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Effect of Urea and Some Organic Acids on Plant Growth, Fruit Yield and its Quality of Sweet Pepper (*Capsicum annum*)

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Abstract: Two field experiments were conducted during the two successive seasons of 2006 and 2007 to investigate the effect of each of some organic acids (gibberellic acid, salsillic acid and citric acid) and the urea application method on the growth, fruits, yield and its physical and chemical consistent of sweet pepper. The obtained results indicated that the soil dressing of urea fertilizer resulted in vigor plant growth of sweet pepper as expressed by plant length, number of leaves and shoots, fresh and dry weight of different plants organs and gave, the heavier total fruits yield and the better physical quality and chemical quality. The soil dressing is more benefit for plant compared with the foliar spraying. The foliar spraying of sweet pepper by gibberellic acid gave the best plant growth and the heaviest tonnage of total, early fruits yield and its physical and chemical consistent of fruits.

Key words: Sweet pepper, fruit yield, quality, urea, organic acid

INTRODUCTION

The goal of optimal plant nutrition is to ensure that crop plants have access to adequate amounts of the plant nutrients required for high yields. The nutrients have to be present in the soil or provided through suitable sources on adequate amounts and forms usable by plants. There are two methods of application nutrients, first mainly through plant roots, i.e., soil dressing and the second through the foliar application. The soil dressing application is the suitable for give plant requirements at once time, then plants adsorb there needed gradually and slowly during the growing season. However, foliar fertilization, its necessary only for that plants which obtain additional nutrients such as N, P, K and or micro elements. The main advantage of foliar fertilization is the immediate uptake of the nutrients applied.

Sweet pepper is one of the important popular vegetable crop grown in Egypt for the local consumption and/or for the foreign exporting market. The total growing area increased during the few last years, but its yield did not behave the same trend. However, the fruits yield could be enhanced by two main ways, i.e. Horizontally or vertically, where the 2nd way, could be expected by improving the agricultural treatments, i.e. following the suitable method of fertilizer application, and/or treating the plants the some materials such as chemical substances which causing an enhancement on plant metabolism and reflex on plant growth and its yield. The previous reviews in this view indicated that, urea application as a source of nitrogen fertilizer had a great role in enhancing the metabolism processing due to the importance of nitrogen in building carbohydrates, protein and fats in plant tissues. The main application method of urea is during the dressing within the rooting system, but also could be supplied as foliar spraying. Many previous reviews concering urea, application were studied by[17,25,2,20]. Camargo *et al*.[5]. and Shaheen *et al*.[22]. Also, the foliar application of some organic acids such as GA_3, salsillic acid and or citric acid were found that plays a great role (especially GA_3) in improving the productivity of vegetable plants[17,6,27,20,10,22,15].

The aim of this study is to investigate the effect of each of some organic acids (gibberellin, salsillic and citric) and the urea application method (soil dressing and/or foliar spraying) on the plant growth, fruits yield and its physical and chemical constituents of sweet pepper.

MATERIALS AND METHODS

Two field experiments were carried out at the horticulture experimental station (Ministry of Agriculture) at Baramoon experimental farm, Dakahlia Governorate, Egypt, during the two successive seasons of 2006 and 2007 to study, the effect of urea application wihout or wish foliar application of GA_3 (50 ppm); Citric acid (500 ppm), Salsilic acid (500 ppm) on growth, yield and its quality of sweet pepper cv. California Winder. Pepper seeds were sown

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in the nursery in 2 X 2 m beds after six weeks, seedlings were transplanted to the field on March 20th of both 2006 and 2007. The experimental soil was clay loam in texture with EC. 2.3 m hos/cm^3, and pH 8.0, available N was 31.8 ppm, P 14.6 ppm and exchangeable K was 115 ppm.

The transplanting was grown on one side of ridge (70 cm width) at 30 cm apart. The experimental unit was consisted of 4 ridges, each of 4 m long and 0.7 m width, with an area of 11.2 m². The experimental design used in the two growing seasons was split plot design with three replicates. The methods of urea application were arranged randomly within the main plots while the organic substance i.e., GA_3, salsilic acid, citric acid plus the water were arranged within the sub-plots. The rates urea soil dressing were 90 N units per feddan (as ammonium sulphate), where added at twice, first half was during the soil preparing and the second half added 45 days after transplanting.

