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Effect of soil application of potassium and foliar spray of zinc and boron on available nutrient content in soil at different growth stages of watermelon [*Citrullus lanatus* (Thunb.)]

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Abstract
The experiment was conducted on the lateritic soil of *Konkan* region to study the "Effect of soil application of potassium and foliar spray of zinc and boron on availability of different nutrient in soil at different growth stage of watermelon [*Citrullus lanatus* (Thunb).]. The investigation was revealed that the nutrient content in soil i.e available nitrogen, phosphorus, potassium, zinc and boron at various growth stages found influenced due to application of 75 kg K_2O ha^{-1} along with 0.5% Zn and 0.1% B, significantly. It was observed that nitrogen, phosphorus and potassium content in soil is decreased at harvest and Boron and zinc availability in soil is highest after foliar spraying of Zn and B at 60 DAS.

Keywords: Watermelon, nutrient content, boron, zinc

Introduction
Watermelon [*Citrullus lanatus* (Thunb.)] is an important fruit crop among the various cucurbits grown in MH, for its sweet juicy fruits for quenching the thirst especially during summer. *Konkan* is narrow belt in between Arabian sea and Western Ghat having warm and humid climate. Agroclimatic condition during *rabi* season of Konkan region is ideal for watermelon cultivation. So that watermelon is grown popularly in *s* during *rabi* season due to its short duration, minimum tillage, less amount of labour and water requirement, better profitability within a short period (Fursa,1973) [2].

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 (Wojcik *et al.*, 2005) [6]. Watermelon flowers are viable for a short period so that it is most important that supply of boron are not limiting during pollination. So that in order to see availability of nutrient in soil at various growth stage by the soil application of potassium and foliar spray of micronutrient present investigation was carried out.

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 (25kg 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. Watermelon (NS-295) was sown during 2013 with the spacing 2m x 0.5m.

Result and discussion

Effect of soil application of potassium and foliar spray of zinc and boron on chemical properties of soil Soil pH

The individual effect of the K and foliar spray of Zn and B as well as interaction effect of both the factors found non-significant at 30 DAS 60 DAS stage. At harvest stage, the individual factors influenced non-significantly in soil reaction. But the interaction effect showed significance in change in soil reaction. The treatment K_1M_0 resulted the maximum pH value which was at par with K_0M_0, K_0M_1, K_2M_0, K_3M_1, K_3M_2 treatment combinations. Patil *et al.*, (2004) [4] reported that pH ranged from (3.90-6.28) in the very high rainfall lateritic soil of Konkan region.

Electrical conductivity

The individual effect of the K and foliar spray of Zn and B as well as interaction effect of both the factors found non-significant at 30 DAS, 60 DAS and at harvest stage.

Organic carbon

At 30 DAS

Application of different levels of K, recorded highest organic carbon (15.88g kg^{-1}) of soil in the K_3 treatment, which found at par with K_0 treatment i.e. control. The highest organic carbon (15.72 g kg^{-1}) of soil in relation to the foliar spray of micronutrient was recorded in M_2 treatment which found at par with M_3 treatments

The interaction between effect of soil application of K and foliar spray of Zn and B showed significant result with respect to organic carbon of soil. The organic carbon of soil varied from 12.90 to 19.90 g kg^{-1} in various treatment combinations, but highest organic carbon 19.90 g kg^{-1} was observed in K_3M_3 treatment combination which was found significantly superior over rest of treatment combinations.

At 60 DAS

At 60 DAS, The individual effect of the potassium and foliar spray of Zn and B as well as interaction effect of both the factors found non-significant.

At harvest

At harvest, the individual effect of potassium and foliar sprays of micronutrients showed non-significant. The interaction effect of the both factors found significant. Highest organic carbon 18.50 g kg^{-1} was found in K_2M_2 treatment combination which was found at par with K_0M_1, K_0M_2, K_0M_3, K_1M_1, K_1M_3, K_2M_0, K_2M_1, K_3M_0, K_3M_1, K_3M_2 treatment combinations.

