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Suitability of some post harvest treatment combinations for better shelf life of green chilli (*Capsicum annuum* L.)

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ABSTRACT

Green chilli is most important vegetable cum spice crop of the world and compulsory item of every kitchen for cooking, salad and making sauces, canned green chilli, pickles etc. Due to its perishable nature a huge loss of fresh fruits occurs in weak marketing channels throughout the India. The present investigation on the suitability of some post harvest treatment combinations for better shelf life of green chilli revealed that LDPE + Cool + GA_3 was most effective and suitable for increasing the shelf life of chilli less effecting the quality in respect to less physiological loss in weight (PLW), highest green colour retension and highest ascorbic acid content. When chemicals are not available the harvested fresh fruits can be stored after wrapping with PVC or LDPE and should be kept within cold condition (6-8^{0}C temperature with 75 % RH) for better shelf life.

Key words : Chilli, Storage, Post harvest quality.

Green chilli (*Capsicum annuum* L.) is one of the common vegetable cum spice crop of the world. The mature green fruits are the compulsory item of every kitchen for cooking and salad. Besides sauces, canned green chilli, pickles are produced from green chillies. Though the crop was introduced from Brazil during 16th centuries, it is now growing in allover the India. Andhra Pradesh, Karnataka, Maharashtra, Orissa, Tamilnadu are the leading states in chilli production in India. In West Bengal there is a considerable production of green chilli. But due to lack of improved marketing channels a huge destruction of fresh chilli before marketing are causing a great loss for chilli growers, mainly during the end of summer and throughout the rainy season. In some chilli growing belts of North Bengal farmers are now in opposite of growing green chilli as there are no such special cold storage facility and facility of processing of green or red chillies. Also low cost, easy posthervast technologies for extending the shelf life of green chillies are not in hand. Keeping this in mind an attempt was made in present investigation to find one low cost and easy post harvest operation to increasing the shelf life of green chilli.

MATERIALS AND METHODS

The present study was carried out at Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar (WB) during 2006-2007. Seeds of local chilli cultivar were collected from Haldibari (a prominent chilli growing belt of Cooch Behar district) and were grown at the institutional farm of the university following the standard package of practices to obtain the fresh green chilli fruits. Just harvested fresh fruits were taken for 18 different post harvest treatment combinations, T_1 -LDPE + Ambient + GA_3, T_2- LDPE + Ambient + $CaCl_2$, T_3- LDPE + Cool + GA_3, T_4- LDPE + Cool + $CaCl_2$, T_5-PVC + Ambient + GA_3, T_6- PVC + Ambient + $CaCl_2$, T_7-PVC + Cool + GA_3, T_8- PVC + Cool + $CaCl_2$, T_9- LDPE + Ambient + DDW, T_{10}-LDPE + Cool + DDW, T_{11}- PVC + Ambient + DDW, T_{12}-PVC + Cool + DDW, T_{13}- GA_3 + Ambient, T_{14}- GA_3 + Cool, T_{15}- $CaCl_2$ + Ambient, T_{16}- $CaCl_2$ + Cool, T_{17}- DDW + Ambient, T_{18}- DDW + Cool,

LDPE : Packaging the fruits with Low Density Poly Ethylene of 100 guaze having 5 % perforations.
PVC : Packaging the fruits with Poly Vinyl Chloride.
Ambient: 20-30^{0}C temperature with 90-95 % RH
Cool : 6-8^{0}C temperature with 75 % RH
GA_3 : Solution of Gibberellic Acid 3 @ 150 ppm
$CaCl_2$: Solution of Calcium Chloride @ 0.5 %
DDW : Double Distilled Water

In case of post harvest treatment combinations having GA_3 or $CaCl_2$ or DDW the fresh fruits were dipped into the solutions or water as suitable for 10 minutes. Then they were packed with packaging materials and stored according to the treatment combinations. Ambient + DDW was considered as the control treatment.