The organic chemical substances were sprayed at 3 times starting 60 days of after transplanting by 10 days intervals. Vegetative samples of pepper plants were taken at 95 days old randomly from each sub-plot to estimate the plant length (cm), number of shoots, and leaves per plant, fresh and dry weight of shoots and leaves as g./plant, fresh and dry weight of shoots and leaves as g./plant. The pepper fruits were harvested every 7 days by intervals.

Total fruits yield as tons/fed. and its components (early yield, ton/fed., average weight of fruit, g/fruits, diameter and height fruits as cm/fruit.

For chemical analysis samples of 4 pepper fruits were taken for N, P and K determination according to the methods of[29,19,4]. respectively. Also, Cu, Mn, Zn, Ni and Pb contents were determined using flame ionization atomic absorption spectrometer model 1100B of perkin Elemer according to the methods of Champman and Pralt[7]. The total soluble solids, it was determined by abbey Refrectometer[1]. and the ascorbic acid, it was estimated as mg/100 g. fresh weight using the day 2,6 dichlorophenol-indophennol method[1]. The total acidity, it was determined by titration of the blended flesh against NaOH 0.1 N using phenolphthalein as an indicator[1]. All the obtained data were statistically analyzed according to Gomez and Gomez[11].

Table 1: Effect of urea and some organic acids on the plant growth characters of sweet pepper during the experimental season of 2006.

Treatments		Plant length (cm)	No. /plant		Fresh weight (g.)/plant			Dry weight (g.)/ plant		
Urea	Organic acids		Leaves	Shoots	Leaves	Shoots	Whole plant	Leaves	Shoots	Whole plant
Foliar	0	50.34	116.67	16.21	152.10	31.69	183.79	35.41	8.97	44.38
	Citric	53.36	131.33	18.07	185.70	33.68	219.38	39.98	9.42	49.40
	GA_3	60.67	150.00	24.13	196.60	50.16	246.76	44.89	14.28	59.17
	Salsilic	54.27	153.00	19.60	188.57	39.73	228.29	40.96	11.27	52.22
Mean		54.66	137.75	19.50	180.74	38.82	219.56	40.31	10.99	51.29
Soil dressing	0	54.00	119.33	17.20	159.53	41.92	201.45	37.94	12.22	50.16
	Citric	57.41	138.00	20.13	195.67	42.12	237.79	46.49	14.45	60.93
	GA_3	61.60	150.00	25.10	196.20	59.17	255.37	48.01	17.67	65.67
	Salsilic	57.94	144.33	21.30	196.30	49.90	246.20	47.45	12.52	59.97
Mean		57.74	137.92	20.93	186.92	48.28	235.20	44.97	14.21	59.19
Average	0	52.17	118.00	16.71	155.82	36.81	192.62	36.68	10.59	47.27
	Citric	55.39	134.67	19.10	190.68	37.90	228.58	43.23	11.94	55.17
	GA_3	61.14	150.00	24.62	196.40	54.67	251.07	46.45	15.98	62.42
	Salsilic	56.10	148.67	20.45	192.43	44.82	237.25	44.20	11.90	56.10
L.S.D. at 5%	Urea	2.11	N.S.	0.54	N.S.	1.79	10.76	N.S.	0.68	N.S.
	Organic acid	4.06	18.26	3.72	28.91	4.71	28.67	N.S.	1.44	9.57
	Interactions	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

N.S: not significant

Table 2: Effect of urea and some organic acids on the plant growth characters of sweet pepper during the experimental season of 2007.

