Estimation some genetic parameters of five tomato cultivars under the influence of Nanofertilizers addition

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ABSTRACT

for Breeding genetic structures adaptive for the country's atmosphere and to give a high yield, must the work on diffused varieties locally cultivation to determine the traits the most correlated with yield and The most inheritability and the affected by nano-Fertilization ,Which is one of the most important tools of modern agriculture to increase the productivity of tomatoes and reduce nutrient losses in rhizosphere area. However ,little is known about responding different genotypes of tomatoes nanofertilizers under field conditions in Babylon .Thus, using nanofertilizers may increase tomato growth productivity and decreasing the loss of nutrient in Sustainable agriculture .Here, we planted tomato cultivars (Red rock, Castel rock, Rock star, Early pearson, and Super queen) and sprayed them with three rates of nanofertilzers (0,1,2 g L-1) the factorial experiment was conducted in Complete Randomized Blocks Design (RCBD), The varieties differed among themselves in the characteristics of plant growth and under the effect of the three treatments, and the superiority of the variety early pearson on the other varieties in The qualities of vitamin C and under the influence of all the treatments and in the content of chlorophyll content on all varieties and under the influence of all treatments and recipe for the hight of the first inflorescence and acidity under the influence of the first treatment Recipe for percentage of potassium under the treatment of the first and second and The genetic variability values and the of expected genetic improvement were high in the percentage of nitrogen and potassium under the first treatment and Under the second treatment the genetic variability values and the of expected genetic improvement were high for the height of the first inflorescence , the percentage of potassium and phosphorus, low for the number of branches and the hardness and medium for the acidity and vitamin C and Under the influence of the third treatment, the genetic variance values and the of expected genetic improvement were high for the hight of the first inflorescence and vitamin C and the percentage of phosphorus.

Introduction

There is a need to increase the productivity of this crop through appropriate breeding programs that meet the requirements of local and export markets. Plant breeders have sought to produce Genetic variations . They are the basis for successful selection of the traits they are looking for ,Locally grown varieties possesses Genetically diverse Much more than modern or hybrid varieties , they are among the most important sources of genetic variation of breeders, and a large number of locally grown species and species have been collected (Chen et al., 2009).Varieties vary in their growth and potential productivity and Which are controlled by the interaction of both genetic and environmental variability. This diversity can be attributed to adaptability of genes, to morphological characteristics, and physiological factors during crop growth. This diversity can be attributed to adaptability of genes , morphological characteristics, and physiological factors during crop growth (Olaniyi et al., 2010(.result increase in the

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world's population led to increased demand for food and due to high food production prices; it was necessary to use technology in agriculture. Nanotechnology could be used as an alternative in a broad scientific field. Nanotechnology was described as materials, systems and processes that operate on a range of 100 nm or less(Ditta, 2012). Nanotechnology is a modern technology that has made a big breakthrough in various fields of science ,Progress Nanoparticles in agriculture For the purpose of minimizing nutrient loss to soil, water and air through direct internalization of crops and avoid nutrient interactions with soil, microorganisms and air (Servin et al., 2015). This research aims to:-

*Evaluation of the performance of five local varieties of Tomato in the conditions of the province of Babylon.

*Estimation of some genetic parameters of these varieties under the influence of manure.

*Effect of nano-Fertilisers in the performance of these varieties.

*Interaction of varieties and manure in some growth characteristics of Tomato

MATERIALS AND METHODS

A field experiment was carried out in Babylon province in March / 2018, where five cultivars (Red rock, Castel rock, Roke star, Early pearson, Super queen) were planted in glass dishes in the glass house and were transferred to the field on 20/3/2018. Plants were sprayed with nanofertilizer in 2018-4-2 with three batches separated by one month from one batch to another (0, 1,2 g L-1 macro and micro elements). All different service operations were carried out by irrigating, combing and fertilizing plants according to the recommended fertilizer by (200N + P 60 + 120K kg ha-1 (Faraj et al., 2012) Use the RCBD design and analyze the results by testing the least significant difference below the 5% probability level and the three replicates.

studied the traits: Number of branches ,chlorophyll content spad, Percentage of contract, height of the first inflorescence cm, potassium% and nitrogen% for all treatments, the number of days of planting until the flowers bloom 50% of plants experimental unit, percentage of phosphorus, the percentage of acidity, vitamin C mg.100gm-1, Hardness cm2.

