

Table (2). Effect of silicon levels, application methods and their interaction on plant height, number of shoots and leaves/plant of Zinnia during 2015 and 2016 seasons

Treatments	Plant height (cm)		No. of Shoots/plant		No. of leaves/plant		
	2015	2016	2015	2016	2015	2017	
Application methods							
Soil	20.66a	21.5a	6.38a	6.83a	31.83a	32.38a	
Foliar	20.27a	20.66a	6.11a	6.38b	29.61a	28.77b	
Silicon levels (ppm)							
0.00 (Cont.)	17.16d	17.83d	4.50d	4.83c	22.66f	22.66f	
100	18.16d	18.50d	5.00d	5.33c	26.16e	25.20e	
200	19.83c	19.83c	5.66c	6.16b	29.66d	29.83d	
300	21.66b	22.33b	6.83b	7.33a	32.00c	32.83c	
400	22.33b	23.50ab	7.50a	7.83a	35.00b	34.66b	
500	23.66a	24.50a	8.00a	8.16a	38.83a	38.00a	
Interaction							
Soil	0.00(Cont.)	17.33c	18.00e	4.67d	5.00cd	22.67f	23.33fg
	100	18.33c	18.66e	5.33cd	5.66bcd	26.67e	26.33de
	200	19.66bc	20.33cde	5.67bcd	6.33abcd	30.66cd	32.33c
	300	22.00ab	23.00abc	7.00ab	7.66ab	33.00c	35.33b
	400	22.66ab	24.00ab	7.67a	8.00ab	36.66b	36.66b
	500	24.00a	25.00a	8.00a	8.33a	41.33a	40.33a
Foliar	0.00(Cont.)	17.00c	17.66e	4.33d	4.66d	22.66f	22.00g
	100	18.00c	18.33e	4.66d	5.00cd	25.66ef	24.66ef
	200	20.00bc	19.33de	5.66bcd	6.00abcd	28.66de	27.33d
	300	21.33ab	21.66bcd	6.66abc	7.00abc	31.00cd	30.33c
	400	22.00ab	23.00abc	7.33a	7.66ab	33.33c	32.66c
	500	23.33a	24.00ab	8.00a	8.00ab	36.33b	35.66b

Means within a column having the same letters are not significantly differences according to Duncan's multiple range test (DMRT).

Table (3) Effect of silicon levels, application methods and their interaction on stem thickness, leaf area and total green color (SPAD) of Zinnia during 2015 and 2016 seasons

Treatments	Stem thickness (mm)		Leaf area (cm ²)		Total green color (SPAD)		
	2015	2016	2015	2016	2015	2016	
Application methods							
Soil	7.15a	7.51a	26.51a	26.66a	38.89a	39.09a	
Foliar	6.50b	6.93b	25.22b	25.76b	38.57a	38.56a	
Silicon levels (ppm)							
0.00 (Cont.)	5.41e	5.85e	21.58e	22.33d	35.20f	35.31f	
100	5.85de	6.28de	23.05de	23.50d	36.70e	36.91e	
200	6.50cd	6.93cd	24.61d	25.46c	37.96d	37.95d	
300	7.15bc	7.58bc	26.6c	27.33b	39.10c	39.51c	
400	7.80ab	8.01ab	28.71b	28.50b	40.81b	40.90b	
500	8.23a	8.66a	30.66a	30.16a	42.63a	42.38a	
Interaction							
Soil	0.00(Cont.)	5.20h	5.63b	21.73f	22.66ef	35.63de	35.86de
	100	5.63g	6.06b	24.10ef	24.33def	37.23cd	37.50cd
	200	6.06f	6.50ab	25.53de	25.66cde	38.00cd	38.03cd
	300	6.93e	7.36ab	27.06cd	27.33bcd	39.13bc	39.83bc
	400	7.36d	7.80ab	29.33abc	29.00ab	40.70ab	41.06ab
Foliar	0.00(Cont.)	5.63g	6.06b	21.43f	22.00f	34.76e	34.76e
	100	6.06f	6.50ab	22.00f	22.66ef	36.16de	36.33de
	200	6.93e	7.36ab	23.70ef	25.26cde	37.93cd	37.86cd
	300	7.36d	7.80ab	26.13de	27.33bcd	39.06bc	39.20bc
	400	8.23b	8.23ab	28.10bcd	28.00bc	40.93ab	40.73ab
	500	8.66a	9.10a	30.00ab	29.33ab	42.60a	42.50a

Means within a column having the same letters are not significantly differences according to Duncan's multiple range test (DMRT).

