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ROLE OF WAX COATING AND CALCIUM NITRATE WITH HDPE AND LDPE WRAPPING ON SHELF LIFE OF TOMATO

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ABSTRACT

The present investigation on the role of wax coating and calcium nitrate with HDPE & LDPE wrapping on shelf life of Tomato was carried out during 2009-2010.The main emphasis was given to study the changes on physiochemical parameters of fruits and to ascertain the possibility of extending the shelf life of fruits at ambient storage. Faster changes in physiochemical parameters in control fruits (untreated) and slower changes in biochemical constituent was observed in fruits that are wax coated and wrapped with LDPE and HDPE bags. The treatment consisting of wax coated fruits and wrapped with LDPE bags was found to be effective in extending the shelf life of Tomato and suitable for marketability point of view.

KEYWORDS: Role of Wax Coating and Calcium Nitrate with HDPE and LDPE Wrapping on Shelf Life of Tomato

INTRODUCTION

Tomato is one of the most important vegetable grown in India. There is a considerable gap between the gross production and unavailability of tomato due to uncontrolled post harvest losses. The mature green tomato has less visual appeal and nutritive quality when harvested than it has days later after it has ripen. However the degree of quality it attained upon ripen was detected by its condition when harvested and the treatment it received after the harvested an economic and acceptable method of treatment of fruits and vegetables has been developed at CFTRI. Mysore in order to avoid enormous wastage and to improve the marketability of fruits. This involves the application of wax emulsion to the fruits where by the storage life is considerably extended by reducing the respiration and transpiration. Keeping this in view the present investigation was planned.

MATERIALS AND METHOD

The present experiment was carried out at department of Horticulture, Allahabad Agriculture Deemed University, Uttarpradesh during 2009-2010. Two hundred ten fruits were selected for study. The experiment was laid out in Complete Randomised Block design (CRD) with seven treatments viz. T_1- fruits wrapped in LDPE (low density polyethylene) bags, T_2 – Fruits wrapped in HDPE (high density polyethylene) bags, T_3 – Paraffin wax coated fruits wrapped in LDPE bags, T_4 – paraffin wax coated fruits wrapped in HDPE bags, T_5 – calcium nitrate (2.5%) treated fruits wrapped in LDPE bags, T_6 – calcium nitrate (2.5%) treated fruits wrapped in HDPE bags replicated thrice.

Fresh fruits of uniform size, unblemished, free from diseases and pests were harvested from the research plot of Horticulture Department. The selected fruits were cleaned, washed in tap water and allowed to dry under fan. Fruits were dipped for 30 seconds in paraffin wax (58-60%) and in calcium Nitrate (2.5%) for 2 minutes separately. The LDPE bags (Low density polyethylene Bags) and HDPE (High density polyethylene Bags) of size 32.5x 20 cm were selected and stapled by folding the upper side. The treated fruits were then air dried and wrapped in LDPE and HDPE bags. Fruits washed in distilled water were treated as control. The treated and untreated fruits were stored at room temperature. Regular observations were made on various physical, chemical parameters were assess the storage behaviour affected by different treatment at 5 days interval up to 30 days. The weight loss in fruit was calculated by weighing individual fruit and loss in weight was calculated in percentage. The size was determined by vernier callipers and average was calculated. Specific gravity was determined by water displaced method

$$\text{Specific gravity} - \frac{\text{Weight of the fruit (g)}}{\text{Amount of water displaced (ml)}}$$

RESULTS AND DISCUSSIONS

Physiological Loss in Weight

Fruits and vegetables are highly perishable products. They are living entities whose life processes continue even after are removed from the parent plant. They carry out respiration by absorbing oxygen and giving out CO_2. Vegetables contain a high percentage of water. Comparatively high humidity should be maintained in the storage rooms, otherwise the products will lose weight rapidly because of evaporation of the moisture and will eventually wilt and detoriate in quality. The physiological loss in weight of fruits during storage may be attributed to the accumulation of carbon dioxide restricted intake of oxygen from the atmosphere, low level of relative humidity of the air in the storage and the lower rate of respiration. It was observed that (table 1,fig 1) maximum loss in fruit weight was occurred in the control (15.70%) and the minimum with wax coated fruits wrapped in LDPE bags (3.12%) after 5 days of treatment (table 1)An identical trend was noticed at the successive stages of observation i.e. 10,20,25,30 days after the treatment. Significant losses occurred in all the treatments expect with wax coated fruit wrapped in LDPE bags i.e. (8.70%) in 30 days followed by wax coated fruits in HDPE bags (9.47%), where as in control maximum losses (48.10%) i.e. untreated fruit. This might be due to reduced exposure of transpiration and respiration area of the fruit surface compared to fruits kept openly during storage period. The result is corroborated with the findings Nylala and Wain (1998) in tomato and Jawandha*et.al*.(2010) in kinnow**.**

