Influence of macro and micronutrients on the yield and quality attributes of cauliflower (*Brassica oleracea* var. botrytis L.) cv. "Pusa Sharad

Abstract

The present investigation was conducted during the *Rabi* seasons of 2017–18 and 2018–19 at the Horticultural Research-cum-Instructional Farm, Department of Vegetable Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The field experiments used a Randomized Block Design (RBD) with three replications and treatments that included RDF (100%), RDF (75%), Borax (20 kg ha^{-1}), Ammonium Molybdate (2 kg ha^{-1}), and $ZnSO_4$ (25 kg ha^{-1}). During the study, various yield parameters, gross curd weight (g), net curd weight (g), curd diameter (cm) the final yield, and quality parameters, total soluble solids (^{o}Brix), protein content in curd (%) and ascorbic acid content in curd (mg/100g) were recorded. The experimental findings revealed that almost all the treatments showed a positive effect on yield and quality; however, a combined application of 100% RDF with Borax at 20 kg ha^{-1}, ammonium molybdate at 2 kg ha^{-1}, and $ZnSO_4$ at 25 kg ha^{-1} was found most promising compared to the control (100% RDF). Therefore, based on the findings, it can be concluded that the application of micronutrients along with the recommended fertilizer dosage is an effective approach for enhancing the performance of cauliflower in terms of both quality and quantity.

Keywords: Cauliflower, boron, molybdenum, zinc, yield, quality parameters

1. Introduction

Cauliflower (*Brassica oleracea* var. *botrytis* L.) is the most popular cruciferae vegetable among the cole crops. The crop is a native of southern Europe in the Mediterranean region and was introduced to India from England in 1822 (Chatterjee and Swarup, 1972). The edible part of cauliflower is the "curd," which is the prefloral fleshy apical meristem. It is cultivated for its attractive curd, which is used in raw vegetables, curries, soups, and pickles. The curd has a high amount of protein (2.6 g) and is a rich source of nutrients, including vitamin A (51 mg), vitamin C (56 mg), carbohydrates (4.0 g), fat (0.4 g), fiber (1.2 g), and iron (1.5 mg) per 100 g of the edible portion of cauliflower (Singh, 1998; Fageria *et al.*, 2012).

The micronutrients, though required in small quantities, are as important as the macronutrients. The role of micronutrients in regulating plant growth and yield is well established. Different micronutrients have a specific role in cauliflower production. Micronutrients, although required in trace amounts, play a vital role in the completion of the life cycle of this crop.

Cauliflower responds well to both macronutrients (nitrogen, phosphorus, and potassium) and micronutrients (boron, molybdenum, and zinc), as these are also essential for proper crop growth and development (Rahman *et al.*, 2007). The crucial roles of these macronutrients (Das 2012; Sharma 2016) and micronutrients (Kumar *et al.*, 2012; Ningawale *et al.*, 2016) during the plant developmental process are well reported by previous researchers in many crops, including cauliflower. However, among the many factors responsible for the low productivity of cauliflower, inadequate and imbalanced nutrient supply occupies the top position, particularly that of boron, molybdenum, and zinc.

Boron deficiency is a common deficiency of the micronutrient around the world and causes large losses in the production and crop quality of cauliflower. It affects the vegetative and reproductive growth of plants, resulting in inhibition of cell expansion, death of meristem, and reduced yield. Boron deficiency and exposure of curds to sunlight during development causes browning (Norman, 1992; Fritz *et al.*, 2009). It also creates a hollow stem in cauliflower. Hollow areas extend from below the curd when the core or fleshy center splits due to an uneven growth rate with the rest of the plant (Masarirambi *et al*., 2013). Reproductive growth, especially flowering, fruit, and seed set is more sensitive to B deficiency than vegetative growth (Da Silva *et al.*, 2008). Similar to boron, cauliflower is also a sensitive crop to molybdenum deficiency. The deficiency develops 'whiptail' in cauliflower. Whiptail results in a deformed growing point, causing no head to develop, as well as leaf blades consisting mostly of midribs (Sharma, 2002). Adventitious buds may form on the lower point of the stem of severely affected plants and the shoot, and the suckers may produce small curds.

Mo is an essential component of the nitrogen-fixing enzymes nitrogenase and nitrate reductase (BARC, 2018). The nitrate reductase is essential in the assimilation of nitrates since it catalyzes the first step of the reduction of NO_3 to NH_3. The other major molybdo-protein of plants includes nitrogenase, which fixes atmospheric nitrogen to NH_3, which is assimilated by plants (Adesoji *et al.*, 2009).

