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Effect of micronutrients and growth regulators on growth parameters of onion (*Allium cepa* L.)

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Abstract
Field experiment was conducted during 2017 to 2018 at College of Horticulture, Bidar, to know the effect of micronutrients and growth regulators on growth parameters of onion. The experiment was laid out using RCBD design with total 11 treatments and three replications, the pooled data revealed that significantly maximum plant height of 66.12 cm and 84.30 cm at 60 and 90 days after planting respectively and significantly maximum Number of umbels per plant of 5.15 and umbel size (64.29 mm) was recorded in treatment T_{10} (Boron 0.1%+ GA3 100 ppm at 40 DAP).

Keywords: Micronutrients and growth regulators and onion

Introduction
Onion (*Allium cepa* L.) belonging to family *Alliaceae* is an important monocotyledonous, cross pollinated cool season vegetable crop of India grown for its bulbs. The crop is grown for consumption both in the green state as well as in mature bulbs A pound of onion crop contain protein 6 g, Fats 0.9 g, Carbohydrate 44 g, Calcium 137 mg, Phosphorous 188 mg, Iron 2.1 mg, Thiamine 0.15 mg, Riboflavin 0.1mg, Niacin 0.6 mg and Ascorbic acid 38 mg. It is one of the richest sources of flavonoids in the human diet and flavonoid consumption has been associated with a reduced risk of cancer, heart disease and diabetes. In addition it is known for anti-bacterial, antiviral, anti-allergic and anti-inflammatory potential and it is a most common vegetable crop grown in India. Its seed yield unit-1 area is comparatively low. To achieve higher productivity, the mother plants could be supplemented with nutrients through foliar sprays which will reduce the loss through absorption, leaching and other processes associated with soil application (Vasilas *et al.,* 1980) [10]. It could also bring manifold changes in seed composition and its viability and vigour. The response of onion seed crop to various growth substances has been well documented by many workers. Use of plant growth regulators to the onion crop alters the physiology of crop growth and influences the storage life of bulbs and seeds besides affecting seed quality. The role played by different plant growth regulators differs from each other. In this context, foliar application of growth substances assumes paramount importance for better productivity of the seed crop.

Material and method
Field experiment was conducted during 2017 to 2018 at College of Horticulture, Bidar, to know the effect of micronutrients and growth regulators on growth parameters of onion. The experiment was laid out using RCBD design with total 11 treatments and three replications, the treatments included in table number.1. The crop was raised with recommended package of practices of UHS, Bagalkot in a plot size 3 x 2 m^2 under irrigated condition. Foliar spray of growth regulators and Micronutrients were given during interval of 20 and 40 Days after plating. The plots were irrigated immediately after the completion of Transplanting. Thinning of excess seedlings and gap filling was undertaken one week after Establishment. All cultural practices have followed as per package of practices of UHS, Bagalkot. The observations *viz.*, Plant height, No of leaves, No. of umbels per plant and Umbel size were recorded the collected data were subjected for statistical analysis.

Results and Discussion
Pooled analysis of data over the years 2016-17 and 2017-18 revealed that plant height varies significantly among different treatments. Significantly maximum plant height of 66.12 cm and

84.30 cm at 60 and 90 days after planting respectively recorded in treatment T_{10} (Boron 0.1%+ GA3 100 ppm at 40 DAP).Whereas control recorded significantly lower values for plant height (42.89 and 59.42cm) 60 and 90 days after planting respectively (Table 2). Results obtained were in agreement with the findings of Patel *et al.* (2010) [4], Shukla *et al.* (2010), Jagati Yada giri *et al.* (2017) [9] in onion and Chanchan *et al.*, (2013) [1] in garlic

The of number of leaves per plant varies significantly among the different treatments, Treatment T_{10} (Boron 0.1%+ GA3 100 ppm at 40 DAP) records significantly maximum number of leaves plant-1 (13.06 and 19.35) at 60 and 90 days after planting respectively. Whereas control recorded significantly lower number of leaves plant-1 (8.99 and 11.42) at 60 and 90 days after planting respectively (Table 3). Tsiakaras *et al.* (2014) [8], Tyagi *et al.* (2007) [9] in onion.

