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JB Kadu
Department of Soil Science and Agril. Chemistry, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra India

RV Dhopavkar
Department of Soil Science and Agril. Chemistry, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra India

PB Tapkeer
Department of Soil Science and Agril. Chemistry, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra India

MC Kasture
Department of Soil Science and Agril. Chemistry, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra India

Correspondence
JB Kadu
Department of Soil Science and Agril. Chemistry, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra India

Effect of soil application of potassium and foliar spray of zinc and boron on total nutrient content of leaves and yield of watermelon [*Citrullus lanatus* (Thunb.)] in *Lateritic* soils of Konkan

JB Kadu, RV Dhopavkar, PB Tapkeer and MC Kasture

Abstract
The experiment was conducted in the lateritic soil of *Konkan* region to study the "Effect of soil application of potassium and foliar spray of zinc and boron on total nutrient content of leaves and yield of watermelon [*Citrullus lanatus* (Thunb)]. The field experiment was comprised sixteen treatments and three replications. For statistical analysis of data factorial randomized block design was used. The treatments included basal application of FYM @15 t ha^{-1}, nitrogen @ 150 kg ha^{-1} and phosphorus @ 50 kg ha^{-1} with different levels of potassium i.e. K_0, K_1, K_2 and K_3 @ 0, 25, 50 and 75 kg ha^{-1}, respectively and foliar application of micronutrients i.e. M_0, M_1, M_2, M_3 @ 0, 0.5% Zn, 0.1 % B and 0.5% Zn + 0.1 % B at flowering stage, respectively. Result showed that the application of 75 kg K_2O ha^{-1} through soil along with 0.5% Zn and 0.1% B through foliar application found effective to increased total nitrogen, phosphorus, potassium, zinc and boron content in leaves at 30 DAS, 60 DAS and at harvesting stage and yield of watermelon in an *lateritic* soils of Konkan.

Keywords: Watermelon, potassium, zinc, boron, total nutrient content, yield

Introduction
Watermelon [*Citrullus lanatus* (Thunb.)] is an important fruit crop among the various cucurbits grown in Maharashtra, for its sweet juicy fruits for quenching the thirst especially during summer. It is commonly known by various names *tarbuj, kalindi, kalingada, matira* or *paniphal, mathan, thannir, palam panna* and *kalingaddi* in different parts of country (Inamdar, 2009). Even though, tropical Africa is considered to be the place of origin of watermelon, in India it is in cultivation since thousands of years hence India is often considered as secondary place of origin (Fursa, 1973) [5].

Konkan is narrow belt in between Arabian sea and Western Ghat having warm and humid climate. The region is characterized by high annual rainfall (3500 mm) received during June to September. Agroclimatic condition during *rabi* season of Konkan region is ideal for watermelon cultivation. So that watermelon is grown popularly in Konkan during *rabi* season due to its short duration, minimum tillage and water requirement, better profitability within a short period. As the labour availability for agriculture sector is decreasing at a drastic rate therefore, in comparison with the other *solanaceae* vegetables, watermelon needs less amount of labour for its cultivation. The area under watermelon cultivation in Konkan region was about 936 ha (230 ha in Thane, 400 ha in Raigad, 260 ha in Ratnagiri, 46 ha in Sindhudurga (Anonymous, 2009) [1].

Among several factors controlling the yield and profit of crops, plant nutrient is an important factor. Potassium helps to translocation of carbohydrates, increases disease resistance in plants and contract the injurious effect of nitrogen. These nutrient elements are necessary not only for crop yield but for the maintenance of soil nutrient and quality of produce. Foliar feeding is an effective method of supplying nutrients during the period of intensive plant growth when it can improve plants mineral status and increase crop yield. Zinc is main composition of ribosome and is essential for their development. Zinc required for chlorophyll production, pollen function and fertilization. Boron is important in pollen germination and pollen tube growth, which is likely to increase fruit set. Watermelon flowers are viable for a short period so that it is most important that supply of boron are not limiting during pollination. By considering above point an optimum NPK and micronutrients nutrition is essential for the good growth of watermelon, nutrient content of leaves and yield of watermelon.

