To Study the Effect of Aeration on the Post Harvest Quality of Tomatoes

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Abstract- *Aeration has an important role in maintaining the postharvest quality. It is one of the most important factor that effect eating quality like texture, flavor and color. Tomatoes were packed in LDPE low density polyethylene bags with different perforations of 2, 4 & 6 holes. The effect of aeration on tomatoes was studied by noting down following parameters physiological weight loss, color development and palatability by using LDPE film with different perforations (2,4,6 holes) as compared to control samples without packaging. So the aim of the experiments is to study the effect of aeration on the loss in weight, palatability and color development of tomatoes.*

Keywords- Aeration, texture, palatability, physiological weight loss and colour development.

I. INTRODUCTION

Tomato (Lycopersicon esculentum L.) is a climacteric fruit, having economic importance (Kinet and Peet 1997). Being a climacteric and perishable vegetable, tomatoes have a very short life span usually 2-3 weeks. It is one of the most popular vegetable in Indian subcontinent and is widely used in salad and as well as for culinary purposes. Red ripe tomatoes are used as flavouring agent in the preparation of various home made food dishes to increase the palatability. It contains a significant amount of vitamin A and C. Factors affecting eating quality are texture, flavour, and colour (Davies and Hobson, 1987). The major technical problems in postharvest handling and distribution of fresh fruits and vegetables are associated with their perishability as living organisms. They are subject to various biochemical changes, which lower their quality and finally make them unacceptable on a commercial basis. Such deterioration may develop as a result of excessive water losses due to evapo-transpiration; the normal respiration cycles resulting in senescence; physiological disorders such as chilling injury in tropical fruits and fruit rot due to the attack of microbes (Farooqi 1985).

The rate at which air is passed over fruit samples may be a critical factor determining their respiration rates. In some cases the accumulation of CO2 is not very great at air flow rates which are inhibitory. Claypool et al. (1985) reported the effects of air flow treatments on the respiration of a number of deciduous fruits. (Batu and Thompson (1987) suggested that an inhibitory effect of CO2 which accumulated under slow ventilation was responsible for slower respiration (Batu and Thompson, 1987). The effects of ventilation on respiration and ripening of tomato fruits were studied by Badshah et al. (1997). The tomato fruit is known to exhibit a respiration climacteric as it ripens. Packaging can markedly extend the storage life of many fruits and vegetables through the inhibition of physiological deterioration and reducing weight loss (Shetty et al., 1989 and Risseet al., 1985). Packaging can create modified gas atmospheres around the product which slows down the respiratory activity of tomato. Sealing of tomatoes in polyethylene film packages extended the length of time until ripening (Hobson, 1982). In the present study a marked effect of ventilation on the climacteric was found. The aim of this study is to know the effect of aeration on weight, firmness and color development of tomatoes.

II. MATERIAL AND METHODS

The freshly harvested green tomatoes were procured from the local market of Amritsar. Tomatoes were washed, air dried and dipped in the aqueous solution of calcium hypochlorite for 10 minutes. The tomatoes were again air dried and packed in perforated LDPE bags (100 gauge). Perforations on LDPE bags were made with hot metal rod. The tomatoes were packed in LDPE bags with 2 holes, 4holes and 6 holes respectively, control sample were kept without packing. The packed tomatoes were kept in laboratory (Temperature 30oC and relative humidity 65%). The observations on physiological loss in weight, color development and palatability were noted. Before keeping the tomatoes at relative conditions fresh weight of tomatoes were taken.

III. RESULT AND DISCUSSION

Physiological loss in weight

The physiological loss in weight was noted daily. As is evident from Table 1 that the loss of weight was minimum in P2 (2 holes) bag (1.97%), closely followed by P3 (4 holes) (3.86%) and P4 (6 holes) (3.83%) polythene bags. The highest

loss in weight of tomatoes was observed in control (8.79%). The loss in weight increased as the no. of holes increased. Fruits loss weight during storage basically by losing water vapour. Water loss characteristic is important since high loss levels can affect visual appearance. According to Khader (1992), a fresh weight loss of 5% can affect visual appearance. Weight loss in wrapped tomatoes decreased significantly and fruits were more firm than non-wrapped tomatoes (Shetty et al. 1989).

Table 1
Weight loss of tomatoes during storage under different packaging

Storage period (days)	P1	P2	P3	P4
1	0	0	0	0
3	1.96	0.5	0.8	0.29
5	4.1	0.82	0.94	0.42
7	5.64	1.28	1.91	1.93
9	6.93	1.62	2.14	2.62
11	8.79	1.97	3.83	3.83
13	10.78	2.45	4.51	4.62
15	13.54	2.89	5.68	5.94

P1: Sample 1 control without packaging; P2: Sample 2 packed in 2 holes polythene bag;
P3: Sample 3 packed in 4 holes polythene bag; P4: Sample 4 packed in 6 holes polythene bag.