Available nitrogen

At 30 DAS

The individual effect of K and foliar sprays of micronutrients showed non-significant**.** The significant results was obtained in the interaction between soil application of K and foliar spray of Zn and B at 30 DAS. Highest available nitrogen in soil was observed in K_1M_2 treatment combination which was found at par with K_2M_2, K_2M_3, K_3M_0, K_3M_1, K_2M_3 treatment combinations.

At 60 DAS

Regarding the application of different levels of potassium, it was observed that highest available nitrogen (300.60 kg ha^{-1}) in soil was recorded in K_2 treatment in which 50 kg K_2O ha^{-1} was applied showed non-significant effect. The highest available nitrogen in soil (319.20 kg ha^{-1}) was recorded in M_3 treatment in which the 0.5% Zn +0.1% B was applied which found significantly superior over rest of treatments. The significant results was obtained with interaction of soil application of potassium and foliar spray of zinc and boron at 60 DAS. Highest available nitrogen (353.7 kg ha^{-1}) was observed in K_2M_3 treatment combination which was at par with K_3M_3 treatment combination.

At Harvest

Regarding the application of different levels of potassium, it was observed that numerically maximum available nitrogen (310.70 kg ha^{-1}) in soil was recorded in the K_3 treatment in which 75 kg K_2O ha^{-1} was applied, but found non-significant. The highest available nitrogen in soil (325.10 kg ha^{-1}) was recorded in the M_3 treatment in which the 0.5% Zn + 0.1% B was applied which found significant over rest of treatments.

The significant results was obtained with interaction of soil application of potassium and foliar spray of zinc and boron at harvest stage. Highest available nitrogen (353.30 kg ha^{-1}) was observed in K_3M_3 treatment combination which was at par with K_1M_2, K_2M_3 treatment combinations. Similar result obtained by Kolekar *et al.*, (2013) [3] in watermelon, he reported that at harvest stage available N was (373.65 kg ha^{-1}). Similar results obtained by (Shivashankaramurthy *et al.*, 2013) [5].

Available phosphorus

At 30 DAS

Application of different levels of potassium, recorded highest available phosphorus (28.98 kg ha^{-1}) in soil in K_3 treatment in which 75 kg K_2O ha^{-1} was applied which was statistically superior over rest of treatment. The highest available phosphorus (21.99 kg ha^{-1}) in soil was recorded in the M_0 treatment in which no foliar spray was taken which was found non-significant.

The non-significant results was obtained with interaction between soil application of potassium and foliar spray of zinc and boron at 30 DAS.

At 60 DAS

In the application of different levels of potassium, it was observed that the highest available phosphorus (26.42 kg ha^{-1}) in soil was recorded in the K_3 treatment in which 75 kg K_2O ha^{-1} was applied which showed significant result over rest of treatments. The highest available phosphorus (21.06 kg ha^{-1}) in soil was recorded in the M_2 treatment in which the 0.1% B was applied which found at par with M_3 treatment. The significant results was obtained with interaction of soil application of potassium and foliar spray of zinc and boron regarding available phosphorus at 60 DAS.

Highest available phosphorus (29.14 kg ha^{-1}) was observed in K_3M_2 treatment combination which was at par with K_2M_0, K_3M_1, K_3M_3 treatment combinations.

At harvest

It was observed that the highest available phosphorus (20.09 kg ha^{-1}) in soil was recorded in the K_3 treatment in which 75 kg K_2O ha^{-1} was applied which was at par with K_2 (50 kg K_2O ha^{-1}) treatment. In respect to the foliar spray of micronutrient, the highest available phosphorus (19.13 kg ha^{-1}) in soil was recorded in the M_3 treatment in which the 0.5% Zn +0.1% B was applied which found superior amongst all the treatments.