Material and Methods

The experiment was conducted during *Rabi* 2013 at the Department of Agronomy, College of Agriculture, Dapoli. The experiment was laid out in factorial randomized block design with three replications and sixteen treatments based on different treatment combinations of potassium and micronutrient viz., K_0M_0 (control), K_1M_0 (25 kg K_2O ha^{-1}, No foliar spray), K_2M_0 (50 kg K_2O ha^{-1}, No foliar spray), K_3M_0 (75 kg K_2O ha^{-1}, No foliar spray), K_0M_1 (0 kg K_2O ha^{-1}, 0.5% Zn foliar spray), K_1M_1 (25 kg K_2O ha^{-1}, 0.5% Zn foliar spray), K_2M_1 (50 kg K_2O ha^{-1}, 0.5% Zn foliar spray), K_3M_1 (75 kg K_2O ha^{-1}, 0.5% Zn foliar spray), K_0M_2 (0 kg K_2O ha^{-1}, 0.1 % B foliar spray), K_1M_2 (25 kg K_2O ha^{-1}, 0.1 % B foliar spray), K_2M_2 (50 kg K_2O ha^{-1}, 0.1 % B foliar spray), K_3M_2 (75 kg K_2O ha^{-1}, 0.1 % B foliar spray), K_0M_3 (0 kg K_2O ha^{-1}, 0.5% Zn + 0.1 % B foliar spray), K_1M_3 (25 kg K_2O ha^{-1}, 0.5% Zn + 0.1 % B foliar spray), K_2M_3 (50 kg K_2O ha^{-1}, 0.5% Zn + 0.1 % B foliar spray), K_3M_3 (75 kg K_2O ha^{-1}, 0.5% Zn + 0.1 % B foliar spray). Recommended dose of nitrogen @ 150 kg ha^{-1} and phosphorus @ 50 kg ha^{-1} along with FYM @ 15 t ha^{-1} was applied uniformly to all treatments and micronutrient was sprayed at flower initiation stage. Nitrogen @ 150 kg ha^{-1} was applied in three splits *viz.*, first dose was applied at the time of sowing and second dose at 30 DAS and third dose at 60 DAS. Phosphorus @ 50 kg ha^{-1} applied in single dose at the time of sowing and potassium @ 0, 25, 50, 75 kg ha^{-1} were applied in single dose at the time of sowing, in the corresponding treatments. 0.5 % zinc and 0.1% boron spraying was taken at the flower initiation stage according to treatments.

Watermelon (variety-NS-295) was sown during December, 2013 with the spacing 2 m x 0.5m. The field experiment was conducted in the *lateritic* soil. The initial experimental soil was acidic in reaction and showed low electrical conductivity. The initial soil was found high in organic carbon whereas, low in available nitrogen, phosphorus, potassium. DTPA extractable zinc and hot water extractable boron were 2.16 and 0.20 mg kg^{-1} respectively in initial soil sample.

Result and Discussion

Effect of soil application of potassium and foliar spray of zinc and boron on nutrient content in watermelon leaves

- **Effect on nitrogen content**

The data regarding the effect of soil application of potassium and foliar spray of zinc and boron on nitrogen content in watermelon leaves is presented in table 1.

- **At 30 DAS**

In the application of different levels of potassium, it was observed that the maximum nitrogen content (3.93%) in watermelon leaves was recorded in the K_3 treatment in which the 75 kg K_2O ha^{-1} was applied which was at par with K_0, K_1, K_2 treatments in which control, 25 and 50 kg K_2O ha^{-1} was applied, respectively. In respect to the foliar spray of micronutrient, it was observed that the maximum nitrogen content in watermelon leaves i.e. 3.79 % was recorded in the M_3 treatment in which 0.5% Zn+ 0.1% B was applied through foliar spray, which was at par with M_0 and M_2 treatment where no spray and 0.1% B spray was taken through foliar application. The interaction effect showed non-significant results with respect to nitrogen content in watermelon leaves. But the nitrogen content in watermelon leaves varied from 2.58 to 4.34 % in all treatment combinations.

- **At 60 DAS**

In respect to the different levels of potassium, maximum total nitrogen in leaves (2.82 %) was recorded in K_3 treatment in which 75 kg K_2O ha^{-1} was applied which was at par with K_1 and K_2 treatments in which 25 and 50 kg K_2O ha^{-1} was applied, respectively. Regarding the foliar spray of micronutrients, it was observed that M_3 treatment i.e. 0.5% Zn+0.1% B recorded highest total nitrogen (2.94%) in watermelon leaves which was found at par with M_1 and M_2 treatments in which 0.5% Zn and 0.1% B was applied through foliar spray, respectively.

