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Effect of harvesting stages (H), varieties (V), foliar spray treatments (T) and their interactions on pod characteristics in soybean

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Abstract

The present study was carried out under the field and laboratory conditions at Post Graduate Institute Research Farm and Seed Technology Research Unit, Department of Agricultural Botany, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar (M.S.) during *kharif* season 2017 and 2018. Two varieties of soybean *viz.*, V₁ - KDS-726, and V₂ - KDS-344 were used for the study. The foliar spray with antioxidants *viz.*, T₁- Ascorbic acid (100 ppm), T₂- Salicylic acid (100 ppm), T₃- Humic acid (2000 ppm), T₄- Pyridoxine (100 ppm), T₅- Salicylic acid (100 ppm) + Ascorbic acid (100 ppm) along with T₀- Control. The crop was harvested at three harvesting stages *viz.*, H₁- at physiological maturity, H₂- 5th days after physiological maturity and H₃- 10th days after physiological maturity. The experiment was conducted in Split Factorial Design with three replications. The pod characteristics *viz.*, length of pods, diameter of pods and pod wall thickness were recorded in laboratory higher length of pods (4.52 cm), diameter of pods (7.93 cm) and pod wall thickness (0.306 mm), were recorded in variety KDS-726 (V₁) irrespective of foliar application of antioxidants and harvesting stages.

Keywords: Harvesting stages, varieties, foliar spray treatments, interactions on pod characteristics, soybean

Introduction

Soybean (*Glycine max* (L) Merr.) belongs to leguminous family ranked as a top oilseed crop, which provides approximately 50 % edible oil of the world (Akparobi, 2009) ^[1]. It has been recognized as an ancient crop plant since the origin of agriculture (Jandong *et al.*, 2011) ^[2]. Due to the large amount of macro and micro nutrients, it has been considered as a nutritious food for human needs, livestock, industrial and medicinal purposes (Akparobi, 2009) ^[1]. Soybean seed consists of 18 to 25 % oil and 30 to 50 % protein. Protein of soybean seed contains amino acids required for human nutrition and livestock (Raei *et al.*, 2008) ^[3]. Salwa *et al.* (2011) ^[4] stated that soybean is a crop that compensates shortage of oil and protein of other crop. Antioxidants are compounds that inhibit oxidation, a chemical reaction that can produce free radicals and chain reactions that may damage the cells of organisms. Antioxidants such as thiols or ascorbic acid (vitamin C) may act to inhibit these reactions.

Material and Methods

Experiments details

- Variety: V₁: Phule Sangam (KDS-726) :V₂: Phule Agrani (KDS-344)
- Treatments:
 - (T₀) Control
 - (T₁) Ascorbic acid (100 ppm)
 - (T₂) Salicylic acid (100 ppm)
 - (T₃) Humic acid (2000 ppm)
 - (T₄) Pyridoxine (100 ppm)
 - (T₅) Salicylic acid (100 ppm) + Ascorbic acid (100 ppm)

- At physiological maturity
- 5 days after physiological maturity
- 10 days after physiological maturity

Harvesting stages

c) Design: Field and Lab: Split Factorial,

d) Replication: 3

e) Season: Kharif - 2017 and Kharif – 2018

f) Spacing: 30 x 10 cm

g) Plot size: Gross: 3.50 x 1.80 m² Net: 3.30 x 1.50 m²

Foliar Application Application of foliar spray of antioxidants was given at flower initiation stage and 2nd spray at 10 days after 1st spray.

Results**1. Length of Pod (cm)**

The data of length of pod (cm) as influenced by harvesting stages, varieties, foliar spray treatments and their interactions are presented in Table 1.

1.1 Effect of harvesting stages

From the Table 1, it was seen that the length of pod (cm) showed significant difference due to harvesting stages. The higher length of pod (cm) 4.30, 4.29 and 4.30 (cm) was recorded at physiological maturity (H₁) and the lower length of pod (cm) 3.79, 3.78 and 3.78 (cm) was recorded at 10 days after physiological maturity (H₃) during the year 2017, 2018 and on pooled basis, respectively, irrespective of varieties and foliar spray treatments.

