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Effect of Dates of Planting and Application of Foliar Nutrition on Plant Growth and Seed Yield of Onion Cv. Arka Kalyan

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ABSTRACT

In present year, demand of onion in domestic and international market is increasing day by day but non-availability of good quality seed is limitation for profitable seed production programme of onion. Hence an experiment was conducted to study the effect of dates of bulb planting and application of foliar nutrition on plant growth and seed yield of onion during the Rabi season 2015-16 and 2016-17. The experiment consisted of five dates of bulb planting with four application of foliar nutrition. The experiment was laid out in Randomized Complete Block Design (RCBD) with two factorial concepts. The experimental results revealed the significant effect of dates of bulb planting and application of foliar nutrition on growth and seed yield. Significantly highest values were recorded in the growth parameters like plant height (45.83 and 51.17 cm), number of leaves (29.50 and 36.00) @ 40 and 60 DAP and less plant disease severity (11.48 %) and seed yield parameters like number of umbels per plant (8.13), umbel diameter (8.13 cm), number of seed per umbel (918), seed weight per umbel (4.98 g), seed yield per plant (16.33 g) and seed yield per hectare (741.74 kg) were recorded by planting the bulbs on November-1st coupled with application of multi micronutrient mixture at 0.25 per cent (D_3T_3) and significantly the lowest was recorded by December-1st planting with without spray (D_5T_4).

Key word: *Nutrition, Rabi, Seed, Micronutrient, Onion.*

INTRODUCTION

Onion (*Allium cepa L.*) is one of the major spice bulb crops of the world and India. It has great economic importance due to its medicinal and dietetic values. Onion is a biennial crop. It completes vegetative phase with bulb production in the first year. The bulbs are used as planting material for production of true seed in the second year. The demands of quality true seeds are increasing day by day and the price of quality seeds is also high. Onion is a thermo and photosensitive crop; the seeds are produced during winter period *(Rabi* season). Foggy weather at early stage of crop growth and early rain at the flowering stage adversely affect the seed crop. Thus, the time of planting of bulbs for true seed production in a particular location needs to be determined for quality seed production of onion[2].

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Planting date may vary in different localities as well as agro ecological zones and even from year to year at the same place due to climate change. The environmental conditions greatly influence the growth and development of onion plant. Different growth phases of onion have varied environmental requirements. Besides time of bulb planting, plant nutrition also influences the crop growth, seed yield and quality. The application of foliar nutrition is the quickest way to deliver nutrients to the tissues and organs of the crop, and is proved that application of these micronutrients beneficial to correct the certain nutrient deficiencies. Keeping all these above facts in view, the present investigation "effect of planting dates and foliar application of nutrition on seed yield and quality of onion," was undertaken.

MATERIALS AND METHODS

The field experiment was conducted by using foundation seeds Cv. Arka kalyana obtained from Seed unit, UAS, Dharwad at 'H' block, seed unit, University of Agricultural Sciences, Dharwad, during *rabi* -2016-17 to study the effect of five dates of bulb planting *viz*., **D_1**: October-1st, **D_2**: October-15th, **D_3**:November-1st, **D_4**:November-15th and **D_5**:December-1st and four types of application of foliar nutrition viz., **T_1:**Borax @ 0.25 %, **T_2**:Potassium nitrate @ 0.5 %, **T_3**:Micronutrient mixture @ 0.25 % and **T_4**:Control.The experiment was laid out in Randomized Complete Block Design (RCBD) with two factorial concepts.

RESULTS AND DISCUSSION

Among the of dates of bulb planting, the pooled data significantly highest growth parameters like plant height (40.19 and 51.59 cm), number of leaves (22.66 and 30.24) @ 40 and 60 DAP and less per cent disease incidence (15.59) and seed yield parameters like number of umbels per plant (6.40), umbel diameter (7.44 cm), number of seed per umbel (870), seed weight per umbel (4.21 g), seed yield per plant (15.07 g) and seed yield per hectare (710.30 kg) were recorded by bulb planting on November-1st (D_3) followed by November-15th (D_4) and significantly lowest was recorded by December-1st (D_5) planting and the similar results were obtained in both 2015-16 and 2016-17 experiment. (Table 1 to 6).