The interaction effect was significant at harvest stage. Highest available phosphorus (26.80 kg ha^{-1}) was observed in K_2M_0 treatment combination which was found at par with K_3M_2 treatment combination. Similar results obtained by (Ambede 2008) [1] and Shivashankaramurthy *et al.,* 2013 [5].

Available potassium

At 30 DAS

Application of different levels of potassium, recorded highest available potassium (266.5 kg ha^{-1}) in soil in K_3 treatment in which 75 kg K_2O ha^{-1} was applied found significantly superior over rest of treatments. In relation to the foliar spray of micronutrient, the highest available potassium in soil (233.3 kg ha^{-1}) was recorded in the M_3 treatment in which the 0.5% Zn + 0.1% B was applied which found statistically significant over rest of all the treatments.

Interaction effect of soil application of potassium and foliar spray of zinc and boron showed significant result at harvest stage. Highest available potassium (316.4 kg ha^{-1}) was observed in K_3M_2 treatment combination i.e. 75 kg K_2O ha^{-1} + 0.1% B was applied, which was found at par with K_3M_3 treatment combination.

At 60 DAS

Regarding the application of different levels of potassium, it was observed that highest available potassium (185.3 kg ha^{-1}) in soil was recorded in K_2 treatment in which 50 kg K_2O ha^{-1} was applied, which was at par with K_3 treatment. The highest available potassium in soil (180.10 kg ha^{-1}) was recorded in M_3 treatment in which the 0.5% Zn + 0.1% B was applied through foliar spray but found non-significant.

The non-significant results was obtained with interaction between soil application of potassium and foliar spray of zinc and boron at harvest stage.

At Harvest

Regarding the application of different levels of potassium, it was observed that highest available potassium in soil (221.5 kg ha^{-1}) was recorded in K_3 treatment in which 75 kg K_2O ha^{-1} was applied, which was significant over rest of treatment. The highest available potassium in soil (203.28 kg ha^{-1}) was recorded in M_1 treatment in which 0.5% Zn was applied which found at par with M_0 and M_3 treatments.

The significant results were obtained with interaction between soil application of potassium and foliar spray of zinc and boron at harvest stage. Highest available potassium (278.77 kg ha^{-1}) was observed in K_3M_1 treatment combination i.e. 75 kg K_2O ha^{-1} +0.5% Zn which was found superior over all treatment combinations. Similar results obtained by (Ambede 2008) [1] and Shivashankaramurthy *et al.,* 2013 [5].

DTPA extractable zinc

At 30 DAS

Regarding the application of different levels of potassium, it was observed that highest DTPA-Zn content in soil (2.37 mg kg^{-1}) was recorded in the K_3 treatment in which 75 kg K_2O ha^{-1} was applied showed non-significant result. The highest DTPA-Zn content in soil (2.41 mg kg^{-1}) was recorded in M_3 treatment in which foliar spray of 0.5% Zn +0.1% B was applied which was found at par with M_1 and M_2 treatments in which 0.5% Zn and 0.1% B was applied, respectively. The significant results was obtained with interaction between effect of soil application of potassium and foliar spray of zinc and boron at harvest stage. The highest DTPA-Zn content (2.73 mg kg^{-1}) in soil was observed in K_2M_3 treatment combination i.e. 50 kg K_2O ha^{-1} and 0.5% Zn+0.1% B which was at par with. K_3M_1 and K_3M_3 treatment combinations.

At 60 DAS

Regarding the application of different levels of potassium, it was observed that highest DTPA-Zn content (2.75 mg kg^{-1}) in soil was recorded in the K_1 treatment in which 25 kg K_2O ha^{-1} was applied which was at par with K_3 treatment i.e. 75 kg K_2O ha^{-1} and 0.5% Zn +0.1% B. The highest DTPA-Zn content (2.87 mg kg^{-1}) in soil was recorded in the M_3 treatment in which the 0.5% Zn +0.1% B was applied which found at par with M_1 treatment in which 0.5% Zn was applied.

