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Assess the effect of different levels of micronutrient on quality attributes of guava (*Psidium guajava* L.)" Cv Allahabad Safeda

Yatendra Kumar Singh, SS Singh, RajKumar Singh, VM Prasad and Atul Yadav

Abstract
The present investigation was conducted with the objective to know the effect on quality attributes at the Department of Horticulture, Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad (U.P) during two consecutive years 2015-16 & 2016-17. The experiments were laid out 4×4 Factorial in Randomised Block Design (RBD) with sixteen treatment combinations and three replications. The material used in the experiment was two micronutrients *viz.,* Zn (Zinc sulphate) & B (Boric acid) and their different combinations with levels *i.e*,0.0 %, 0.4%, 0.6% & 0.8 % as foliar spray was applied twice at before and after fruit set. The observations were recorded on different quality traits *viz.,* total soluble solids (°B) sugar –acid ratio,total sugar (%), reducing sugar (%), non-reducing sugar (%), Acidity (%), ascorbic acid (Vitamin C mg/100g of pulp) and specific gravity. The experiments revealed that foliar application of Z_3 (zinc sulphate @ 0.8 per cent) before fruit set and after fruit set resulted in higher yield, fruit weight, equatorial and polar diameter specific gravity, TSS, acidity, ascorbic acid, total sugar, non-reducing sugar and sugar-acid ratio. Out of sixteen treatment combinations tried in this study, Z_3B_1 (0.8% zinc sulpahte + 0.4% boric acid) emerged as superior over all other treatment combinations in relation to quality attributes during both the years.

Keywords: Guava, Zinc, Boron, quality characters

Introduction
Guava (*Psidium guajava* L.), is one of the most important tropical and sub-tropical fruit crop of India, which belongs to the family Myrtaceae. It is native of tropical America, stretching from Mexico to Peru and introduced in India by Portuguese. Guava has been growing from Mexico to Peru. In India it has been introduced in early 17th century and gradually become a commercial crop all over country particularly Maharashtra, Uttar Pradesh, Bihar, Orissa, Punjab, Uttrakhand, Gujarat, Madhya Pradesh, Karnataka and West Bengal. In Uttar Pradesh is extensively grown in Lucknow. The total cultivated area of guava fruits in India ranging from 268.2 thousand hectare with annual production ranging from 3667.9 thousand MT. (Anonymous, 2014-15) [2].

Guava is a rich source of Vitamin C and Pectin. It contain 82.5 per cent water, 2.45 per cent Acid, 5.40 per cent reducing sugar, 4.80 per cent non reducing, sugar, 13.60 0Brix total soluble solids, 0.48 per cent ash and 147.34 mg, Vitamin "C"/100gm fruit differ with cultivar, stage of maturity and season. Fruit pulp as well as good amount of iron, calcium and phosphorous. These fruit are consumed either fresh or processed in the form of products like jam, jelly, cheese, juice, nectar, ready to serve (RTS) etc. In some counties the leaves are used for curing diarrhoea and also used for dyeing and tanning. The role of nutrients and plant growth regulators for improving the growth and development, fruit set, control of fruit drop, fruit maturation, fruit quality and overcoming the physiological and nutritional disorders have been well established in number of tropical, sub-tropical and temperate fruit crops. (Ghosh, S.N., 1994) However, it has been studied the physiological, biochemical and biological activities in plant systems are highly influenced due to interaction of nutrients and plant growth regulators. Among, the foliar application of different levels of nutrients viz., Zinc sulphate ($ZnSO_4$), Potassium sulphate (K_2SO_4), Gibberellins (GA_3) etc, have been found more effective in improving the flowering, fruit sets, fruit yield and fruit quality in number of fruit crops. Similar, studies on foliar application of nutrients and plant growth regulators have earlier been under taken to find out the effect on fruit sets, fruit drop, fruit size, fruit maturation, fruit yield and fruit quality of guava.

The micro-nutrients play vital role in growth, development, retention and quality of fruits.

The foliar feeding of micro-nutrients has gained much importance in recent years and comparatively more effective for rapid recovery of plants, as under high soil pH conditions, most of macro and micro-nutrients are unavailable. Various trials have been conducted on foliar feeding of micro-nutrients in different fruit crops and found effective in improving the vegetative growth, yield and quality of fruits (Sindhu *et al.,* 1994; Banik *et al.*, 1997 and Babu and Singh, 1998) [9, 4, 3].