The higher number of leaves/plants during November-1st bulb planting dates attributed to the better availability of nutrition and light which might favoured the production of more photosynthates ultimately resulting into more number of leaves/plant. The late planting of bulbs i.e. 1st December bulb planting recorded less time for seed scape initiation (50.35 days) than early planting (60.35 days). The significantly less time taken by late planting may be due to the non availability of low temperature during February and March which promotes and early initiation of seed scape in late planting. The similar results were reported by Asaduzzaman *et al.*[1], in onion seed production. The reduction in productive umbellates and seed setting in delayed planting and high temperature conditions during flowering which resulted in poor pollination and fertilization due to reduced pollen viability and stigma receptivity. Inadequate pollinator's activities might have also reduced the number of productive umbellates/umbel and seed setting. The similar results were reported by Balraj *et al.*[4] and Anisuzzaman *et al*[1].

The higher seed yield and its components noticed in the November 1st planting might be attributed to lower incidence of disease (18.94 %) compared to late planting *i.e* December 1st planting recorded more (27.90 %) and better growth and development of plants in the optimum planting may resulted into better source to sink relationship due to availability of balanced plant nutrition and adequate soil moisture unlike December 1st

planting which experienced the adverse growth conditions and resulted in less seed yield per hectare (561.83 kg). These results are conformity with those Mohamedali and Nourai[10], Ibrahim *et al.*[6], Mosleh[11] and Mehri *et al.*[9] in onion.

Among the application of foliar nutrition, significantly the highest pooled values were recorded in the growth parameters like plant height (39.30 and 50.74 cm), number of leaves (21.21 and 29.63) @ 40 and 60 DAP and seed yield parameters like number of umbels per plant (5.78), umbel diameter (7.02 cm), number of seed per umbel (838), seed weight per umbel (4.20 g), seed yield per plant (14.42 g) and seed yield per hectare (680.74 kg) were recorded by multi micronutrient at 0.25 per cent (T_3) which was on par with 0.25 per cent Borax spray (T_1) where as significantly the lowest values were recorded in control *i.e* no spray (T_4) and similar results were observed in 2015-16 and 2016-17 experiment (Table 1 to 6).

All these metabolic and enzymatic activities might have enhanced translocation and assimilation rates leading to better expression of growth parameters, by showing significant increased plant height and number of leaves due to application multi micro nutrient at 0.25 % which was on par with potassium nitrate (0.5 %). These results are in accordance with the earlier reports[14,16]. These results also confirmed that multi micronutrient foliar spraying has shown the positive effect in increasing seed setting and yield per hectare and may be due to better expression of growth and reproductive parameters. These findings are in line with Barker and Pilbeam[5], Masoud *et al.*[7] in wheat, Verma *et al.*[16], Rafique *et al.*[12] in onion and Yaseen *et al.*[17] in cotton who have also reported the similar results for application of mineral nutrients on yield attributing traits.

Among the interaction of dates of planting and application of foliar nutrition, significantly highest values in the growth parameters like plant height (45.83 and 57.17 cm), number of leaves (29.50 and 36.00) @ 40 and 60 DAP and percent disease incidence (11.48 %) and seed yield parameters like number of umbels per plant (8.13), umbel diameter (8.13 cm), number of seed per umbel (918), seed weight per umbel (4.98 g), seed yield per plant (16.33 g) and seed yield per hectare (741.74kg) were recorded by November-1st and multi micronutrient (0.25 %) combination (D_3T_3). Significantly the lowest was recorded by December-1st planting with no spray (D_5T_4) and similar values recorded in 2015-16 and 2016-17 both the experiment (Table 1 to 6).

The higher seed yield due to micronutrient mixture (0.25 %) was attributed to its chemical composition with all multi micronutrients like zinc (3.0 %), iron (2.0 %), manganese (1.0 %), and boron (0.5 %) with traces of Ca, Mg, sulphur, copper and molybdenum in the balanced and easily available form. The November-1st planting recorded more seed yield compared to late planting due to the higher vegetative growth, lower disease incidence, with optimum temperature is favorable for bolting and development of seed by accumulation of higher food materials which finally converted into higher seed yield[13]. Teshome *et al.*[15] had also reported similar results in onion and delaying in planting will face the initially heavy dew and fog, favor the development of *Stemphylium* blight and *Purple blotch* and during seed maturation higher temperature may leads to seed abortion resulting into low accumulation of food reserve into seed and had immature seed. During flowering of onions, clear and bright days are necessary to ensure activity insects for pollination. The results are in conformity with Mehri *et al.*[8].