Changes in Diameter

The various treatment tried in the experiment did produce significant changes in succulence and turgidity of tomato fruits. After 30 days the diameter of fruits in different treatments varies from3.34 cm to 4.71 cm. There was significant difference among controlled fruits and that in the treatments in LDPE bags with wax coated. The maximum diameter was recorded in wax coated fruit wrapped in LDPE bags followed by wax coated fruit wrapped in HDPE bags. The minimum diameter was recorded in control (3.42 cm). The reduction in diameter is due to the corresponding decrease in the volume of the fruit Rai and Susanta (1998) and (Singh and Singh, 2005), Dikkiet.al (2007) in *papaya,* Liu*et. al.* (2007) in tomato

Biochemical Constituents

From the table 2 it has been observed that the specific gravity recorded in fresh fruit was 1.24. It was decreased slowly as the storage period progressed. Specific gravity in different treatment varies from 0.98 to 1.15.The maximum specific gravity was observed wax coated fruits with LDPE bags after 30 days of storage. The reduction in specific gravity may be due to loss of weight with non corresponding reduction in volume of the concerned fruits. The result is corroborated with the finding of Jholgiker*et.al* (2007) in annona fruits, Anany *et.al* (2009) in apple Ramin*et.a*l (2008) in lime.

Moderately large amount of fruits spoilage was noticed in all the treatment except in wax coated fruit wrapped in LDPE bags (table 3). Highest percentage of spoilage among different treatment was recorded in untreated fruits (100%). Among the different treatments wax coated fruit wrapped in LDPW bags were found to be best and they were in good marketable condition with no trace of rottenness (6.29%) followed by wax coated fruits wrapped in HDPE bags (10.84%).The rotting of fruit was mainly due to soft rot and fungal attack. However there was no rotting and fungal infection in wax coated and wrapped fruits.

CONCLUSIONS

Changes in biochemical constituent were comparatively faster in untreated fruits of tomato than those dipped in wax and calcium nitrate solution and wrapped in LDPE bags and HDPE bags. As per marketability point of view post harvest dip of fruits with paraffin wax and wrapped in LDPE bags proved to be best among all other treatments.

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APPENDICES

Table 1: Change in Physiological Loss in Weight (%) and Fruit Diameter (cm) of Fruits during Storage at Room Temperature

Treatments	Physiological loss in weight (%)							Change in diameter (cm)						
	Days after harvest							Days after harvest						
Days	5	10	15	20	25	30	Mean	5	10	15	20	25	30	Mean
Control(T0)	15.70	20.10	32.60	40.21	33.40	48.10	13.84	5.59	5.34	5.04	4.69	4.21	3.34	4.71
LDPE bags (T1) Fruits in LDPE bags	11.2	14.75	22.97	30.93	39.09	45.26	27.36	5.69	5.30	4.85	4.30	4.12	4.01	4.71
HDPE bags (T2) Fruits in HDPE bags	13.09	17.27	25.92	30.70	40.08	44.15	27.36	5.67	5.59	5.23	492	4.64	4.32	5.06
Wax coated fruits in LDPE bags (T3)	3.12	4.57	5.23	6.98	7.53	8.73	29.36	5.62	5.52	5.37	5.15	4.94	4.71	5.22
Wax coated fruits in HDPE bags (T4)	4.23	5.94	6.34	7.08	8.91	9.47	6.02	5.19	4.98	4.84	4.64	4.58	4.41	4.77
CaNo3 treated fruits in LDPE bags (T5)	12.22	13.14	15.12	15.89	16.98	20.45	6.99	5.72	5.53	5.21	5.02	4.99	4.19	5.27
CaNo3 treated fruits in HDPE bags (T6)	0.50	11.89	12.34	14.59	15.43	18.34	15.63	5.73	5.15	4.85	4.12	3.89	3.48	5.06