The genetic parameters were studied and included first ;the components of phenotypic variance were estimated to be based on the absence of an overlap between the genetic and environmental structure and the absence of a link between genetics and the environment according to the following equation: VP = VG + VE

VG: Genotypic variance, variance Environmental VE: Variance Phenotypic: VP

According to the genetic and environmental variance of the mean squares of the table for the analysis of variance for the design of complete random sectors, Table (1) according to the fixed model provided by (singh and ceccarelli, 1996(.

The analysis of genetic variance, phenotypic, environmental, and qualities Common was estimated according to the method explained by Walter (1975). VG=(msg-mse)/R

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Table 1. ANOVA for complete randomized segments design with mean squares expected by constant model

Source of variation	Degrees of freedom	Sum of Squares	Mean sum of Squares	Average squares expected
Replications (r)	**(r-1)=2**	$SR=\frac{\square Y_J^2}{g}-\frac{Y\ldots^2}{rg}$	**M3**	$Ve+g\theta^2R$
Genotypes (g)	**(g-1)=4**	$SG=\frac{\square Y_i^2}{b}-\frac{Y\ldots^2}{rg}$	**M2**	$Ve+r\theta^2G$
Errors (e)	**(r-1)(g-1)=8**	**Se=ST-SR-SG**	**M1**	$Ve+\theta^2GR$
Sum	**(rg-1)=14**	$ST=\square Y_{ij}^2-\frac{Y\ldots^2}{Rg}$		

Where R is the number of replicates = three, G is the number of Varieties = five.
where: MSe= VE, VG = (MS2-MS1)/R
M2: Average squares for varieties, M1: Mean squares of experimental error (VE = M1)
R: number of replicates.
Determination of genotypic coefficients of variation and phenotypic coefficients of variation (panse and sukhatme, 1984) using the following The equation :
II. Estimation of inheritance in the broad sense: Broad Sense Heritability (H2 (b.s().

Falconer and Mackay (1996). H2(B.S)=VG/VP*100

The values of inheritance in the broad sense were expressed within the limits outlined by Ali (1999) within the following limits.
(Less than 40% low, between 40-60% medium, more than 60% high)

GCV%=(VG/ Ỹ) ×100
PCV%=(VP/ Ỹ) ×100
Note that Ỹ is the arithmetic mean of the characteristic.
The values of the genetic and phenotypic coefficient were expressed using the scales used by Agarwal and Ahmed (1982) and in the following ranges
(Less than 10% low, between 10-30% medium, more than 30% high).
The percentage of contamination in the broad sense was estimated in the equation presented by
III. Estimation of Expected Genetic Improvement Expectant Genetic Advance (EGA:(
The expected genetic improvement as the percentage of the mean of the characteristic in the way explained (Kempthorne, 1969)
E.G.A%= [(K H2(b.s) VP)/ Ỹ] ×100
where :
E.G.A: Genetic improvement expected as a percentage of the overall mean.

K: 2.06 The intensity of the selection for 5% of plants (Allard, 1960)

H2 (b.s): inheritance in the broad sense

√VP : square root of phenotypic variation, Ỹ: average trait.

