmness and freshness of rose sepals and fruits of spoil and stain the other side was too low. Potassium chloride, nitrate levels in treated fruits was low and it took a significant amount of iron increased, thus enabling the potassium nitrate instead of potassium chloride is grown tomatoes. (Aduayi.E.A et al., 2003) Effect of potassium and sodium content of the water on tomato yield and CRP test results obtained in this experiment was that the use of 10 to 20 mg per kg of soil application of sodium, potassium, 80 milligrams of grams per kilogram of soil water content and yield were reduced. The 5 mg, 40 mg sodium, potassium highest number of fruit set, thus the sodium to potassium ratio between 1:4 and 1:8 should be considered and applied.(Shirazi , 2007) Experimental Agriculture Research Center Bushehr Borazjan did a test in which the effect of potassium intake was increased tolerance to drought stress in tomato plants. The test - split plot randomized complete block design with three replications was conducted in 81 crop years. Test results showed that the combined treatment of both primary and secondary treatments are significant at the one percent level, but their interaction was not significant. Therefore, in this study it was found that the highest yield of the recommended amount of potash fertilizer. Is based on soil test levels and amounts due mostly to combat drought conditions in the area of soil and water, reduces the product is not beneficial

MATERIALS AND METHODS

The experiments were arranged in the city in September 2012. City to city corruption arranged from north, west and south of the city Firoozabad, east of the city of Darab, Shiraz city from the northwest to the southeast of the city limits Elahi. In this study, the effect of soil pH in different Nsrptasym evaluated. For this purpose three soils with a pH of 6, 7 and 8 to select and choose the pots and any soil that contains 5 kg of potassium Hrgldan Vtymar shed with three Saqr, 40 and 80 mg potassium kg soil potassium sulfate is added to the pots. In the first two seeds per pot of tomato varieties were planted Kljy after seed emergence and plant to plant stronger hold four cards and the other was cut from the surface of the soil. After planting the seed treatments applied during the growth period and tried to farm capacity is about soil moisture, N-plants to provide 200 mg of urea nitrogen per kilogram of soil in the pots was Fzvhdh. Shelf life 30 days after the first flowering plants in the soil in the pot. As we see, the number of treatments and the number of iterations in this study had a total of 81 pots had 27 treatments and 3 replications. The statistical design used in this study was a completely randomized design with three replications and is twenty-seven treatment comparisons were carried out by Duncan's multiple range test. Computer software used for data analysis software, is MSTA-TC.

RESULTS AND DISCUSSION

Number flower

As can be seen from the results of comparing the interaction of pH and potassium showed that the highest number of goals in the pH level of 6 to 80 mg per kg of soil potassium (4/10 flower) and pH 6 and 7 , and the lowest level 80 potassium milligrams per kilogram of soil (4/2 flower) was observed . Plants grown at pH 8 and 80 mg of potassium are all destroyed. At pH 6 , the addition of potassium , a significant increase in the number of flowers found. At pH 7 , the increase of K from zero to 40 and 80 showed a significant reduction in the number of flowers . The lack of significant differences between pH 8 and 40 mg potassium levels were observed in the number of flowers . Significant reduction in the number of flowers medium without potassium was evident with increasing pH . Medium

containing 40 mg of potassium increased the pH from 6 to 7 significantly reduced the number of flowers , but there was no significant reduction of 7 to 8 . Increasing the pH of the medium containing 80 mg of potassium had no effect on flower number.

Chlorophyll Index

As can be seen from the results of the comparisons showed interaction of pH and potassium maximum chlorophyll index at pH 8 using 80 mg per kg of potassium times 8/65 and the lowest on the pH of potassium equivalent to 40 mg of 6 0/40 was observed. Plants grown at pH 8 and 80 mg of potassium are all destroyed. At pH 6 with potassium levels were significantly increased chlorophyll index. At pH 7 with potassium levels were significantly increased chlorophyll index. At pH 8 with potassium levels increased significantly from zero to 40 mg.

Fruits number

As can be seen from the results of the comparisons showed interaction of pH and potassium levels of potassium in pH has a significant effect on the number of tomato fruits. The maximum number of fruits at pH 6 and 80 milligrams of potassium, which is equal to 3/2 values than the control and potassium levels increased significantly had the lowest number of fruits at pH 6 level zero (control), which equal to 0/1, which is significantly lower than the 80 mg. Plants grown at pH 8 and 80 mg of potassium are all destroyed.

