POSTHARVEST TREATMENTS FOR SHELF LIFE IMPROVEMENT IN PEAR (*Pyrus communis* L.)

PRE DISSERTATION REPORT

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CERTIFICATE

This is to certify that synopsis titled **"Postharvest treatments for shelf life improvement in pear (*Pyrus communis* L.)"** submitted in partial fulfilment of the requirement for the award of degree of **Master of Science** in the discipline of **Horticulture,** is a research work carried out by **Prikshit Kaith (Registration No. 11719465)** under my supervision and that no part of this synopsis has been submitted for any other degree or diploma.

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INTRODUCTION

Pear (*Pyrus communis* L.) is a tempertae fruit having good taste and flavour. Pear is largely grown as a fresh fruit in india. The pear fruit crop needs very less care due to its hardy nature. Most of pear species are native to the Northern world. Vavilov proposed three main centers of pear cultivation. First center is Chinese centre, second center is central Asiatic center and third one is eastern centre. The predominant cultivars required high chilling hours and in regions of Himachal Pradesh, Jammu and Kashmir and Uttarakhand they are grown. Whereas low chilling cultivars are quite successful in areas of northern plateaus. Semi-delicate pear cultivar named as 'Punjab Beauty' in light of its unbeaten organoleptic characteristics is very prevalent in Punjab district. China is leads in pear production whereas India occupies 2nd place in the world in terms of area and production. The total area under pear cultivation in India is about 48,000 hectares. In Punjab region, pear cultivation is successfully practiced in the areas of Tarn-Tarn, Amritsar, Ludhiana, Patiala and Jalandhar. The fruit of pear is very juicy in nature and is a rich source of protein. The fruit can be used for the preparation of different products like preserve, pear jam, pear juice etc. Due to the high juice content present in the fruit, pear is liable to more post harvest losses as compared to other fruits which contain less moisture content. Studies have been carried out for minimizing the post harvest losses with the use of different kinds of packaging materials and these studies have yielded positive results. Since pear is a climacteric fruit, any means that can check the respiration of the harvested fruits can cause an increment in the shelf life of the fruit, application of coatings on freshly harvested fruits have been tried with different concentrations. The present investigation entitled **"Postharvest treatments for shelf life improvement in pear (*Pyrus communis* L.)"** will be initiated in the month of june-july at laboratory of School of Agriculture, Lovely Professional University, Punjab with following objectives:

1. To study the effect of different coatings on the shelf-life of pear fruit.
2. To evaluate the effect of different coatings on physio-chemical characteristics of pear fruit.
3. To determine the sensory quality of pear fruit.

PROBLEMS BACKGROUND

1. Lack of storage facilities.
2. Storage life of pear fruit is too short
3. Inadequate processing and industry facilities
4. Contamination by the pesticide residue

REVIEW OF LITERATURE

Mani *et al*. (2017) evaluate the effect of edible coatings on the quality and post harvest physiology of ber (*Zizyphus mauritiana* Lamk.) under ambient storage conditions. They reported that coating of ber fruits with Aloe vera gel (2%) significantly retained the quality of ber fruit over a storage period of over 15 days. The fruits also showed minimum physiological weight loss, minimum shrinkage percentage, maximum colour retention, lesser loss in acid content with respect to uncoated ones.

Kou *et al*. (2017) reported that application of edible coatings of $CaCl_2$ (2%) significantly delayed senescence in *Zizyphus jujube* Miller cv. Dongzao during storage. $CaCl_2$ treatment not only maintained the storage quality of the fruit but also restrained the production and accumulation of malondialdehyde in jujube.

Aloe Vera is a plant made up of numerous perplexing fixings including polysaccharides, glycoproteins, phenolic mixes, salicylic corrosive, lignins, hormones, amino acids, vitamins, saponins and proteins which give Aloe Vera its numerous advantageous properties. Aloe vera gel is utilized as an antibacterial, antifungal and calming gel. The fundamental utilization of Aloe vera gel is in the corrective business including treatment of consumes and scars and wound mending (Serrano et al., 2006). As of late, the utilization of Aloe Vera gel as a palatable covering has been accounted for to drag out the timeframe of realistic usability and postpone senescence in sweet cherry and table grapes (Romero et al., 2006; Serrano et al., 2006). Aloe Vera. gel based palatable coatings have been appeared to anticipate dampness misfortune and softening lessening, control breath and senescence rate, postpone oxidative searing and diminish microorganism multiplication in organic products, for example, sweet fruits, table grapes, nectarines and papaya (Ahmad et al., 2009; Valverde et al., 2005; Martinez-Romero et al., 2006; Marpudi et al., 2011).