The interaction effect showed non-significant results with respect to nitrogen content in watermelon leaves. The nitrogen content in watermelon leaves varied from 1.37 to 3.08 % in all treatment combinations but the numerically highest nitrogen content (3.08%) in watermelon leaves was recorded in K_1M_3 treatment combination in which 25 kg K_2O ha^{-1} through soil and 0.5% Zn+ 0.1% B through foliar spray was applied.

- **At harvest**

At harvest, the individual effect of potassium and foliar sprays of micronutrients showed non-significant. The interaction effect of the both factors also found non-significant. But numerically the nitrogen content in watermelon leaves varied from 1.25 to 3.18 % in all treatment combinations but the numerically highest nitrogen content (3.18 %) in watermelon leaves was recorded in K_3M_3 treatment combination in which 75 kg K_2O ha^{-1} through soil and 0.5% Zn+0.1% B through foliar spray was applied.

In general, it was observed that total nitrogen content in leaves was increased at 30 DAS, later on it was declined at 60 DAS and harvest stage. Result obtained was in the same ranged as the limit values of nutrients in watermelon leaves given by Reuter-Robinson (1986) [9] that lies between 2.5 to 4.5 % N in leaves.

Effect on phosphorus content

The data regarding the soil application of potassium and foliar spray of zinc and boron on phosphorus content in watermelon leaves is presented in table 2.

- **At 30 DAS**

The soil application of potassium played significant role in total phosphorus content in watermelon leaves. The maximum total phosphorus (0.25 %) in leaves was recorded in K_2 treatment in which 50 kg K_2O ha^{-1} was applied which was found at par with K_1 and K_3 treatment in which 25 and 75 kg K_2O ha^{-1} was applied, respectively. The maximum phosphorus content (0.23 %) in watermelon leaves was recorded in the M_3 treatment in which 0.5% Zn + 0.1% B was applied which was at par with M_1 and M_2 treatment in which 0.5% Zn and 0.1% B was applied, respectively. The interaction effect showed non-significant result with respect to phosphorus content in watermelon leaves. But the phosphorus content in watermelon leaves varied from 0.13 to 0.27 % in all treatment combinations.

- **At 60 DAS**

In respect to the different levels of potassium, maximum total phosphorus in leaves (0.20 %) was recorded treatments K_2 and K_3 in which 50 and 75 kg K_2O ha^{-1} was applied, respectively, which was statistically at par with K_1 (25 kg K_2O

ha^{-1}) treatment. The maximum phosphorus content of watermelon leaves (0.19%) was recorded in the M_2 treatment in which 0.1% B was applied which was non-significant.

The interaction effect showed non-significant results with respect to phosphorus content in watermelon leaves. The phosphorus content of watermelon leaves varied from 0.12 to 0.21 % due to application of various treatment combinations.

- **At harvest**

In relation to the application of different levels of potassium, it was observed that the maximum phosphorus content of watermelon leaves (0.17 %) was recorded in the treatment K_3 in which 75 kg K_2O ha^{-1} was applied which was statistically at par with K_1 and K_2 treatment in which 25 and 50 kg K_2O ha^{-1} was applied, respectively. The highest phosphorus content (0.16 %) of watermelon leaves was recorded in M_1 treatment in which 0.5% Zn was applied through foliar spray found statistically non-significant. The interaction effect showed significant result with respect to phosphorus content in watermelon leaves at harvest. The highest phosphorus content (0.20%) was found in K_2M_1 treatment combination which was at par with K_1M_1, K_1M_2, K_3M_0, K_3M_2, K_3M_3 treatment combinations.

In general, it was observed that total phosphorus content in leaves was increased at 30 DAS, later on it was declined at 60 DAS and harvest stage. This might be due to uptake of phosphorus utilized by crop for metabolic activities. Similar result showed by Cikili *et al*. (2013) [4], in cucumber plant shoot P accumulation ranged from 0.11 to 0.31 % in both K and B treatment. Okur and Yagmur (2004) [8] reported that leaf phosphorus content lies between 0.13 to 0.18 % in watermelon crops by the treatment of different levels of potassium.