Results and discussion

Evaluation of the genotypes under the influence of the three factors flowering

The results in Table 2 indicate that the mean of the varieties of most studied traits under the influence of all the treatments were significant differences. Red rock was significantly superior to all varieties

In the vitamin C under the influence of all treatments and in the characteristics of early and percent of phosphorus under the influence of the third treatment and in the rate of hardness under the treatment of the first treatment. The superiority of the castel rock cultivar significantly in the rate of early flowering and the percent of phosphorus under The effect of the first and second treatment and the percent of the contract under the treatment of the first treatment.The superiority of the Rock star in the percent of nitrogen under the first treatment and the percent of potassium under the treatment of the third treatment. And the superiority of the category Early person in the content of chlorophyll on all varieties and under the influence of all treatment and the recipe for the hight of the first inflorescence and acidity under the influence of the first treatment and recipe percent of potassium under the treatment of the first and second. And the superiority of the phosphorus and low for the number of branches and hardness and medium for acidity and vitamin C The percentage of genetic improvement expected gave the highest rate of the hight of the first inflorescence and the percentage of potassium and phosphorus and the lowest rate of the number of branches and category Super queen on all classes in the number of branches under the influence of all treatment In the percentage of nitrogen under the influence of the second treatment and in the percent of the contract under the influence of the third treatment.

That the existence of moral differences between these varieties is necessary to continue to study the genetic behavior of these qualities to improve them (Hamdani, 2013.(

Genetic variability, inheritance ratio and expected genetic Advance The results of Table (3) indicate the general average and some genetic indicators of vegetative and syphilis growth characteristics and the qualitity characteristics of the tomato plant she was The percentage of inheritance ratio and the expected percentage of genetic improvement were different between the varieties. The inheritance rate was high for the characteristics of early flowering, chlorophyll content and the percentage of the contract under the influence of all the treatments and high in the percentage of nitrogen and potassium while it was low for acidity and vitamin C and medium for the number of branches and hardness and percentage of phosphorus The percentage of genetic improvement expected was high percentage of nitrogen and potassium and low for acidity and vitamin C for the first treatment. Under the influence of the second treatment, the inheritance ratio was high for the hight of the first inflorescence For the percentage of potassium and hardness, and under the impact of the third treatment was the inheritance rate high to the hight of the first inflorescence,Vitamin C, phosphorus percentage, low acidity, hardness, nitrogen percentage, average number of branches and percentage of potassium. The expected genetic improvement rate gave the

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highest rate of the hight of the first inflorescence and vitamin C and the percentage of phosphorus and the lowest rate of acidity and hardness and percentage of nitrogen.

Varieties	**Number of branches**	**Chlorophyll(spad)**	**High of first inflorscences cm**	**Early in flowering**	**Fruit set %**	**Acidity%**	**Hardness kg.cm2**	**Vit C mg.100gm^{-1}**	**%N**	%P	%K
	Under the influence of the first transaction										
Red rock	8.33	37.9	11.00	42.33	28.17	0.907	2.10	12.66	1.369	0.380	1.369
Castel rock	8.00	33.7	11.67	39.3	36.31	0.763	1.51	9.09	1.577	0.423	1.577
Rock star	8.00	44.7	15.00	43.67	24.89	0.770	1.57	10.51	2.073	0.330	2.073
Early person	8.00	53.9	15.33	49.00	35.68	0.787	1.91	9.66	1.867	0.327	1.867
Super queen	13.33	35.4	11.00	46.67	33.02	1.087	1.64	7.73	1.590	0.400	1.590
L.S.D 0.05	3.315	10.21	3.556	4.307	5.499	N.S	0.953	4.097	0.2993	N.S	0.2993
Varieties	**Under the influence of the second transaction**										
Red rock	13.33	40.8	13.67	39.67	38.68	0.720	2.75	17.63	1.919	0.577	2.6400
Castel rock	14.33	51.5	12.67	35.00	36.08	1.170	2.74	15.90	2.127	0.777	3.1470
Rock star	12.00	35.8	16.33	39.33	29.13	0.933	2.07	16.12	1.827	0.613	3.880
Early person	11.67	56.3	18.33	47.33	38.37	1.377	1.89	12.58	2.077	0.503	4.330
Super queen	16.67	39.6	12.67	43.00	22.62	1.373	2.91	11.50	2.223	0.480	3.673
L.S.D 0.05	5.484	12.60	3.446	4.429	5.564	0.4588	N.S	3.861	0.2662	0.1248	0.4568
Varieties	**Under the influence of the third transaction**										
Red	13.33	38.9	11.67	33.00	31.89	1.133	1.90	23.9	2.243	0.823	2.96