1.2 Effect of varieties

From the data, it was found that length of pod (cm) indicated significant differences due to the soybean varieties KDS-726 (V₁) and KDS-344 (V₂) during both years and on pooled basis (Table 1).

The variety KDS-726 (V₁) had significantly higher length of pod (cm) as 4.52, 4.51 and 4.52 (cm) than that of KDS-344 (V₂) 3.55, 3.54 and 3.55 (cm) during the year 2017, 2018 and on pooled basis, respectively, irrespective of harvesting stages and foliar spray treatments.

1.3 Effect of foliar spray treatments

The data regarding length of pod (cm) showed significant differences due to foliar spray treatment during both years and on pooled basis irrespective of harvesting stages and varieties. From the data, it was observed that the foliar spray with ascorbic acid (100 ppm) (T₁) recorded 4.15, 4.14 and 4.14 (cm) length of pod (cm) followed by pyridoxine (100 ppm) (T₄) 4.11, 4.10 and 4.10 (cm) length of pod (cm) during the year 2017, 2018 and on pooled basis, respectively. While minimum length of pod (cm) was recorded in control 3.93, 3.92 and 3.93 (cm) during the year 2017, 2018 and on pooled basis, respectively, irrespective of harvesting stages and varieties.

2. Diameter of Pod (mm)

The data of diameter of pod (mm) as influenced by harvesting stages, varieties, foliar spray treatments and their interactions are presented in Table 1.

2.1 Effect of harvesting stages

From the Table 1, it was seen that the diameter of pod (mm) showed significant difference due to harvesting stages. The higher diameter of pod (mm) 8.23, 8.22 and 8.22 (mm) was recorded at physiological maturity (H₁) and the lower diameter of pod (mm) 6.98, 6.97 and 6.98 (mm) was recorded at 10 days after physiological maturity (H₃) during the year 2017, 2018 and on pooled basis, respectively, irrespective of varieties and foliar spray treatments.

2.2 Effect of varieties

From the data, it was observed that the diameter of pod (mm) indicated significant differences due to the soybean varieties KDS-726 (V₁) and KDS-344 (V₂) during both years and on pooled basis (Table 1).

The variety KDS-726 (V₁) had significantly higher diameter of pod (mm) as 7.93, 7.92 and 7.93 than that of KDS-344 (V₂) 7.53, 7.52 and 7.52 (mm) during the year 2017, 2018 and on pooled basis, respectively, irrespective of harvesting stages and foliar spray treatments.

2.3 Effect of foliar spray treatments

The data regarding diameter of pod (mm) showed significant differences due to foliar spray treatment during both years and on pooled basis irrespective of harvesting stages and varieties.

From the data, it was observed that the foliar spray of ascorbic acid (100 ppm) (T₁) recorded 8.00, 7.99 and 7.99 diameter of pod (mm) followed by pyridoxine (100 ppm) (T₄) 7.78, 7.77 and 7.78 diameter of pod (mm) during the year 2017, 2018 and on pooled basis, respectively. While minimum diameter of pod (mm) was recorded in control 7.60, 7.59 and 7.59 (mm) during the year 2017, 2018 and on pooled basis, respectively, irrespective of harvesting stages and varieties.

3. Pod Wall Thickness (mm)

The data of pod wall thickness (mm) as influenced by harvesting stages, varieties, foliar spray treatments and their interactions are presented in Table 4.9.

3.1 Effect of harvesting stages

From the Table 4.9, it was seen that the pod wall thickness (mm) showed significant difference due to harvesting stages. The maximum pod wall thickness (mm) 0.321, 0.319 and 0.320 (mm) was recorded at physiological maturity and the minimum pod wall thickness (mm) 0.270, 0.267 and 0.269 (mm) was recorded at physiological maturity during the year 2017, 2018 and on pooled basis, respectively, irrespective of varieties and foliar spray treatments.