Treatments		Plant length (cm)	Leaves (No. /plant)	Shoots (No. /plant)	Fresh weight (g/plant)			Dry weight (g/ plant)		
Urea	Organic acids				Leaves	Shoots	Whole plant	Leaves	Shoots	Whole plant
Foliar	0	51.83	115.33	13.10	124.93	35.30	160.23	31.49	10.12	41.61
	Citric	54.87	128.33	18.00	137.44	46.77	184.21	34.45	13.37	47.82
	GA_3	58.23	139.03	22.67	152.70	60.27	212.97	39.03	17.21	56.24
	Salsilic	56.17	133.67	20.27	147.37	50.57	197.93	36.60	14.84	51.44
Mean		55.28	129.09	18.51	140.61	48.23	188.84	35.39	13.88	49.28
Soil dressing	0	59.10	133.00	14.00	145.83	40.60	186.43	34.19	14.90	49.09
	Citric	61.10	136.33	17.33	148.93	47.50	196.43	35.77	16.77	52.53
	GA_3	66.50	139.67	22.00	161.53	57.23	218.77	41.30	20.74	62.04
	Salsilic	63.00	138.33	19.33	155.30	50.83	206.13	37.07	18.60	55.67
Mean		62.43	136.83	18.17	152.90	49.04	201.94	37.08	17.75	54.83
Average	0	55.47	124.17	13.55	135.38	37.95	173.33	32.84	12.51	45.35
	Citric	57.98	132.33	17.67	143.19	47.13	190.32	35.11	15.07	50.18
	GA_3	62.37	139.35	22.33	157.12	58.75	215.87	40.17	18.97	59.14
	Salsilic	59.58	136.00	19.80	151.33	50.70	202.03	36.83	16.72	53.55
L.S.D. at 5%	Urea	0.97	N.S.	0.22	N.S.	N.S.	N.S.	N.S.	2.13	N.S.
	Organic acid	2.18	5.76	1.49	7.18	3.42	7.92	3.12	1.21	3.75
Interactions	N.S. 8.15	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.		

N.S: not significant.

RESULTS AND DISCUSSION

Plant Growth:

Effect of Urea App Lication: The data of Tables (1 and 2) of the two experimental seasons shows that, soil dressing of urea fertilizer resulted the vigor plant growth of sweet pepper as expressed by plant length, average number of leaves and shoots, fresh and dry weight of different plant, organs, these vigorously compared with that plants which received urea as foliar spraying. These findings were true in both experiments. The superiority in whole fresh and dry weight amounted by 7.1 % and 15.4 % and 6.9 and 11.5 % for the same respective in 1st and 2nd experiments.

The vigor plant growth of sweet pepper plants which received their needed nitrogen as urea by the soil dressing method may be due to the increase in one or more of the estimated attributes either in leaves or shoots. However, the picture reflected significant increases in leaves and shoots number, fresh and dry weight of different plant organs. So, these increments in our opinion led to the favored jump in the plant growth in this experiment. Many investigators studied the response of some vegetables to nitrogen fertilization and resulted that, the soil dressing is more benefit for plant if compared by the foliar spraying[24,21,28,10,]. On the opposite many others recorded that, the foliar application of nitrogen had a better plant growth [9,16,12,25,2,5,22]. It means that, the literature regarding to the effect of urea application method on plant growth fluctuated and depending on type of plant, its stage, soil fertility. etc.

Effect of Organic Acids: The application of some organic acids such as citric, gibberellic and salsilic as foliar caused an increase in all plant growth measurements, of compared with the control treatment, within the organic acid used, the foliar spraying of sweet pepper by gibberellic acid (25 ppm), gave the best plant growth expressed as length of plant, average leaves and shoots number, fresh and dry weight of plant organs. These findings recorded in both experiments. The increments in whole fresh and dry weight over the control plants amounted by 26.7 %; 30.9 % and 16.9 %, 26.4 % respectively in 1st and 2nd season. The previous reviews in this view indicated that, some chemical substance such as organic acids using for promotion the metabolism processes[17,3,27,20,22,15].

Effect of Interaction Between Urea Application and Organic Acids: The interaction treatments within the two experimental factors showed that, the statistical analysis recorded no significant effect on the plant growth parameters in both seasons, except average leaves number in 2nd experiment. These obtained results indicated that each factor of the interaction treatments act independently.

Fruits Yield and its Physical Properties:

Effect of Urea Application: Total sweet pepper fruits yield and early (tons/fed.) as well as its some physical properties i.e., average weight of fruits (g/fruit), length (cm) and diameter (cm^3) as affected by the urea treatments and some organic acids in the two experimental seasons are shown in Table (3). The soil dressing of urea fertilizer gave the heavier total fruits yield (4.78 and 3.96 tons/fed. in 1st and 2nd season respectively) than the foliar application method of urea fertilization. However, the increment in early pepper fruits amount by 33.4 % and 3.5 % for the same previous respective. In spite of the increment of soil dressing compared the foliar spraying but, the statistical analysis of the obtained data reveals that, the differences within the two methods were no great enough to reach 5 % in both seasons.