Effect on potassium content of leaves

The data regarding the effect of soil application of potassium and foliar spray of zinc and boron on potassium content in watermelon leaves presented in table 3.

- **At 30 DAS**

The application of 75 kg K_2O ha^{-1} i.e. K_3 treatment bagged the highest potassium (0.78 %) content in watermelon leaves which found significantly superior over rest of the treatments. The treatment M_3 in which 0.5% Zn + 0.1% B was applied reported higher potassium (0.67%) content in watermelon leaves which was at par with M_1 and M_2 treatments in which 0.5% Zn and 0.1% B was applied, respectively.

The interaction effect of soil application of potassium and foliar application of micronutrient showed non-significant result. The potassium content in watermelon leaves was varied from 0.40 to 0.87 % in all treatment combinations

- **At 60 DAS**

Application of different levels of potassium, recorded maximum potassium content (0.36 %) in watermelon leaves was recorded in K_3 treatment in which 75 kg K_2O ha^{-1} was applied. The K_3 treatment found superior over rest of treatments. With respect to the foliar spray of micronutrients, treatment M_1 in which 0.5% Zn was applied recorded maximum potassium content (0.31%) in leaves which found at par with M_2 and M_3 treatments in which 0.1% B and 0.5% Zn+0.1% B was applied, respectively. The interaction effect showed a non-significant results at 60 DAS. The potassium content in watermelon leaves was varied from 0.22 to 0.39 % in all treatment combinations.

- **At harvest**

It was observed that the maximum potassium content (0.30%) in watermelon leaves was recorded in the K_3 treatments in which 75 kg K_2O ha^{-1} was applied which was superior over rest of treatments. In respect to the different levels of micronutrients, treatment M_1 in which 0.5% Zn was applied recorded maximum total potassium content (0.27%) in watermelon leaves which was found at par with M_2 and M_3 treatment in which 0.1% B and 0.5% Zn+0.1% B was applied, respectively.

The interaction effect showed a significant results with respect to total potassium content in watermelon leaves at harvest stage. The highest total potassium content (0.32%) in watermelon leaves was observed in K_3M_0 treatment combination which was found at par with K_3M_1, K_3M_2 treatment combinations.

In general, it was observed that total potassium content in leaves was increased at 30 DAS, later on it was declined at 60 DAS and harvest stage. This might be due to uptake of potassium utilized by crop for metabolic activities. Similar results were showed by Cikili *et al*. (2013) [4] in cucumber crop and reported that increased potassium content in leaves as increasing the application rate of potassium and boron. Anonymous (a) (1994) resulted that leaf potassium concentration was increased by all K fertilization treatment in watermelon crop. Okur and Yagmur (2004) [8] reported that leaf potassium content increased as increasing the application rate of potassium in watermelon crop.

Effect on zinc content of watermelon leaves

The data regarding the effect of soil application of potassium and foliar spray of zinc and boron on zinc content in watermelon leaves is presented in table 4

- **At 30 DAS**

In respect to the different levels of potassium, maximum zinc (33.05 mg kg^{1}) content in leaves was recorded in K_3 treatment in which 75 kg K_2O ha^{-1} was applied which showed non-significant effect. Similarly non-significant results were obtained with respect to foliar application of micronutrients. The interaction showed non-significant result with respect to zinc content in watermelon leaves. The zinc content in watermelon leaves varied from 27.5 to 33.8 mg kg^{-1} in all treatment combinations.

- **At 60 DAS**

The application of potassium showed non-significant effect at 60 DAS with respect to zinc content in leaves. The maximum zinc content (73.45 mg kg^{-1}) in watermelon leaves was recorded in M_3 treatment in which 0.5% Zn+0.1% B was applied which was at par with M_1 treatment in which 0.5 % Zn was applied through foliar spray. The interaction effect also showed non-significant result with respect to zinc content in watermelon leaves. The zinc content in watermelon leaves varied from 23.6 to 86.96 mg kg^{-1} in all treatment combinations.