The rate of fertilizer application has increased compared to earlier in crop production, whereas the application of micronutrients has largely been neglected, and deficiency of micronutrients is more prevalent in Indian soils. Furthermore, the over-mining of soil nutrients by plants causes a deficiency of micronutrients in crops and the appearance of disorders, resulting in low yields (Joshi 1997). Therefore, rational and optimum use of micronutrients coupled with recommended fertilizers would be beneficial for increasing curd yield per unit area in cauliflower.

On the other hand, the majority of the available literature is confined to studies where either a single micronutrient or the interaction of only two micronutrients was taken into consideration (Kant *et al.*, 2013; Ningawale *et al.*, 2016). Hence, keeping in view this scenario, research work on the effect of different micronutrients on the growth and yield of cauliflower during consecutive seasons has been carried out to assess the role of micronutrients (boron, molybdenum, and zinc) on both yield and quality parameters.

2. Materials and methods

The whole experimental trial was designed and carried out for two consecutive *rabi* seasons, 2017–18 and 2018–19, at the Horticultural Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The experimental site comes under sub-tropical conditions and was located at 21°16´ N latitude and 81°36´ E longitude with an altitude of 298.56 meters above the mean sea level. The soil at the experimental site was clay-loam in texture (vertisols), having good drainage capacity, and the whole study was undertaken according to Randomised Block Design (RBD) in three replications, consisting of 15 treatments. The seeds of the variety 'Pusa Sharad' were sown in a nursery bed under polyhouse conditions and transplanted into fields after five weeks. The recommended package of practices was followed to raise healthy seedlings in the nursery and need-based plant protection measures were taken up as and when necessary.

The treatment combinations were T_1 - Control (100 % RDF), T_2 -100 % RDF + Borax @ 20 kg ha^{-1}, T_3 - 100% RDF + Ammonium molybdate @ 2 kg ha^{-1}, T_4 -100% RDF + $ZnSO_4$ @ 25 kg ha^{-1}, T_5 -100% RDF + Borax @ 20 kg ha^{-1} + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}, T_6 -100% RDF + Ammonium molybdate @ 2 kg ha^{-1} + Borax @ 20 kg ha^{-1}, T_7 -100% RDF + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kgha^{-1}, T_8 -100% RDF + Borax 20 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}, T_9 -75% RDF + Borax @ 20 kg ha^{-1}, T_{10} - 75% RDF + Ammonium molybdate @ 2 kg ha^{-1}, T_{11} - 75% RDF + $ZnSO_4$ @ 25 kg ha^{-1}, T_{12} -

75% RDF + Borax @ 20 kg ha^{-1} + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}, T_{13} -75% RDF + Ammonium molybdate @ 2 kg ha^{-1} + Borax @ 20 kg ha^{-1}, T_{14} -75% RDF + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}, T_{15}- 75% RDF + Borax 20 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}.

The yield parameters and quality parameters encompassed in the study were gross curd weight (g), marketable curd weight (g), net curd weight (g), curd diameter (cm), curd yield (kg plot -1), total soluble solids (0 Brix), protein content in curd (%), and ascorbic acid content in curd (mg/100g). The yield parameters and quality parameters were recorded at the harvest stage for five tagged plants. The data collected from five randomly selected plants for the above-said parameters were subjected to the analysis of variance technique (ANOVA) and the least significance difference test was applied to separate different treatment means (Panse and Sukhatme 1967).

3. Results and Discussion

3.1 Yield and yield attributing traits

The curd yield and yield attributing traits such as gross (g), net curd weight (g), curd diameter (cm), curd yield (kg $plot^{-1}$) total soluble solids (^{o}Brix)), protein content in curd (%) and ascorbic acid content in curd (mg/100g) were recorded and are furnished in table 1,2 and 3.

3.1 Curd diameter (cm)

The analysis of variance showed significant variations in curd diameter during both years. The mean curd diameter ranged from 14.85 to 19.27 cm during the first year and from 14.26 to 18.70 cm during the second year. The highest curd diameter was recorded with a combination of RDF (100%), Borax (20 kg ha^{-1}), Ammonium Molybdate (2 kg ha^{-1}), and ZnSO4 (25 kg ha^{-1}). The mean data indicated that the combined application of B, Zn, and Mo along with RDF to the cauliflower plants significantly enhanced the curd diameter, and this is consistent with the findings of Singh *et al.* (2014) and Islam *et al.* (2015). The findings of Lashkari *et al.* (2008) suggested that the combined application of micronutrients enhances the curd width and curd weight, which is due to their promotional effect on physiological activities such as photosynthesis, the translocation of assimilates from leaves to curd, and their storage in curd.