Concerning to the physical properties of pepper fruits, i.e. fruit weight, length and diameter, generally followed the same pattern of change like that mentioned above. It means that, the more size of fruits which had higher length and diameter values were correlated with the application of urea fertilizer as soil dressing. These results are true in 1st and 2nd season. Whereas, the statistical analysis of the collected data shows that, no significant differences were found concerning to fruit length (in two seasons), diameter (1st season) and average weight (2nd season). The higher total and early fruits yield and the better physical quality obtained from using urea as soil dressing may be due the increase in one of more of the estimated parameter either in foliage fresh of plant or dry weight. So, this superiority led to the favored jump in the fruits yield and its physical quality in these experiments. Generally, it is noteworthy to mentioned that urea as a nitrogen fertilizer is essential for plant growth and fruits yield as it is a constituent of all proteins and nucleic acids and hence of all protoplasm and consequently to have a large surface available for photosynthesis.

The obtained results of urea application are in accordance with that recorded by[24,25,26,21,20,5,28,22].

Effect of Organic Acids: The foliar application of some organic acids such as citric (500 ppm), gibberellic (25 ppm) and salsilic (500 ppm) on the total and early pepper fruits, as well as its some physical properties in the two seasons of 2006 and 2007 are presented in Table (3). The obtained results indicate that the used organic acids caused an enhancement in the total and early fruits yield over the control treatment. Within the 3 organic acids, the GA3 application resulted the heaviest tonnage of total (4.97 and 5.27 tons/fed. in 1st and 2nd season respectively) and early (2.7 and 2.19 tons/fed. for the same respectively), followed in descending order by Salsilic acid and citric acid. These were completely similar in both experiments. The differences within the organic acids treatments were enough to be significant for total and early yields in the two experiments. It is known that, the main role of GA_3 in plant growth and fruits yield where it caused an inlargment and number of plants tissues, hence gave a big vegetative growth which turn rising total fruits yield and its components. The obtained data are in good accordance with that which reported by[30,18,6,27,20,10,15].

Regarding to response of some physical properties, i.e. fruit length, diameters and average weight to the organic acids treatments in the two experimental seasons, the obtained data are shown in Table (3). It evident that, the best values of physical properties were associated to the application of GA_3, followed in decreasing order by salsilic acid and lastly by citric acid. By other means it could be constracted that the organic acid treatments caused an improve in the physical character of sweet pepper fruits. These results were true in the two experiments. Moreover, the statistical analysis of the obtained data reveals that, the differences within organic acids treatments were great enough to reach the 5 % levels in both seasons, except that of fruit length in 2nd season. The promotion effect of GA_3 on some physical properties are studied previously by others and their obtained data support that written here[25,20,10,22].

Effect of the Interaction: The interaction between urea application methods and foliar spraying by some organic acids and their effects on total, early fruits yield and the physical fruits measurements in both season of 2006 and 2007 are shown in Table (3). Whereas, total fruits yield as tons/fed., in two seasons and early yield 2nd season, responsed no significantly by the interaction treatments. Also, fruit length and average weight followed the same pattern of change previously mentioned. Generally, it could be concluded that, the interaction treatment had little effect on the fruits yield and its physical properties. This might be attributed to that, each factor of the interaction treatment act independently.

Table 3: Effect of urea and some organic acids on the yield and quality of sweet pepper during the experimental seasons of 2006 and 2007.