Table 2: Change in Specific Gravity of Fruits during Storage at Room Temperature

Treatments	Specific Gravity						
	Days after Harvest						
Days	5	10	15	20	25	30	Mean
Control (T0)	1.19	1.03	1.02	1.01	1.01	0.98	1.04
LDPE bags (T1) Fruits in LDPE bags	1.17	1.15	1.13	1.10	1.10	1.03	1.11
HDPE bags (T2) Fruits in HDPE bags	1.19	1.17	1.14	1.12	1.11	1.09	1.13
Wax coated fruits in LDPE bags (T3)	1.25	1.24	1.13	1.22	1.20	1.15	1.19
Wax coated fruits in HDPE bags (T4)	1.23	1.20	1.17	1.12	1.02	1.01	1.25
CaNo3 treated fruits in LDPE bags (T5)	1.20	1.17	1.13	1.10	1.05	1.00	1.10
CaNo3 treated fruits in HDPE bags (T6)	1.23	1.20	1.19	1.16	1.11	1.01	1.15

Table 3: Effect of Different Treatments on Spoilage/Rotting during Storage in Room Temperature

Treatments	Percentage of Spoilage
Control	45.62
LDPE bags(T1)	100
HDPE bags (T2)	69.73
Wax coated in LDPE bags (T3)	64.92
Wax coated in HDPE bags (T4)	6.29
CaNo3 in LDPE bags (T5)	10.84
CaNo3in HDPE bags (T6)	39.54

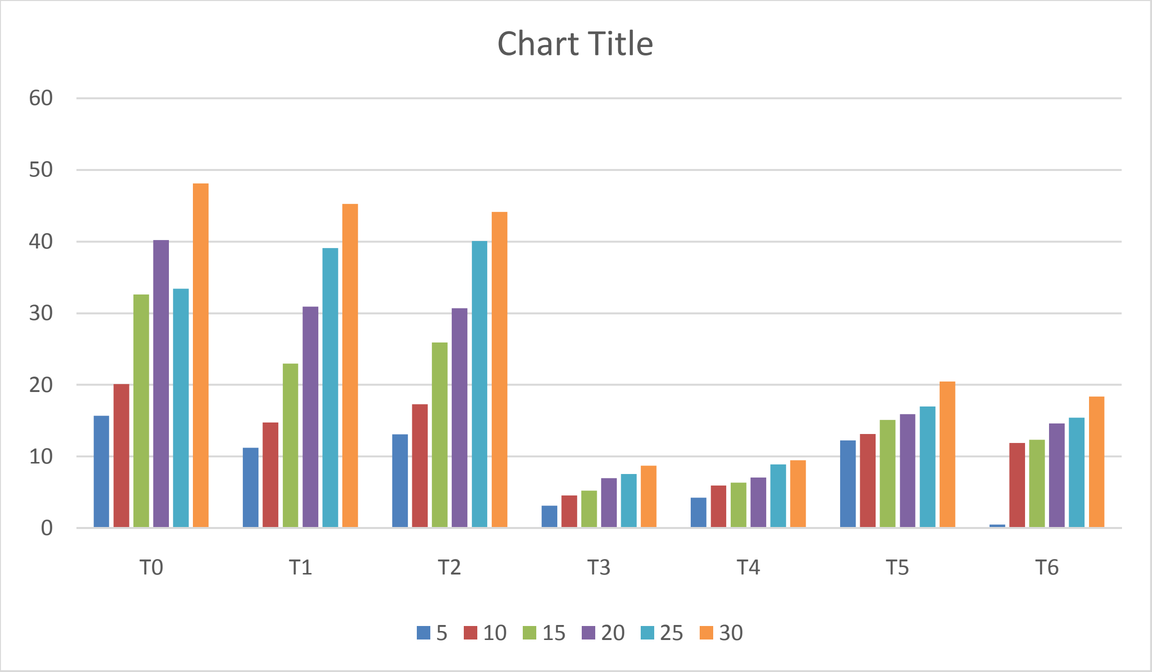

Figure 1: Change in Physiological Loss in Weight (%) during Storage at Room Temperature