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Improvement of Growth and Yield of Onion (*Allium cepa* L.) cv. Agrifound Light Red through Different Application Methods of Gibberellic Acid and *Trichoderma viride*

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ABSTRACT

A field experiment was conducted at Department of Horticulture, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, (M.P.) during rabi 2014-15 and 2015-16 to study the effect of gibberellic acid and Trichoderma viride on growth and yield of onion (Allium Cepa L.) cv. Agrifound Light Red. Foliar application of GA_3 100mg and soil treatment of T. viride (10kg/ha^{-1}) (T_{11}) was observed significantly maximum (68.67, 66.60 and 64.53 cm) plant height, (18.67, 17.82and 16.97) number of leaves plant^{-1}, (62.83, 61.17 and 59.50 cm) length of leaf and (1.14, 1.12 and 1.10 cm) width of leaf at first year, second year and pooled, respectively, over to control (T_1 i.e., GA_3 0mg + T. viride 0). Growth analytical parameters viz., (668.47, 656.97 and 612.72cm^2) leaf area plant^{-1}, (4.46, 4.09 and 3.71) leaf area index,(1.77, 1.74 and 1.71) bulb / green top ratio and (1.49, 1.48 and 1.46) neck thickness of bulb at first year, second year and pooled, respectively, over to control (T_1 i.e., GA_3 0mg + T. viride 0). Significantly maximum (44.43, 43.31 and 42.18g) fresh weight of bulb plant^{-1} and (28.13, 28.10 and 28.07g) dry weight of bulb for 100g fresh weight. (5.36, 5.33 and 5.31cm) diameter of bulb, (5.11, 5.90 and 6.01cm) length of bulb and (329.94, 323.57 and 326.76qha^{-1}) bulb yield were recorded in the treatment T_{11} (GA_3 100mg and soil treatment of T. viride (10kg ha^{-1}) at first year, second year and pooled, respectively. Significantly maximum (16.04, 15.73 and 15.89 kg plot^{-1}) and (329.94, 323.57 and 326.76 qha^{-1}) bulb yield were recorded in the treatment T_{11} (GA_3 100mg and soil treatment of T. viride (10kg ha^{-1}) and lowest (0.10, 0.07 and 0.09%) bolting percentage and this treatment also proved the best antagonistic activity against Fusarium oxysporu sp. Cepae basal rot with minimum disease incidence (5.22, 5.20 and 5.21%) over to control at first year, second year and pooled , respectively.

Key words: *Gibberellic acid, Growth & yield attributes, Onion, Trichoderma viride.*

INTRODUCTION

Onion (*Allium cepa* L.) is one of the most important commercial vegetable crops grown in India and being used as vegetables, spices or as medicines. These bulb crops are rich in minerals like phosphorous, calcium and carbohydrate.

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It also contains proteins and Vitamin C. The area of onion in Madhya Pradesh is 117.3 thousand hectare, total production is 2826.0 thousand metric tonnes and productivity is about 24.1 metric tonnes per hectare during 2013-14 [1]. Onion accounts for 70 per cent of our total foreign exchange earnings from the export of fresh vegetables. Gibberellins are natural constituents of plants and are known to participate in the endogenous control of growth activities and some important role of gibberellins in plant. Application of *Trichoderma viride* significantly reduces the basal rot in onion crop. Therefore, the present experiment was undertaken to find out the effects of GA3 and *Trichoderma viride* on the growth, yield and percentage of incidence of basal rot of onion to optimum dose and maximum efficiency.

MATERIALS AND METHODS

A field experiment was conducted at Department of Horticulture, College of Agriculture, R.V.S. Krishi Vishwa Vidyalaya, Gwalior, (M.P.) during *rabi* 2014-15 and 2015-16. The experiment was laid out in Randomized Complete Block Design with sixteen treatments and three replications. Ten kg seeds (7.5 kg seeds untreated + 2.5 kg seeds treated with 10g *T. viride*) of onion cv. Agrifound Light Red was sown on the nursery beds on September 2nd, 2014 and September 5th 2015. Healthy seedlings were transplanted in the field during October 17th, 2014 and October 19th, 2015 with row to row 15 cm and plant to plant 10.0 cm space. A recommended dose of 100kg N, 60kg P_2O_5 and 80 kg K_2O ha^{-1} along with 20 tonnes FYM ha^{-1} was applied in the form of urea, single super phosphate and murate of potash respectively. The treatment combinations involving four levels of GA3 *viz.*, 0, 50, 100 and 150 ppm (foliar spray was done after 30 DAT) and four methods of application of *Trichoderma viride* i.e. control (without treatment), seed treatment (4 g kg^{-1} seed), soil treatment (10 kg ha^{-1} before transplanting) and seedling treatment (10 g lit.-1) were applied at the time of transplanting (by root dipping). Five plants were randomly selected from each treatment and observations regarding morphological parameter growth analytical parameters and yield characters and also incidence of basal rot disease (%) were recorded. Collected data were analyzed statistically using SPAR 2.0 computer programme. The significance of difference between pair of means was tested by the Critical differences (CD) test at 5% level of probability[11].

