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Effect of ethephon on post-harvest characteristics of kiwi (*Actinidia deliciosa* cv. Monty) in Dolakha, Nepal

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ABSTRACT

An experiment was conducted in laboratory of Rural Development Tuki Association, Dolakha in 2019 to study the effect of ethephon on post-harvest characteristics of kiwifruit and identify appropriate concentration required for timely ripening of kiwis. Monty variety of kiwi was used under study. The experiment was laid out in Completely Randomized Design (CRD) with five treatments having different concentration of ethephon i.e. T_1 = Control, T_2 = 100 ppm, T_3 = 300 ppm, T_4 =500 ppm and T_5 = 700 ppm, each replicated four times. The study showed that maximum TSS (16.63^{0}brix) was observed in the fruits treated with 700 ppm at the end of ripening period which was statistically at par with 500 ppm whereas minimum TSS (12.0^{0}brix) was observed in control fruits during 30th day after treatment. At the peak period of ripening, fruits treated with 700 ppm led to lowest titratable acidity (0.66%), maximum TSS/TA (25.57), maximum physiological weight loss(17.28%) and highest Ph(4.08) whereas Control fruits showed maximum acid content (1.1%), minimum TSS/TA(12.1), lowest physiological weight loss (11.8%) and lowest Ph (3.5) during 3oth day of treatment. The storage life of fruits treated with 700 ppm was minimum (16.25 days) followed by 500 ppm (22.13 days) which was maximum (48.25 days) in case of control fruits. Eating quality declined significantly in highest dose (700ppm) of ethephon at the end of ripening period and in this stage, 500 ppm ethephon developed very good edible quality (2.75) followed by 300 ppm (2.25). In a nutshell, considering the post-harvest life and quality attributes, the concentration of ethephon ranging from (500-700) ppm was found appropriate for timely ripening of kiwi.

Key Words: *Kiwifruit, Climacteric, Ethephon, Post-harvest and Ripening*

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I. Introduction

Kiwi fruit is native to china which is often called as Chinese gooseberry (Abedini 2004). It belongs to genus Actinidia and family Actinidiaceae. The cultivated kiwifruit species include *Actinidia deliciosa, Actinidia chinensis,* and *Actinidia arguta* (Sims 2011). There are different varieties of Kiwi cultivated with green flesh and red flesh. It performs well in sandy loam and loamy soil. It works well in Ph range of 6.5 to 7. In Nepal, Kiwi show better production at an altitude of 1200m to 2400m (Dhakal 2018). It can grow well in that area where there is fog and frost but not snow.

Kiwi is a climacteric fruit. Generally, kiwi is harvested during November-December when it is still green in colour, hard texture, high acid content, soluble solid content when around 7 and less flavor. Ripening in kiwi is often related with term climacteric rise (MacRae *et al.* 1989). Ripening in kiwi has been a topic of discussion as it does not start ripe unless it is detached from tree. Most of the producers and consumers of kiwi are confronted with the problem of late and uneven ripening. Different practices including wrapping of fruits in clothes, papers and jute bag, smoke induction, piling in bag, wounding of fruits, putting fruits in bag containing straw or husk, putting fruits nearby the ethylene producing fruits were made to induce ripening in kiwi. However, none of these methods seem to be producing a significant output and hence people nowadays are searching for new alternatives for ripening kiwi fruits.

Many fruits produce tremendous quantities of ethylene and ripening of fruit is influenced upon this production (Sergent *et al.* 2009). Ethephon treatment nowadays can be considered as the best alternative as it induces ethylene hormone and helps in ripening. Ethephon (2-chloroethylphosphonic acid) is a compound that slowly produce ethylene gas and effects on ripening and quality upon its treatment with fruits. The parameters of ripening like TSS, TA, TSS/TA, Ph and storability of fruits are affected based on concentrations of ethephon used. Ethephon when used in proper concentration based on time of demand of consumer will solve the problem of late and uneven ripening of the kiwifruits. The toxicity of ethephon is very low as it gets easily converted to ethylene (Baramati, 2009). Keeping in mind these aspects, this study aims at finding out proper concentration of ethephon that enhance timely and uniform ripening of kiwi with minimum health hazard on consumers.