3.2 Effect of varieties

From the data, it was found that pod wall thickness (mm) indicated significant differences due to the soybean varieties KDS-726 (V₁) and KDS-344 (V₂) during both years and on pooled basis (Table 4.9). The variety KDS-726 (V₁) had significantly higher pod wall thickness (mm) as 0.307, 0.305 and 0.306 (mm) than that of KDS-344 (V₂) 0.284, 0.281 and 0.282 (mm) during the year 2017, 2018 and on pooled basis, respectively, irrespective of harvesting stages and foliar spray treatments.

3.3 Effect of foliar spray treatments

The data regarding pod wall thickness (mm) showed significant differences due to foliar spray treatment during both years and on pooled basis irrespective of harvesting stages and varieties.

From the data, it was observed that the foliar spray with ascorbic acid (100 ppm) (T₁) recorded maximum 0.308, 0.306 and 0.307 (mm) pod wall thickness followed by pyridoxine (100 ppm) (T₄) 0.303, 0.301 and 0.302 (mm) during the year 2017, 2018 and on pooled basis, respectively. While minimum pod wall thickness (mm) was recorded in control 0.281, 0.278 and 0.279 (mm) during the year 2017, 2018 and on pooled basis, respectively, irrespective of harvesting stages and varieties.

Table 1: Effect of harvesting stages (H), varieties (V), foliar spray treatments (T) and their interactions on length of pod (cm) and diameter of pod (mm)

Harvesting stages (H)	Length of pod (cm)			Diameter of pod (mm)		
	2017	2018	Pooled	2017	2018	Pooled
H ₁ -At physiological maturity	4.30	4.29	4.30	8.23	8.22	8.22
H ₂ - 5 days after physiological maturity	4.03	4.02	4.02	7.98	7.98	7.98
H ₃ - 10 days after physiological maturity	3.79	3.78	3.78	6.98	6.97	6.98
SE (m) ±	0.007	0.002	0.007	0.007	0.008	0.010
CD at 5%	0.029	0.007	0.021	0.027	0.033	0.031
Varieties(V)						
V ₁ -KDS-726 (Phule Sangam)	4.52	4.51	4.52	7.93	7.92	7.93
V ₂ -KDS-344 (Phule Agrani)	3.55	3.54	3.55	7.53	7.52	7.52
SE (m) ±	0.002	0.001	0.001	0.002	0.002	0.003
CD at 5%	0.005	0.003	0.004	0.005	0.007	0.007
Treatments (T)						
T ₀ -Control	3.93	3.92	3.93	7.60	7.59	7.59
T ₁ -Ascorbic acid (100 ppm)	4.15	4.14	4.14	8.00	7.99	7.99
T ₂ -Salicylic acid (100 ppm)	3.97	3.96	3.97	7.63	7.62	7.63
T ₃ -Humic acid (2000 ppm)	4.02	4.00	4.01	7.67	7.66	7.66
T ₄ -Pyridoxine (100 ppm)	4.11	4.10	4.10	7.78	7.77	7.78
T ₅ -Salicylic acid (100 ppm) + Ascorbic acid (100 ppm)	4.06	4.05	4.06	7.71	7.70	7.70
SE (m) ±	0.003	0.002	0.003	0.003	0.004	0.004
CD at 5%	0.009	0.006	0.009	0.009	0.012	0.013
Harvesting stages × Variety interaction (H×V)						
H ₁ V ₁	4.80	4.79	4.79	8.39	8.38	8.39
H ₁ V ₂	3.81	3.79	3.80	8.06	8.05	8.06
H ₂ V ₁	4.51	4.50	4.51	8.19	8.18	8.19
H ₂ V ₂	3.55	3.54	3.54	7.77	7.77	7.77
H ₃ V ₁	4.26	4.25	4.26	7.21	7.21	7.21
H ₃ V ₂	3.31	3.30	3.31	6.75	6.74	6.74
SE (m) ±	0.003	0.002	0.003	0.003	0.004	0.004
CD at 5%	0.009	0.006	0.009	0.009	0.012	0.013
Harvesting stages × Treatment interaction (H×T)						
H ₁ T ₀	4.19	4.18	4.18	8.10	8.08	8.09
H ₁ T ₁	4.42	4.41	4.41	8.39	8.38	8.38
H ₁ T ₂	4.22	4.21	4.21	8.14	8.13	8.14
H ₁ T ₃	4.28	4.27	4.27	8.21	8.19	8.20
H ₁ T ₄	4.38	4.37	4.37	8.28	8.26	8.27
H ₁ T ₅	4.33	4.31	4.32	8.26	8.26	8.26
H ₂ T ₀	3.92	3.90	3.91	7.91	7.90	7.90
H ₂ T ₁	4.14	4.13	4.14	8.06	8.05	8.06
H ₂ T ₂	3.97	3.95	3.96	7.94	7.93	7.93
H ₂ T ₃	4.01	3.99	4.00	7.96	7.95	7.96
H ₂ T ₄	4.10	4.08	4.09	8.04	8.03	8.04
H ₂ T ₅	4.05	4.04	4.05	8.00	7.99	7.99
H ₃ T ₀	3.69	3.68	3.69	6.79	6.78	6.79
H ₃ T ₁	3.89	3.87	3.88	7.55	7.54	7.54
H ₃ T ₂	3.73	3.71	3.72	6.82	6.81	6.82
H ₃ T ₃	3.76	3.75	3.76	6.83	6.83	6.83
H ₃ T ₄	3.85	3.83	3.84	7.03	7.02	7.03
H ₃ T ₅	3.81	3.80	3.81	6.85	6.84	6.85
SE (m) ±	0.006	0.004	0.006	0.006	0.007	0.008
CD at 5%	0.016	0.010	0.016	0.016	0.020	0.022