Materials and Methods

Detail of treatments

The zinc was used in form of zinc sulphate and Boron in the form of Boric acid at the time of bud initiation stage by foliar application at 15 days interval.

1. **Levels of Zinc (Z)**
   - Z0 0.0 %
   - Z1 0.4 %
   - Z2 0.6%
   - Z3 0.8%

2. **Levels of Boron (B)**
   - B0 0.0 %
   - B1 0.4 %
   - B2 0.6%
   - B3 0.8%

The acidity was determined in accordance with the method suggested by (A. O. A. C., 1990) [1]. Sugar were determined by Lane and Eynon method (A. O. A. C., 1990) [1] and expressed in percentage (%).Total sugars were estimated by titrating boiling mixture of 5 ml each Fehling a and Fehling B solution against hydrolyzed aliquot using methylen blue dye as indicator (A. O. A. C., 1990) [1].

Results and Discussion

The quality parameters *viz.,* total soluble solids, total sugars, reducing sugar, non-reducing sugar, acidity, ascorbic acid and specific gravity significantly influenced due to foliar application of boron and zinc alone or in combination during both the years.

In Table 1 shows that maximum total soluble solids were accumulated with zinc sulphate level Z_3 (0.8%) which was statistically at par with Z_2 (0.6%) and remaining treatments accumulated significantly lesser total soluble solids. While, the minimum total soluble solids was recorded with Z_0 (0.0%). Spray of boric acid B_1 (0.4%) recorded maximum total soluble solids which was statistically at par with B_2 and B_3, the minimum was with B_0 (0.0%). The interaction between zinc sulphate and boric acid levels was found significant and maximum total soluble solids was with Z_3B_1 (0.8% zinc sulphate + 0.4% boric acid) followed by with Z_2B_1 (0.6% zinc sulphate + 0.4% boric acid) and the minimum remained with Z_0B_0 (Control) during both years of experimentation.

The higher total soluble solids might be due to the efficient translocation of photosynthates to the fruit by regulation of boron. Growth in physico – chemical characters of guava fruit might have been augmented due to higher synthesis of nucleic acids. Increase in total soluble solids may be on account of maximum availability of plant metabolism. The results are more or less similar to the findings of Rawat *et al.* (2010) [8].

The present study revealed that the maximum reducing sugar %, non-reducing and total sugars were accumulated with zinc sulphate level Z_3 (0.8%) followed by Z_2 (0.6%) and Z_1 (0.4%).While, the minimum reducing sugar %, non-reducing and total sugars were recorded with Z_0 (0.0%). Spray of boric acid B_1 (0.4%) recorded maximum reducing sugar %, non-reducing and total sugars which were statistically at par with B_2 and remaining treatments accumulated significantly lesser sugars. the minimum were with B_0 (0.0%). The interaction between zinc sulphate and boric acid levels was found significant and maximum reducing sugar %, non-reducing and total sugars were with Z_3B_1 (0.8% zinc sulphate + 0.4% boric acid) followed by with Z_2B_1 (0.6% zinc sulphate + 0.4% boric acid) and the minimum remained with Z_0B_0 (Control) during both the years.

The higher percentage of total sugar, reducing sugar and non–reducing sugar might be due to efficient translocation photosynthates to the fruits by regulation of boric acid. Augmentation of sugar percentage may be attributable to higher synthesis of nucleic acids, on account of maximum availability of plants metabolism. These results are in conformity with the findings of Singh and Brahmachari (1999) [10], Das *et al.* (2000) [5] and El-Sheriff *et al.* (2000).

Foliar spray of zinc sulphate, boric acid and their interaction significantly influenced the acidity % of guava during both the years (Y_1= 2015-16 & Y_2= 2016-17).