The observations on Physiological Loss in Weight (PLW) in percentage, changes in chlorophyll content (mg/100g) and changes in ascorbic acid content (mg/100g) were taken on 5th day, 10th day, 15th day, 20th day and 25th day. Chlorophyll and ascorbic acid content were analyzed

as suggested by Rangana (1979). The recorded observations were subjected to statistical analysis as per method suggested by Gomez and Gomez (1983).

RESULTS AND DISCUSSION

The physiological loss (PLW) in weight was significantly lowest (5.46 %) in the treatment combination PVC + Cool + GA_3 and followed by PVC + Cool + $CaCl_2$ (7.76 %) and LDPE + Cool + GA_3 (8.70 %) on 25th day after harvest. But the chlorophyll degradation was statistically lowest in LDPE + Cool + GA_3 followed by LDPE + Cool + $CaCl_2$ and PVC + Cool + GA_3.The fruits stored on these treatment combinations contained 1.92mg/100g, 1.86mg/100g and1.83mg/100g chlorophyll, respectively on 25th day after harvest. Ascorbic acid content of the fruits on 25th day after harvest was significantly highest (138.56mg/100g) in the fruits of LDPE + Cool + GA_3 followed by PVC + Cool + GA_3 (135.36mg/100g) and LDPE + Cool + $CaCl_2$ (133.76mg/100g) (Table 3). It is clear from the result of the

Table 1 : Physiological loss in weight (%) of green chilli fruits under different post harvest treatment combinations

Treatment Combinations	5th day	10th day	15th day	20th day	25th day
LDPE + Ambient + GA_3	13.63	15.70	17.83	20.13	21.36
LDPE+Ambient + $CaCl_2$	15.33	16.86	19.40	23.30	26.26
LDPE + Cool + GA_3	2.13	4.40	5.66	7.43	8.70
LDPE + Cool + $CaCl_2$	4.16	5.76	7.66	9.46	11.43
PVC + Ambient + GA_3	7.30	8.86	10.13	12.13	13.63
PVC + Ambient + $CaCl_2$	9.26	11.46	13.26	15.63	18.60
PVC + Cool + GA_3	1.40	1.90	3.33	4.50	5.46
PVC + Cool + $CaCl_2$	2.40	3.56	4.90	6.03	7.76
LDPE+Ambient + DDW	25.56	29.56	36.50	41.46	47.70
LDPE + Cool + DDW	9.50	15.63	22.10	28.26	32.30
PVC + Ambient + DDW	21.30	26.20	34.73	39.36	43.63
PVC + Cool + DDW	12.30	17.63	21.40	25.60	29.50
GA_3 + Ambient	29.80	38.13	47.36	56.26	62.33
GA_3 + Cool	15.80	15.70	32.30	43.63	56.30
$CaCl_2$ + Ambient	26.40	40.30	49.33	56.10	60.26
$CaCl_2$ + Cool	18.86	31.26	39.63	48.53	56.20
DDW + Ambient	33.16	48.20	57.70	66.33	73.30
DDW + Cool	21.26	38.60	47.76	58.30	67.13
C.D. (P=0.05)	0.208	0.230	0.300	0.275	0.378

Table 2 : Changes in chlorophyll content (mg/100g) of green chilli fruits under different post harvest treatment combinations

Treatment Combinations	5th day	10th day	15th day	20th day	25th day
LDPE + Ambient + GA_3	1.876	1.776	1.713	1.640	1.576
LDPE+Ambient + $CaCl_2$	1.853	1.773	1.703	1.626	1.543
LDPE + Cool + GA_3	1.960	1.956	1.943	1.926	1.923
LDPE + Cool + $CaCl_2$	1.956	1.933	1.920	1.887	1.863
PVC + Ambient + GA_3	1.806	1.723	1.636	1.550	1.483
PVC + Ambient + $CaCl_2$	1.786	1.696	1.620	1.516	1.420
PVC + Cool + GA_3	1.953	1.923	1.883	1.873	1.830
PVC + Cool + $CaCl_2$	1.943	1.916	1.876	1.824	1.803
LDPE+Ambient + DDW	1.773	1.660	1.573	1.456	1.353
LDPE + Cool + DDW	1.913	1.856	1.806	1.767	1.703
PVC + Ambient + DDW	1.753	1.646	1.553	1.427	1.320
PVC + Cool + DDW	1.916	1.876	1.836	1.783	1.757
GA_3 + Ambient	1.713	1.606	1.483	1.373	1.267
GA_3 + Cool	1.903	1.893	1.783	1.716	1.660
$CaCl_2$ + Ambient	1.703	1.570	1.446	1.343	1.200
$CaCl_2$ + Cool	1.883	1.806	1.746	1.687	1.627
DDW + Ambient	1.683	1.563	1.426	1.296	1.146
DDW + Cool	1.826	1.746	1.643	1.563	1.487
C.D. (P=0.05)	0.009	0.010	0.011	0.012	0.011