The non-significant results was obtained with interaction effect of soil application of potassium and foliar spray of zinc and boron. But the DTPA-Zn content in soil was ranged between 1.96 to2.78 mg kg^{-1}.

At Harvest

In application of different levels of potassium, it was observed that the highest DTPA-Zn content (2.91 mg kg^{-1}) in soil was recorded in the K_1 treatment in which 25 kg K_2O ha^{-1} was applied which was found non-significant. The highest DTPA-Zn content (3.23 mg kg^{-1}) in soil was recorded in the M_3 treatment in which foliar spray of 0.5% Zn + 0.1% B was applied which found at par with M_1 treatment in which 0.5% Zn was applied.

The significant results was obtained with interaction between soil application of potassium and foliar spray of zinc and boron. Highest DTPA-Zn content (3.89 mg kg^{-1}) in soil was observed in K_1M_3 treatment combination which was found at par with K_2M_1 treatment combination. Results obtained was in the same ranged as given by Patil *et al.,* (2004) [4] they reported that Zn ranged from (0.29-3.25mg kg $^{-1}$) in the very high rainfall lateritic soil of Konkan region.

Hot water extractable boron

At 30 DAS

In the application of different levels of potassium, it was observed that highest hot water extractable boron (0.23 mg kg^{-1}) in soil was recorded in the K_3 treatment in which 75 kg K_2O ha^{-1} was applied which was at par with K_2 (50 kg K_2O ha^{-1}) treatment. The effect of Zn and B foliar spray influenced non-significantly in B content of soil.

The interaction showed significant results with soil application of potassium and foliar spray of zinc and boron. Highest hot water extractable boron (0.26 mg kg^{-1}) was observed in K_3M_3 treatment combination i.e. 75 kg K_2O ha^{-1} and 0.5% Zn+0.1% B was applied which was found at par with K_1M_0, K_2M_0, K_2M_2, K_2M_3, K_3M_1, K_3M_2 treatment combinations.

At 60 DAS

The highest hot water extractable boron (0.28 mg kg^{-1}) in soil was recorded in the M_2 treatment in which 0.1% B was applied which found at par with M_3 treatment in which 0.5% Zn + 0.1% B was applied. However the effect of soil application of potassium levels and interaction effect found non-significant. But the hot water extractable boron in soil was ranged between from 0.20 to 0.28 mg kg^{-1} in different treatment combinations.

At Harvest

was recorded in the M_3 treatment in which foliar spray of 0.5% Zn + 0.1% B was applied which found at par with M_2 treatment. But the effect of soil application of potassium levels and interaction effect of both factors found non-significant with respect to hot water extractable boron in soil at harvest stage.

Table 1: Effect of soil application of potassium and foliar spray of zinc and boron on pH of soil

Treatments	**pH** (1:2.5)														
	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	6.06	6.23	6.33	6.13	6.19	6.20	6.20	6.13	6.13	6.16	6.16	6.13	6.06	6.06	6.10
K_1	6.23	6.26	6.10	6.20	6.20	6.06	6.10	6.13	6.16	6.11	6.23	5.96	6.06	6.03	6.07
K_2	6.13	6.23	6.20	6.20	6.19	6.16	6.06	6.20	6.20	6.15	6.10	6.06	6.06	6.03	6.06
K_3	6.23	6.13	6.10	6.26	6.18	6.23	6.10	6.10	6.11	6.13	6.03	6.13	6.16	6.03	6.09
Mean	6.16	6.21	6.18	6.20		6.16	6.11	6.14	6.15		6.13	6.07	6.09	6.04	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	0.03		0.03		0.07	0.02		0.02		0.05	0.02		0.02		0.04
C.D(P=0.05)	NS		NS		NS	NS		NS		NS	NS		NS		0.13

Table 2: Effect of soil application of potassium and foliar spray of zinc and boron on electrical conductivity of soil