Table (4)Effect of silicon levels, application methods and their interaction on fresh and dry weight of vegetative parts and roots of zinnia plant during 2015 and 2016 seasons

Treatments	Vegetative parts/plant				Roots				
	Fresh weight(g)		Dry weight (g)		Fresh weight (g)		Dry weight (g)		
	2015	2016	2015	2016	2015	2016	2015	2016	
Application methods									
Soil	74.46a	75.12a	12.80a	12.92a	20.95a	21.18a	4.79a	5.06a	
Foliar	70.09b	70.69b	12.03b	12.09b	20.26b	20.41b	4.55b	4.70b	
Silicon levels (ppm)									
0.00 (Cont.)	50.52f	50.88f	8.44f	9.02e	17.20e	16.97f	3.85f	3.97f	
100	60.12e	61.69e	10.86e	10.91d	18.58d	18.78e	4.17e	4.42e	
200	69.49d	71.05d	12.36d	12.65c	20.31c	20.53d	4.59d	4.78d	
300	78.11c	78.04c	13.15c	13.45b	21.88b	21.87c	4.96c	5.17c	
400	48.18b	84.80b	14.37b	13.97b	22.25b	22.91b	5.09b	5.38b	
500	91.26a	90.98a	15.34a	15.04a	23.41a	23.70a	5.37a	5.57a	
Interaction									
Soil	0.00(Cont.)	51.86ef	51.52f	8.86g	9.04d	17.72f	17.42f	3.98g	4.12ef
	100	63.14d	65.07d	9.89f	10.10d	18.91de	19.00de	4.25ef	4.56d
	200	72.74c	75.46c	11.08e	11.67c	20.81c	21.07c	4.73d	5.02c
	300	81.33b	81.96b	12.60cd	12.89bc	21.99bc	22.20bc	5.02bc	5.29bc
	400	85.70ab	84.70ab	14.24ab	13.62ab	22.55b	23.33ab	5.24b	5.63b
	500	92.01a	92.02a	15.51a	15.26a	23.73a	24.09a	5.55a	5.77a
Foliar	0.00(Cont.)	49.18f	50.24f	8.01g	9.01d	16.67g	16.52f	3.72h	3.83f
	100	57.09e	58.30e	11.83de	11.72c	18.26ef	18.56e	4.09fg	4.28de
	200	66.23d	66.64d	13.64bc	13.62ab	19.81d	20.00d	4.45e	4.55d
	300	74.89c	74.12c	13.69bc	14.00ab	21.76bc	21.54c	4.90cd	5.06c
	400	82.66b	84.90ab	14.50ab	14.32ab	21.96bc	22.50bc	4.94cd	5.13c
	500	90.50a	89.93ab	15.16a	14.82ab	23.08ab	23.32ab	5.20b	5.36bc

Means within a column having the same letters are not significantly differences according to Duncan's multiple range test (DMRT).

Table (5) Effect of silicon levels, application methods and their interaction on number of flowers, flower diameter and vase life of Zinnia plant during 2015 and 2016 seasons