Treatments		Fruit			Fruits yield Ton/fed.		Fruits			Fruits yield Ton/fed.	
Urea	Organic acids	Length (cm)	Diameter (cm)	Average wt. g	Total	Early	Length (cm)	Diameter (cm)	Average wt. g	Total	Early
		2006					2007				
Foliar	0	5.13	3.98	51.90	3.27	2.19	6.13	3.70	46.74	2.783	1.727
	Citric	5.80	4.13	54.90	3.80	2.30	6.24	3.31	49.06	3.317	1.997
	GA_3	6.57	4.50	67.33	4.27	2.60	6.71	6.24	58.17	5.160	2.253
	Salsilic	6.10	4.37	59.67	3.93	2.47	6.45	3.65	49.23	4.070	2.063
Mean		5.90	4.24	58.45	3.82	2.39	6.38	4.23	50.80	3.833	2.010
Soil dressing	0	5.73	4.07	58.90	4.20	2.50	6.38	2.90	48.31	2.703	1.980
	Citric	6.13	4.20	66.33	4.47	2.67	6.37	3.23	49.50	3.403	2.093
	GA_3	6.63	4.73	69.00	5.67	2.80	7.47	3.56	58.60	5.387	2.143
	Salsilic	6.37	4.50	65.67	4.80	4.80	6.58	3.20	49.97	4.357	2.113
Mean		6.22	4.38	64.98	4.78	3.19	6.70	3.22	51.59	3.963	2.083
Average	0	5.43	4.02	55.40	3.73	2.35	6.26	3.30	47.52	2.743	1.853
	Citric	5.97	4.17	60.62	4.13	2.48	6.31	3.27	49.28	3.360	2.045
	GA_3	6.60	4.62	68.17	4.97	2.70	7.09	4.90	58.38	5.273	2.198
	Salsilic	6.23	4.43	62.67	4.37	3.63	6.52	3.43	49.60	4.213	2.088
L.S.D. at 5%	Urea	N.S.	N.S.	0.55	0.29	0.19	N.S.	0.42	N.S.	N.S.	N.S.
	Organic acid	0.30	0.11	1.46	0.41	0.15	N.S.	0.67	5.80	0.431	0.159
	Interactions	N.S.	N.S.	2.07	N.S.	0.21	N.S.	0.95	N.S.	N.S.	N.S.

N.S: not significant.

Chemical Constituents:

Effect of Urea Application: The method of urea application affected the chemical content, i.e. total soluble solids, total acidity, vitamin C, N, P, K, Zn, Cu, Ni and Pb of sweet pepper fruits in the two experiments of 2006 and 2007 as shown in Tables (4 and 5). Using urea as nitrogen fertilizer applied as soil dressing had a significant encourages in all the above chemical constituents, in both experiments, except that of total soluble solids in the two seasons, total acidity and Vitamin C values only in 2nd season. Generally, the obtained data reveals that, using urea as soil dressing gave the higher values of chemical constituents if compared with that of the foliar spraying.

It could be conducted that, the nature method for absorption nutrients is through roots, where, the big quantities of nitrogen needed and/or other major elements, it's not possible to adsorb through the foliar application. So, increases the nitrogen in rooting media absolutely will increase the absorption increase of the elemental nutrition by plant, consequently increase their concentration in plant tissues. The obtained results are in accordance with those obtained by[13,26]. N the other hand, the results recorded by[14,24]. indicated that application method of nitrogen fertilizer had no great effect on the nutritional elements in plant tissues.

Effect of Organic Acids: Organic acids such as citric, gibberellic and salsilic caused an enhancement in the chemical constituents of sweet pepper fruits if compared with the control treatment. Moreover, using GA_3 at a rate of 25 ppm resulted in the highest values of all chemical constituents in both seasons. The statistical analysis of the obtained data reveals that the differences within different organic acids treatments were great enough to reach the 5 % levels in both seasons. Generally, it could be concluded that, the application of GA_3 as foliar for sweet pepper plants caused an improvement in chemical constituents of fruits. These findings are supported by those reported by[17,8,18,20,22,15].

Effect of the Interactions: The interaction between urea application method and organic acids treatments affected the chemical constituents of pepper fruits as shown in Tables (4 and 5) for the two experimental seasons. Whereas, total soluble solids, total acidity,

vitamin C in both seasons and protein content, N, P and Pd contents in 2nd season responsed no significantly by the interaction treatment. Generally, in spite of the no significant effect, but, it could be stated that, the soil dressing application of urea and the foliage spraying by GA_3 resulted the highest values of chemical constituents in both seasons.

Table 4: Effect of urea and some organic acids on the chemical content of sweet pepper during the experimenta season of 2006.