Table 1: Effect of dates of bulb planting and application of foliar nutrition on plant height at 40 and 60 DAP in onion cv. Arka Kalyan

Treatment	Plant height (cm) at 40 DAP			Plant height (cm) at 60 DAP		
Planting time (D)	**2015-16**	**2016-17**	**Pooled**	**2015-16**	**2016-17**	**Pooled**
D_1 : OCT-1st	37.45	38.20	**37.82**	48.82	49.76	**49.29**
D_2 : OCT-15th	36.41	37.16	**36.78**	47.78	48.72	**48.25**
D_3 : NOV-1st	40.06	40.33	**40.19**	51.36	51.82	**51.59**
D_4 : NOV-15th	38.22	38.97	**38.59**	49.59	50.53	**50.06**
D5: DEC-1st	33.70	34.45	**34.07**	45.07	46.01	**45.54**
S.Em±	**0.33**	**0.31**	**0.31**	**0.34**	**0.35**	**0.31**
C.D. (P=0.05)	**0.95**	**0.90**	**0.88**	**0.97**	**1.00**	**0.90**
Application of foliar nutrition (T)						
T_1 : Borax @ 0.25 %	36.90	37.65	**37.28**	48.27	49.21	**48.74**
T_2 : Potassium nitrate @ 0.5 %	38.60	38.91	**38.76**	49.92	50.47	**50.19**
T_3:Micronutrient mixture @0.25%	38.90	39.70	**39.30**	50.27	51.22	**50.74**
T_4 :Control	34.25	35.00	**34.63**	45.62	46.56	**46.09**
S.Em±	**0.30**	**0.28**	**0.27**	**0.30**	**0.31**	**0.28**
C.D. (P=0.05)	**0.85**	**0.80**	**0.78**	**0.87**	**0.90**	**0.80**
Interactions (D x T)						
D_1T_1	37.80	38.55	**38.18**	49.17	50.11	**49.64**
D_1T_2	38.31	39.06	**38.69**	49.68	50.62	**50.15**
D_1T_3	38.67	39.42	**39.05**	50.04	50.98	**50.51**
D_1T_4	35.00	35.75	**35.38**	46.37	47.31	**46.84**
D_2T_1	36.20	36.95	**36.58**	47.57	48.51	**48.04**
D_2T_2	36.57	37.32	**36.95**	47.94	48.88	**48.41**
D_2T_3	36.97	37.72	**37.35**	48.34	49.28	**48.81**
D_2T_4	35.89	36.64	**36.26**	47.26	48.20	**47.73**
D_3T_1	36.67	37.42	**37.04**	48.04	48.98	**48.51**
D_3T_2	43.22	41.81	**42.52**	54.35	53.33	**53.84**
D_3T_3	45.33	46.33	**45.83**	56.67	57.67	**57.17**
D_3T_4	35.00	35.75	**35.38**	46.37	47.31	**46.84**
D_4T_1	39.49	40.24	**39.87**	50.86	51.80	**51.33**
D_4T_2	39.92	40.67	**40.30**	51.29	52.23	**51.76**
D_4T_3	38.08	38.83	**38.46**	49.45	50.39	**49.92**
D_4T_4	35.37	36.12	**35.74**	46.74	47.68	**47.21**
D_5T_1	34.36	35.11	**34.74**	45.73	46.67	**46.20**
D_5T_2	34.96	35.71	**35.34**	46.33	47.27	**46.80**
D_5T_3	35.46	36.21	**35.84**	46.83	47.77	**47.30**
D_5T_4	30.00	30.75	**30.38**	41.37	42.31	**41.84**
S.Em±	**0.67**	**0.63**	**0.61**	**0.68**	**0.70**	**0.63**
C.D. (P=0.05)	**1.90**	**1.79**	**1.75**	**1.95**	**2.00**	**1.80**

Table 2: Effect of dates of planting and application of foliar nutrition on number of leaves at 40 and 60 DAP in onion cv. Arka Kalyan