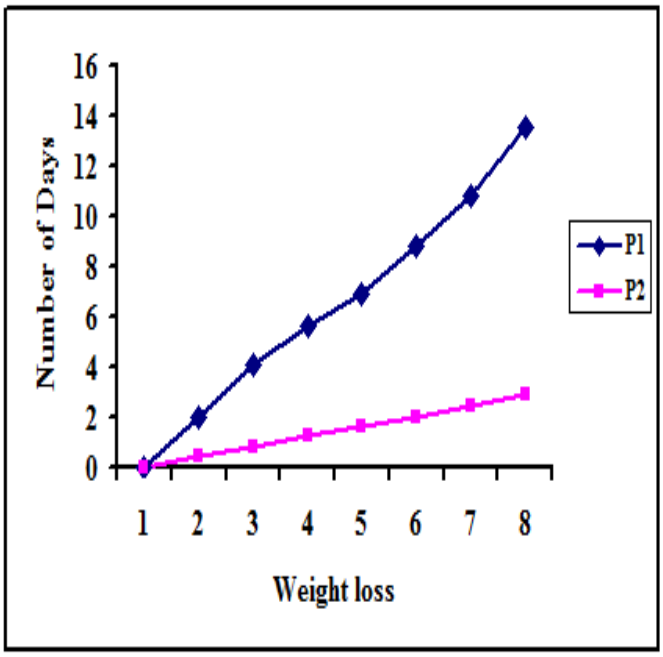

Fig.1. Weight loss of tomatoes P1 and P2

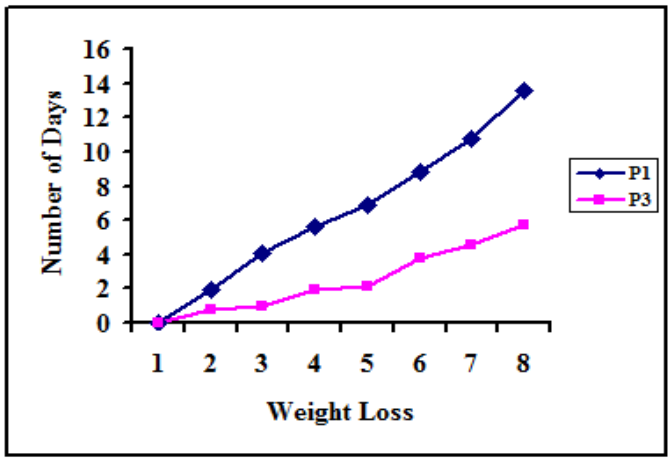

Fig.2. Weight loss of tomatoes P1 and P3

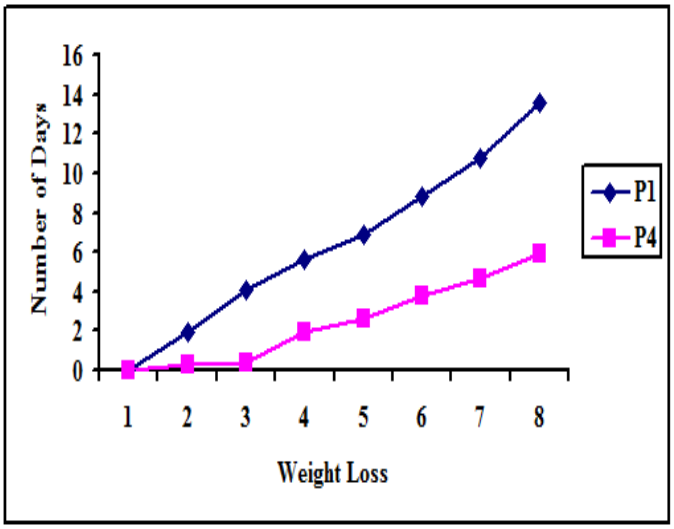

Fig.3. Weight loss of tomatoes P1 and P4

P1: Sample 1 control without packaging; P2: Sample 2 packed in 2 holes polythene bag;
P3: Sample 3 packed in 4 holes polythene bag; P4: Sample 4 packed in 6 holes polythene bag.

Color development in tomatoes

The results of visual color development on tomatoes as a result of packaging in different LDPE bags with 2 holes, 4 holes and 6 holes respectively, control sample were kept without packing are presented in Table 2. Initially the tomatoes were greenish, but subsequently they turned yellow, yellowish red, red and finally deep red during storage. The changes in color was much fast in control sample without packing followed by P4 (6 holes), P3 (4 holes) and P2 (2 holes). As the ripening proceeded, the colour of fruits changed from green to red. At this stage the chlorophyll pigment starts to deteriorate and beta carotene production was initialized (Chiesa et al. 1998). As the ripening stage advances from pink

to pink red the lycopene production has started producing red colour and masking the yellow colour of beta carotene (Salunkhe and Desai, 1984).

Table 2
Color development in tomatoes during storage

Samples	1st day	3rd day	5th day	7th day	9th day	11th day	13th day	15th day
P1	G	GY	YG	Y	YR	R	DR	DR
P2	G	G	G	GY	YG	Y	YR	R
P3	G	G	GY	YG	Y	YR	YR	R
P4	G	G	GY	YG	YR	YR	R	DR

G: Green; GY: Greenish Yellow; YG: Yellowish Green; YR: Yellowish Red; R: Red; DR: Deep Red

Palatability

Palatability rating of tomatoes decreased with the length of storage. Increase in PLW, incidence of fungal infection, over maturity and decline in acidity level may be contributing factors. The tomatoes stored in LDPE bags P4 showed very good palatability after 20 days of storage. It was followed by P2 and P3 whose palatability rating was good as it is evident from Table 3. Palatability of control sample was very poor as it was spoiled by fungal growth. The results well correlated with the results of Naik et al. (1993).

Table 3
Palatability rating of tomatoes during storage

Samples	1st day	3rd day	5th day	7th day	9th day	11th day	13th day	15th day
P1	P	FG	G	VG	G	P	VP	VP
P2	P	P	FG	FG	FG	G	G	G
P3	P	P	FG	FG	G	G	VG	G
P4	P	FG	FG	G	G	VG	VG	G

P: Poor; G: Good; VG: Very Good; FG: fairly Good; VP: Very Poor

The study concluded that polyethylene bag is comparatively better packaging material to retain good quality attributes in tomatoes during storage. Moreover tomatoes wrapped in polyethylene bags have better quality in terms of weight loss, colour and palatability as compared to the control sample.

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