- **At harvest**

At harvest, it was observed that the maximum zinc content (33.96 mg kg^{-1}) in leaves was recorded in treatment K_3 in which 75 kg K_2O ha^{-1} was applied which also showed non-significant results. The highest zinc content (38.71 mg kg^{-1}) in leaves was recorded in M_3 treatment in which 0.5% Zn + 0.1% B was applied through foliar spray which was found statistically superior over rest of the treatments. The interaction effect showed non-significant result with respect to zinc content in watermelon leaves. The zinc content of watermelon leaves varied from 27.08 to 41.48 mg kg^{-1} in all treatment combinations.

In general, it was observed that the zinc content in leaves showed increased pattern upto 60 DAS, later on it was declined at harvest. It might be due to the application of Zn at 45 DAS. The mining of the Zn through uptake which was increased due to supplementation of K reflects during harvest. Result obtained was in the same range as the limit values of nutrients in watermelon leaves given by Bergmann (1988) [3] that lies between 20-70 mg kg^{-1} and according Reuter and Robinson (1986) [9] these limit value ranged between 20-60 mg kg^{-1} of zinc. Cikili *et al.* (2013) [4] showed that in cucumber average shoot accumulation of Zn increased in boron treated plant.

- **Effect on boron content of watermelon leaves**

The data regarding the effect of soil application of potassium and foliar spray of zinc and boron on boron content in watermelon leaves is presented in table 5

- **At 30 DAS**

In respect to the different levels of potassium, maximum boron (31.32 mg kg^{-1}) in leaves was recorded in K_3 treatment in which 75 kg K_2O ha^{-1} was applied which found at par with treatment K_1 in which 25 kg K_2O ha^{-1} was applied. Regarding the foliar spray of micronutrient, it was observed that maximum boron content (30.48 mg kg^{-1}) in watermelon leaves was recorded in M_0 treatment in which foliar spray of micronutrient was not taken and found at par with M_1 treatment in which 0.5% Zn was applied through foliar spray.

The interaction effect showed significant result with respect to boron content in watermelon leaves. The highest boron content (33.73 mg kg^{-1}) was found in K_3M_3 treatment combination which was at par with K_1M_0, K_1M_1, K_2M_0, K_2M_1, K_3M_0 and K_3M_1 treatment combinations.

- **At 60 DAS**

The maximum boron content (40.21 mg kg^{-1}) in leaves was recorded in K_3 treatment in which 75 kg K_2O ha^{-1} was applied which found at par with K_1 and K_2 treatments in which 25 and 50 kg K_2O ha^{-1} was applied, respectively. The maximum boron content (46.61 mg kg^{-1}) in watermelon leaves was recorded in M_3 treatment in which 0.5 % Zn + 0.1% B was applied which was found at par with M_2 in which 0.1% B was applied. The interaction effect showed non-significant results with respect to boron content in watermelon leaves. The highest boron content in watermelon leaves (47.81 mg kg^{-1}) was found in K_3M_3 treatment combination.

- **At harvest**

It was observed that the maximum boron content (33.91 mg kg^{-1}) in watermelon leaves was recorded in treatment K_3 in which 75 kg K_2O ha^{-1} was applied which showed non significant results. The highest boron content (37.71 mg kg^{-1}) in watermelon leaves was recorded in M_2 treatment in which 0.1% B was applied which was at par with M_3 treatment in which 0.5 % Zn + 0.1% B was applied. The interaction effect showed non-significant results with respect to boron content in watermelon leaves. The boron content of watermelon leaves varied from 23.72 to 40.77 mg kg^{-1} in all treatment combination.

In general, it was observed that the boron content in leaves showed increased pattern upto 60 DAS, later on it was declined at harvest. It might be due to the application of B at 45 DAS. The mining of the B through uptake which was increased due to supplementation of K reflects during harvest. The boron value was in the same range as given by Mills and Jones (1996) in cucumber plant. They suggested that critical values of boron for optimum cucumber growth was 25-85 mg kg^{-1}.

- **Effect on yield of watermelon fruits**

The data presented in table (6) revealed that the highest fruit yield (42.5 t ha^{-1}) were recorded by the treatment K_3 receiving 75 kg K_2O ha^{-1}, which found significantly superior over rest of the treatments. However, minimum yield (29.1 t ha^{-1}) were registered in the treatment K_0 receiving no potash.