Treatment	Number of leaves at 40 DAP			Number of leaves at 60 DAP		
Planting time (D)	**2015-16**	**2016-17**	**Pooled**	**2015-16**	**2016-17**	**Pooled**
D_1 : OCT-1st	18.94	20.37	**19.65**	27.64	29.18	**28.41**
D_2 : OCT-15th	17.00	18.25	**17.63**	25.70	27.10	**26.40**
D_3 : NOV-1st	20.94	24.38	**22.66**	29.46	31.01	**30.24**
D_4 : NOV-15th	19.87	21.00	**20.43**	28.57	29.97	**29.27**
D5: DEC-1st	14.98	16.07	**15.52**	23.68	24.73	**24.21**
S.Em±	**0.36**	**0.41**	**0.36**	**0.37**	**0.41**	**0.38**
C.D. (P=0.05)	**1.03**	**1.16**	**1.04**	**1.05**	**1.17**	**1.10**
Application of foliar nutrition (T)						
T_1 : Borax @ 0.25 %	18.05	19.35	**18.70**	26.75	28.15	**27.45**
T_2 : Potassium nitrate @ 0.5 %	19.36	21.63	**20.50**	28.06	29.49	**28.77**
T_3:Micronutrient mixture @0.25%	20.27	22.15	**21.21**	28.83	30.43	**29.63**
T_4 :Control	15.71	16.92	**16.32**	24.41	25.53	**24.97**
S.Em±	**0.32**	**0.36**	**0.32**	**0.33**	**0.37**	**0.34**
C.D. (P=0.05)	**0.92**	**1.04**	**0.93**	**0.94**	**1.05**	**0.98**
Interactions (D x T)						
D_1T_1	18.80	20.10	**19.45**	27.50	28.90	**28.20**
D_1T_2	19.27	20.57	**19.92**	27.97	29.50	**28.73**
D_1T_3	19.47	21.27	**20.37**	28.17	30.00	**29.08**
D_1T_4	18.23	19.53	**18.88**	26.93	28.33	**27.63**
D_2T_1	16.84	18.14	**17.49**	25.54	26.94	**26.24**
D_2T_2	17.14	18.44	**17.79**	25.84	27.24	**26.54**
D_2T_3	17.60	18.30	**17.95**	26.30	27.70	**27.00**
D_2T_4	16.43	18.13	**17.28**	25.13	26.53	**25.83**
D_3T_1	18.97	20.27	**19.62**	27.67	29.07	**28.37**
D_3T_2	23.82	30.00	**26.91**	32.52	33.92	**33.22**
D_3T_3	27.00	32.00	**29.50**	35.00	37.00	**36.00**
D_3T_4	13.97	15.27	**14.62**	22.67	24.07	**23.37**
D_4T_1	20.82	22.12	**21.47**	29.52	30.92	**30.22**
D_4T_2	21.23	22.53	**21.88**	29.93	31.33	**30.63**
D_4T_3	21.80	22.40	**22.10**	30.50	31.90	**31.20**
D_4T_4	15.63	16.93	**16.28**	24.33	25.73	**25.03**
D_5T_1	14.83	16.13	**15.48**	23.53	24.93	**24.23**
D_5T_2	15.33	16.63	**15.98**	24.03	25.43	**24.73**
D_5T_3	15.47	16.77	**16.12**	24.17	25.57	**24.87**
D_5T_4	14.30	14.73	**14.52**	23.00	23.00	**23.00**
S.Em±	**0.72**	**0.81**	**0.73**	**0.73**	**0.82**	**0.77**
C.D. (P=0.05)	**2.06**	**2.32**	**2.08**	**2.10**	**2.34**	**2.20**

Table 3: Effect of dates of planting and application of foliar nutrition on number of umbels per plant and umbel diameter in onion cv. Arka Kalyan

