EFFECT OF SOME SUPPLEMENTARY REFRIGERATION TREATMENTS ON STORAGABILITY OF GRAPES

BY

YOSEF SHAHIN AL-SHOFFE
B.Sc. Agric. Sc. (Horticulture), Damascus University, 1999

A thesis submitted in partial fulfillment

of

the requirements for the degree of

MASTER OF SCIENCE

In
Agricultural Science
(Pomology)

Department of Horticulture
Faculty of Agriculture - Ain Shams University

2005

EFFECT OF SOME SUPPLEMENTARY REFRIGERATION TREATMENTS ON STORAGABILITY OF GRAPES

BY

YOSEF SHAHIN AL-SHOFFE
B.Sc. Agric. Sc. (Horticulture), Damascus University, 1999

Under the supervision of:

Prof. Dr. Ibrahim Mohamed Desouky
Prof. Emeritus of Pomology, Dept. of Hort., Fac. of Agric., Ain Shams Univ. (Principle supervisor)

Prof. Dr. Nazmy Abd El-Hamid Abd El-Gany
Prof. of Pomology, Dept. of Hort., Fac. of Agric., Ain Shams Univ.

Approval Sheet

EFFECT OF SOME SUPPLEMENTARY REFRIGERATION TREATMENTS ON STORAGABILITY OF GRAPES

BY

YOSEF SHAHIN AL-SHOFFE
B.Sc. Agric. Sc. (Horticulture), Damascus University, 1999

This thesis for M. Sc. degree has been approved by:

Prof. Dr. Bahia Abd El-Aziz Fahmy …….....
Head of Research Emeritus, Hort. Research Institute, Agric. Research Center

Prof. Dr. Abd El-Azim M. El-Hammady .....
Prof. Emeritus of Pomology, Fac. of Agric., Ain Shams Univ.

Prof. Dr. Nazmy Abd El-Hamid Abd El-Ghany……...
Prof. of Pomology, Fac. of Agric., Ain Shams Univ.

Prof. Dr. Ibrahim Mohamed Desouky .....……
Prof. Emeritus of Pomology, Fac. of Agric., Ain Shams Univ.

Date of examination 30 / 7 / 2005

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPRIVIATIONS

atm	Atmosphere
CA	Controlled atmosphere storage
Ca1	Defoliation + 1 % $CaCl_2$ spray at the pea size of berries
Ca2	Defoliation + 2 % $CaCl_2$ spray at the pea size of berries and two days before harvest
$CaCl_2$	Calcium chloride
CC	Cool chamber
C.Wr.	Cluster wrapping
HDPE	High density polyethylene bag
$KMnO_4$	Potassium permanganate
KMS	Potassium metabisulfite
LDPE	Low density polyethylene bag
MA	Modified atmosphere
MAP	Modified atmosphere packaging
MTCA	1-methyl-1,2,3,4-tetra hydro-beta-carboline-3-carboxylic acid
NAA	Naphthalene acetic acid
PD	Polyethylene density
PG2	Plant guard
PP	Micro perforated polyethylene
SO_2	Sulfur dioxide
SMS	Sodium metabisulfite
SSC	Soluble solids contents
STS	Sodium thiosulfate
THCA	1,2,3,4- tetra hydro-beta-carboline-3-COOH
TopsinM	Thiophanate-methyle
T.S.S	Total soluble solids

CONTENTS

ACKNOWLEDGMENT

I wish to express my thanks and pay my respect to **Dr. Ibrahim Mohamed Desouky**, Professor of Pomology, Horticulture Department, Facility of Agriculture, Ain Shams University, for his supervision, criticism and all his efforts since my arrival in Egypt until this time and his huge contribution to the success of this work.

All my regards, thanks, love and respect to **Dr. Nazmy Abd El-Hamid Abd Al-Gany**, Professor of Pomology, Horticulture Department, Facility of Agriculture, Ain Shams University, for his supervision, guidance and his friendship. He was as a brother to me in all stages of my studies. He was my guiding light.

All my sincere, deep thanks and best regards to my father, my sisters and my brothers in Syria, Swida city, for all they gave me throughout my life.

I pray Allah for the soul of my mother.

I give my love, respect and the best feeling to my wife **Etab** for her encouragement and bearing far a way on home to success my work.

My best wishes with more health and success to all my friends in Syria and Egypt.

To every person who knew the meaning of humanity in this life.

At the end the best emotions of love and glory to my daughter **Walaa** and I pray to Allah to give her health and knowledge.

1. INTRODUCTION

Grape (*Vitis vinifera L.*) is considered one of the most important fruits in the world. It is the third largest fruit crop by area and value of production in Egypt. The acreage of grape vines in Egypt reached about **152919 Feddan** producing about **1103840** tons **(FAO. annually 2003).**

Superior grape vines is an early maturity cultivar, which meets export needs of the European markets. Therefore, it is necessary to find ways to extend its marketability periods by minimizing loss in quality during cold storage, which will in turn increase the exportation chance in this period.

Calcium chloride application under different levels as a pre-harvest treatment and several post harvest treatments like modified atmosphere packaging (MAP), clusters wrap (C.Wr.) and SO_2 fumigation are considered effective in prolonging storage life of grapes. However, calcium my be a major contributing factor in reducing cluster weight loss, decay percentage and berry shattering. In addition, increasing berry attachment force during cold storage **(EL-Hefnawi and Nomier, 2001)**. Whereas, MAP resulted in decreased berry rot **(Lue *et al,* 1993).** Moreover, MAP slowed and reduced changes in sugar and amino acid concentration compared to conventional storage, resulting improved quality **(Mukailov, 1992)**. On the other hand, cluster wrapping (C.Wr.) my be one of the most important applications which gives a good effect in transportation by increasing the storage life **(Tian *et al,* 1998).**

The main role of SO_2 fumigation in reducing percentage of decay was obvious **(Taylor *et al,* 1990), (Thomas *et al,* 1995) and (Xu *et al,* 1998).** Conversely**, Cenci and Ferreira (1996)** demonstrated that, the presence and absence of SO_2 during cold storage of grapes didn't change SSC % or acidity.

For agriculture products with relatively short shelf life, time in transit is a critical factor in determining which transportation method is used. Air shipment of products including grapes is often used due to the short in-transit time.

A high disease incidence and severity occur when cool and wet weather conditions prevail during harvest, and economic losses may occur in the vineyard or more often during transport to markets in the USA or Europe **(Capellini *et al.*, 1986; Bulit and Dubos, 1994).**

The main objective of this work was to evaluate the effect of pre-harvest application of different levels of calcium chloride ($CaCl_2$) and the effects of post-harvest treatments (MAP, C.Wr., and SO_2 fumigation), during cold storage on shelf life extension and storagability of *Vitis vinifera L*. cv. Superior.