The maximum acidity % was recorded with zinc sulphate level Z_3 (0.8%) which was statistically at par with Z_2 (0.6%). While, the minimum acidity % was recorded with Z_0 (0.0%). Spray of boric acid B_3 (0.8%) recorded maximum acidity % and remaining treatments accumulated significantly lesser acidity. While, the minimum was with B_0 (0.0%). The interaction between zinc sulphate and boric acid levels was found significant and maximum acidity %) was with Z_3B_3 (0.8% zinc sulphate + 0.8% boric acid) followed by with Z_3B_1 (0.8% zinc sulphate + 0.4% boric acid) and the minimum remained with Z_0B_0 (Control) during both the years. Acidity percentage of guava fruit might have been augmented due to higher synthesis of nucleic acids, on account of maximum availability of plant metabolism. El-Sherif *et al.* (2000) have also reported similar results.

The maximum ascorbic acid was recorded with zinc sulphate level Z_3 (0.8%) which was statistically at par with Z_2 (0.6%). While, the minimum ascorbic acid was recorded with Z_0 (0.0%). Spray of boric acid B_1 (0.4%) recorded maximum ascorbic acid which was at par with B_2 and B_3. While, the minimum was with B_0 (0.0%). The interaction between zinc sulphate and boric acid levels was found significant and maximum ascorbic acid was with Z_3B_1 (0.8% zinc sulphate + 0.4% boric acid) followed by mg with Z_2B_1 (0.6% zinc sulphate + 0.4% boric acid) and the minimum remained with Z_0B_0 (Control) during both the years. Accumulation of ascorbic acid percentage of guava fruit might have been due to higher synthesis of nucleic acid, on account of maximum availability of plant metabolism. El-Sharif *et al.* (2000) and Jaiprakash *et al.* (2006) [7] have also reported similar results.

Foliar spray of zinc sulphate, boric acid and their interaction significantly influenced the specific gravity of guava during both the years (Y_1= 2015-16 & Y_2= 2016-17).

Maximum specific gravity was recorded with zinc sulphate level Z_3 (0.8%) which was statistically at par with Z_2 (0.6%). While, the minimum specific gravity was recorded with Z_0 (0.0%). Spray of boric acid B_3 (0.8%) recorded maximum specific gravity which was at par with B_1 and B_2. While, the minimum specific gravity was with B_0 (0.0%). The interaction between zinc sulphate and boric acid levels was found significant and maximum specific gravity was with Z_3B_1 (0.8% zinc sulphate + 0.4% boric acid) followed by with Z_2B_1 (0.6% zinc sulphate + 0.4% boric acid) and the minimum remained with Z_0B_0 (Control) during both the years.

Table 1: Effect of foliar application of Zinc, Boron and their interaction on TSS of Guava (*Psidium guajava* L.) during winter seasons of 2015-16 & 2016-17

TSS (°B) Y_1 (2015-16)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	9.62	11.53	12.11	12.17	11.36
B_1 (0.4%)	10.58	11.79	15.40	15.48	13.32
B_2 (0.6%)	11.25	12.79	13.61	13.68	12.83
B_3 (0.8%)	11.36	12.92	13.75	13.81	12.96
Mean	10.70	12.26	13.72	13.79	12.62
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.32	0.65		
Boron (B)	S	0.32	0.65		
Interaction (Z x B)	S	0.63	1.29		

TSS (°B)Y_2 (2016-17)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	9.71	11.65	12.23	12.29	11.47
B_1 (0.4%)	10.69	11.91	15.56	15.64	13.45
B_2 (0.6%)	11.36	12.92	13.75	13.81	12.96
B_3 (0.8%)	11.47	13.05	13.88	13.95	13.09
Mean	10.81	12.38	13.85	13.92	12.74
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.36	0.74		
Boron (B)	S	0.36	0.74		
Interaction (Z x B)	S	0.73	1.48		

Table 2: Effect of foliar application of Zinc, Boron and their interaction on Sugar acid ratio of Guava (*Psidium guajava* L.) during winter seasons of 2015-16 & 2016-17

Sugar acid ratio Y_1 (2015-16)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	15.53	15.62	14.70	14.70	15.14
B_1 (0.4%)	14.77	15.64	15.91	15.91	15.56
B_2 (0.6%)	15.22	14.56	15.22	15.22	15.06
B_3 (0.8%)	15.22	14.56	15.22	15.22	15.06
Mean	15.18	15.09	15.27	15.27	15.20
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.18	0.36		
Boron (B)	S	0.18	0.36		
Interaction (Z x B)	NS	0.35	-		