Treatment	Number of umbels per plant			Umbel diameter (cm)		
Planting time (D)	**2015-16**	**2016-17**	**Pooled**	**2015-16**	**2016-17**	**Pooled**
D_1 : OCT-1st	4.13	5.23	**4.68**	5.68	6.37	**6.03**
D_2 : OCT-15th	3.79	4.61	**4.20**	5.53	6.05	**5.79**
D_3 : NOV-1st	6.06	6.73	**6.40**	7.15	7.73	**7.44**
D_4 : NOV-15th	5.14	5.69	**5.41**	6.32	7.08	**6.70**
D5: DEC-1st	3.04	4.27	**3.65**	4.67	5.38	**5.02**
S.Em±	**0.09**	**0.13**	**0.09**	**0.14**	**0.11**	**0.09**
C.D. (P=0.05)	**0.26**	**0.36**	**0.27**	**0.40**	**0.32**	**0.27**
Application of foliar nutrition (T)						
T_1 : Borax @ 0.25 %	4.50	5.34	**4.92**	5.87	6.65	**6.26**
T_2 : Potassium nitrate @ 0.5 %	4.35	5.14	**4.75**	5.54	6.54	**6.04**
T_3:Micronutrient mixture @0.25%	5.15	6.42	**5.78**	6.83	7.20	**7.02**
T_4 :Control	3.71	4.32	**4.02**	5.24	5.70	**5.47**
S.Em±	**0.08**	**0.11**	**0.08**	**0.12**	**0.10**	**0.08**
C.D. (P=0.05)	**0.23**	**0.32**	**0.24**	**0.36**	**0.29**	**0.24**
Interactions (D x T)						
D_1T_1	4.42	5.33	**4.88**	5.67	6.25	**5.96**
D_1T_2	4.17	4.83	**4.50**	5.57	6.57	**6.07**
D_1T_3	4.50	5.92	**5.21**	6.50	7.00	**6.75**
D_1T_4	3.42	4.83	**4.13**	5.00	5.67	**5.33**
D_2T_1	3.60	4.35	**3.98**	5.33	5.80	**5.57**
D_2T_2	3.40	4.43	**3.92**	4.80	5.70	**5.25**
D_2T_3	5.00	5.75	**5.38**	7.00	7.00	**7.00**
D_2T_4	3.15	3.90	**3.53**	5.00	5.72	**5.36**
D_3T_1	6.25	7.25	**6.75**	7.17	8.13	**7.65**
D_3T_2	6.00	6.75	**6.38**	6.83	7.87	**7.35**
D_3T_3	7.75	8.50	**8.13**	7.67	8.60	**8.13**
D_3T_4	4.25	4.43	**4.34**	6.92	6.33	**6.63**
D_4T_1	5.25	6.00	**5.63**	6.50	7.58	**7.04**
D_4T_2	5.00	5.75	**5.38**	6.00	7.25	**6.63**
D_4T_3	5.50	6.25	**5.88**	6.83	7.50	**7.17**
D_4T_4	4.80	4.75	**4.78**	5.93	6.00	**5.97**
D_5T_1	3.00	3.75	**3.38**	4.67	5.50	**5.08**
D_5T_2	3.20	3.95	**3.58**	4.50	5.33	**4.92**
D_5T_3	3.00	5.67	**4.33**	6.17	5.89	**6.03**
D_5T_4	2.95	3.70	**3.33**	3.33	4.78	**4.06**
S.Em±	**0.18**	**0.25**	**0.19**	**0.28**	**0.22**	**0.19**
C.D. (P=0.05)	**0.52**	**0.72**	**0.54**	**0.80**	**0.64**	**0.54**

Table 4: Effect of dates of planting and application of foliar nutrition on number of seeds per umbel and seed weight per umbel in onion cv. Arka kalyan