Table 1: cont....

Variety × Treatment interaction (V×T)						
V ₁ T ₀	4.42	4.41	4.41	7.77	7.76	7.77
V ₁ T ₁	4.64	4.63	4.64	8.32	8.31	8.31
V ₁ T ₂	4.45	4.44	4.45	7.81	7.80	7.81
V ₁ T ₃	4.50	4.49	4.49	7.86	7.85	7.85
V ₁ T ₄	4.59	4.58	4.58	7.94	7.92	7.93
V ₁ T ₅	4.54	4.53	4.54	7.90	7.89	7.90
V ₂ T ₀	3.45	3.44	3.44	7.43	7.42	7.42
V ₂ T ₁	3.65	3.64	3.65	7.68	7.67	7.67
V ₂ T ₂	3.49	3.48	3.48	7.45	7.45	7.45
V ₂ T ₃	3.53	3.52	3.53	7.48	7.47	7.47
V ₂ T ₄	3.62	3.61	3.62	7.63	7.62	7.62
V ₂ T ₅	3.58	3.57	3.57	7.51	7.50	7.50

SE (m) ±	0.005	0.003	0.005	0.005	0.006	0.006
CD at 5%	0.013	0.008	0.013	0.013	0.016	0.018
Harvesting stages × Variety × Treatment interaction (H×V×T)						
H ₁ V ₁ T ₀	4.69	4.68	4.69	8.21	8.20	8.20
H ₁ V ₁ T ₁	4.92	4.91	4.92	8.57	8.56	8.56
H ₁ V ₁ T ₂	4.72	4.71	4.72	8.29	8.28	8.29
H ₁ V ₁ T ₃	4.78	4.77	4.78	8.40	8.38	8.39
H ₁ V ₁ T ₄	4.87	4.86	4.86	8.47	8.43	8.45
H ₁ V ₁ T ₅	4.82	4.81	4.81	8.44	8.43	8.44
H ₁ V ₂ T ₀	3.69	3.68	3.68	7.98	7.97	7.98
H ₁ V ₂ T ₁	3.92	3.91	3.91	8.20	8.19	8.20
H ₁ V ₂ T ₂	3.72	3.71	3.71	7.99	7.98	7.99
H ₁ V ₂ T ₃	3.78	3.77	3.77	8.02	8.01	8.01
H ₁ V ₂ T ₄	3.89	3.88	3.88	8.10	8.09	8.09
H ₁ V ₂ T ₅	3.83	3.82	3.82	8.09	8.08	8.08
H ₂ V ₁ T ₀	4.41	4.40	4.41	8.10	8.09	8.10
H ₂ V ₁ T ₁	4.63	4.62	4.63	8.29	8.28	8.28
H ₂ V ₁ T ₂	4.45	4.44	4.45	8.14	8.13	8.13
H ₂ V ₁ T ₃	4.48	4.47	4.48	8.15	8.14	8.15
H ₂ V ₁ T ₄	4.57	4.56	4.57	8.27	8.26	8.27
H ₂ V ₁ T ₅	4.52	4.51	4.52	8.21	8.20	8.21
H ₂ V ₁ T ₀	3.42	3.41	3.42	7.71	7.70	7.71
H ₂ V ₁ T ₁	3.65	3.64	3.65	7.83	7.82	7.83
H ₂ V ₂ T ₂	3.48	3.47	3.48	7.74	7.73	7.74
H ₂ V ₂ T ₃	3.53	3.52	3.53	7.77	7.76	7.77
H ₂ V ₂ T ₄	3.62	3.61	3.62	7.81	7.80	7.81
H ₂ V ₂ T ₅	3.58	3.57	3.58	7.79	7.78	7.78
H ₃ V ₁ T ₀	4.15	4.14	4.14	7.00	6.99	7.00
H ₃ V ₁ T ₁	4.38	4.37	4.37	8.10	8.09	8.10
H ₃ V ₁ T ₂	4.19	4.18	4.19	7.01	7.00	7.01
H ₃ V ₁ T ₃	4.23	4.22	4.23	7.03	7.02	7.02
H ₃ V ₁ T ₄	4.33	4.32	4.33	7.09	7.08	7.09