II. Materials and Methods

The experiment was conducted at lab of Rural Development Tuki Association, Charikot, Dolakha from January 20, 2019 to March 5, 2019. Monty variety was used under study. Kiwis were harvested from farmer's farm and were taken to lab for experiment. Temperature and RH were recorded on 3 days interval on time of data observation. The data were taken using thermo-hygrometer and on average, the temperature and RH recorded within experimental period were 8.3^0C with standard deviation of 1.206 and 75.2 % with standard deviation of 4.158 respectively.

Experimental design and treatment details: The research was carried out in Completely Randomized Design (CRD) with 5 treatments and 4 replications. The harvested kiwi fruits were treated with different concentrations of ethephon 39% SL (Kripon) i.e. control fruits (T1), 100 ppm ethephon(T2), 300 ppm ethephon (T3), 500 ppm ethephon (T4) and 700 ppm ethephon(T5). For the preparation of 100 ppm of ethephon, 5.13 ml of ethephon (kripon) is dissolved in 20 L of water. Similarly, 300 ppm, 500 ppm and 700 ppm ethephon solution were prepared by dissolving 15.4 ml, 25.65 ml and 35.9 ml of ethephon in 20 L of water respectively. Each plot had 14 kiwi fruits, out of them 10 were taken as destructive samples and 4 as non-destructive samples.

Observations taken: Physiological loss in weight (PLW) was determined weighing fruits in respective days using digital sensitive balance. Total soluble solids (^{0}Brix) were determined with the help of hand-held refractometer calibrated using distilled water. The titratable acidity (TA) of the fruits (% of citric acid) from each treatment was estimated as per standard procedures of (A.O.A.C 2005). 10 ml of the clear homogenized juice of a fruit from each treatment was taken and titrated against standard 0.1 N of sodium hydroxide (NaOH) solution using phenolphthalein as an indicator. TSS/TA ratio was calculated dividing TSS value and TA. pH of the juice was measured with the help of pH meter. Storability of the fruits were measured in term of days from the initiation of the experiment up to 50% rotting. Organoleptic(taste) evaluation was made by introducing a taste panel of 4 person and readings were recorded on fruits at different stage at weekly interval i.e. at 7 days , 14 days, and 21 days on a scale of

1-3 (1 = poor , 2 = good, 3 = Excellent). The pulp of the fruits treated with different concentrations of ethephon were provided to them and they ranked based on taste from scale 1-3.

Data analysis: The collected data was compiled by using the MS-Excel program and subjected to analysis of variance using R-STAT software package. Means of separation was done by LSD analysis at 5% level of significance. Graph and tables were constructed by using the MS-excel.

III. Results and Discussion

Table 01. Effect of ethephon doses on total soluble solids (° brix) of Kiwifruit (*Actinidia deliciosa* cv. Monty) at ambient condition at Dolakha, Nepal 2019

Treatments	TSS (° brix)									
	Day 3	Day 6	Day 9	Day 12	Day 15	Day 18	Day 21	Day 24	Day 27	Day 30
Control	8.3^{b}	8.65^{c}	8.30^{c}	10.55^{c}	11.30^{c}	11.03^{d}	11.68^{d}	11.20^{c}	11.89^{c}	12.0^{c}
100 ppm	8.98^{b}	9.70^{bc}	9.83^{bc}	11.95^{b}	12.35^{bc}	12.20^{c}	12.88^{c}	12.67^{b}	15.20^{a}	14.4^{b}
300 ppm	8.77b	10.00^{b}	11.87^{b}	11.4^{bc}	12.83^{b}	13.23^{b}	14.00^{b}	14.68^{a}	13.63^{b}	14.9^{a}
500 ppm	9.88^{a}	11.60^{a}	14.65^{a}	16.48^{a}	16.20^{a}	15.93^{a}	15.75^{a}	-	-	-
700 ppm	9.73^{a}	12.60^{a}	16.63^{a}	16.53^{a}	15.80^{a}	-	-	-	-	-
Sem (±)	0.24	0.392	0.714	0.36	0.419	0.310	0.323	0.246	0.203	0.178
LSD (0.05)	0.719	1.18	2.15	1.08	1.26	0.95	0.99	0.78	0.65	0.569
F test	**	***	***	***	***	***	***	***	***	***
CV, %	5.22	7.46	7.83	5.37	6.12	4.7	4.8	3.8	3.0	2.6

*, ** and *** indicate significant at 5 %, 1 % and 0.1% probability level.