RESULTS AND DISCUSSION

The result demonstrated that treatment combinations of GA_3 and *Trichoderma viride* had significant influence on all the morphological and yield parameters of onion cv. Agrifound Light Red. The plant height, number of leaves $plant^{-1}$, length of leaf and width of leaf linearly increased up to the maximum vegetative growth stage (120 DAT) and thereafter decreased possibly due to the senescence and drying up of the tips of the leaves. The highest plant height (68.67, 64.53 and 66.60 cm) were obtained from T_{11} (GA_3 100 mg + *T. viride* soil treatment 10 kg ha^{-1}) followed by T_{11} (GA 100 ppm + T. viride seedling dipping 10 g lit^{-1}) (66.90, 63.63 and 65.27cm) at first year, second year and pooled, respectively and which were at par in second year only, while the lowest plant height (56.23, 54.03 and 55.13 cm) were recorded with the control (T_1) (Table 1).Results obtained were in agreement with the findings of [5, 12, 6, 10, 2] for GA_3 treatment, [7] for use of *T. viride*. The maximum number of leaves $plant^{-1}$ (18.67, 16.97 and 17.82) were obtained from T_{11} followed by T_{12} (18.43, 16.37 and 17.40) at first year, second year and pooled,

respectively and which were at par in first year and second year, while the lowest number of leaves plant^{-1} (12.23, 9.67 and 10.95) were recorded with the control (T_1) (Table 1).The length of leaf was significantly increased by the different treatments. The treatment T_{11} was found significantly superior as compared to other treatments and which was recorded maximum (62.83, 59.50 and 61.17 cm) length of leaf followed by T_{12} (61.13, 58.80 and 59.97 cm) and T_{10} (GA_3 100 ppm + T. viride seed treatment 4 g kg^{-1}) (60.43, 58.17 and 59.30 cm) at first, second year and pooled, respectively and which were at par with each other. While, it was recorded lowest (54.33, 52.07 and 53.20 cm) in treatment T_1 (control) at first, second year and pooled, respectively (Table 1). These findings are in agreement with the findings of [5,12,2] for GA_3 treatment [7] for use of *T. viride*. Treatment T_{11} was found significantly superior as compared to other treatments and which was exhibited maximum (1.14, 1.10 and 1.12 cm) width of leaf followed by T_{12} (1.10, 1.06 and 1.09 cm) and T_{10} (1.06, 1.01 and 1.04 cm) at first, second year and pooled, respectively, while, it was recorded minimum (0.65, 0.56 and 0.61 cm) in treatment control (T_1) in first, second year and pooled, respectively (Table 1). These findings are in agreement with the findings of [5,12,2] for GA_3 treatment [7] for use of *T. viride*.The significantly maximum 668.47, 556.97 and 612.72 cm^2 leaf area plant^{-1} was observed under the treatment T_{11} followed by T_{12} (621.63, 509.74 and 565.68 cm2) and T_{10} (582.77, 462.32 and 522.55 cm^2) as compared to other treatments at first, second year and pooled, respectively. However, it was recorded minimum (216.04, 140.92 and 178.48 cm^2 in control (T_1) at first, second year and pooled, respectively. The treatment T_{11} was recorded significantly maximum 4.46, 3.71 and 4.09 leaf area index followed by T_{12} (4.14, 3.40 and 3.77) and T_{10} (3.88, 3.08 and 3.49) as compared to other treatments at first, second year and pooled, respectively. While, it was recorded minimum 1.44, 0.94 and 1.19 in treatment T_1 (control) at first, second year and pooled, respectively (Table 2). These findings are in agreement with the findings of [5, 12, 15, 2] for GA_3 treatment [7] for use of *T. viride*.The significantly maximum (1.77, 1.71 and 1.74) bulb/green top ratio was recorded in treatment T_{11} which was at par with T_{12} (1.73, 1.63 and 1.68), T_{10} (1.69, 1.57 and 1.63), T_9 (1.64, 1.53 and 1.58) and T_{15} (1.61, 1.50 and 1.55) at first, second year and pooled, respectively. On the other hand the minimum (1.17, 1.13 and 1.15) bulb /green top ratio were recorded in treatment T_1 at first, second year and pooled, respectively (Table 2).The neck thickness of the bulb was significantly influenced by various treatments of levels of gibberelic acid and methods of application of *T. viride.* The significantly minimum (0.98, 0.86 and 0.92 cm) neck thickness of the bulb was recorded in treatment control (T_1 *i.e.* GA3 0 ppm + *T. viride* without treatment), while, the highest (1.49, 1.46 and 1.48 cm) neck thickness of the bulb was recorded with treatment T_{11} (GA_3 100 mg + *T. viride* soil treatment 10 kg ha^{-1}) in first year, second year and pooled, respectively (Table 2). These findings are in agreement with the findings of [5] for GA_3 treatment. Application of treatment T_{11} was recorded highest fresh weight of bulb plant^{-1} (44.43, 42.18 and 43.31 g) followed by T_{12} (42.16, 40.70 and 41.43 g) and T_{10} (41.13, 39.42 and 40.28 g) at first, second year and pooled, respectively and which were at par with each other. However, it was found lowest in T_1 (27.01, 25.01 and 26.01 g at first, second year and pooled, respectively) (Table 3). These findings are in agreement with the findings of [5, 12, 15, 2] for GA_3 treatment [5] for use of *T. viride*. The data revealed that maximum dry weight of bulb per 100g fresh