H ₃ V ₁ T ₅	4.29	4.28	4.29	7.06	7.05	7.05
H ₃ V ₂ T ₀	3.23	3.22	3.23	6.58	6.57	6.58
H ₃ V ₂ T ₁	3.39	3.38	3.39	6.99	6.99	6.99
H ₃ V ₂ T ₂	3.26	3.25	3.26	6.63	6.62	6.62
H ₃ V ₂ T ₃	3.29	3.28	3.29	6.64	6.63	6.64
H ₃ V ₂ T ₄	3.36	3.35	3.36	6.97	6.96	6.97
H ₃ V ₂ T ₅	3.33	3.32	3.33	6.65	6.64	6.65
SE (m) ±	0.008	0.005	0.008	0.008	0.010	0.011
CD at 5%	0.023	0.014	0.023	0.022	0.028	0.031

Table 2: Effect of harvesting stages (H), varieties (V), foliar spray treatments (T) and their interactions on pod wall thickness (mm).

	Pod wall thickness (mm)			Length of seed (mm)		
	2017	2018	Pooled	2017	2018	Pooled
Harvesting stages (H)						
H ₁ -At physiological maturity	0.321	0.319	0.320	7.451	7.447	7.449
H ₂ - 5 days after physiological maturity	0.295	0.293	0.294	7.253	7.250	7.251
H ₃ - 10 days after physiological maturity	0.270	0.267	0.269	6.979	6.976	6.978
SE (m) ±	0.0007	0.0005	0.0008	0.017	0.015	0.019
CD at 5%	0.0028	0.0020	0.0025	0.066	0.057	0.063
Varieties (V)						
V ₁ -KDS-726 (Phule Sangam)	0.307	0.305	0.306	7.863	7.859	7.861
V ₂ -KDS-344 (Phule Agrani)	0.284	0.281	0.282	6.593	6.590	6.591
SE (m) ±	0.0002	0.0002	0.0002	0.0024	0.0028	0.0032
CD at 5%	0.0005	0.0005	0.0006	0.0068	0.0079	0.0089
Treatments (T)						
T ₀ -Control	0.281	0.278	0.279	7.117	7.114	7.116
T ₁ -Ascorbic acid (100 ppm)	0.308	0.306	0.307	7.302	7.299	7.300
T ₂ -Salicylic acid (100 ppm)	0.287	0.284	0.286	7.136	7.132	7.134
T ₃ -Humic acid (2000 ppm)	0.296	0.294	0.295	7.253	7.250	7.251
T ₄ -Pyridoxine (100 ppm)	0.303	0.301	0.302	7.288	7.284	7.286
T ₅ -Salicylic acid (100 ppm) + Ascorbic acid (100 ppm)	0.298	0.296	0.297	7.271	7.268	7.270
SE (m) ±	0.0003	0.0003	0.0003	0.004	0.005	0.006
CD at 5%	0.0008	0.0008	0.0010	0.012	0.014	0.015
Harvesting stages × Variety interaction (H×V)						
H ₁ V ₁	0.331	0.330	0.331	7.950	7.946	7.948
H ₁ V ₂	0.311	0.309	0.310	6.952	6.948	6.950
H ₂ V ₁	0.307	0.305	0.306	7.858	7.855	7.857