Treatment	Number of seeds per umbel			Seed weight per umbel (g)		
Planting time (D)	**2015-16**	**2016-17**	**Pooled**	**2015-16**	**2016-17**	**Pooled**
D_1 : OCT-1st	812	817	**815**	3.82	3.84	**3.83**
D_2 : OCT-15th	780	782	**781**	3.62	3.72	**3.67**
D_3 : NOV-1st	867	872	**870**	4.13	4.30	**4.21**
D_4 : NOV-15th	833	841	**837**	3.94	3.97	**3.95**
D5: DEC-1st	720	725	**722**	3.37	3.32	**3.34**
S.Em±	**7.89**	**7.46**	**7.52**	**0.07**	**0.12**	**0.08**
C.D. (P=0.05)	**22.60**	**21.37**	**21.54**	**0.20**	**0.34**	**0.23**
Application of foliar nutrition (T)						
T_1 : Borax @ 0.25 %	826	830	**828**	3.88	4.03	**3.95**
T_2 : Potassium nitrate @ 0.5 %	818	823	**820**	3.83	3.81	**3.82**
T_3:Micronutrient mixture @0.25%	836	841	**838**	4.07	4.32	**4.20**
T_4 :Control	731	736	**733**	3.32	3.15	**3.24**
S.Em±	**7.06**	**6.67**	**6.73**	**0.06**	**0.11**	**0.07**
C.D. (P=0.05)	**20.21**	**19.11**	**19.27**	**0.18**	**0.31**	**0.21**
Interactions (D x T)						
D_1T_1	826	831	**828**	3.86	3.88	**3.87**
D_1T_2	815	820	**818**	3.78	3.80	**3.79**
D_1T_3	835	840	**838**	3.93	3.94	**3.94**
D_1T_4	772	777	**775**	3.70	3.72	**3.71**
D_2T_1	782	787	**785**	3.56	3.58	**3.57**
D_2T_2	775	780	**778**	3.49	3.51	**3.50**
D_2T_3	797	802	**800**	3.60	4.33	**3.97**
D_2T_4	766	759	**762**	3.83	3.46	**3.65**
D_3T_1	906	911	**909**	4.38	5.17	**4.77**
D_3T_2	896	901	**899**	4.33	4.36	**4.35**
D_3T_3	915	920	**918**	4.63	5.33	**4.98**
D_3T_4	752	757	**754**	3.17	2.33	**2.75**
D_4T_1	866	871	**868**	4.23	4.15	**4.19**
D_4T_2	855	860	**858**	4.05	4.08	**4.07**
D_4T_3	876	881	**878**	4.18	4.01	**4.10**
D_4T_4	735	751	**743**	3.29	3.64	**3.46**
D_5T_1	749	751	**750**	3.37	3.35	**3.36**
D_5T_2	747	752	**750**	3.51	3.31	**3.41**
D_5T_3	755	760	**758**	4.00	4.00	**4.00**
D_5T_4	630	635	**633**	2.60	2.62	**2.61**
S.Em±	**15.79**	**14.93**	**15.05**	**0.14**	**0.24**	**0.16**
C.D. (P=0.05)	**45.19**	**42.73**	**43.08**	**0.41**	**0.69**	**0.47**

Table 5: Effect of dates of planting and application of foliar nutrition on seed yield per plant and seed yield per hectare in onion cv. Arka kalyan

Treatment	Seed yield per plant (g)			Seed yield per hectare (Kg)		
Planting time (D)	**2015-16**	**2016-17**	**Pooled**	**2015-16**	**2016-17**	**Pooled**
D_1 : OCT-1st	12.60	12.94	**12.77**	630.50	643.97	**637.24**
D_2 : OCT-15th	11.89	12.31	**12.10**	603.12	616.59	**609.85**
D_3 : NOV-1st	14.92	15.22	**15.07**	705.00	718.60	**710.30**
D_4 : NOV-15th	12.83	13.27	**13.05**	657.01	670.48	**663.74**
D5: DEC-1st	11.60	11.92	**11.67**	583.08	596.68	**589.88**
S.Em±	**0.17**	**0.18**	**0.15**	**3.50**	**3.47**	**3.49**
C.D. (P=0.05)	**0.50**	**0.51**	**0.44**	**10.02**	**9.94**	**9.98**
Application of foliar nutrition (T)						
T_1 : Borax @ 0.25 %	13.11	13.18	**13.14**	646.10	659.67	**652.65**
T_2 : Potassium nitrate @ 0.5 %	12.17	12.87	**12.52**	634.87	648.34	**640.64**
T_3:Micronutrient mixture @0.25%	14.29	14.56	**14.42**	674.00	687.47	**680.74**
T_4 :Control	11.50	11.91	**11.63**	588.00	601.57	**594.79**
S.Em±	**0.16**	**0.16**	**0.14**	**3.13**	**3.11**	**3.12**
C.D. (P=0.05)	**0.45**	**0.46**	**0.39**	**8.96**	**8.89**	**8.92**
Interactions (D x T)						
D_1T_1	13.00	12.67	**12.83**	643.68	657.15	**650.42**
D_1T_2	11.67	12.33	**12.00**	616.67	630.14	**623.40**
D_1T_3	14.72	15.29	**15.01**	686.67	700.14	**693.40**
D_1T_4	11.00	11.45	**11.23**	575.00	588.47	**581.74**
D_2T_1	12.33	12.00	**12.17**	600.45	613.92	**607.19**
D_2T_2	10.67	12.32	**11.49**	582.02	595.49	**588.75**
D_2T_3	13.56	13.74	**13.65**	650.00	663.47	**656.74**
D_2T_4	11.00	11.18	**11.09**	580.00	593.47	**586.74**
D_3T_1	15.00	15.85	**15.42**	726.67	740.14	**732.25**
D_3T_2	14.67	14.33	**14.50**	721.67	735.14	**723.58**
D_3T_3	16.33	16.33	**16.33**	735.00	748.47	**741.74**
D_3T_4	13.67	14.35	**14.01**	636.67	650.65	**643.66**
D_4T_1	13.33	13.33	**13.33**	681.68	695.15	**688.42**
D_4T_2	12.33	13.67	**13.00**	676.35	689.82	**683.09**
D_4T_3	14.67	14.85	**14.76**	695.00	708.47	**701.74**
D_4T_4	11.00	11.24	**11.12**	575.00	588.47	**581.74**
D_5T_1	11.86	12.04	**11.95**	578.00	591.98	**584.99**
D_5T_2	11.53	11.71	**11.62**	577.67	591.14	**584.40**
D_5T_3	12.18	12.57	**12.38**	603.33	616.80	**610.07**
D_5T_4	10.83	11.36	**10.73**	573.33	586.80	**580.07**
S.Em±	**0.35**	**0.36**	**0.31**	**7.00**	**6.94**	**6.97**
C.D. (P=0.05)	**1.00**	**1.02**	**0.88**	**20.04**	**19.88**	**19.95**