Treatments	Number of flowers/plant		Flower diameter (cm)		Vase life (days)		
	2015	2016	2015	2016	2015	2016	
Application methods							
Soil	5.88a	6.00a	6.40a	6.57a	8.05a	8.11a	
Foliar	5.38a	5.05b	5.74b	5.68b	7.72a	7.88a	
Silicon levels (ppm)							
0.00 (Cont.)	4.66d	4.33d	4.91f	5.01f	5.50d	6.16d	
100	4.83d	4.83cd	5.36e	5.33e	7.00c	6.83cd	
200	5.50c	5.33bcd	5.75d	5.80d	7.66c	7.50c	
300	5.83bc	5.83abc	6.26c	6.35c	8.50b	8.66b	
400	6.33ab	6.16ab	6.76b	6.78b	9.16ab	8.83b	
500	6.66a	6.66a	7.35a	7.51a	9.50a	10.00a	
Interaction							
Soil	0.00(Cont.)	5.00abc	4.66bc	5.10fg	5.26fg	5.66d	6.33de
	100	5.00abc	5.33abc	5.46d-g	5.50efg	7.33bc	6.66cde
	200	5.66abc	5.66abc	6.03cde	6.26cd	7.66abc	7.66bcde
	300	6.00abc	6.33abc	6.73bc	6.83bc	8.67ab	8.66abcd
	400	6.66ab	6.66ab	7.20b	7.43b	9.33ab	9.00abc
	500	7.00a	7.33a	7.86a	8.16a	9.66a	10.33a
Foliar	0.00(Cont.)	4.33c	4.00c	4.73g	4.76g	5.33d	6.00e
	100	4.66bc	4.33bc	5.26efg	5.16fg	6.66cd	7.00cde
	200	5.33abc	5.00abc	5.46d-g	5.33fg	7.66abc	7.33bcde
	300	5.66abc	5.33abc	5.80def	5.86def	8.33abc	8.66abcd
	400	6.00abc	5.66abc	6.33cd	6.13de	9.00ab	8.66abcd
	500	6.33abc	6.00abc	6.83bc	6.86bc	9.33ab	9.66ab

Means within a column having the same letters are not significantly differences according to Duncan's multiple range test (DMRT).

Table (6) Effect of silicon levels, methods of application and their interaction on leaf minerals percent (N,P,K and Si) of Zinnia plant during 2015 and 2016 seasons

Treatments	Leaf minerals percent								
	N (%)		P (%)		K (%)		Si (ppm)		
	2015	2016	2015	2016	2015	2016	2015	2016	
Application methods									
Soil	2.44a	2.38a	0.31a	0.31a	1.45a	1.45a	1.09a	1.09a	
Foliar	2.33b	2.36a	0.28 b	0.27b	1.32a	1.33b	0.96b	0.98b	
Silicon levels (ppm)									
0.00 (Cont.)	1.99e	2.01d	0.25d	0.25e	1.30f	1.31f	0.43e	0.48d	
100	2.34d	2.38c	0.28c	0.27d	1.34e	1.35e	0.98d	1.05c	
200	2.40c	2.42bc	0.29c	0.28d	1.37d	1.37d	1.11c	1.14b	
300	2.44c	2.43bc	0.31b	0.29c	1.39c	1.40c	1.14c	1.15b	
400	2.50b	2.47b	0.32a	0.31b	1.43b	1.43b	1.22b	1.16b	
500	2.64a	2.50a	0.32a	0.33a	1.49a	1.48a	1.28a	1.23a	
Interaction									
Soil	0.00(Cont.)	1.99e	2.00c	0.26fg	0.26e	1.36de	1.37ef	0.50d	0.56d
	100	2.36cd	2.40b	0.30cde	0.28cd	1.37de	1.38de	1.06b	1.16ab
	200	2.42cd	2.44ab	0.31cd	0.29cd	1.41cd	1.42d	1.15b	1.18ab
	300	2.48cd	2.44ab	0.32c	0.30c	1.44c	1.46c	1.16b	1.17ab
	400	2.56b	2.48ab	0.34b	0.33b	1.51b	1.51b	1.29a	1.20ab
	500	2.83a	2.53a	0.36a	0.36a	1.60a	1.57a	1.36a	1.25a
Foliar	0.00(Cont.)	2.00e	2.03c	0.25g	0.25f	1.24f	1.26g	0.36e	0.40e
	100	2.33d	2.37b	0.27ef	0.27de	1.31e	1.32f	0.90c	0.93c
	200	2.39cd	2.41ab	0.27ef	0.27de	1.33e	1.33ef	1.07b	1.10b
	300	2.41cd	2.43ab	0.30cde	0.29cd	1.34e	1.35ef	1.12b	1.13ab
	400	2.44cd	2.45ab	0.30cde	0.29cd	1.34e	1.35ef	1.14b	1.13ab
	500	2.45c	2.46ab	0.29de	0.29cd	1.37de	1.38de	1.20b	1.20ab

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