weight (28.13, 28.07 and 28.10 g) was found in treatment T_{11} followed by T_{12} (26.97, 26.90 and 26.93 g) as compared to other treatments in first, second year and pooled, respectively. While, it was noted minimum (9.0, 8.83 and 8.92 g at first, second year and pooled, respectively) in T_1 (Table 3). It is obvious from table 2 that the diameter of bulb was significantly influenced by the different treatmentsSignificantly maximum (5.36, 5.31 and 5.33 cm) diameter of bulb was recorded in treatment T_{11} which was at par with T_{12} (5.30, 5.25 and 5.28 cm) and T_{10} (5.24, 5.20 and 5.23 cm) in first year, second year and pooled, respectively. However, minimum (3.63, 3.57 and 3.60 cm) diameter of bulb was recorded in treatment T_1 (control) in first year, second year and pooled, respectively. The length of bulb was significantly influenced by the different treatments. Treatment T_{11} was observed maximum (5.11, 5.90 and 6.01 cm) length of bulb followed by T_{12} (5.62, 5.58 and 5.60 cm) and T_{10} (5.59, 5.55 and 5.57 cm), while, it was noted minimum (4.14, 3.81 and 3.97 cm) in treatment T_1 (control) in first year, second year and pooled, respectively. The treatment T_{11}, T_{12}, T_{10}, T_9, T_{15}, T_{16}, T_{14} and T_{13} were found statistically at par (Table 2).Significantly maximum (16.04, 15.73 and 15.89 kg plot^{-1}) bulb yield was recorded in treatments T_{11} followed by T_{12} (15.22, 15.05 and 15.13 kg plot^{-1}) and T_{10} (14.85, 14.71 and 14.78 kg plot^{-1}), at first, second year and pooled, respectively and which were at par with each other. While, the minimum (9.75, 9.08 and 9.42 kg plot^{-1} at first, second year and pooled, respectively) was recorded in the treatment T_1 (Table 4). It was apparent from the results (Table 4) that the treatments T_{11} recorded significantly maximum (329.94, 323.57 and 326.76 q ha^{-1}) bulb yield which was statistically at par with T_{12} (313.07, 309.51 and 311.29 q ha^{-1}) and T_{10} (305.40, 302.58 and 303.99 q ha^{-1}) in the first year, second year and pooled, respectively. While, bulb yield hectare^{-1} was observed minimum (200.56, 186.84 and 193.70 q ha^{-1}) in the treatment T_1 (control) in first year, second year and pooled, respectively. Likewise, maximum bulb diameter, bulb length and bulb yield showed upward trend with the increase in GA_3 concentrations which could be due to the rapid cell division and elongation leading to longer bulb formation. These findings are in agreement with the findings of [5, 12, 15, 16, 6, 10, 2.] for GA_3 treatment [3,9,8] for use of *T. viride*.Significantly lowest (0.10, 0.07 and 0.09%) bolting percentage was recorded in treatment T_{11} followed by T_{12} (0.21, 0.21 and 0.21%), T_{10} (0.31, 0.30 and 0.31%) and T_9 (0.42, 0.39 and 0.40%) and which were at par with each other, while, it was noted maximum (6.86, 6.58 and 6.73%) bolting percentage in treatment T_1 (control) in first, second year and pooled, respectively (Table 4). The highest plant height, number of leaves plant^{-1}, length of leaf and width of leaf (cm) linearly increased up to the maximum vegetative growth stage might be due to the rapid increment and expansion of plant cells for proper plant growth by the increased concentrations of GA_3 and the use of *Trichoderma viride* as bio-control agent. It was apparent from the results (Table 4), that the minimum 5.22, 5.20 and 5.21 % incidence of percentage of basal rot was obtained in treatment T_{11} followed by T_{12} (5.63, 5.60 and 5.61%) in first year, second year and pooled, respectively. While, the maximum (10.14, 10.11 and 10.13%) percentage of basal rot was recorded in treatment T1 in first year, second year and pooled, respectively. *T. viride* has provided the best antagonistic activity against *Fusarium oxysporu* sp. cepae with minimum disease incidence. These findings are in agreement with the findings of [14, 4,13, 3, 9.]