Table 02. Effect of ethephon doses on Titratable Acidity (% of citric acid) of Kiwifruit (*Actinidia deliciosa* cv. Monty) at ambient condition in Dolakha, Nepal 2019

Treatments	Titrable acidity (TA) (% of citric acid)									
	Day 3	Day 6	Day 9	Day 12	Day 15	Day 18	Day 21	Day 24	Day 27	Day 30
Control	1.45^{c}	1.32^{c}	1.42^{d}	1.29^{c}	1.26^{c}	1.24^{c}	1.24^{d}	1.20^{c}	1.16^{c}	1.1^{c}
100 ppm	1.41^{bc}	1.23^{bc}	1.34^{d}	1.25^{c}	1.22^{bc}	1.18^{c}	1.15^{cd}	1.05^{b}	0.99^{b}	0.87^{b}
300 ppm	1.35^{abc}	1.20^{b}	1.11^{c}	1.14^{b}	1.14^{b}	1.03^{b}	1.05^{bc}	0.86^{a}	0.79^{a}	0.82^{a}
500 ppm	1.34^{ab}	1.17^{b}	0.88^{b}	0.83^{a}	0.83^{a}	0.83^{a}	0.86^{b}	-	-	-
700 ppm	1.24^{a}	1.06^{a}	0.66^{a}	0.77^{a}	0.73^{a}	-	-	-	-	-
Sem (±)	0.037	0.017	0.007	0.034	0.033	0.033	0.004	0.014	0.015	0.023
LSD (0.05)	0.11	0.10	0.13	0.11	0.10	0.03	0.03	0.04	0.05	0.07
F test	*	**	***	***	***	***	***	***	***	***
CV, %	5.44	5.5	7.83	6.58	6.46	6.1	5.4	2.7	3.1	4.8

*, ** and *** indicate significant at 5 %, 1 % and 0.1% probability level.

Table 03. Effect of ethephon doses on TSS/TA ratio of Kiwifruit (*Actinidia deliciosa* cv. Monty) at ambient condition in Dolakha, Nepal 2019

Treatments	TSS/TA									
	Day 3	Day 6	Day 9	Day 12	Day 15	Day 18	Day 21	Day 24	Day 27	Day 30
Control	5.72^{c}	6.54^{d}	5.83^{d}	8.20^{b}	8.97^{d}	8.51^{d}	9.00^{e}	8.75^{c}	11.6^{c}	12.1^{c}
100 ppm	6.35^{c}	7.89^{cd}	7.35^{cd}	9.58^{b}	10.16^{cd}	9.86^{d}	10.69^{d}	11.70^{b}	14.53^{b}	15.62^{b}
300 ppm	6.55^{bc}	8.35^{c}	10.84^{c}	10.02^{b}	11.25^{c}	12.33^{c}	12.75^{c}	15.30^{a}	14.6^{a}	18.8^{a}

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500 ppm	7.39^{ab}	9.92^{b}	16.60^{b}	20.14^{a}	22.02^{a}	18.97^{a}	17.73^{a}	-	-	-
700 ppm	7.89^{a}	11.92^{a}	25.57^{a}	21.39^{a}	19.13^{b}	-	-	-	-	-
Sem (±)	0.341	0.502	1.287	0.66	0.72	0.357	0.49	0.167	0.549	0.196
LSD (0.05)	1.03	1.51	3.88	1.99	2.16	1.10	1.51	0.534	1.76	0.63
F test	**	***	***	***	***	***	***	***	**	***
CV, %	10.1	11.2	19.4	9.51	10.0	5.7	7.8	2.8	8.1	2.5

*, ** and *** indicate significant at 5 %, 1 % and 0.1% probability level.

Table 04. Effect of ethephon doses on pH of Kiwifruit (*Actinidia deliciosa* cv. Monty) at ambient condition in Dolakha, Nepal 2019

Treatment	pH									
	Day 3	Day 6	Day 9	Day 12	Day 15	Day 18	Day 21	Day 24	Day 27	Day 30
Control	3.13^{b}	3.15^{c}	3.08^{d}	3.23^{d}	3.28^{c}	3.33^{c}	3.30^{c}	3.27^{b}	3.39^{b}	3.50^{b}
100 ppm	3.10^{b}	3.28^{c}	3.20^{c}	3.30^{cd}	3.35^{c}	3.45^{b}	3.47^{b}	3.5^{ab}	3.63^{a}	3.70^{a}
300 ppm	3.15^{b}	3.25^{c}	3.35^{b}	3.48^{c}	3.50^{bc}	3.53^{b}	3.60^{ab}	3.73^{a}	3.68^{a}	3.80^{a}
500 ppm	3.13^{b}	3.43^{b}	3.43^{b}	3.73^{b}	3.70^{ab}	3.75^{a}	3.73^{a}	-	-	-
700 ppm	3.33^{a}	3.58^{a}	3.83^{a}	4.08^{a}	3.82^{a}	-	-	-	-	-
Sem (±)	0.047	0.045	0.035	0.014	0.086	0.040	0.049	0.061	0.043	0.047
LSD (0.05)	0.14	0.14	0.11	0.18	0.26	0.12	0.15	0.20	0.14	0.15
F test	*	***	***	***	**	***	***	**	***	**
CV, %	2.97	2.71	2.06	3.32	4.88	2.3	2.8	3.5	2.4	2.6