Table 3 : Changes in ascorbic acid content (mg/100g) of green chilli fruits under different post harvest treatment combinations

Treatment Combinations	5th day	10th day	15th day	20th day	25th day
LDPE + Ambient + GA_3	79.94	92.56	103.80	120.40	128.63
LDPE+Ambient + $CaCl_2$	78.20	91.66	103.56	113.40	122.26
LDPE + Cool + GA_3	85.05	100.83	118.73	129.46	138.56
LDPE + Cool + $CaCl_2$	83.09	94.66	107.63	121.43	133.76
PVC + Ambient + GA_3	77.76	87.43	98.26	107.60	119.70
PVC + Ambient + $CaCl_2$	76.06	89.53	100.33	107.43	112.36
PVC + Cool + GA_3	84.05	96.60	108.93	123.36	135.36
PVC + Cool + $CaCl_2$	82.26	95.70	108.50	120.66	133.56
LDPE+Ambient + DDW	76.53	87.50	97.60	105.73	114.37
LDPE + Cool + DDW	81.45	93.36	106.40	118.46	131.26
PVC + Ambient + DDW	75.37	84.46	93.36	101.16	108.70
PVC + Cool + DDW	80.66	93.26	106.33	118.30	130.80
GA_3 + Ambient	73.06	80.43	87.50	95.50	102.40
GA_3 + Cool	78.84	89.10	101.43	113.50	123.37
$CaCl_2$ + Ambient	70.83	77.50	84.56	91.26	98.13
$CaCl_2$ + Cool	75.93	91.00	93.37	116.63	125.73
DDW + Ambient	74.59	82.66	89.33	97.23	105.43
DDW + Cool	77.22	88.43	95.17	107.60	116.50
C.D. (P=0.05)	0.24	0.22	0.22	0.27	0.25

experiment that the wrapping of fruits by LDPE or PVC considerably lowered the physiological loss in weight (PLW) and PVC was the most efficient in this regard similar findings were observed by Brar *et al.* (2000). It may be due to stability of humidity within the wrapped system and less evapo-transpiration moisture loss from the fruits. Comparing the results of PLW obtained from the treatment combination pair Cool + GA_3 and Cool + $CaCl_2$ or Ambient + GA_3 and Ambient + $CaCl_2$ we can say that the chemicals were not such different in respect to PLW. But comparing the storage condition, Cool storage condition has much greater role in decreasing PLW than Ambient which akins to the investigation of Attri *et al.* (2002). Observations taken in respect to chlorophyll content of fruits on 25th day after harvest from treatment combination LDPE + Cool + GA_3 and PVC + Cool + GA_3, LDPE storage condition was better in green colour retension of fresh chilli. Whereas comparing the chlorophyll content of the fruits of LDPE + Cool + GA_3 and LDPE + Cool + $CaCl_2$, GA_3 treatment was better than the $CaCl_2$ treatment for maintenance of green colour of chilli in storage. In another experiment Arora *et al.* (2000) found the highest chlorophyll content with GA_3 @ 200ppm. Cold storage condition was better than the ambient storage condition for green colour retension of chilli. More or less similar trend of ascorbic acid content of green chilli were observed in the present experiment. Ascorbic acid degradation also occurs due to increasing activity of ascorbic acid oxidase within the stored fruits. But there was an increasing trend of ascorbic acid content