Table 6: Effect of dates of planting and application of foliar nutrition on per cent disease incidence in onion cv. Arka kalyan

Treatment	Per cent disease incidence (%)		
Planting time (D)	**2015-16**	**2016-17**	**Pooled**
D_1 : OCT-1st	22.38	20.10	**21.24**
D_2 : OCT-15th	24.52	21.60	**23.06**
D_3 : NOV-1st	16.37	14.82	**15.59**
D_4 : NOV-15th	21.29	18.91	**20.10**
D5: DEC-1st	27.16	24.48	**25.82**
S.Em±	**0.45**	**0.52**	**0.46**
C.D. (P=0.05)	**1.29**	**1.50**	**1.32**
Application of foliar nutrition (T)			
T_1 : Borax @ 0.25 %	25.42	22.68	**24.05**
T_2 : Potassium nitrate @ 0.5 %	22.93	20.52	**21.73**
T_3:Micronutrient mixture @0.25%	15.87	13.40	**14.64**
T_4 :Control	25.16	23.32	**24.24**
S.Em±	**0.40**	**0.47**	**0.41**
C.D. (P=0.05)	**1.16**	**1.34**	**1.18**
Interactions (D x T)			
D_1T_1	25.00	22.86	**23.93**
D_1T_2	24.67	22.29	**23.48**
D_1T_3	14.67	12.41	**13.54**
D_1T_4	25.20	22.82	**24.01**
D_2T_1	27.52	23.54	**25.53**
D_2T_2	26.55	24.17	**25.36**
D_2T_3	16.00	13.62	**14.81**
D_2T_4	28.01	25.08	**26.55**
D_3T_1	21.28	18.90	**20.09**
D_3T_2	14.00	12.21	**13.10**
D_3T_3	12.67	10.29	**11.48**
D_3T_4	17.52	17.87	**17.70**
D_4T_1	23.08	20.70	**21.89**
D_4T_2	20.14	17.76	**18.95**
D_4T_3	18.33	15.95	**17.14**
D_4T_4	23.60	21.22	**22.41**
D_5T_1	30.21	27.38	**28.80**
D_5T_2	29.30	26.20	**27.75**
D_5T_3	17.67	14.75	**16.21**
D_5T_4	31.46	29.58	**30.52**
S.Em±	**0.90**	**1.04**	**0.92**
C.D. (P=0.05)	**2.58**	**2.99**	**2.63**

CONCLUSION

Higher plant growth and seed yield can be obtained in onion Cv. Arka Kalyan by bulb planting in the month of November first coupled with further spraying of micronutrient mixture at (0.25 %) which accounted for 26.52 per cent increase over the control.

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