*, ** and *** indicate significant at 5 %, 1 % and 0.1% probability level.

Table 05. Effect of ethephon doses on physiological loss in weight (PLW) of Kiwifruit (*Actinidia deliciosa* cv. Monty) at ambient condition in Dolakha, Nepal, 2019

Treatments	Physiological loss in weight (%)									
	Day 3	Day 6	Day 9	Day 12	Day 15	Day 18	Day 21	Day 24	Day 27	Day 30
Control	2.20^{b}	3.59^{c}	4.23^{d}	3.94^{c}	5.76^{c}	5.89^{c}	7.12^{b}	9.0^{b}	12.3^{b}	11.8
100 ppm	2.43^{b}	4.52^{bc}	4.94^{cd}	6.21^{c}	7.67^{c}	8.95^{c}	10.26^{a}	15.36^{a}	12.05^{b}	14.35
300 ppm	2.57^{b}	4.88^{bc}	6.34^{c}	6.76^{c}	8.25^{c}	10.29^{c}	13.46^{a}	13.20^{b}	16.43^{a}	15.83
500 ppm	2.93^{b}	6.06^{ab}	8.93^{b}	11.84^{c}	11.57^{b}	12.53^{a}	13.12^{a}	-	-	-
700 ppm	4.76^{a}	7.75^{a}	11.65^{a}	15.39^{a}	17.28^{a}	-	-	-	-	-
Sem (±)	0.37	0.567	0.67	0.954	1.191	1.402	1.70	0.399	0.398	0.344
LSD (0.05)	1.14	1.71	1.77	2.88	3.59	4.32	5.22	1.27	1.27	1.10
F test	**	**	***	***	***	**	***	**	***	***
CV, %	25.3	21.2	18.4	21.6	23.6	27.6	26.8	5.8	4.4	3.8

*, ** and *** indicate significant at 5 %, 1 % and 0.1% probability level.

Table 06. Effect of ethephon doses on Storability (Post-harvest life) of Kiwifruit (*Actinidia deliciosa* cv. Monty) at ambient condition in Dolakha, Nepal, 2019

Treatments	**Storage days**
Control	48.25^{a}
100 ppm	32.75^{b}
300 ppm	30.75^{b}
500 ppm	22.13^{c}
700 ppm	16.25^{d}
Sem (±)	1.702

LSD (0.05)	5.13
F test	***
CV, %	11.2

*, ** and *** indicate significant at 5 %, 1 % and 0.1% probability level.

Table 07. Effect of ethephon doses on sensory evaluation(Taste) of kiwifruit (*Actinidia deliciosa* cv. Monty) at ambient condition in Dolakha, Nepal 2019

Treatments	Sensory evaluation		
	7 Days	14 Days	21 Days
Control	1.00^{c}	1.00^{c}	1.25^{b}
100 ppm	1.00^{c}	1.25^{bc}	1.50^{b}
300 ppm	1.25^{bc}	2.00^{ab}	2.25^{ab}
500 ppm	1.75^{b}	2.50^{a}	2.75^{a}
700 ppm	2.75^{a}	1.75^{abc}	-
Sem (±)	0.194	0.289	0.260
LSD (0.05)	0.58	0.62	0.80
F test	***	*	**
CV, %	25	22.7	26.9

*, ** and *** indicate significant at 5 %, 1 % and 0.1% probability level.

Table 08. Correlation matrix

	tss7	ta7	pH 7	se3	std
tss7	1.000				
ta7	-0.894***	1.000			
ph7	0.833***	-0.942***	1.000		
se3	0.683***	-0.614**	0.527**	1.000	
Std	-0.882***	0.907***	-0.914***	-0.587**	1.000

Tss7, ta7, and Ph7 refers to 7th reading taken at 21st day of treatment. Se3 refers to sensory quality testing (taste) at 21st day of treatment and std refers to storage days (Post-harvest life).