H ₂ V ₂	0.284	0.281	0.283	6.648	6.645	6.646
H ₃ V ₁	0.284	0.281	0.283	7.780	7.777	7.778
H ₃ V ₂	0.257	0.253	0.255	6.179	6.176	6.178
SE (m) ±	0.0003	0.0003	0.0003	0.004	0.005	0.006
CD at 5%	0.0008	0.0008	0.0010	0.012	0.014	0.015
Harvesting stages × Treatment interaction (H×T)						
H ₁ T ₀	0.309	0.307	0.308	7.402	7.398	7.400
H ₁ T ₁	0.333	0.331	0.332	7.496	7.493	7.495
H ₁ T ₂	0.313	0.311	0.312	7.423	7.418	7.421
H ₁ T ₃	0.319	0.317	0.318	7.441	7.438	7.439
H ₁ T ₄	0.329	0.327	0.328	7.483	7.480	7.482
H ₁ T ₅	0.324	0.322	0.323	7.460	7.457	7.458
H ₂ T ₀	0.280	0.277	0.278	7.008	7.005	7.007
H ₂ T ₁	0.309	0.307	0.308	7.398	7.395	7.397
H ₂ T ₂	0.287	0.285	0.286	7.024	7.021	7.022
H ₂ T ₃	0.293	0.290	0.291	7.344	7.341	7.342
H ₂ T ₄	0.305	0.302	0.304	7.380	7.377	7.379
H ₂ T ₅	0.299	0.296	0.297	7.364	7.361	7.362
H ₃ T ₀	0.253	0.250	0.251	6.942	6.939	6.940
H ₃ T ₁	0.283	0.279	0.281	7.011	7.008	7.010
H ₃ T ₂	0.261	0.257	0.259	6.960	6.957	6.959
H ₃ T ₃	0.278	0.275	0.276	6.975	6.972	6.973
H ₃ T ₄	0.277	0.273	0.275	6.999	6.996	6.998
H ₃ T ₅	0.272	0.269	0.270	6.990	6.987	6.988
SE (m) ±	0.000	0.000	0.001	0.007	0.008	0.010
CD at 5%	0.001	0.001	0.002	0.020	0.024	0.027

Table 4.9: cont....

