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EFFICACY OF ALOE VERA GEL AND CORN STARCH ON THE POSTHARVEST QUALITY OF TOMATO (*Solanum lycopersicum* L.) FRUITS DURING STORAGE

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DECLARATION

KAKAIRE ASHIRAF hereby declare that this research report is my own work portraying the various activities I implemented and how I implemented them in the course of the research undertaking.

SIGN..... **DATE**10th/10/2023.....

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APPROVAL

This research report has been approved by the academic supervisor

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DEDICATION

I dedicate this research report to my parents, Mr. Menya Muhammad and Mrs. Nabirye Sirina and to my elder brother Dr. Menya Muzafar who have worked hard to support me through my academics. I am so delighted and grateful for all the work well done.

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LIST OF ABBREVIATIONS

ALVG	Aloevera gel
CS	Corn starch
MCP	Methylcyclopropene
T.A	Titratable acidity
T.S.S	Total Soluble Solids
R.I	Ripening index
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Statistics
Ml	Milliliter
FW	Fresh weight
USA	United States of America
O.D	Optical Density
DMRT	Duncan Multiple Range Test

ABSTRACT

Tomato (*Solanum lycopersicum* L.**)** is an important crop that is consumed by majority of the people globally. However the postharvest quality deteriorates during storage coupled with the reduced shelf life which ultimately leads to significant losses after harvest. This study attempted to find out the efficacy of the aloevera gel (ALVG) and corn starch (CS) coating in extending the shelf life and maintenance of tomato fruit quality. The fruits were coated with 100% ALV gel and 5% cornstarch edible coatings while the untreated control was dipped in distilled water containing glycerol and stored under ambient conditions. The fruit quality attributes such as the fruit colour index, weight loss, decay incidence, pH, titratable acidity (TA), Total soluble solids (TSS), Ripening index (RI), ascorbic acid content, Lycopene, and Chlorophyll degradation (Chl a and b) were assessed for a period of 16 d. The postharvest fruit ripening as indicated by colour change and RI was delayed by both ALVG and CS compared to the untreated control; The CS had a profound effect in delaying fruit colour change during the storage period. Additionally, both ALV and CS had a lower disease incidence and reduced weight loss. The edible coatings maintained the tomato fruit pH at 4 and 8 d after treatment. Meanwhile, the ALV gel and CS observed a significantly higher TA compared to the untreated control. The CS maintained the highest TSS during storage followed by the ALV gel. Surprisingly, the control fruit showed the highest ascorbic acid content in the first 12 d of storage but showed a sharp decline 16 d after storage. The ALV gel and CS delayed chlorophyll degradation by maintaining the highest levels of Chl a and b. The control observed the highest lycopene concentrations compared to other treatments. The findings of this study showed that CS and ALV gel extended the shelf life of tomato fruit while maintaining the internal fruit quality and have a great potential to be used as postharvest treatments. Generally, the CS was found to be more effective than ALV is this study.

CHAPTER ONE

1.0 INTRODUCTION

Background of the study

Tomato (*Solanum lycopersicum* L.) is one of the most studied plants that belongs to the Solanaceae family (Villanueva, 2018). Tomato is cultivated in 170 countries globally over a wide range of climatic conditions (Adjouman *et al.*, 2018). The value chain of tomato is amongst those that are most well established and organized while most of the actors, activities and general structure of the industry vary from one country to another. Worldwide, annual production of tomato has progressively increased over the last few decades and was valued by FAO at about 123 million tons obtained from a total production area of about 4.5 million ha with the leading tomato producer on global scale being China, European Union, USA and Turkey (Gatahi, 2020). Globally, tomato (*Solanum lycopersicum* L.) is a major cultivated and consumed fruit vegetable with per capita consumption of either fresh or processed type of about 21kg in 2017 and around 19% of the total vegetable consumption per year (FAOSTAT, 2020).Tomato is a rich source of micronutrients for human diet (Bauchet *et al.*, 2020). Large amounts of nutritional and bioactive compounds such as phenolics, flavonoids, carotenoids, vitamins, minerals and glycoalkaloids have drawn increasing interest in tomato fruits (Wang *et al.*, 2022). Postharvest losses incurred in vegetables and fruits are estimated at 5-20% and 20-50 % in developed countries and developing countries respectively. On the same note, FAO (2011) stated that 32% globally and 37% of sub-Saharan Africa had the highest levels of hunger and food insecurity (Sc, 2017). Tomato is a climacteric fruit that continues to ripen after the harvest (Majidi *et al.*, 2011). Stored tomatoes undergo processes like respiration, ripening, transpiration, and other biochemical activities, which bring about deterioration in quality (Sree *et al.*, 2020). Besides other technologies, the use of edible films or coatings represents an alternative way of preservation of fruits because of their ability to reduce moisture, solute migration, respiration and transpiration rate, to maintain firmness and generally delay senescence (Rosa and Romani, 2017). The coating material forms a thin film, which can be applied precisely on the epidermis of food product, with the objective of providing it with a modified atmosphere, regulating transmission of gases, decreasing loss of moisture and aroma, preventing rapid variations in colour and improving the general

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