IV. Discussion

Total soluble solids (TSS): Regardless of the treatments used, total soluble solids (TSS) content of kiwis increased almost consistently with advancement of ripening. However, ethephon treated fruits had significantly higher soluble solid content compared to control fruits. Fruits treated with 700 ppm showed maximum TSS content throughout its ripening period and ranged from 9.73^{0} brix on 3rd days to 16.63^{0} brix on 9th days of treatment (peak period of ripening) and decrease in TSS afterward till its storage days. The result was statistically at par with 500 ppm treated fruit where TSS ranged from 9.48 ^{0} brix on 3rd day of treatment to 16.48^{0} brix on 12th day and almost same level of TSS was maintained till 16th day of treatment(its storage day). The TSS content of fruits treated with 100 ppm and 300 ppm ethephon were found statistically at par in most of the reading. The minimum value of TSS content was shown by control fruits throughout ripening period and ranged from 8.3^{0} brix on 3rd day to 12.0^{0} brix on 30th day of treatment.

Fluctuation in temperature might have resulted some deviation in linear increment of TSS change with increasing days of ripening period. Increase in solid content might be the result of metabolic activities due to respiration. Treatment with ethephon excites endogenous ethylene production and finally conversion of starch into sugars resulting increase in TSS. The decrease in TSS content at the end of ripening in each treatment may be due to advanced ripening stage which resulted in the gradual utilization of sugars and hence the reduced TSS was observed.

The value of TSS is maximum at the peak of ripening period and thereafter it decreases (Dhall and Singh, 2013). Similarly, these finding are in close proximity with earlier result reported after advanced

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ripening is by Matsumoto *et al*. (1983) in kiwifruit, Singh and Jones (2001) in mango, Jawandha *et al.* 2016) in mango, Dhillion and Mahajan (2011) in pear, Zhang *et al.* (2012) in kiwifruit.

Titratable acidity (TA): Changes in titratable acidity in ethephon treated and control kiwifruits are highly significant and are summarized in table 2. Almost consistent and significant decline in acid content was exhibited with ripening period in all treatments including control. Higher acidity was recorded in control fruits which was 1.45% on 3rd day to 1.1% on 30th day of treatment which was statistically at par with result of 100 ppm. The table showed gradual decrease in TA content of fruits treated with 300 ppm ethephon ranging from 1.35% on 3rd day to 0.82% on 30th day of treatment. Higher dose of ethephon (700 ppm) led to sharp reduction in acid content which was 1.24% on 3rd day to 0.66 on 9th day (peak of ripening period) and its slight increment thereafter till its storage period. The result of fruits treated with 700 ppm was followed by 500 ppm where TA ranged from 1.34% on 3rd day to 0.83% on 12th day and almost same value was maintained till end of storage life.

Mean acid content of fruit at harvest was observed significantly higher than at the end of ripening period. The decreasing trend of acid content on ripening period might be due to utilization of organic acids as a substrate in tricarboxylic acid cycle in the respiration process.

Bal and Kok (2007)found that acid content goes on decreasing with maturity levels in experiment of glycerin added ethephon treatment in kiwifruits. Jawandha *et al.* (2016) also reported that there was consistent decrease in juice acid contents of mangoes with ethephon applications. These results are also in close agreement with the finding of Park *et al*. (2000) in kiwifruit, Zhang *et al.* (2012) in kiwifruit, Matsumoto *et al.* (1983), Dhillion and Mahajan (2011) in pear, Singh and Janes (2001) in mango, Dhall and Singh(2013).

TSS/TA ratio: Influence of different treatments on TSS/TA ratio of kiwifruit is depicted in table 3. The effect of treatments was highly significant with respect to TSS/TA ratio throughout ripening period. The significantly maximum ratio was observed in fruits treated with 700 ppm ranging from 7.89 on 3rd day to 25.57 on 9th days of treatment followed by fruits treated with 500 ppm. The minimum ratio was observed in control fruits ranging from 5.18 on 3rd day to 12.1 on 30th day. Similar result was reported by Singh and Janes (2001)in mango.

pH of the fruit: Table 4 reveals that the effect was significant in pH of fruits regardless of treatment used and maximum pH was observed at the end of ripening period in each treatment. The trend shows gradual increment in pH with increase in ripening period. The maximum pH value was observed in fruits treated with 700 ppm from 3.33 to 4.08 on 3rd and 12th day after treatment followed by 500 ppm ranged from 3.13 to 3.75 on 3rd and 18th day of treatment which was statistically at par with 300 ppm. Control fruits exhibited minimum pH value which was 3.13 to 3.5 on 3rd and 30th day of treatment respectively.