Asghari *et al.* (2013) described the Impacts of palatable Coating of Aloe vera gel on the capacity of grapes organic products .The Harvested bunches of Gizel Uzum in Iran, were dealt with by Aloe Vera gel at two (1: 3), (1: 4) and salicylic corrosive at three (0, 1 and 2 mmolL-1) fixations for 45 days and after that at 0±0.5 ˚C 90 days after first treatment in same temperature to evaluate as their timeframe of realistic usability. The most reduced PPO was seen in blend of treatment 2 mmolL-1salicylic corrosive and 33% Aloe Vera gel.

In an another study, Asghari *et al*. (2013) observed that mix treatment with nitric oxide and Aloe vera gel was powerful than every treatment alone in holding organic product quality characteristics. Nitric oxide when connected before treatment with Aloe vera gel adequately saved natural product attractiveness, add up to phenolics content, vitamin C, catalase chemical action and decreased rot list and weight reduction. The outcomes showed that Simple Kumar and Tripti Bhatnagar the utilization of nitric oxide and Aloe vera gel might be presented as a viable and effective system in postharvest innovation of the Siahe mashhad sweet cherry natural product.

Marpudi et al. (2011) concluded that in the event of Papaya, the Aloe vera covered natural products survived the capacity time of 15 days at low temperature while all the uncoated controls rotted inside 10 days. Attractiveness was likewise observed to be better for covered natural products.

Martinez-Romero *et al.* (2006) concluded that Aloe vera covering was powerful in deferring weight reduction, the rate being twofold in charge than in Aloe-treated sweet cherry following 16 days of cold storage at 1°C in addition to 1 day at 20°C.

Chauhan *et al.* (2011) determined that the Aloe Vera 6 gel coating decrease the respiration rate furthermore, the catalyst polyphenol oxidase and peroxidase in apple cuts, while there is a bit of apple polyphenol oxidase and peroxidase compound action isn't shrouded in many modes.

Adetunji *et al.* (2012) showed that Aloe Vera gel, apply as an edible coating in pineapple fruit, has positive effects in retarding the ripening process. Aloe Vera treatment notably reduced the firmness losses (>50%) at some stage in ambient conditions compared with control fruits.

Ergun and Satici (2012) studied the impacts of Aloe Vera gel (0, 1, 5 and 10% w/v) covering on green-hued "Granny Smith" and red-hued "Red Chief" apples those were put away

at 2°C for a half year. Aloe Vera gel medications significantly smothered the expansion in weight reduction for Granny Smith'apples yet did not influence for _Red Chief'apples.

Benitez *et al*. (2013) showed that Aloe Vera gel at four unique focuses (0, 1, 5, 15% (v/v)) in keeping up the nature of crisp cut kiwifruit. The kiwifruit cuts were bundled under latent climate and put away at 4 ± 1°C. Quality characteristics, for example, shading and surface (solidness and surface profile investigation), titrable acridity, add up to solvent solids, gelatin content, microbial load and tactile parameters were assess accompanied by capacity.

Marpudi *et al.* (2013) study has verified the efficiency of Aloe gel obtained from Aloe Vera, is less expensive and eco-friendly primary packing material for sub-tropical and tropical fruits.

Martinez-Romero *et al.* (2013) concluded that a few postharvest medicines were performed on pomegranate arils preceding capacity in inflexible polypropylene boxes for 12 days at 8 3°C: water (control), ascorbic + citrus extracts (at 0.5 or 1%), Aloe Vera gel (at 50 or 100%), half Aloe Vera gel + 0.5% ascorbic and 0.5% citrus extract, and 100% Aloe Vera gel + 1% ascorbic and 1% citrus extract.

Hassanpour (2015) assay the antioxidant capacity, total phenol, total anthocyanin, antioxidant enzyme actions and postharvest inferiority of Aloe Vera gel coated raspberry fruits (Rubus spp.) storaging at 4°C after 8 days, comparative to a control group.

Olivas and Barbosa-Canovas (2005) Eatable coatings are additionally utilized as bearers of dynamic fixings, for example, hostile to cooking, antimicrobial, and surface upgrading mixes, and in addition flavors and supplements, to enhance the quality, wellbeing, and wholesome estimation of new cut organic products.

Jose M. Garcıa *et. al* (1996) studied the effect of $CaCl_2$ covering in strawberry at 25 or 45 °C.The organic products were put away at 1°C for 1 day. Their maturing quality parameters were then checked amid a time span of usability of 3 days at 18 °C. at the point when the organic products plunged in 1% $CaCl_2$ arrangement was the best treatment for expanding the calcium substance of the natural products, for controlling their postharvest rot, and dissolvable solids content and for keeping up their solidness. The medicines did not influence the sensorial nature of organic products.