Treatments	**Electrical conductivity (dS m^{-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	0.17	0.34	0.20	0.410	0.28	0.34	0.29	0.12	0.49	0.31	0.35	0.26	0.38	0.42	0.35
K_1	0.47	0.44	0.31	0.47	0.42	0.44	0.20	0.26	0.25	0.28	0.34	0.44	0.50	0.36	0.41
K_2	0.34	0.46	0.37	0.48	0.41	0.30	0.17	0.22	0.45	0.28	0.37	0.51	0.61	0.29	0.44
K_3	0.34	0.38	0.38	0.44	0.38	0.26	0.29	0.45	0.53	0.38	0.30	0.32	0.54	0.34	0.37
Mean	0.33	0.40	0.32	0.45		0.34	0.24	0.26	0.43		0.34	0.38	0.51	0.35	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	0.04		0.04		0.09	0.05		0.05		0.10	0.04		0.04		0.09
C.D (P=0.05)	NS		NS		NS	NS		NS		NS	NS		NS		NS

Table 3: Effect of soil application of potassium and foliar spray of zinc and boron on organic carbon in soil

Treatments	**Organic carbon (g 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	14.00	14.70	17.47	13.10	14.82	13.00	13.00	12.60	11.90	12.63	12.50	18.30	18.00	16.10	16.23
K_1	14.20	15.60	13.70	14.70	14.55	12.50	13.67	12.80	13.97	13.23	13.30	14.20	10.90	15.20	13.40
K_2	14.10	12.90	15.30	13.00	13.83	13.00	10.80	13.20	14.50	12.88	18.10	13.97	18.50	12.00	15.64
K_3	14.10	13.10	16.40	19.90	15.88	13.30	13.50	13.30	13.97	13.52	15.80	15.60	16.60	12.70	15.18
Mean	14.10	14.08	15.72	15.18		12.95	12.74	12.98	13.58		14.93	15.52	16.00	14.00	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	0.45		0.45		0.90	0.51		0.51		1.03	0.84		0.84		1.69
C.D (P=0.05)	1.30		1.30		2.61	NS		NS		NS	NS		NS		4.892

Table 4: Effect of soil application of potassium and foliar spray of zinc and boron on available nitrogen status in soil

Treatments	**Available nitrogen (kg ha^{-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	333.5	313.5	354.4	330.4	332.9	277.0	283.3	308.4	306.3	293.7	283.3	300.0	314.6	301.1	299.7
K_1	320.8	331.4	368.0	323.0	335.8	274.9	296.9	316.7	282.2	292.7	282.2	304.2	333.5	294.8	303.7
K_2	315.6	332.4	340.8	364.8	338.4	277.0	272.8	299.0	353.7	300.6	270.7	285.7	313.6	351.2	305.3
K_3	351.2	340.8	305.2	366.9	341.0	279.1	297.8	268.7	334.5	295.0	316.7	303.1	269.7	353.3	310.7
Mean	330.3	329.5	342.1	346.3		277.0	287.7	298.2	319.2		288.2	298.3	307.8	325.1	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	5.54		5.54		11.09	4.37		4.37		8.74	5.51		5.51		11.03
C.D (P=0.05)	NS		NS		32.02	NS		12.63		25.26	NS		15.93		31.87

Table 5: Effect of soil application of potassium and foliar spray of zinc and boron on available phosphorus status in soil

Treatments	Available phosphorus (Kg ha^{-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	11.22	10.55	11.22	12.73	11.43	11.22	10.55	11.39	11.06	11.05	10.55	10.38	11.22	10.04	10.55
K_1	18.60	18.93	23.45	24.46	21.36	13.74	14.07	21.27	18.59	16.92	10.38	11.05	19.26	21.27	15.49
K_2	27.47	21.62	22.78	21.61	23.37	25.96	14.40	22.45	24.96	21.94	26.80	13.73	15.74	22.61	19.72
K_3	30.65	28.98	28.31	27.97	28.98	24.46	25.46	29.14	26.63	26.42	14.07	18.76	24.96	22.58	20.09
Mean	21.99	20.02	21.44	21.69		18.84	16.12	21.06	20.31		15.45	13.48	17.79	19.13	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	0.98		0.98		1.96	0.72		0.72		1.45	0.51		0.51		1.01
C.D (P=0.05)	2.83		NS		NS	2.09		2.09		4.18	1.46		1.46		2.93