Treatments		TSS	mg./100 g.		%				ppm			
Urea	Organic acids		Acidity	VC	Protein	N	P	K	Zn	Cu	Ni	Pb
Foliar	0	4.47	130.03	74.37	11.85	1.90	0.24	1.42	9.10	27.73	0.85	4.20
	Citric	4.90	131.67	81.57	13.65	2.18	0.26	1.63	9.63	32.73	1.40	6.43
	GA_3	5.23	144.00	98.03	15.00	2.40	0.29	1.82	14.00	37.13	1.72	7.33
	Salsilic	4.97	139.33	92.03	14.50	2.32	0.28	1.73	11.22	34.07	1.50	6.50
Mean		4.89	136.26	86.50	86.50	2.20	0.27	1.65	10.99	32.92	1.37	6.12
Soil dressing	0	4.73	132.67	80.00	13.81	2.21	0.27	1.58	9.33	33.27	0.98	4.93
	Citric	5.07	134.00	85.00	14.46	2.31	0.28	1.94	11.80	34.60	1.45	6.90
	GA_3	5.57	146.00	99.00	15.63	2.50	0.32	2.06	15.10	47.13	1.85	8.13
	Salsilic	5.33	141.67	93.00	15.15	2.42	0.29	2.00	13.50	44.17	1.59	7.37
Mean		5.18	138.58	89.25	89.25	2.36	0.29	1.89	12.43	39.79	1.47	6.83
Average	0	4.60	131.35	77.18	12.83	2.05	0.26	1.50	9.22	30.50	0.91	4.57
	Citric	4.99	132.83	83.28	14.05	2.25	0.27	1.78	10.72	33.67	1.42	6.67
	GA_3	5.40	145.00	98.52	15.31	2.45	0.31	1.94	14.55	42.13	1.79	7.73
	Salsilic	5.15	140.50	92.52	14.82	2.37	0.29	1.87	12.36	39.12	1.55	6.93
L.S.D. at 5%	Urea	N.S.	1.45	1.18	0.69	0.11	0.02	0.03	0.32	0.57	0.03	0.09
	Organic acid	0.20	1.68	2.09	0.80	0.13	0.01	0.04	0.16	0.47	0.03	0.15
	Interactions	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	0.05	0.23	0.67	0.04	N.S.

N.S: not significant

Table 5: Effect of urea and some organic acids on the chemical content of sweet pepper during the experimental season of 2007.

Treatments		TSS	mg./100 g.		%				ppm			
Urea	Organic acids		Acidity	Acidity	Protein	N	P	K	Zn	Cu	Ni	Pb
Foliar	0	5.43	123.30	61.43	10.79	1.73	0.19	1.30	8.47	28.13	0.94	3.40
	Citric	5.71	125.87	70.63	13.71	2.19	0.23	1.67	10.93	29.20	1.21	4.67
	GA_3	6.94	134.90	77.97	14.71	2.35	0.30	1.97	12.70	34.67	1.71	6.00
	Salsilic	6.33	131.37	71.37	14.29	2.29	0.26	1.84	12.13	29.67	1.51	5.77
Mean		6.10	128.86	70.35	13.38	2.14	0.25	1.70	11.06	30.42	1.35	4.96
Soil dressing	0	5.43	125.10	67.33	13.96	2.23	0.28	2.00	9.20	30.73	1.00	3.86
	Citric	5.78	126.60	71.00	15.19	2.43	0.32	2.17	11.84	36.07	1.33	4.87
	GA_3	7.01	135.13	79.63	16.38	2.62	0.36	2.31	14.50	42.33	1.91	6.60
	Salsilic	6.41	131.60	72.83	15.65	2.50	0.34	2.27	12.40	38.30	1.71	5.50
Mean		6.16	129.61	72.70	15.29	2.45	0.32	2.19	11.99	36.86	1.49	5.21
Average	0	5.43	124.20	64.38	12.38	1.98	0.24	1.65	8.83	29.43	0.97	3.63
	Citric	5.75	126.23	70.82	14.45	2.31	0.28	1.92	11.39	32.63	1.27	4.77
	GA_3	6.98	135.02	78.80	15.54	2.49	0.33	2.14	13.60	38.50	1.81	6.30
	Salsilic	6.37	131.48	72.10	14.97	2.40	0.30	2.05	12.27	33.98	1.61	5.63

Table 5: Continued.

L.S.D. at 5% Urea	N.S.	N.S.	N.S.	0.10	0.02	0.01	0.04	0.42	0.34	0.01	0.25
Organic acid	0.26	1.59	2.73	0.11	0.02	0.01	0.03	0.20	0.53	0.02	0.18
Interactions	N.S.	N.S.	N.S.	0.16	0.03	0.01	0.05	0.29	0.75	0.02	0.25

N.S: not significant.

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