Sugar acid ratioY_2 (2016-17)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	15.69	15.77	14.85	14.85	15.29
B_1 (0.4%)	14.92	15.79	16.07	16.07	15.71
B_2 (0.6%)	15.37	14.70	15.38	15.38	15.21
B_3 (0.8%)	15.37	14.70	15.38	15.38	15.21
Mean	15.34	15.24	15.42	15.42	15.35
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.18	0.36		
Boron (B)	S	0.18	0.36		
Interaction (Z x B)	NS	0.35	-		

Table 3: Effect of foliar application of Zinc, Boron and their interaction on total sugars of Guava (*Psidium guajava* L.) during winter seasons of 2015-16 & 2016-17

Total sugars (%) Y_1 (2015-16)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	5.81	7.12	7.66	7.70	7.07
B_1 (0.4%)	6.42	7.37	8.66	8.70	7.79
B_2 (0.6%)	6.81	7.87	8.29	8.33	7.83
B_3 (0.8%)	6.90	7.95	8.37	8.41	7.91
Mean	6.48	7.58	8.25	8.29	7.65
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.13	0.26		
Boron (B)	S	0.13	0.26		
Interaction (Z x B)	S	0.25	0.52		

Total sugars (%) Y_2 (2016-17)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	5.86	7.19	7.74	7.78	7.14
B_1 (0.4%)	6.48	7.45	8.75	8.79	7.87
B_2 (0.6%)	6.88	7.95	8.37	8.41	7.90
B_3 (0.8%)	6.95	8.03	8.46	8.50	7.98
Mean	6.54	7.65	8.33	8.37	7.72
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.10	0.20		
Boron (B)	S	0.10	0.20		
Interaction (Z x B)	S	0.20	0.40		

Table 4: Effect of foliar application of Zinc, Boron and their interaction on reducing sugar of Guava (*Psidium guajava* L.) during winter seasons of 2015-16 & 2016-17

Reducing sugar (%) Y_1 (2015-16)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	2.97	4.23	4.77	4.79	4.19
B_1 (0.4%)	3.51	4.46	4.88	4.90	4.44
B_2 (0.6%)	4.09	5.00	4.80	4.83	4.68
B_3 (0.8%)	4.10	5.01	4.85	4.88	4.71
Mean	3.67	4.67	4.83	4.85	4.51
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.11	0.23		
Boron (B)	S	0.11	0.23		
Interaction (Z x B)	S	0.22	0.46		

Reducing sugar (%) Y_2 (2016-17)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	2.99	4.26	4.80	4.82	4.22
B_1 (0.4%)	3.53	4.48	4.91	4.93	4.46
B_2 (0.6%)	4.11	5.03	4.83	4.86	4.71
B_3 (0.8%)	4.13	5.04	4.88	4.91	4.74
Mean	3.69	4.70	4.86	4.88	4.53
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.12	0.25		
Boron (B)	S	0.12	0.25		
Interaction (Z x B)	S	0.25	0.50		

Table 5: Effect of foliar application of Zinc, Boron and their interaction on non-reducing sugar of Guava (*Psidium guajava* L.) during winter seasons of 2015-16 & 2016-17

Non-reducing sugar (%) Y_1 (2015-16)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	2.83	2.88	2.89	2.90	2.88
B_1 (0.4%)	2.91	2.92	3.78	3.80	3.35
B_2 (0.6%)	2.72	2.89	3.49	3.50	3.15
B_3 (0.8%)	2.77	2.94	3.52	3.54	3.19
Mean	2.81	2.91	3.42	3.44	3.14
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.07	0.14		
Boron (B)	S	0.07	0.14		
Interaction (Z x B)	S	0.14	0.28		

Non-reducing sugar (%) Y_2 (2016-17)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	2.87	2.93	2.94	2.95	2.92
B_1 (0.4%)	2.95	2.96	3.84	3.86	3.40
B_2 (0.6%)	2.77	2.93	3.54	3.56	3.20
B_3 (0.8%)	2.82	2.99	3.58	3.59	3.24
Mean	2.85	2.95	3.47	3.49	3.19
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.04	0.07		
Boron (B)	S	0.04	0.07		
Interaction (Z x B)	S	0.07	0.15		