3.2 Gross and net curd weight (g)

The data regarding gross and net curd weight revealed significant differences. The mean performance revealed that gross curd weight varied from 1350.56 to 2270.95 g during the first year and from 1285.02 to 2185.05 g during the second year. Similarly, net curd weight ranged from 325.42 to 736.05 g during the first year and from 270.49 to 660.42 g during the second year. Among the various treatments, maximum gross and net curd weight were observed with treatment consisting of 100% RDF + Borax @ 20 kg ha^{-1} + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1} respectively. These results are well in agreement with the findings of Chattopadhyay and Mukhopadhyay (2003) and Gabhale *et al.* (2014) in cauliflower. Chattopadhyay and Mukhopadhyay (2003) suggested that the collective effect of B and Mo might be the reason for enhanced curd weight. Boron and molybdenum together promote the distribution of photosynthetic material to reproductive tissues in cauliflower curd. Along with that, the findings of Kumar and Choudhary (2002), Singh (2003), and Prasad and Yadav (2003) further supported our results. In this regard, Kanujia *et al.* (2006) stated that the increment in the weight of curd might be due to the physiological role of zinc and boron, and other combined micronutrients.

3.3 Curd yield (kg plot $^{-1}$)

The curd yield varied significantly from 6.90 to 11.73 kg during the first year and from 6.07 to 10.75 kg during the second year. The maximum curd yields, i.e., 11.73 kg and 10.75 kg, respectively, were observed when micronutrients were applied in combination with RDF (100% RDF + Borax @ 20 kg ha^{-1} + Ammonium Molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}), when compared to the control and rest of treatments. The higher curd yield might be attributed to the application of micronutrients that in turn promote the distribution of food material from leaves to the storage tissue in the curd, and our interpretation is in close conformity with the findings of Singh (2003); Varghese and Duraisami (2005); Kumar *et al.* (2011); Gabhale *et al.* (2014), and Devi *et al.* (2017). The soil application of different micronutrient mixtures to increase yields can be attributed to the enhanced availability of the essential plant.

3.4 Total soluble solids (^{0}Brix)

The result on total soluble solids (TSS) indicated significant differences due to the application of micronutrients in different combinations. The mean performance showed that during the first year, TSS ranged from 6.08 to 9.22 ^{0}Brix, whereas it from 5.43 to 8.74 ^{0}Brix during the second year. The application of micronutrients in different combinations was found promising in improving the TSS however, maximum TSS was recorded with the combined application of RDF (100%) + Borax (20 kg ha^{-1}) + Ammonium molybdate (2 kg ha^{-1}) + $ZnSO_4$ (25 kg ha^{-1}) compared to rest of treatments and control.

These results conform with those of Lashkari *et al.* (2008), Zaki *et al.* (2015), Thapa *et al.* (2016), Singh *et al.* (2018), Pankaj *et al.* (2018), and Moklikar *et al.* (2018). Furthermore, increased T.S.S. content might be due to the process of either complete or partial hydrolysis during the process of respiration the available food material converts into simple sugar and it results in higher TSS content.

3.5 Protein content in curd (%)

The protein content in curd (%) significantly varied during both the first (12.00 to 19.68%) and second (11.50 to 19.13%) phases of the experiment. The mean performance also indicated that the treatment with different micronutrients significantly improved the protein content in curd compared to the control. In addition, the highest protein content was reported with the treatment consisting of a combined application of RDF (100%) + Borax (20 kg ha^{-1}) + Ammonium Molybdate (2 kg ha^{-1}) + $ZnSO_4$ (25 kg ha^{-1}) compared to the rest of the treatment and the control.

The results showed that the protein content was significantly influenced and reached its maximum when micronutrients were applied in combination with RDF. These results were corroborated by the findings of Sharma *et al.* (2005); and Sharma and Chandra (2004). This increment in protein content might be due to the application of different nutrients that enhance the absorption of nitrogen and affect the metabolic activities of plants; subsequently leading to higher protein content as nitrogen is an important constituent of protein.

3.6 Ascorbic acid content in curd (mg/100g)

The ascorbic acid content in curd (mg/100g) was significantly varied and ranged from 52.80 to 63.20 mg/100g during the first year and from 50.05 to 62.53 mg/100g during the second year. The highest ascorbic acid content in curd was noticed with treatment (100% RDF + Borax @ 20 kg ha^{-1} + Ammonium Molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}) when compared to the remaining treatments and control.