Significantly maximum Number of umbels per plant of 5.15 and umbel size (64.29 mm) was recorded with treatment T_{10} (Boron 0.1%+ GA3 100 ppm at 40 DAP) as compared to other treatments, while significantly lower values of number of umbels per plant of 3.15 and umbel size (42.16 mm) recorded in control (Table 4) Shaikh *et al.* (2002) [5], Geetharani *et al.* (2008) [2] and Tariq *et al.* (2018) [7] in onion.

Table 1: Treatments Details

T1- NAA100 ppm at 20 DAP
T2 -NAA 100 ppm at 40 DAP
T3- GA3-100 ppm at 20 DAP
T4- GA3-100 ppm at 40 DAP
T5 – Boron-0.1% at 20 DAP
T6 – Boron-0.1% at 40 DAP
T7 – Boron 0.1%+ NAA100 ppm at 20 DAP
T8 – Boron 0.1%+ NAA100 ppm at 40 DAP
T9- Boron 0.1%+ GA3 100 ppm at 20 DAP
T10- Boron 0.1%+ GA3 100 ppm at 40 DAP
T11 - Control

Table 2: Effect of micronutrients and growth regulators on plant height of onion

Treatments	Plant height(cm) 60 DAP			Plant height(cm) 90 DAP		
	2016- 17	2017-18	pooled	2016-17	2017-18	pooled
T1- NAA100 ppm at 20 DAP	51.51	43.64	47.57	67.70	61.33	64.52
T2 -NAA 100 ppm at 40 DAP	53.65	44.37	49.01	69.84	70.27	70.05
T3- GA3-100 ppm at 20 DAP	66.96	61.27	60.78	83.15	80.20	81.68
T4- GA3-100 ppm at 40 DAP	67.12	63.93	65.53	83.31	81.07	82.19
T5 – Boron-0.1% at 20 DAP	47.33	43.25	45.29	63.52	59.23	61.38
T6 – Boron-0.1% at 40 DAP	46.52	43.33	44.93	60.38	61.60	60.99
T7 – Boron 0.1%+ NAA100 ppm at 20 DAP	59.00	60.73	59.87	75.19	72.47	73.83
T8 – Boron 0.1%+ NAA100 ppm at 40 DAP	61.12	61.07	61.09	77.31	80.93	79.12
T9- Boron 0.1%+ GA3 100 ppm at 20 DAP	64.33	57.53	60.93	81.85	83.80	82.83
T10- Boron 0.1%+ GA3 100 ppm at 40 DAP	68.00	64.23	66.12	84.19	84.40	84.30
T11 - Control	44.19	41.60	42.89	62.71	56.13	59.42
Mean	57.24	53.17	54.90	73.55	71.94	72.75
SEm±	2.47	3.849	4.649	2.18	4.827	4.587
CD (0.05)	7.30	11.35	13.71	6.43	14.24	13.53
CV (%)	7.48	12.53	14.66	9.56	11.62	10.92

Table 3: Effect of micronutrients and growth regulators on number of leaves in onion