Table 6: Effect of foliar application of Zinc, Boron and their interaction on acidity of Guava (*Psidium guajava* L.) during winter seasons of 2015-16 & 2016-17

Acidity Y_1 (2015-16)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	0.375	0.456	0.521	0.524	0.469
B_1 (0.4%)	0.435	0.472	0.544	0.547	0.499
B_2 (0.6%)	0.447	0.541	0.545	0.547	0.520
B_3 (0.8%)	0.452	0.546	0.550	0.553	0.525
Mean	0.427	0.504	0.540	0.543	0.503
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.005	0.011		
Boron (B)	S	0.005	0.011		
Interaction (Z x B)	S	0.011	0.022		

Acidity Y_2 (2016-17)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	0.374	0.456	0.521	0.524	0.469
B_1 (0.4%)	0.435	0.472	0.544	0.547	0.499
B_2 (0.6%)	0.447	0.541	0.545	0.547	0.520
B_3 (0.8%)	0.452	0.546	0.550	0.553	0.525
Mean	0.427	0.504	0.540	0.543	0.503
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.006	0.012		
Boron (B)	S	0.006	0.012		
Interaction (Z x B)	S	0.012	0.024		

Table 7: Effect of foliar application of Zinc, Boron and their interaction on ascorbic acid of Guava (*Psidium guajava* L.) during winter seasons of 2015-16 & 2016-17

Ascorbic acid Y_1 (2015-16)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	121.78	161.95	182.58	183.49	162.45
B_1 (0.4%)	133.65	175.15	219.29	220.39	187.12
B_2 (0.6%)	139.02	185.90	203.62	204.64	183.30
B_3 (0.8%)	140.41	187.76	205.66	206.68	185.13
Mean	133.72	177.69	202.79	203.80	179.50
	F - test	**S. Ed. (±)**	**C. D. at 5%**		

Zinc (Z)	S	2.21	4.51		
Boron (B)	S	2.21	4.51		
Interaction (Z x B)	S	4.41	9.01		

Ascorbic acid Y_2 (2016-17)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	124.22	165.19	186.23	187.16	165.70
B_1 (0.4%)	135.87	178.66	223.68	224.80	190.75
B_2 (0.6%)	141.80	189.62	207.69	208.73	186.96
B_3 (0.8%)	143.22	191.52	209.77	210.82	188.83
Mean	136.28	181.25	206.84	207.88	183.06
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	2.30	4.70		
Boron (B)	S	2.30	4.70		
Interaction (Z x B)	S	4.61	9.41		

Table 8: Effect of foliar application of Zinc, Boron and their interaction on specific gravity of Guava (*Psidium guajava* L.) during winter seasons of 2015-16 & 2016-17

Specific gravity Y_1 (2015-16)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	0.89	0.94	0.97	0.98	0.95
B_1 (0.4%)	0.92	0.97	1.03	1.04	0.99
B_2 (0.6%)	0.93	0.98	1.01	1.02	0.99
B_3 (0.8%)	0.94	0.99	1.02	1.03	1.00
Mean	0.92	0.97	1.01	1.02	0.98
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.011	0.021		
Boron (B)	S	0.011	0.021		
Interaction (Z x B)	S	0.021	0.043		

Specific gravity Y_2 (2016-17)					
Levels of Boron	**Levels of Zinc**				
	Z_0 (0.0%)	**Z_1 (0.4%)**	**Z_2 (0.6%)**	**Z_3 (0.8%)**	**Mean**
B_0 (0.0%)	0.90	0.94	0.97	0.98	0.95
B_1 (0.4%)	0.92	0.97	1.03	1.04	0.99
B_2 (0.6%)	0.93	0.98	1.02	1.03	0.99
B_3 (0.8%)	0.94	0.99	1.03	1.04	1.00
Mean	0.92	0.97	1.01	1.02	0.98
	F - test	**S. Ed. (±)**	**C. D. at 5%**		
Zinc (Z)	S	0.012	0.025		
Boron (B)	S	0.012	0.025		
Interaction (Z x B)	S	0.025	0.050		

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