Table 1: Effect of foliar sprays of gibberellic acid and methods of application of *T. viride* on morphological parameters

		Plant height (cm) at 120 DAT			Number of leaves plant^{-1} at 120 DAT			Length of leaf (cm) at 120 DAT			Width of leaf (cm)		
		I year	II year	Pooled	I year	II year	Pooled	I year	II year	Pooled	I Year	II Year	Pooled
T_1	GA_3 0 mg + T_0 (without treatment)	56.23	54.03	55.13	12.23	9.67	10.95	54.33	52.07	53.20	0.65	0.56	0.61
T_2	GA_3 0 mg + T_1 (seed treatment 4g/kg)	56.83	54.70	55.77	12.49	10.16	11.33	54.87	52.60	53.73	0.68	0.59	0.64
T_3	GA_3 0 mg + T_2 (soil treatment 10kg/ha)	57.80	56.17	56.98	13.21	10.97	12.09	55.73	53.27	54.50	0.76	0.66	0.71
T_4	GA_3 0 mg + T_3 (seedling treatment 10g/lit)	57.27	55.40	56.33	12.83	10.57	11.70	55.33	52.97	54.15	0.72	0.62	0.67
T_5	GA_3 50 mg + T_0 (without treatment)	58.47	56.80	57.63	13.67	11.28	12.47	56.03	53.67	54.85	0.79	0.68	0.74
T_6	GA_3 50 mg + T_1 (seed treatment 4g/kg)	58.90	57.57	58.23	14.05	11.67	12.86	56.40	54.13	55.27	0.83	0.71	0.77
T_7	GA_3 50 mg + T_2 (soil treatment 10kg/ha)	60.10	58.90	59.50	15.67	12.20	13.93	57.30	55.17	56.23	0.90	0.78	0.84
T_8	GA_3 50 mg + T_3 (seedling treatment 10g/lit)	59.53	58.13	58.83	14.97	11.93	13.45	56.90	54.67	55.78	0.87	0.74	0.81
T_9	GA_3 100 mg + T_0 (without treatment)	64.53	62.50	63.52	17.90	14.93	16.42	59.83	57.50	58.67	1.02	0.96	0.99
T_{10}	GA_3 100 mg + T_1 (seed treatment 4g/kg)	65.83	63.03	64.43	18.20	15.70	16.95	60.43	58.17	59.30	1.06	1.01	1.04
T_{11}	GA_3 100 mg + T_2 (soil treatment 10kg/ha)	68.67	64.53	66.60	18.67	16.97	17.82	62.83	59.50	61.17	1.14	1.10	1.12
T_{12}	GA_3 100 mg + T_3 (seedling treatment 10g/lit)	66.90	63.63	65.27	18.43	16.37	17.40	61.13	58.80	59.97	1.10	1.06	1.09
T_{13}	GA_3 150 mg + T_0 (without treatment)	60.53	59.53	60.03	16.60	12.46	14.53	57.83	55.67	56.75	0.92	0.82	0.87
T_{14}	GA_3 150 mg + T_1 (seed treatment 4g/kg)	60.97	60.20	60.58	16.94	12.90	14.92	58.47	56.03	57.25	0.94	0.86	0.90
T_{15}	GA_3 150 mg + T_2 (soil treatment 10kg/ha)	62.17	61.87	62.02	17.60	14.20	15.90	59.40	57.07	58.23	0.98	0.92	0.95
T_{16}	GA_3 150 mg + T_3 (seedling treatment 10g/lit)	61.53	61.11	61.32	17.30	13.50	15.40	58.93	56.50	57.72	0.96	0.89	0.93
	SEm ±	0.42	0.49	0.34	0.22	0.21	0.12	1.30	1.16	0.90	0.008	0.008	0.006
	CD 5%	1.21	1.42	0.97	0.65	0.61	0.36	3.80	3.49	2.61	0.024	0.023	0.02