Treatments	No. leaves 60 DAP			No. of leaves 90 DAP		
	2016- 17	2017-18	pooled	2016-17	2017-18	pooled
T1- NAA100 ppm at 20 DAP	11.41	8.27	9.84	12.93	12.33	12.63
T2 -NAA 100 ppm at 40 DAP	11.75	9.13	10.44	13.27	15.87	14.57
T3- GA3-100 ppm at 20 DAP	13.13	10.75	11.94	14.64	17.07	15.85
T4- GA3-100 ppm at 40 DAP	13.71	10.97	12.34	15.22	19.67	17.44
T5 – Boron-0.1% at 20 DAP	10.26	8.40	9.33	10.09	17.33	13.71
T6 – Boron-0.1% at 40 DAP	10.41	9.33	9.87	11.93	16.23	14.08
T7 – Boron 0.1%+ NAA100 ppm at 20 DAP	11.83	8.80	10.32	13.35	12.67	13.01
T8 – Boron 0.1%+ NAA100 ppm at 40 DAP	12.24	8.67	10.45	13.76	14.33	14.04
T9- Boron 0.1%+ GA3 100 ppm at 20 DAP	13.91	9.13	11.52	15.42	15.88	15.65
T10- Boron 0.1%+ GA3 100 ppm at 40 DAP	14.19	11.94	13.06	16.24	22.47	19.35
T11 - Control	8.58	9.40	8.99	11.78	11.07	11.42
Mean	11.94	9.52	10.73	13.51	15.90	14.70
SEm±	0.94	0.890	0.645	1.05	1.518	0.952
CD(0.05)	2.77	2.62	1.90	3.15	4.47	2.81
CV (%)	13.63	16.18	10.40	11.96	16.53	11.22
Treatments	**No. leaves 60 DAP**			**No. of leaves 90 DAP**		
	2016- 17	**2017-18**	**pooled**	**2016-17**	**2017-18**	**pooled**
T1- NAA100 ppm at 20 DAP	11.41	8.27	9.84	12.93	12.33	12.63
T2 -NAA 100 ppm at 40 DAP	11.75	9.13	10.44	13.27	15.87	14.57
T3- GA3-100 ppm at 20 DAP	13.13	10.75	11.94	14.64	17.07	15.85
T4- GA3-100 ppm at 40 DAP	13.71	10.97	12.34	15.22	19.67	17.44
T5 – Boron-0.1% at 20 DAP	10.26	8.40	9.33	10.09	17.33	13.71
T6 – Boron-0.1% at 40 DAP	10.41	9.33	9.87	11.93	16.23	14.08
T7 – Boron 0.1%+ NAA100 ppm at 20 DAP	11.83	8.80	10.32	13.35	12.67	13.01
T8 – Boron 0.1%+ NAA100 ppm at 40 DAP	12.24	8.67	10.45	13.76	14.33	14.04
T9- Boron 0.1%+ GA3 100 ppm at 20 DAP	13.91	9.13	11.52	15.42	15.88	15.65

T10- Boron 0.1%+ GA3 100 ppm at 40 DAP	14.19	11.94	13.06	16.24	22.47	19.35
T11 - Control	8.58	9.40	8.99	11.78	11.07	11.42
Mean	11.94	9.52	10.73	13.51	15.90	14.70
SEm±	0.94	0.890	0.645	1.05	1.518	0.952
CD(0.05)	2.77	2.62	1.90	3.15	4.47	2.81
CV (%)	13.63	16.18	10.40	11.96	16.53	11.22

Table 4: Effect of micronutrients and growth regulators on Number of umbels of onion

Treatments	No. Umbels/plant			Umbel size(mm)		
	2016- 17	2017-18	pooled	2016- 17	2017-18	pooled
T1- NAA100 ppm at 20 DAP	3.92	4.03	3.97	64.07	66.63	65.35
T2 -NAA 100 ppm at 40 DAP	4.15	4.10	4.13	50.09	52.09	51.09
T3- GA3-100 ppm at 20 DAP	3.81	5.00	4.41	70.86	73.69	72.27
T4- GA3-100 ppm at 40 DAP	4.55	5.30	4.93	71.94	74.82	73.38
T5 – Boron-0.1% at 20 DAP	3.09	3.86	3.47	63.03	65.55	64.29
T6 – Boron-0.1% at 40 DAP	3.04	3.63	3.34	57.79	59.44	58.62
T7 – Boron 0.1%+ NAA100 ppm at 20 DAP	4.06	4.36	4.21	52.76	51.41	52.08
T8 – Boron 0.1%+ NAA100 ppm at 40 DAP	4.10	4.44	4.18	57.47	59.77	58.62
T9- Boron 0.1%+ GA3 100 ppm at 20 DAP	4.46	4.56	4.51	62.73	65.24	63.98
T10- Boron 0.1%+ GA3 100 ppm at 40 DAP	4.58	5.72	5.15	75.83	78.87	77.35
T11 - Control	3.04	3.43	3.15	41.33	42.99	42.16
Mean	3.86	4.40	4.13	60.71	62.77	61.74
SEm±	0.18	0.344	0.178	3.530	3.915	3.688
CD(0.05)	0.55	1.01	0.52	10.41	11.55	10.88
CV (%)	8.40	13.55	7.48	10.07	10.80	10.34

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