With respect to foliar spray of micronutrient, it was observed that the maximum yield of watermelon fruits (36.3 t ha^{-1}) were obtained in the M_2 treatment receiving 0.1% B through foliar application which was found at par with treatment M_3 in which 0.5% Zn + 0.1% B was applied. The interaction effect between soil application of potassium and foliar spray of zinc and boron was also showed significant result with respect to yield of watermelon fruits. It was observed that the K_3M_3 (75 kg K_2O $ha^{-1}$and 0.5% Zn + 0.1% B) treatment combination showed highest yield (43.8 t ha^{-1}) which was found at par with K_3M_1 and K_3M_2 treatment combinations.

From the foregoing result, it was concluded that the use of higher level of potash fertilizer with foliar spray of micronutrient Zn and B exhibited favorable effect on the yield of watermelon. The reason for obtaining higher yield of fruits was to application of potash and foliar spray of micronutrient Zn and B. There was a beneficial interaction between major nutrient potash and foliar spray of Zn and B. Similar result obtained by Vasanthkumar *et al.* (2012) [2] in which genotype NS-246 and NS-295 recorded 38.60 and 36.01 t ha^{-1} fruits yield in watermelon, respectively. Okur and Yagmur (2004) [8] reported that yield increased as the potassium dose increased in watermelon crop.

Conclusions

1. The soil application of higher levels of potassium i.e 75 kg K_2O ha^{-1} along with foliar spray with 0.5% Zn and 0.1% B at flowering stage significantly influenced the nutrient content of watermelon leaves in *lateritic* soils of Konkan region.
2. Application of 75 kg K_2O ha^{-1} through soil along with 0.5% Zn and 0.1% B through foliar application found effective to increase the yield of watermelon

Table 1: Effect of soil application of potassium and foliar spray of zinc and boron on total nitrogen content in watermelon leaves

Treatments	Total nitrogen (%)														
	30 DAS					60 DAS					At harvest				
	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean
K_0	2.58	2.58	2.84	2.66	2.67	1.37	2.47	2.34	2.75	2.23	1.70	2.80	2.07	2.31	2.22
K_1	3.96	3.53	4.15	3.91	3.89	1.74	2.52	2.40	3.08	2.44	1.25	2.57	2.60	2.68	2.28
K_2	3.73	3.76	3.84	4.34	3.91	1.91	2.72	2.63	2.96	2.56	2.78	2.89	2.39	2.09	2.54
K_3	4.01	3.35	4.11	4.23	3.93	2.93	2.65	2.75	2.95	2.82	2.11	2.02	2.66	3.18	2.49

Mean	3.57	3.30	3.73	3.79		1.99	2.59	2.53	2.94		1.96	2.57	2.43	2.56	
	K		M		KXM	K		M		KXM	K		M		KXM
S.Em.±	0.11		0.11		0.225	0.14		0.14		0.28	0.173		0.173		0.346
C.D(P=0.05)	0.32		0.32		NS	0.41		0.41		NS	NS		NS		NS

Table 2: Effect of soil application of potassium and foliar spray of zinc and boron on total phosphorus content in watermelon

Treatments	Total phosphorus (%)														
	30 DAS					60 DAS					At harvest				
	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean
K_0	0.13	0.14	0.16	0.17	0.15	0.13	0.14	0.13	0.12	0.13	0.10	0.12	0.11	0.12	0.11
K_1	0.19	0.27	0.25	0.23	0.23	0.18	0.19	0.21	0.16	0.19	0.13	0.17	0.16	0.13	0.15
K_2	0.23	0.23	0.26	0.27	0.25	0.19	0.21	0.19	0.19	0.20	0.15	0.20	0.13	0.13	0.15
K_3	0.21	0.22	0.22	0.25	0.23	0.19	0.18	0.21	0.21	0.20	0.16	0.15	0.17	0.18	0.17
Mean	0.19	0.22	0.22	0.23		0.17	0.18	0.19	0.17		0.14	0.16	0.14	0.14	
	K		M		KXM	K		M		KXM	K		M		KXM
S.Em.±	0.01		0.01		0.02	0.01		0.01		0.01	0.01		0.01		0.01
C.D(P=0.05)	0.02		0.02		NS	0.02		NS		NS	0.02		NS		0.04

Table 3: Effect of soil application of potassium and foliar spray of zinc and boron on total potassium content in watermelon leaves