Increasing trend of pH may be due to the conversion and utilization of different acids in the respiration process. This finding is in line with the result reported by Bal and Kok (2007), Matsumoto *et al.* (1983) and Ben-Arie *et al.* (1981)

Physiological loss in weight (PLW): As presented in table 5, the physiological loss in weight (PLW) was significantly increased in all the treatments with the advancement of the ripening period. Maximum weight loss was recorded in fruits treated with 700 ppm ranged from 4.76% to17.28% on 3rd day and 15th day respectively followed by fruits treated with 500 ppm ranging from 2.93% to 13.12% on 3rd day and 21st day. Minimum weight loss was recorded in control fruits and ranged from 2.2% to 11.8% on 3rd and 30th day respectively which was statistically at par with weight loss of 100 ppm and 300 ppm. The maximum weight loss in the fruits treated with 700 ppm might have been due to due to acceleration in the process of transpiration and respiration. The finding is in close agreement with the finding of (Dhall and Singh, 2013) and (Dhillion and Mahajan, 2011) in tomato.

Storability (Post-harvest life): Table 6 reveals that there is a high significant difference between ethephon treated fruits and control fruit with respect to storage days. Control fruits exhibited maximum storage life of 48.25 days followed by 100 ppm (32.75 days) which was statistically at par with 300 ppm (30.75 days). Minimum storage life was observed in fruits treated with 700 ppm i.e. 16.25 days which is followed by fruits treated with 500 ppm (22.13 days).

Shortening of storage life in ethephon treated fruits compared to control fruits may be due to higher respiration rate as a result of higher ethylene production that lead to conversion of starch to sugars and utilization of organic acids as substrate that decrease storability of fruit.

Sensory evaluation: As seen in the table 7, the sensory (eating) quality of kiwi was significantly increased with ripening in ethephon treated fruit compared to control fruits. Advancement of ripening period brought improvement in sensory(edible)quality in all treatments. Ethephon treatments contributed to develop better organoleptic quality of fruits in terms of decreased flesh firmness, sugar-acid blending and taste. After 7 days of treatment, fruits treated in ethephon 700 ppm (2.75) developed very much desirable eating quality followed by 500 ppm ethephon treatment (1.75), while the control fruits after the same time had inferior sensory quality (1.0). After 14 days of treatment, maximum sensory quality was developed in fruits treated with 500 ppm (2.5) followed by fruits with 300 ppm (2.0) which was statistically at par with 700 ppm and 100 ppm fruits whereas control fruit still showed no change in quality (1.0). However, fruit quality in highest dose of ethephon declined significantly at the end of ripening studies and on this stage 500 ppm ethephon doses resulted in very good edible quality attributes followed by 250 ppm.

Reduction of fruit firmness, increase in soluble solids content and decrease in acidity might be the factors contributing better edible quality. Similar results were reported in finding of Singh and Janes (2001), Jaeger *et al.* (2003) and Bal and Kok (2007) in kiwifruit.

Correlation matrix: After the analysis of various parameters of ripening in kiwi, different correlation coefficients have been found. Sensory quality (taste) showed strongly positive correlation with total soluble solids (0.683***) and moderately positive correlation with Ph (0.527**). But it showed negative correlation with Titratable acidity (-0.614**).

Similarly, on analyzing correlation coefficient of storage days with other parameters, storage days showed strongly negative correlation with Total soluble solid (-0.882***) and with Ph (-0.914***) as well. But storage days showed strongly positive correlation with titratable acidity (0.907***).

V. Conclusion

Ethephon treatment in kiwi was found effective as the ethephon treated fruit ripped quicker as compared to control fruit. On increasing the dose of ethephon, the maximum value of TSS, TSS/TA and pH was found at the end of ripening period in 700 ppm, but highest dose resulted in maximum physiological weight loss, short storage life due to early rotting and decline in eating(sensory) quality. Considering the post-harvest life and quality attributes of Kiwi, the concentration of ethephon ranging from (500-700) ppm was found appropriate for ripening of kiwi.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper**.**

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