www.hortflorajournal.com ICV: 4.79

HortFlora Research Spectrum, 2(4): 356-359 (Oct.-Dec. 2013) ISSN : 2250-2823

RESPONSE OF DIFFERENT POST HARVEST TREATMENTS ON PHYSIOLOGICAL LOSS IN WEIGHT AND CHANGES IN COLOUR OF TOMATO (*Lycopersicon esculentum* MILL.)

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ABSTRACT: An experiment was conducted in the laboratory of the Department of CIHAB, Palli Sikshya Bhavana (Institute of Agriculture), Visva-Bharati, Sriniketan (WB) on storage life of tomato fruits with different post harvest treatments. The experiment was laid out in RBD with nine treatments each comprising of three replications and ten fruits per replication. The results revealed that ripening was initially delayed by MAP, NAA and NAA+MAP treatments. Among all the chemicals the performance of GA_3, was better than NAA in reducing physiological loss in weight of tomato. The results on the colour development of the fruit in storage indicated that the percentage colour development varied significantly in all the treatments of tomato fruits up to 6th day of storage.

Keywords: *Tomato, PGRs, packaging material, PLW, colour development.*

Tomato (*Lycopersicon esculentum* Mill), belonging to the family *Solanaceae,* is one of the popular and widely grown vegetable in the world. The post harvest losses in tomato are high and can go up to 60 per cent (Shanmuga-sundaram, 7). The factors that affect the post harvest life of tomato are improper handling, pathogen attack, lack of proper packaging, transports and storage facilities. Loss of quality includes the physiological and chemical changes associated with ripening resulting in changes in appearance, taste, texture and development of off flavours. Heavy post harvest losses also reduce the export potentiality of tomato.

The storage life of tomato can be extended by waxing, control of ripening, proper packaging, transportation, storage, irradiation and pre / post harvest application of certain chemicals. Modified atmosphere packaging (MAP) is also used in prolonging the shelf-life of fresh fruits and vegetables. The term MAP refers to the storage of perishable commodities in plastic films that restricts the transmission of respired gases. As a result of which CO_2 is accumulated and O_2 is depleted around the fruits or vegetables, which may extend the storage life (Kader *et al.,* 1). Polyethylene is used for shrink film packaging. Their permeability to gasses (including water vapour) varies with the type of material from which they are made, temperature, in some cases humidity, the accumulation and concentration of the gases and thickness of the packaging materials (Thompson, 8).

Keeping the above points in view the present experiment was carried out with the post harvest application of some chemicals along with different packaging techniques to increase the shelf-life of tomato on special reference to physiological loss in weight and changes in fruit colour during storage.

Received : 13.08.2013 *Accepted : 18.10.2013*

MATERIALS AND METHODS

The experiment was carried out in the laboratory of the Department of Crop Improvement, Horticulture & Agricultural Botany, Palli Sikshya Bhavana (*Institute of Agriculture*), Sriniketan, Visva-Bharati with nine treatments and three replications such as T_0 – Control, T_1-NAA (50ppm), T_2-GA_3(50ppm),T_3-Modified Atmosphere Packaging (MAP), T_4- Perforated Modified Atmosphere Packaging (PMAP), T_5-NAA (50ppm) + MAP, T_6-NAA (50ppm)+ PMAP, T_7-GA_3 (50ppm)+MAP and T_8-GA_3 (50ppm)+PMAP. Hybrid tomato fruits, free from any visible injuries and pink to yellow-red in colour were used for this experiment. The fruits were purchased from Bolpur local market of West Bengal. After bringing the fruits to laboratory, they were sorted out, wiped free of visible dust with moist cotton wool and air-dried in shade for half an hour.

Required quantity of NAA and GA_3 were weighed with digital electronic balance dissolved in little amount of ethyl alcohol (90 per cent) and the volume was made up to 3 litres with distilled water. Tomatoes were dipped and kept submerged in the respective solution for 15 minutes. Thereafter, tomatoes were taken out and surface was dried with clean tissue paper. Polyethylene packets of 200 gauge (15 mm) and 1kg capacity were used as modified atmosphere packaging material. A group of packets were perforated (3% of the total area) and used as perforated MAP. The mouth of each packet was tied after filling with treated fruits with rubber band. The treated fruits were then arranged on a clean table in well-ventilated room under ambient condition. The data obtained during the period of investigations were analyzed by the analysis of variance method (Panse and Sukhatme, 6) and the significance of different source of variations was tested by error mean square by Fisher's 'F' Test of probability levels at 0.5 per cent.

RESULTS AND DISCUSSION

The data pertaining to the physiological loss in weight (PLW) as presented in Table 1 revealed that the various treatments exhibited significant effect on PLW of tomato fruits in storage. Treatment with MAP reduced the PLW significantly almost throughout the experiment i.e. up to 14th day. Maximum weight loss was recorded in the control fruits throughout the storage period. The performance of PMAP treatment was not as good as MAP treatment in the beginning. However with increase in the duration of storage, its performance was relatively better. Treatment with GA_3+PMAP showed promising results in moisture retention towards the last part of the storage that fall between 12-20 days. More over the performance of GA_3 was found better than NAA in reducing PLW of fruits. Present finding agrees with the results of Kader *et al.* (1), Thompson (8), Kumar *et al.* (4), Noor *et al.* (5) and Kumar *et al.* (3).