Treatments	Total potassium (%)														
	30 DAS					60 DAS					At harvest				
	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean
K_0	0.40	0.50	0.53	0.48	0.48	0.22	0.23	0.24	0.23	0.23	0.20	0.22	0.22	0.22	0.22
K_1	0.60	0.66	0.65	0.65	0.64	0.28	0.32	0.30	0.27	0.29	0.21	0.29	0.24	0.25	0.25
K_2	0.62	0.74	0.71	0.66	0.68	0.31	0.33	0.30	0.32	0.31	0.25	0.25	0.23	0.23	0.24
K_3	0.74	0.76	0.74	0.87	0.78	0.34	0.38	0.34	0.39	0.36	0.32	0.31	0.30	0.28	0.30
Mean	0.59	0.66	0.66	0.67		0.28	0.31	0.30	0.30		0.24	0.27	0.25	0.25	
	K		M		KXM	K		M		KXM	K		M		KXM
S.Em.±	0.02		0.02		0.03	0.01		0.01		0.01	0.01		0.01		0.01
C.D(P=0.05)	0.05		0.05		NS	0.02		0.02		NS	0.02		0.02		0.03

Table 4: Effect of soil application of potassium and foliar spray of zinc and boron on zinc content in watermelon leaves.

Treatments	Zn (mg kg^{-1})														
	30 DAS					60 DAS					At harvest				
	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean
K_0	27.58	29.18	29.81	29.89	29.11	34.833	68.10	39.03	73.60	53.89	30.46	32.31	27.08	37.29	31.78
K_1	29.17	29.39	29.43	31.59	29.90	28.367	62.13	33.00	57.23	45.18	30.28	32.87	30.87	41.48	33.87
K_2	31.36	29.52	29.96	31.43	30.57	23.633	71.4	37.33	76.00	52.10	28.28	32.63	28.57	35.22	31.18
K_3	32.88	32.68	33.87	32.77	33.05	29.133	68.16	32.80	86.96	54.26	30.03	35.83	29.13	40.86	33.96
Mean	30.25	30.19	30.77	31.42		28.992	67.46	35.54	73.45		29.76	33.41	28.91	38.71	
	K	M	KXM			K	M	KXM			K		M		KXM
S.Em.±	1.12	1.12	2.25			2.88	2.88	5.77			1.25		1.25		2.50
C.D(P=0.05)	NS	NS	NS			NS	8.33	NS			NS		3.62		NS

Table 5: Effect of soil application of potassium and foliar spray of zinc and boron on boron content in watermelon leaves

Treatments	B (mg kg^{-1})														
	30 DAS					60 DAS					At harvest				
	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean	M_0	M_1	M_2	M_3	Mean
K_0	23.35	23.72	27.42	27.05	25.39	29.65	24.09	43.73	46.70	36.04	25.94	23.72	37.43	34.84	30.48
K_1	33.36	31.88	28.17	27.79	30.30	30.39	30.39	45.22	47.07	38.27	27.79	25.94	38.55	37.80	32.52
K_2	33.35	31.87	24.46	22.61	28.07	31.87	32.24	47.07	44.85	39.01	25.94	29.28	34.84	29.65	29.93
K_3	31.87	32.99	26.68	33.73	31.32	32.62	33.73	46.70	47.81	40.21	28.54	26.31	40.02	40.77	33.91
Mean	30.48	30.11	26.68	27.80		31.13	30.11	45.68	46.61		27.05	26.31	37.71	35.76	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	0.96		0.96		1.92	0.66		0.66		1.32	1.15		1.15		2.30
C.D(P=0.05)	2.77		2.77		5.54	1.91		1.91		NS	NS		3.33		NS

Table 6: Effect of soil application of potassium and foliar spray of zinc and boron on yield of watermelon

Treatments	Yield (t ha^{-1})				
	M_0	M_1	M_2	M_3	Mean
K_0	28.2	28.4	29.8	29.9	29.1
K_1	33.4	34.2	35.3	33.2	34.0
K_2	38.3	36.0	37.4	36.5	37.1
K_3	41.1	42.1	42.8	43.8	42.5
Mean	35.2	35.2	36.3	35.9	
	M		K		MXK
S.Em.±	0.3		0.3		0.6
C.D(P=0.05)	0.9		0.9		1.7

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