STUDIES ON THE STORAGE ABILITY OF TOMATO'S KEEPING QUALITY AND PESTICIDE RESIDUES

By

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B.Sc. (Horticulture) 1984

THESIS

Submitted in Partial Fulfilment for

The Requirement of the

Degree of

MASTER

In

Environmental Agricultural Science

Supervised by Prof. Dr. Abd El-Azim M. El-Hamady, Hort.

Dept. Ain-Shams University

Institute of Environmental Research

1995

APPROVAL SHEET

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M.Sc. Thesis

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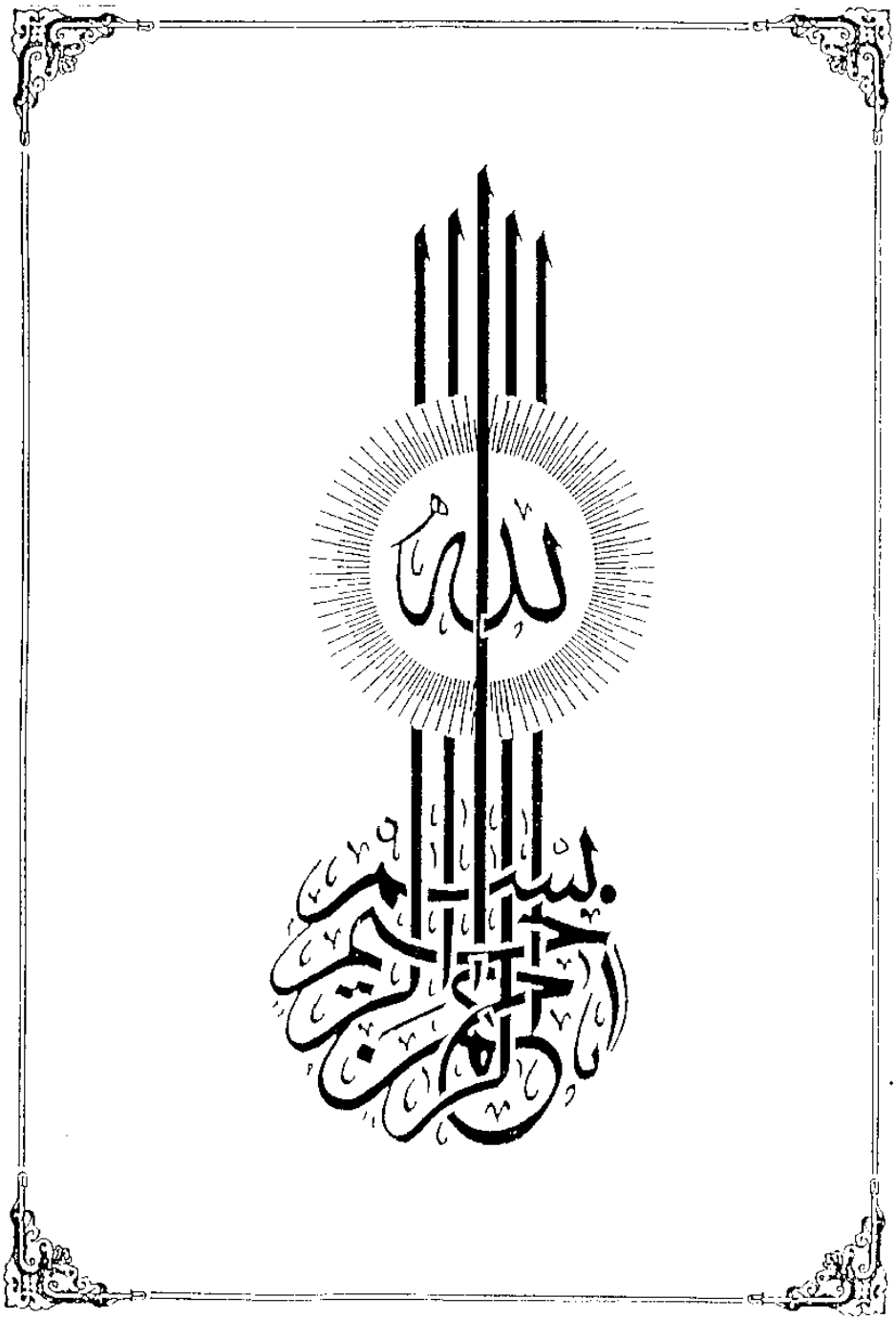

ACKNOWLEDGEMENT

I wish to express my deep gratitude and sincere appreciation to **Prof. Dr. Abd EL-Azim Mohamed El-Hamady**, Department of Horticulture, Ain Shams University for his valuable guidance, effective scientific supervision and valuable assistance. It is a great honour to work under his supervision.