Xiao-Hong Kou(2013) observed about the different coating treatments like $CaCl_2$, pullulan and chitosan on antioxidant action of “Huang guan” pears (Pyrus pyrifolia Nakai) . and

results shows that in all the coatings, chitosan gives us better results then calcium chloride and phullulanall coatings but overall both coatings are also extends their shelf-life, keep its quality and manage the antioxidant activity in pear.

Proposed Reasearch objectives

1. To determined the impact of different coatings on pear.
2. To observed the impact of coatings on the quality of pear.

Proposed Research Methodology

The experiment is planned to be conducted in the Post Graduate Laboratory, Department of Horticulture, School of Agriculture, Lovely Professional University, Phagwara, India.

Experimental Details

Location : Agriculture lab, School of Agriculture, LPU

Treatment Details

Sr.No	Treatments	Symbol	Concentration
1.	Chitosan	T_1	1%
2.	$CaCl_2$	T_2	2%
3.	Aloe Vera	T_3	50%
4.	Bee Wax	T_4	12%
5.	Pectin	T_5	3%
6.	Guar Gum	T_6	6%
7.	Petroleum Jelly	T_7	-
8.	Control	T_8	-

Glycerol (0.7%) will be added as plasticizer to each solution.

Total Treatment Combinations : 8
No. of replications : 2
No. of fruits in one replication : 10
Design : CRD
Observation interval : 2 days

Fruit Samples

Fruit samples of an identified cultivar of pear will be procured from Punjab Agricultural University, Ludhiana for the purpose of the experiment. The fruits will be treated with the different formulations of coatings for the purpose of enhancement of shelf life of pear.

Coating application

The natural products will be washed with refined water took after by a wash of Sodium hypochlorite (200 ppm for 10 min) for disinfection. The organic products will be partitioned into 7 sets with 10 natural products in each set and will be duplicated 3 times. Coatings were connected to the organic product surface by plunging strategy, with plunging time of 2 min took after by drying. Natural products treated with just refined water were considered as control tests. The covered pears were pressed in cardboard boxes and put away at surrounding temperature.

Data recording

Data will be recorded as per the treatment details after two days interval. All analyses were carried out at starting of experiment (0 day) and after that at regular interval of 4 days till the fruits became unfit for consumption due to decay or infection

OBSERVATIONS TO BE RECORDED

a. Physical observations

- *Fruit weight*- The samples of pear fruit were taken and weighted on electric weight machine and fruit weight was recoded in gm
- *Fruit length*- The fruit length and bredth is observed in mm with the help of oDigital Vernier caliper.

- *Fruit width*- The fruit length and bredth is observed in mm with the help of of Digital Vernier caliper.

- *Fruit Volume (cc):*- The volume of the sample is measured by using the water displacement method. To measure volume, beaker is filled with water and then the sample is immersed in water. The amount of water increased from initial level is equal to volume of that sample.

One millimetre (1 ml) of water has volume of one cubic centimeter (1 cm^3)

Volume of fruit = Final water level – Initial water level

- *Physiological Loss in Weight (%)*:- The fruit weight is measured with the help of weighing machine. The loss in weight was measured by using the following methodology:

$$\text{Weight loss percentage} = \frac{\text{initial weight} - \text{final weight}}{\text{Initial weight}} \times 100$$

- *Fruit density:* - density of the fruit volume is measured by weight of the sample over volume of the sample. It can be considered as

$$\text{Density} = \frac{\text{Weight of the sample}}{\text{Volume of the sample}}$$

- *Shelf life of pear*: - The shelf life of fruit is after harvesting the fruit to remain fresh or in edible form at some period of time without losing their market value. When the fruit starts decaying or any other microbial and fungal growth is their then that fruit is unfit to consumed it.and when some fowl smells produced by the fruit then that fruit sample should

be discarded. The time interval between after harvesting the fruit to starts spoilage/discarding the fruit

is the shelf life of fruit is measured in our experiment.

b. Bio-Chemical parameters :-

- Total Soluble Solids (^{o}Brix) :- TSS of fruit is measured by Refractometer
- pH :- pH was measured by pH meter, indicating its acidity or alkalinity expressed as pH.
- Vitamin C
- Sugars (Reducing and non-reducing)
- Acidity
- Anti-oxidants

c. Sensory evaluation :-

Organoleptic rating

The organoleptic evaluation of pear fruits was judged by visual method and on the basis of palatability, scored from 1 to 9 on Hedonic Rating Test Scale

$$\text{Acceptance (\%)} = \frac{\text{Number of fruits per each degree of liking x 100}}{\text{Total number of fruit in each treatment}}$$

Expected Research Outcomes

The expected research outcome is the the shelf life of the fruit should be increased with the help of these coatings at the room temperature (25^{o}c-30^{o}c) or in cooled storage (4^{0}c) without losing their chemical properties.

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