The data on the colour development of fruits in storage (Table 2) revealed that the percentage colour development varied significantly in all the treatments of tomato fruits up to 6th day of storage. After 2 days of storage minimum colour development was noticed in tomatoes kept under MAP, which was statistically at par with NAA+MAP and NAA alone. Maximum colour development was noted in GA_3+PMAP followed by control. Similar trend in colour development was observed after 4 days of storage. After 6 days of storage maximum colour development was noted in GA_3+PMAP fruits. By 8th day in storage, almost all the fruits attained nearly cent per cent red colour irrespective of treatments. The results are inconsonance with the views of Kumar and Kumar (2) as reported in mango.

Conclusion

It is evident from the finding of the present investigation that the various treatments had significant effect on PLW of tomato fruits in

Table 1: Response of different postharvest treatments on physiological loss in weight of tomato during storage.

Treatments	Physiological loss in weight									
	Day in storage									
	2	4	6	8	10	12	14	16	18	20
Control	2.6(9.0)	2.6(9.1)	2.6(8.1)	2.7(9.1)	3.1(9.6)	3.6(34.6)	3.7(10.6)	44(11.8)	4.5(12.0)	4.5(12.6)
NAA 50 ppm	1.5(6.8)	1.6(6.8)	1.6(6.8)	1.6(6.8)	1.7(6.9)	1.7(6.9)	1.7(7.0)	1.8(7.1)	1.8(6.9)	1.8(6.0)
GA_3 50 ppm	0.9(5.0)	0.9(5.0)	0.9(5.0)	0.9(5.0)	1(4.9)	1(5.1)	1(5.1)	1.1(5.4)	—	—
MAP	0.2(2.2)	0.2(2.20	0.2(2.3)	0.2(2.3)	0.2(2.4)	0.7(4.3)	1(5.1)		—	—
Perforated MAP (3%)	0.8(4.9)	0.9(4.7)	1(5.4)	1(5.2)	1(5.0)	1(5.0)	1 (5.3)	1.1(5.4)	—	—
NAA 50 ppm+MAP	0.8(7.3)	1.1(7.2)	1.3(7.8)	1.6(8.1)	1.9(7.8)	2.0(7.9)	2.0 (7.9)	2.0(7.9)	—	—
NAA 50 ppm+MAP	0.4(3.2)	0.4(3.2)	0.4(3.1)	0.4(3.1)	0.4(3.1)	0.4(3.1)	0.4(3.1)	0.4(3.3)	0.4(3.4)	—
GA_3 50ppm+MAP	0.8(4.8)	0.8(4.8)	0.8(4.8)	0.8(4.5)	0.8(4.6)	0.8(4.2)	0.8(4.5)	0.8(4.5)	0.8(4.5)	—
GA_3 50ppm+MAP	0.8(4.2)	0.8(4.0)	0.9(4.3)	0.9(4.3)	0.9(4.4)	0.3(2.5)	0.1(2.5)	0.1(1.6)	0.1(1.5)	0.1(1.5)
CD (P=0.05)	2.3	2.8	2.8	1.0	1.3	1.4	1.1	1.0	1.0	1.9

(Angular transformed values are presented in parenthesis)

Table 2: Response of different postharvest treatments on changes in colour of tomato during storage.

Treatments	Percentage of colour development				
	Days in storage				
	2	4	6	8	10-12
Control	95.7(78.1)	96.1(78.7)	97.3(80.5)	99.9(88.2)	All Fruits Developed 100 % red Colour
NAA 50 ppm	89.6(71.3)	93.1(74.7)	98.1(82.0)	100(89.2)	
GA3 50 ppm	92.0(73.8)	93.7(75.5)	97.5(80.7)	99.9(88.8)	
MAP	86.3(68.3)	89.5(71.8)	98.3(82.3)	100(89.2)	
Perforated MAP (3%)	94.0(76.0)	96.1(78.6)	98.6(83.2)	99.9(88.7)	
NAA 50 ppm+MAP	88.9(70.3)	93.5(75.2)	98.2(82.3)	99.9(88.8)	
NAA 50 ppm+MAP	93.6(75.9)	95.1(77.3)	98.2(82.4)	99.9(88.7)	
GA_3 50 ppm+MAP	94.2(75.8)	94.4(77.0)	98.2(82.4)	99.9(89.4)	
GA_3 50 ppm+MAP	97.8(81.5)	78.9(81.5)	99(84.1)	100(89.3)	
CD (P=0.05)	5.0	3.1	1.5	NS	

(Angular transferred values are presented in parenthesis)

storage. Treatment with MAP reduced PLW significantly up to 14 days Fruits treated with GA_3 showed better performance than NAA treated fruits. In general, the fruits treated with GA_3+PMAP expressed promising effect.

It is also clear from the results that the percentage of colour development varied significantly in tomato fruits under different treatment conditions. Treatments with MAP NAA and NAA+MAP delayed the colour development up to 6 days in storage. All most all the fruits showed cent percent colour development by the 8th day in storage irrespective of treatment.

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