Vitamin C

As can be seen from the results of the comparisons showed interaction of pH and potassium levels of potassium in pH has a significant effect on the amount of vitamin C in tomatoes. So more Vitamin C in pH 7 and 80 mg is equivalent to 67/47 mg compared with control and potassium levels increased significantly had the lowest vitamin C at pH 8 and zero (control), which equals with 30/36 mg compared to 80 mg had significantly decreased. Plants grown at pH 8 and 80 mg of potassium are all destroyed.

TSS

As can be seen from the results of the comparisons showed interaction of pH and potassium levels of potassium in pH has a significant effect on TSS tomatoes. The maximum TSS at pH 8 and 40 milligrams of potassium, which equals 16/6 percent compared to the control and potassium levels increased significantly had the lowest TSS at pH 7 and zero (control) or 40 mg potassium, which is equal to 00/5 percent compared to 80 mg of potassium is decreased significantly. Plants grown at pH 8 and 80 mg of potassium are all destroyed.

Total acid

As can be seen from the results of the comparisons showed interaction of pH and potassium levels of potassium in pH has a significant effect on total acidity of tomatoes. Mqdarasyd of the maximum level at pH 8, equivalent to 40 mg of potassium, 016/1 and potassium levels significantly increased compared to control who has the least amount of acid in the pH level of 8 zero (control) that equal to 416/0 to 40 mg of potassium, which has been significantly reduced. Plants grown at pH 8 and 80 milligrams of potassium, all died.

Plant fresh weight

As can be seen from the results of the comparisons showed interaction of pH and potassium levels of potassium in pH has a significant effect on the fresh weight of tomato plant. And the maximum weight per pH 8, 80 mg potassium level was equal to 925/37 when compared to control and potassium levels significantly increased plant fresh weight at a pH of 7 is also the lowest levels control which is equal to 733/17 compared with 80 mg potassium levels have been significantly reduced. Plants grown at pH 8 and 80 mg of potassium are all destroyed.

Days to flowering

As can be seen from the results of different levels of potassium in pH had no significant effect on the number of days until the tomatoes are flowering. The maximum number of days to flowering pH 8, equivalent to 40 mg of 2/51 and potassium levels significantly increased compared to controls is also the minimum number of days to flowering in the pH levels 7 control in which equals 7/19, which is significantly lower than the 40 mg. Also at pH 8 to 80 mg of dried herb and possible loss of days to flowering was not possible.

Table 1. 2 - Comparison of treatment effects on the characteristics of the interaction of pH and potassium

Quality PH * k	Numberflowers	fruits	vitaminC	chlorophyll (mg)	TSS(%)
6 zero	2/4c	1/0d	43/94ab	40/6ef	5/28bc
40	5/8b	1/5cd	44/00ab	40/0f	5/17bc
80	10/4a	2/3a	46/20a	56/3bc	5/50b
7 zero	2/4c	1/5cd	46/20a	47/8de	5/00c
40	3/0c	1/6bcd	45/47a	50/2cd	5/00c
80	6/3b	1/7bc	47/67a	63/6ab	5/33bc
8 zero	2/8c	1/6bcd	36/30c	53/7cd	5/25bc
40	3/0c	2/2ab	41/06b	65/8a	6/16a
80	0/0d	0/0e	0/000i	0/0g	0/00d

Means in each column having the same letter, have not significant difference ($P \leq 0.01$) according to DMRT

More Table 1. 2 - Comparison of treatment effects on the characteristics of the interaction of pH and potassium

Quality PH * k	Totalacid (Mg)	per wet weight (g)	The number of days to flowering
6 zero	0/523cd	23/472b	28/0cd
40	0/595c	26/781b	35/7bc
80	0/646bc	27/060b	40/3b
7 zero	0/461d	17/733b	19/7d
40	0/616bc	18/395b	21/0d
80	0/738b	21/230b	37/6b
8 zero	0/416d	21/492b	41/8b
40	1/016a	37/925a	51/2a
80	0/000e	0/000c	0/0e

†Means in each column having the same letter, have not significant difference ($P \leq 0.01$) according to DMRT

Discussion

The effect of different soil pH on nutrient uptake in tomato plants results in a great many studies researchers reported. The topics discussed and conclusions about the results of this study we will compare it with researchers expensive.