Table 2: Effect of foliar sprays of gibberellic acid & methods of application of *T. viride* on growth analytical parameters

Treatment	Leaf area plant (cm) thickness of bulb at 120 DAT			Leaf area index at 120 DAT			Bulb /green top ratio			Neck (cm)		
	I year	II year	Pooled	I year	II year	Pooled	I year	II year	Pooled	I Year	II Year	Pooled
	I year	II year	Pooled	I year	II year	Pooled	I year	II year	Pooled	I Year	II Year	Pooled
T_1	216.04	140.92	178.48	1.44	0.94	1.19	1.17	1.13	1.15	0.98	0.86	0.92
T_2	233.15	157.57	195.36	1.55	1.05	1.31	1.22	1.17	1.20	1.03	0.94	0.99
T_3	279.73	192.85	236.29	1.86	1.28	1.58	1.26	1.23	1.24	1.10	1.07	1.09
T_4	255.54	173.51	214.53	1.70	1.16	1.43	1.24	1.20	1.22	1.06	1.02	1.04
T_5	302.54	205.87	254.21	2.02	1.37	1.70	1.29	1.27	1.28	1.13	1.10	1.12
T_6	327.51	224.18	275.85	2.18	1.50	1.84	1.33	1.29	1.31	1.17	1.15	1.16
T_7	403.96	262.51	333.24	2.69	1.75	2.22	1.42	1.34	1.39	1.25	1.21	1.23
T_8	369.08	241.34	305.22	2.46	1.61	2.04	1.37	1.32	1.35	1.20	1.18	1.19
T_9	546.24	412.22	479.23	3.64	2.75	3.20	1.64	1.53	1.58	1.37	1.36	1.37
T_{10}	582.77	462.32	522.55	3.88	3.08	3.49	1.69	1.57	1.63	1.41	1.40	1.41
T_{11}	668.47	556.97	612.72	4.46	3.71	4.09	1.77	1.71	1.74	1.49	1.46	1.48
T_{12}	621.63	509.74	565.68	4.14	3.40	3.77	1.73	1.63	1.68	1.46	1.44	1.45
T_{13}	441.41	282.97	362.19	2.94	1.88	2.42	1.46	1.40	1.43	1.28	1.26	1.27
T_{14}	465.52	310.79	388.16	3.10	2.07	2.59	1.51	1.44	1.48	1.30	1.28	1.29
T_{15}	512.21	372.75	442.49	3.42	2.49	2.96	1.61	1.50	1.55	1.35	1.33	1.34
T_{16}	489.38	339.44	414.41	3.26	2.26	2.76	1.56	1.46	1.51	1.33	1.30	1.32
SEm±	11.89	9.56	7.85	0.08	0.064	0.05	0.081	0.09	0.06	0.011	0.01	0.009
CD 5 %	34.35	27.60	22.68	0.23	0.18	0.15	0.23	0.26	0.19	0.031	0.03	0.03

Table 3: Effect of foliar sprays of gibberellic acid and methods of application of *T. viride* on yield parameters