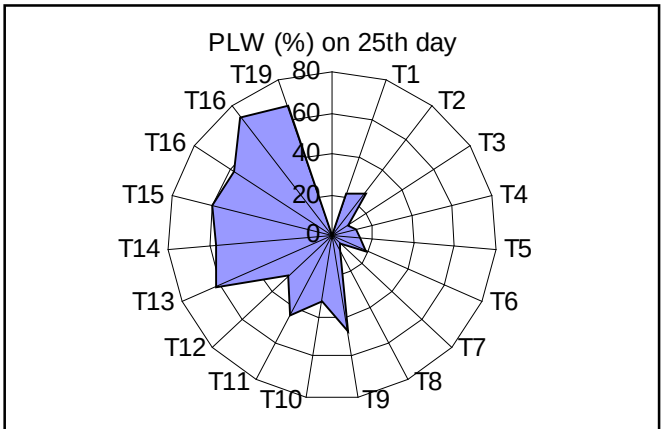

Fig. 1: Physiological Loss in Weight (%) of chilli of different treatments on 25th day

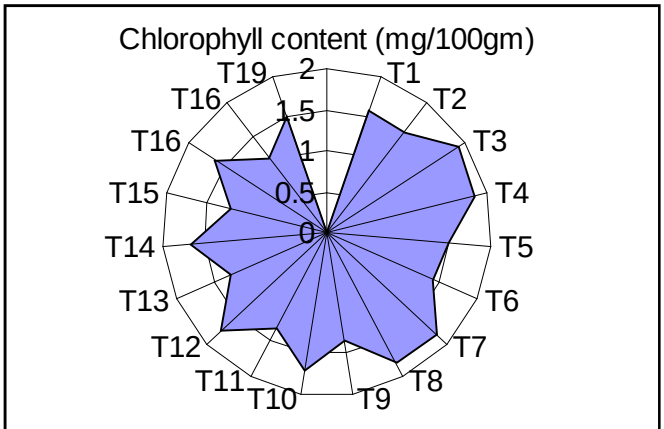

Fig. 2: Chlorophyll Content (mg/100) of chilli of different treatments on 25th day

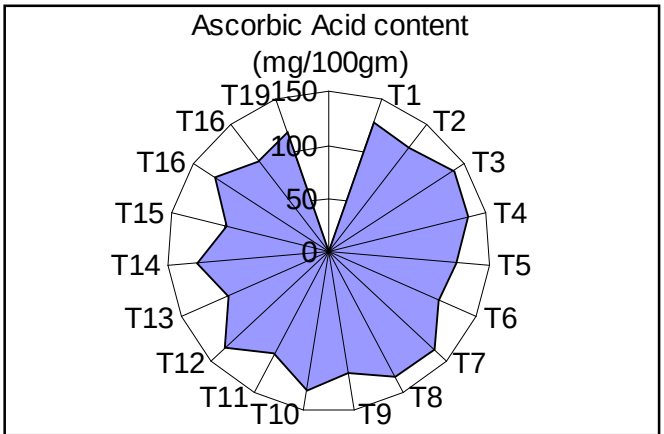

Fig. 3: Ascorbic acid content (mg/100gm) of chilli of different treatments on 25th day

of fruits from 5th day to 25th day. It may be due to the conversion of sugar to ascorbic acid (Chinoy, 1967) and also may be due to loss of moisture from fruits which may lead to specific increase of ascorbic acid content.

Conclusion:

From the above results and discussion it may be concluded that among the post harvest treatment combinations which were used in the present investigation LDPE + Cool + GA3 was most effective and suitable for increasing the shelf life of chilli less effecting the quality in respect to less physiological loss in weight, lowest chlorophyll degradation and highest ascorbic acid content of chilli. If the chemicals are not available the harvested fresh fruits can be stored after wrapping with PVC or LDPE and should be kept within cold condition (6-8°C temperature with 75 % RH).

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