rock								5			
Castel rock	11.67	38.4	18.33	35.67	36.13	0.670	1.97	11.67	2.033	0.607	4.01
Rock star	11.67	56.7	15.67	35.33	29.85	1.183	2.42	21.22	2.530	0.450	4.86
Early person	9.00	58.6	20.00	46.33	38.46	0.980	2.27	15.80	2.313	0.740	4.24
Super queen	13.33	37.6	15.00	37.00	34.26	0.827	1.60	21.08	2.200	0.610	4.27
L.S.D 0.05	3.113	14.68	2.254	5.532	4.942	0.4237	0.894	3.501	0.5996	0.1467	1.061

Table (2) The average studied traits of the tomato plant under the influence of the treatments
Statistical and genetic analyzes

The high values of inheritance ratios of some traits give an indication of the high values of genetic variability and low environmental variability values, The traits are genetically controlled and The environment has slightly effect on them (Welsh, 1981). The values of genetic variation were high for the percentage of nitrogen and potassium, while low for acidity, vitamin C, medium for the number of branches, hardness and percentage of phosphorus. The values of environmental variability were high for acidity and vitamin C and low for the percentage of nitrogen and potassium and medium for the number of branches, Percent of the phosphorus for the first treatment. Under the second treatment, the genetic variability values were high for the height of the first bulb and the percentage of potassium and phosphorus and low for the number of branches and the hardness and medium for the acidity and vitamin C While she was the values of the environmental variability were high for the number of branches and the hardness and low for the hight of the first inflorescence and the percentage of potassium and phosphorus and the medium of the acidity and vitamin C, but under the treatment of the third was the values of genetic variance high for the hight of the first inflorescence and vitamin C and the percentage of phosphorus and low for the acidity and hardness and percentage of nitrogen And the mean of the number of branches and the percentage of potassium. The values of environmental variation were high acidity, hardness and percentage of nitrogen and low for the hight of the first inflorescence and vitamin C and the percentage of phosphorus and medium for the number of And potassium percentage. These results are consistent with Hasan et al., 2016 (Kumar et al., 2013), Shashikanth et al., 2010 (Kaushik et al., 2011) (Kumar and Bhardwaj, 2014.(

The high variance coefficient of some characteristics means that dispersion exists between the studied traits. Thus, the selection of such qualities is easy and the program is effective for their improvement (Singh and Chaudhary, 1985.(

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Varieties	Number of branch	Chlorophyll (spad)	High of first inflorscences	Early in flowering	Fruit set	acidity	Hardness cm.$k^{-}g^{-1}$	Vit C	N%	P%	K%

Table (3) The general average, variance phenotypical, genetic, environmental, inheritance and expected genetic improvement of the studied yields of the tomato plant under the influence of the treatments