The obtained results were found to be inconsistent with the findings of Kumar *et al.* (2010), Mishra *et al.* (2014) in knol-khol, Yadav *et al.* (2013), Sharma and Kumar (2014) in cauliflower, Roni *et al.* (2014) in broccoli, Zaki *et al.* (2015) in broccoli, and Kotecha *et al.* (2016) in cabbage. The increased ascorbic acid content appeared might be due to the application of micronutrients particularly boron which helps in carbohydrate metabolism. In addition, zinc is also known to improve the quality of cauliflower.

4. Conclusion

The present investigation was carried out for two years to find out the effect of different micronutrients in various combinations along with RDF on the yield and quality of cauliflower. The obtained experimental results revealed that the combined application of all three micronutrients, viz., boron, zinc, and molybdenum, in various combinations significantly improved the yield, yield attributing, and quality of cauliflower. Furthermore, the application of 100% RDF + Boron at 20 kg ha^{-1}, molybdenum at 2 kg ha^{-1}, and zinc at 25 kg ha^{-1} was found most beneficial in improving the yield and quality traits of cauliflower. Therefore, it can be concluded that, compared to a sole application, a combined application of micronutrients (B, Zn, and Mo) along with RDF is highly effective in improving the yield and quality of cauliflower.

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Table 1: Influence of macro and micronutrients on gross curd weight and net curd weight of cauliflower

Treatment	Gross curd weight (g)			Net curd weight (g)		
	2017-18	**2018 -19**	**Pooled Mean**	**2017-18**	**2018-19**	**Pooled Mean**
T_1: Control (100 % RDF)	1350.56	1285.02	1317.79	325.42	270.49	297.96
T_2: 100 % RDF + Borax @ 20 kg ha^{-1}	1740.46	1680.53	1710.49	575.10	520.61	547.85
T_3: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1}	1870.44	1741.13	1805.79	564.90	505.39	535.14
T_4: 100% RDF + $ZnSO_4$ @ 25 kg ha^{-1}	1670.38	1613.77	1642.08	559.83	482.26	521.05
T_5: 100% RDF + Borax @ 20 kg ha^{-1} + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	2270.95	2185.05	2228.00	736.05	660.42	698.24
T_6: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1} + Borax @ 20 kg ha^{-1}	2090.21	2010.92	2050.57	636.39	571.71	604.05
T_7: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	1951.81	1840.68	1896.25	682.25	594.53	638.39
T_8: 100% RDF + Borax 20 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	1980.13	1936.26	1958.20	604.76	550.13	577.45
T_9: 75% RDF + Borax @ 20 kg ha^{-1}	1600.90	1451.04	1525.97	558.75	465.17	511.96
T_{10}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1}	1657.45	1590.81	1624.13	490.28	438.34	464.31
T_{11}: 75% RDF + $ZnSO_4$ @ 25 kg ha^{-1}	1500.39	1420.68	1460.54	428.89	371.05	399.97
T_{12}: 75% RDF + Borax @ 20 kg ha^{-1} + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 2 kg ha^{-1}	2160.61	2050.14	2105.38	690.65	625.38	658.02
T_{13}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1} + Borax @ 20 kg ha^{-1}	2041.78	1970.35	2006.07	624.16	561.83	593.00
T_{14}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	1892.72	1813.75	1853.24	614.36	552.22	583.29
T_{15}: 75% RDF + Borax 20 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	1972.65	1870.92	1921.78	596.22	548.16	572.19
Mean	**1850.10**	**1764.07**	**1807.08**	**579.20**	**514.51**	**546.86**
SEm±	**107.15**	**89.91**	**97.49**	**22.51**	**16.59**	**19.35**
CD (P=0.05)	**310.40**	**260.46**	**282.41**	**65.21**	**48.07**	**56.04**

Table 2: Influence of macro and micronutrients on curd diameter and curd yield (kg plot $^{-1}$) of cauliflower