Treatment	Fresh weight of bulb (g)			Dry weight of bulb (g)			Diameter of bulb (cm)			Length of bulb (cm)		
	I year	II year	Pooled	I year	II year	Pooled	I year	II year	Pooled	I Year	II Year	
T_1	27.01	25.01	26.01	9.00	8.83	8.92	3.63	3.57	3.60	4.14	3.81	3.97
T_2	30.23	27.94	29.09	9.95	9.87	9.91	4.01	3.90	3.95	4.22	4.09	4.16
T_3	34.25	31.82	33.03	13.27	13.13	13.20	4.66	4.64	4.65	4.46	4.36	4.41
T_4	32.89	29.22	31.06	11.33	11.25	11.30	4.41	4.22	4.32	4.35	4.23	4.30
T_5	36.67	33.41	35.04	15.30	15.23	15.27	4.83	4.80	4.81	5.08	4.47	4.78
T_6	37.16	34.23	35.70	16.67	16.47	16.57	4.88	4.84	4.86	5.11	4.71	4.91
T_7	37.34	35.00	36.17	19.23	19.17	19.20	4.97	4.91	4.94	5.21	5.13	5.17
T_8	37.26	34.78	36.03	17.83	17.67	17.75	4.90	4.86	4.88	5.15	4.93	5.04
T_9	40.63	38.15	39.39	24.77	24.70	24.73	5.21	5.16	5.19	5.56	5.51	5.54
T_{10}	41.13	39.42	40.28	25.87	25.80	25.83	5.24	5.20	5.23	5.59	5.55	5.57
T_{11}	44.43	42.18	43.31	28.13	28.07	28.10	5.36	5.31	5.33	6.11	5.90	6.01
T_{12}	42.16	40.70	41.43	26.97	26.90	26.93	5.30	5.25	5.28	5.62	5.58	5.60
T_{13}	37.51	35.70	36.61	20.43	20.37	20.40	5.03	4.96	4.99	5.33	5.23	5.29
T_{14}	38.23	36.31	37.27	21.17	21.13	21.15	5.09	5.01	5.05	5.41	5.34	5.38
T_{15}	39.85	37.35	38.60	23.60	23.50	23.55	5.18	5.12	5.16	5.52	5.48	5.50
T_{16}	39.11	36.96	38.04	22.43	22.37	22.40	5.15	5.07	5.11	5.45	5.41	5.43
SEm±	1.20	1.12	0.85	0.46	0.36	0.38	0.08	0.05	0.05	0.27	0.30	0.26
CD 5%	3.60	3.35	2.48	1.34	1.05	1.11	0.25	0.15	0.15	0.80	0.90	0.76

Table 4: Effect of foliar sprays of gibberellic acid and methods of application of *T. viride* on post-harvest parameters and incidence of basal rot disease

	I year	II year	Pooled	I year	II year	Pooled	I year	II year	Pooled	I Year	II Year	Pooled
T_1	9.75	9.08	9.42	200.56	186.84	193.70	6.86	6.58	6.73	10.14	10.11	10.13
T_2	10.91	9.75	10.33	224.49	200.56	212.52	4.67	4.56	4.61	9.79	9.77	9.78
T_3	12.36	11.25	11.81	254.31	231.34	242.83	2.66	2.56	2.61	9.13	9.09	9.11
T_4	11.87	10.22	11.05	244.23	210.29	227.26	4.00	3.83	3.91	9.45	9.43	9.44
T_5	13.24	12.05	12.64	272.28	247.87	260.08	2.47	2.37	2.42	8.82	8.79	8.80
T_6	13.42	12.71	13.06	275.98	261.38	268.68	2.19	1.82	2.00	8.44	8.41	8.43
T_7	13.48	13.35	13.42	277.28	274.68	275.98	0.96	0.93	0.95	7.72	7.70	7.71
T_8	13.45	13.23	13.34	276.73	272.14	274.44	1.33	1.06	1.20	8.05	8.03	8.04
T_9	14.67	14.41	14.54	301.70	296.42	299.06	0.42	0.39	0.40	6.25	6.23	6.24
T_{10}	14.85	14.71	14.78	305.40	302.58	303.99	0.31	0.30	0.31	5.97	5.94	5.95
T_{11}	16.04	15.73	15.89	329.94	323.57	326.76	0.10	0.07	0.09	5.22	5.20	5.21
T_{12}	15.22	15.05	15.13	313.07	309.51	311.29	0.21	0.21	0.21	5.63	5.60	5.61
T_{13}	13.54	13.44	13.49	278.52	276.53	277.53	0.80	0.79	0.80	7.40	7.38	7.39
T_{14}	13.80	13.64	13.72	283.87	280.58	282.23	0.67	0.66	0.67	7.13	7.10	7.12
T_{15}	14.39	14.20	14.29	295.93	292.03	293.98	0.52	0.53	0.52	6.61	6.58	6.59
T_{16}	14.12	13.95	14.04	290.45	286.95	288.70	0.59	0.58	0.58	6.88	6.86	6.87
SEm±	0.43	0.47	0.38	8.93	9.78	7.98	0.220	0.15	0.16	0.08	0.08	0.08
CD 5 %	1.25	1.37	1.12	25.80	28.26	23.06	0.641	0.45	0.48	0.24	0.24	0.25

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