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Under the influence of the first transaction											
General mean	**9.13**	**41.1**	**12.80**	**44.20**	**31.61**	**0.863**	**1.75**	**9.93**	**1.695**	**0.372**	**0.5071**
Genotypic variance	**4.5**	**59.103**	**3.566**	**12.4**	**21.551**	**0.00576**	**0.0231**	**1.767**	**0.0674**	**0.0039**	**0.4490**
variance Environmental	**3.100**	**29.38**	**3.567**	**5.233**	**8.529**	**0.07454**	**0.2563**	**4.734**	**0.02528**	**0.004302**	**0.0725**
Variance Phenotypic	**7.6**	**88.48**	**7.133**	**17.633**	**30.08**	**0.0803**	**0.2794**	**6.5**	**0.0926**	**0.0082**	**0.525**
genotypic coefficients of variation	**23.23**	**14.38**	**14.75**	**7.96**	**14.68**	**27.80**	**1.32**	**17.16**	**15.13**	**16.78**	**132.13**
phenotypic coefficients of variation	**30.19**	**22.88**	**20.86**	**9.50**	**17.35**	**32.83**	**30.20**	**25.67**	**17.96**	**24.34**	**242.40**
Broad Sense Heritability	**59.21**	**66.76**	**49.99**	**70.32**	**70.32**	**7.17**	**8.26**	**27.18**	**72.72**	**47.56**	**86.09**
Expectant Genetic Advance	**36.82**	**31.48**	**21.48**	**13.762**	**13.76**	**4.851**	**5.139**	**14.37**	**26.9057**	**23.34**	**39.84**
Under the influence of the second transaction											
General mean	**13.60**	**44.8**	**14.73**	**40.87**	**32.98**	**1.115**	**2.47**	**14.75**	**2.034**	**0.590**	**3.214**
Genotypic variance	**1.25**	**60.64**	**5.13**	**19.3**	**45.42**	**0.0620**	**0.234**	**5.288**	**0.0189**	**0.01233**	**0.4108**
variance Environmental	**8.483**	**44.77**	**3.350**	**5.533**	**8.732**	**0.05937**	**1.330**	**4.204**	**0.01999**	**0.004393**	**0.05886**
Variance Phenotypic	**9.733**	**105.41**	**8.533**	**24.833**	**54.152**	**0.1213**	**1.564**	**9.492**	**0.03889**	**0.016723**	**0.4697**
genotypic coefficients of variation	**8.22**	**17.38**	**15.38**	**10.74**	**20.43**	**22.33**	**19.58**	**15.59**	**6.75**	**18.82**	**18.13**
phenotypic coefficients of variation	**22.93**	**22.91**	**19.83**	**12.19**	**22.31**	**31.23**	**50.63**	**20.88**	**9.69**	**21.91**	**19.39**
Broad Sense Heritability	**12.84**	**57.52**	**60.15**	**77.71**	**83.87**	**51.11**	**14.96**	**55.71**	**48.59**	**73.73**	**87.46**
Expectant Genetic Advance	**6.0675**	**27.154**	**24.57**	**19.51**	**38.55**	**32.88**	**15.60**	**23.97**	**9.70**	**33.29**	**34.93**
Under the influence of the third transaction											
General mean	**11.80**	**46.0**	**16.13**	**37.47**	**34.12**	**0.959**	**2.03**	**18.70**	**2.264**	**0.646**	**4.07**
Genotypic variance	**2.23**	**92.51**	**9.83**	**23.76**	**9.23**	**0.0286**	**0.0276**	**23.91**	**0.00106**	**0.01836**	**0.3772**

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variance Environmental	**2.733**	**60.76**	**1.433**	**8.633**	**6.890**	**0.05065**	**0.2256**	**3.458**	**0.1014**	**0.006072**	**0.3178**
Variance Phenotypic	**4.963**	**153.27**	**11.263**	**32.393**	**16.12**	**0.07925**	**0.2532**	**27.368**	**0.1024**	**0.02443**	**0.695**
genotypic coefficients of variation	**12.65**	**20.90**	**19.43**	**13.008**	**8.90**	**17.63**	**8.18**	**26.14**	**1.43**	**20.97**	**15.09**
phenotypic coefficients of variation	**18.87**	**26.91**	**20.80**	**15.18**	**11.76**	**29.35**	**24.78**	**27.97**	**14.13**	**24.19**	**20.48**
Broad Sense Heritability	**44.93**	**60.35**	**87.27**	**73.34**	**57.25**	**36.08**	**10.90**	**87.36**	**1.03**	**75.15**	**54.27**
Expectant Genetic Advance	**17.47**	**33.45**	**37.40**	**22.94**	**13.87**	**21.81**	**5.565**	**50.34**	**0.299**	**37.45**	**22.89**

Conclusion

Different varieties among them under the influence of all varieties and superiority of the variety Early person in most of the studied traits.

The values of genetic improvement were high for most studied traits and under the influence of all studied traits. The values of genetic improvement were high in the characteristics of early flowering, percentage of the fruit set and the chlorophyll content in the leaves under the influence of all the treatments.

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