Table 6: Effect of soil application of potassium and foliar spray of zinc and boron on available potassium status in soil

Treatments	Available potassium (kg ha^{-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	127.7	128.4	123.2	141.1	130.1	133.7	136.6	146.3	182.6	149.8	152.69	153.64	177.96	149.33	158.41
K_1	215.3	161.3	169.9	209.1	188.9	145.6	154.6	166.1	164.6	157.7	173.23	154.93	142.18	175.84	161.55
K_2	219.1	178.5	211.2	286.7	223.9	185.9	196.4	183.0	175.8	185.3	201.97	225.76	157.05	200.85	196.41
K_3	228.9	224.5	316.4	296.4	266.5	163.9	171.7	194.4	197.3	181.8	206.08	278.77	194.51	206.71	221.52
Mean	197.7	173.2	205.2	233.3		157.3	164.8	172.5	180.1		183.49	203.28	167.93	183.18	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	4.14		4.14		8.28	6.35		6.35		12.71	7.26		7.26		14.52
C.D (P=0.05)	11.96		11.96		23.92	18.35		NS		NS	20.97		20.97		41.95

Table 7: Effect of soil application of potassium and foliar spray of zinc and boron on DTPA- extractable Zn in soil

Treatments	Zinc (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	2.23	2.12	2.38	2.00	2.19	1.99	2.50	2.17	2.59	2.31	2.28	2.92	2.36	3.14	2.67
K_1	2.17	2.36	2.37	2.34	2.31	2.74	3.32	2.15	2.78	2.75	2.62	2.78	2.36	3.89	2.91
K_2	2.26	2.03	2.23	2.73	2.31	2.33	2.74	1.96	2.78	2.45	2.19	3.50	2.55	2.79	2.76
K_3	2.07	2.48	2.33	2.58	2.37	2.14	2.90	2.36	3.33	2.68	2.17	3.18	2.35	3.10	2.70
Mean	2.18	2.25	2.33	2.41		2.30	2.86	2.16	2.87		2.32	3.09	2.41	3.23	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	0.06		0.06		0.11	0.10		0.10		0.19	0.08		0.08		0.17
C.D (P=0.05)	NS		0.16		0.32	0.28		0.28		NS	NS		0.24		0.48

Table 8: Effect of soil application of potassium and foliar spray of zinc and boron on hot water extractable boron in soil

Treatments	Boron (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	0.20	0.21	0.19	0.21	0.20	0.20	0.22	0.27	0.27	0.24	0.18	0.19	0.21	0.23	0.20
K_1	0.22	0.19	0.20	0.17	0.20	0.22	0.22	0.28	0.25	0.24	0.19	0.19	0.21	0.23	0.21
K_2	0.23	0.21	0.24	0.22	0.22	0.23	0.23	0.28	0.26	0.25	0.19	0.22	0.23	0.20	0.21
K_3	0.19	0.23	0.22	0.26	0.23	0.24	0.22	0.28	0.26	0.25	0.20	0.19	0.24	0.25	0.22
Mean	0.21	0.21	0.21	0.22		0.22	0.22	0.28	0.26		0.19	0.20	0.22	0.23	
	K		M		KXM	K		M		KXM	K		M		KXM
S.E.±	0.01		0.01		0.01	0.01		0.01		0.01	0.01		0.01		0.01
C.D (P=0.05)	0.02		NS		0.04	NS		0.02		NS	NS		0.02		NS

Conclusions

The available primary nutrients as well as micronutrients (Zn and B) in soil at various growth stages influenced significantly due to application of 75 kg K_2O ha^{-1} through soil along with 0.5% Zn and 0.1% B through foliar application.

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