Variety × Treatment interaction (V×T)						
V ₁ T ₀	0.292	0.290	0.291	7.818	7.815	7.817
V ₁ T ₁	0.319	0.317	0.318	7.902	7.899	7.901
V ₁ T ₂	0.299	0.297	0.298	7.838	7.835	7.837
V ₁ T ₃	0.311	0.309	0.310	7.854	7.851	7.853
V ₁ T ₄	0.314	0.311	0.313	7.889	7.886	7.888
V ₁ T ₅	0.309	0.307	0.308	7.873	7.870	7.872
V ₂ T ₀	0.269	0.266	0.267	6.416	6.413	6.415
V ₂ T ₁	0.297	0.294	0.296	6.702	6.698	6.700
V ₂ T ₂	0.275	0.272	0.273	6.433	6.430	6.431
V ₂ T ₃	0.282	0.278	0.280	6.652	6.648	6.650
V ₂ T ₄	0.293	0.290	0.292	6.686	6.682	6.684
V ₂ T ₅	0.287	0.284	0.286	6.669	6.666	6.667
SE (m) ±	0.0004	0.0004	0.0005	0.0059	0.0068	0.0078
CD at 5%	0.0011	0.0011	0.0014	0.0166	0.0193	0.0218
Harvesting stages × Variety × Treatment interaction (H×V×T)						
H ₁ V ₁ T ₀	0.320	0.318	0.319	7.906	7.902	7.904
H ₁ V ₁ T ₁	0.343	0.342	0.342	7.990	7.987	7.989
H ₁ V ₁ T ₂	0.323	0.322	0.322	7.925	7.919	7.922
H ₁ V ₁ T ₃	0.328	0.327	0.328	7.941	7.937	7.939
H ₁ V ₁ T ₄	0.339	0.337	0.338	7.978	7.975	7.977
H ₁ V ₁ T ₅	0.334	0.333	0.334	7.961	7.957	7.959
H ₁ V ₂ T ₀	0.298	0.295	0.297	6.898	6.895	6.897
H ₁ V ₂ T ₁	0.323	0.321	0.322	7.002	6.999	7.001
H ₁ V ₂ T ₂	0.303	0.301	0.302	6.921	6.917	6.919
H ₁ V ₂ T ₃	0.309	0.306	0.308	6.941	6.938	6.940
H ₁ V ₂ T ₄	0.319	0.316	0.318	6.988	6.985	6.987
H ₁ V ₂ T ₅	0.314	0.312	0.313	6.960	6.956	6.958
H ₂ V ₁ T ₀	0.290	0.288	0.289	7.808	7.805	7.807
H ₂ V ₁ T ₁	0.321	0.319	0.320	7.905	7.902	7.904
H ₂ V ₁ T ₂	0.298	0.296	0.297	7.828	7.825	7.827
H ₂ V ₁ T ₃	0.303	0.301	0.302	7.847	7.844	7.846
H ₂ V ₁ T ₄	0.316	0.314	0.315	7.891	7.888	7.890
H ₂ V ₁ T ₅	0.311	0.309	0.310	7.870	7.867	7.869
H ₂ V ₁ T ₀	0.269	0.266	0.268	6.208	6.205	6.207
H ₂ V ₁ T ₁	0.297	0.294	0.296	6.891	6.888	6.890
H ₂ V ₂ T ₂	0.276	0.273	0.275	6.219	6.216	6.218
H ₂ V ₂ T ₃	0.282	0.279	0.281	6.840	6.837	6.839
H ₂ V ₂ T ₄	0.294	0.291	0.292	6.869	6.866	6.868
H ₂ V ₂ T ₅	0.286	0.283	0.285	6.857	6.854	6.856

H ₃ V ₁ T ₀	0.267	0.264	0.266	7.741	7.738	7.740
H ₃ V ₁ T ₁	0.293	0.290	0.292	7.811	7.808	7.810
H ₃ V ₁ T ₂	0.275	0.272	0.274	7.762	7.759	7.761
H ₃ V ₁ T ₃	0.302	0.299	0.301	7.775	7.772	7.774
H ₃ V ₁ T ₄	0.286	0.283	0.285	7.799	7.796	7.798
H ₃ V ₁ T ₅	0.282	0.279	0.281	7.789	7.786	7.788
H ₃ V ₂ T ₀	0.239	0.235	0.237	6.143	6.140	6.141
H ₃ V ₂ T ₁	0.272	0.268	0.270	6.211	6.208	6.210
H ₃ V ₂ T ₂	0.246	0.242	0.244	6.158	6.155	6.157
H ₃ V ₂ T ₃	0.254	0.250	0.252	6.174	6.171	6.172
H ₃ V ₂ T ₄	0.267	0.263	0.265	6.199	6.196	6.198
H ₃ V ₂ T ₅	0.262	0.258	0.260	6.190	6.187	6.189
SE (m) ±	0.0007	0.0007	0.0008	0.010	0.012	0.014
CD at 5%	0.0019	0.0020	0.0024	0.029	0.033	0.038

Conclusion

From present study it is concluded that application of ascorbic acid @ 100 ppm (T₁) and harvested at physiological maturity (H₁) is better for pod characteristic's.

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