Treatment	Curd diameter (cm)			Curd yield (kg plot $^{-1}$)		
	2017-18	2018-19	Pooled Mean	2017-18	2018-19	Pooled Mean
T_1: Control (100 % RDF)	14.85	14.26	14.55	6.90	6.07	6.49
T_2: 100 % RDF + Borax @ 20 kg ha^{-1}	16.80	16.38	16.59	9.14	8.52	8.83
T_3: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1}	16.37	15.82	16.10	9.52	8.76	9.14
T_4: 100% RDF + $ZnSO_4$ @ 25 kg ha^{-1}	16.27	15.74	16.01	8.84	8.06	8.45
T_5: 100% RDF + Borax @ 20kg ha^{-1} + Ammonium molybdate @ 2kg ha^{-1} + $ZnSO_4$ @2 5kg ha^{-1}	19.27	18.70	18.99	11.73	10.75	11.24
T_6: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1} + Borax @ 20 kg ha^{-1}	17.89	17.22	17.56	10.77	10.29	10.53
T_7: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	18.54	17.97	18.25	9.89	9.05	9.47
T_8: 100% RDF + Borax 20 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	17.55	16.70	17.13	10.24	9.36	9.74
T_9: 75% RDF + Borax @ 20 kg ha^{-1}	15.55	15.11	15.33	8.05	7.38	7.72
T_{10}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1}	16.04	15.42	15.73	8.41	7.57	7.99
T_{11}: 75% RDF + $ZnSO_4$ @ 25 kg ha^{-1}	15.01	14.89	14.95	7.80	6.76	7.28
T_{12}: 75% RDF + Borax @ 20 kg ha^{-1} + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ kg ha^{-1}	18.72	18.18	18.45	11.24	10.57	10.91
T_{13}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1} + Borax @ 20 kg ha^{-1}	18.47	17.55	18.01	10.48	9.71	10.10
T_{14}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	17.64	17.04	17.34	9.86	8.82	9.34
T_{15}: 75% RDF + Borax 20 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	17.00	16.43	16.72	10.05	9.12	9.58
Mean	**17.07**	**16.49**	**16.78**	**9.55**	**8.74**	**9.14**
SEm±	**0.54**	**0.40**	**0.46**	**0.43**	**0.27**	**0.33**
CD (P=0.05)	**1.58**	**1.14**	**1.33**	**1.25**	**0.77**	**0.94**

Table 3: Influence of macro and micronutrients on quality parameters of cauliflower

Treatment	Total soluble solids (^{0}Brix)			Protein content in curd (%)			Ascorbic acid content in curd (mg/100g)		
	2017 -18	2018 -19	Pooled Mean	2017-18	2018-19	Pooled Mean	2017-18	2018-19	Pooled Mean
T_1: Control (100 % RDF)	6.08	5.43	5.76	12.00	11.50	11.75	52.80	50.05	51.43
T_2: 100 % RDF + Borax @ 20 kg ha^{-1}	7.70	7.12	7.41	15.74	15.19	15.46	57.30	56.71	57.01
T_3: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1}	7.81	7.35	7.58	16.06	15.56	15.81	57.43	57.04	57.24
T_4: 100% RDF + $ZnSO_4$ @ 25 kg ha^{-1}	7.46	6.97	7.22	14.83	14.81	14.82	56.15	55.60	55.88
T_5: 100% RDF + Borax @ 20 kg ha^{-1} + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 2kg ha^{-1}	9.22	8.74	8.98	19.68	19.13	19.40	63.20	62.53	62.87
T_6: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1} + Borax @ 20 kg ha^{-1}	8.59	8.08	8.34	17.70	17.25	17.47	60.97	60.39	60.68
T_7: 100% RDF + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	8.80	8.29	8.55	17.56	17.06	17.31	61.55	60.98	61.27
T_8: 100% RDF + Borax 20 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	8.18	7.80	7.99	17.49	16.81	17.15	60.28	59.64	59.96
T_9: 75% RDF + Borax @ 20 kg ha^{-1}	6.53	6.09	6.31	13.92	13.75	13.83	55.19	54.43	54.81
T_{10}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1}	7.05	6.56	6.80	14.76	14.56	14.66	55.83	55.81	55.82
T_{11}: 75% RDF + $ZnSO_4$ @ 25 kg ha^{-1}	6.42	6.11	6.26	13.57	12.88	13.22	54.92	52.59	53.75
T_{12}: 75% RDF + Borax @ 20 kg ha^{-1} + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 2kg ha^{-1}	8.90	8.53	8.72	18.54	18.19	18.36	62.88	62.27	62.57
T_{13}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1} + Borax @ 20 kg ha^{-1}	8.12	7.77	7.94	17.14	16.56	16.85	59.71	59.46	59.59
T_{14}: 75% RDF + Ammonium molybdate @ 2 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	7.95	7.52	7.73	16.93	16.44	16.68	59.32	58.33	58.83
T_{15}: 75% RDF + Borax 20 kg ha^{-1} + $ZnSO_4$ @ 25 kg ha^{-1}	7.87	7.46	7.67	16.23	15.75	15.99	58.24	57.82	58.03
Mean	**7.78**	**7.32**	**7.55**	**16.14**	**15.70**	**15.92**	**58.38**	**57.58**	**57.98**
SEm±	**0.28**	**0.23**	**0.25**	**0.77**	**0.62**	**0.65**	**2.07**	**2.39**	**2.08**
CD (P=0.05)	**0.81**	**0.67**	**0.73**	**2.22**	**1.80**	**1.89**	**5.99**	**6.92**	**6.03**