Effects of different levels of pH, potassium and their interaction effect on flower number

The results are presented in graphs and plots the number of goals last season, so we can conclude that the pH of the pH of applied 6 for , in the of number of flowers is a tomato . The effect of different levels of potassium alone was shown that increasing potassium intake flower number flower number was significantly reduced. The evaluation of the interaction and the interplay of two factors, pH, K the number of flowers was found that the highest number of goals in the pH 6 and no potassium was obtained and it shows that the pH equal to 6 and without the use of potassium for floral and flower number in tomato plants is very effective roles .

Effects of different levels of pH, potassium and their interactions on chlorophyll index

The results and graphs presented on the factor of chlorophyll in the previous chapter , we explained that the pH of applications , maximum chlorophyll index at pH = 8 , and the pH of 7 and 6 increased significantly is shown . The effect of different levels of potassium alone chlorophyll index showed that increasing potassium intake was significantly increased chlorophyll index so that the minimum amount of chlorophyll index was observed in the control group .pH = 8 has the greatest effect on the index and chlorophyll content of tomato greens is gay .

Effects of different levels of pH, potassium and their interactions on the number of fruits

Factor in the number of fruits that can be explained by soil pH 8 compared to pH 6 and 7 , the number of fruit has the highest Asrra . Also , as noted in the previous chapter , you can see the interaction of two factors: the maximum number of fruits obtained at pH 6 and K fertilizers potassium levels and the results indicate that the role of floral and nature fruit of the tomato plant will , and with the results obtained by (Esfandiari et al., 2008) are consistent.

Effects of different levels of pH, vitamin C, potassium and their interactions on

Comparing the pH Applied highest amount of vitamin C in the pH equal to 7 is also the effect of different levels of potassium alone the amount of vitamin C was found that increasing the potassium level from zero to 80 mg per kg of soil , the amount vitamin C is also increased , but this increase was not significant effect on the amount of vitamin C in tomato products . The interaction of Dvfaktr pH, potassium and vitamin C. It was found that the highest pH 7 Drtymarba Vsfr 40 milligrams of potassium per kg of soil with the results of their(Rkhsar et al., 2008) is consistent .

Effects of different levels of pH, potassium and their interactions on TSS

In this study the effect of the pH of the soil was found on the TSS, pH 8 has the highest TSS but significant increase compared to the pH of did not show. The effect of different levels of potassium alone on TSS was found that increased levels of potassium in tomato plants TSS levels decreased, but this decrease is not significant. The interaction of the two factors was found that the highest TSS pH 8 and K, respectively, and the results obtained by (sharaei et al., 2004) do not match.

Effects of different levels of pH, potassium and their interactions on total acid

The effect of different levels of potassium alone was found that the total acidity increased from zero to 80 mg per kg of soil potassium levels, total acidity increases, but this increase is not significant. The interaction and the interaction of two factors: pH, total acidity, potassium was found that the highest levels in soil with a pH of 8 and K, respectively.

Effects of different levels of pH, potassium and their interactions on plant fresh weight

In this study, the highest fresh weight of tomato plants in soil with a pH of various applications related to soil pH of soil with a pH of 7 to 8 was significantly increased the pH of the different 6 meaningful not significant . In comparison with interaction and interaction between the two factors , pH, potassium was found that the maximum weight per pH equal to 6 and 40 mg kg- K , respectively , and it can be kind of concluded usage Azkvdhay potassium weight gain more tomato plants will be more effective and the results obtained by (Mami et al ., 2007) is consistent .

Effects of different levels of pH, potassium and phosphorus and their interaction on the number of days to flowering

According to the results presented in the previous tables , the maximum number of days to flowering in soil with a pH of 8 is equal to the soil with a pH of 6 and 7 that showed significant increase .by (layegh et al., 2009) do not match . The interaction and the interaction of two factors: pH, potassium was found that the maximum number of days to flowering at pH 8 and 40 mg potassium level was achieved and it indicated that the level of 40 mg , and potassium fertilizers a longer vegetative phase and late tomato crop will conclude with the (results and layegh et al., 2009) are inconsistent.

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