Special thanks and profound appreciation are due to **Prof.Dr. Mohamed Ibraheam Abd-EL-megeed**, Prof. of Pesticides, Department of Plant Protection, Ain Shams Universty, who kindly devoted a great deal of his valuable time in the planning and development of the work, his encouragement and helpfull discussion and friendly supervision.

My deepest respect, and profound appreciation to **Dr. Mordy A. Atta-Aly**, associate Prof. Postharvest Physiology, Hort. Dept., Faculty of Agric., Ain Shams University for his generous and sincere initiating power, creative guidance, stimulating suggestions and constructive criticism.

I am gratefull to **Prof. Dr. Faiza M. Hassan**, head of Postharvest Research Section, Horticulture Research Institute, Agriculture Research Center for her creative supervision and usefull help and advice.

It is difficult to translate my feeling toward, **Prof. Dr. Khalifa Attia Okasha** , Head of Horticulture Institute for his valuable support and encouragement, stimulating suggestions and coperation in offering all the facilities for achieving this work.

Special thanks and deep appreciation are due to **Prof. Dr. Ahmed Abd-El Halim,** Head of Institute of Statistical Research, Agriculture Research Center for his valuable advice and indispensable help in the statistical analysis of the data.

Special thanks and appreciation are due to **Prof. Dr. Salah Mohammdin,** for his assistance and cooperation in offering the facilities to work and use the plastic houses and plant materials used in this study.

Dr.K.A.. Alam in plant protection department Ain-Shams Univ.

Thanks and sincere gratitude are due to all the staff of Vegetable Handling Section, Horticulture Research Institute, Agriculture Research Center for their moral and kind help.

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INTODUCTION

Tomato, *Lycopersicon esculentum* Mill, is one of the most important vegtetable crops grown all over the world. It belongs to the family solanaceae.

The tomato is widely grown vegetable in Egypt with a total annual planted area of approximately 328,000 feddans. The total tomato commercial yield in 1992 was approximately 4.523 million tons which represent 40 percent of total value of horticultural production.

Tomato is widely consumed fresh in salad, as juice or processed as paste, sauce, catshup and soup. It is a good source of vitamin C and A beside its content of several minerals. Consumer preference for fresh tomatoes is influenced by appearance, nutritional value and safety measurement i.e, mostly freedom from pesticides residues.

During the last few year many environmental problems have developed due to the access amount of used fertilizers. Moreover, pesticides, which have been widely used for controlling diseases, insects and weeds. This leads to environmental contamination and would cause harmfull effect to human health.

The current practice of using pesticides in agriculture has resulted in a world-wide increase in food production and in the provision of abundant food for human needs of a quality, which contrary to much uniformed opinion, is safe for human consumption in countries where health authorities impose adequate guidance and control. Residual pesticide chemicals could be a health hazard to ultimate consumer,

especially when freshly consumed. However when such fruits and vegetables are further processed for one purpose on another, the presence of such pesticide chemical have to be carefully followed and controlled as the usual processing steps could lead to destruction, chemical changing, dissolution or even concentration of such pesticides, thus causing some probable health hazard to consumers or quality alteration of the processed product.

Nowadays there is a tendency to produce fruits and vegetables without the use of chemicals whether as, pesticides or fertilizers due to the awarness of the danger of their residues. This is especially important when the commodities are designated for exportation. The limit of residues which is permitted are internationally reduced which mean that we have to find other alternative methods than postharvest fungicide use. Therefore, the present investigation was carried out to throw light on the use of different method for maintaining good quality and reduce postharvest losses through the following ways :

A- Effect of some postharvest treatments on the storability and keeping quality of tomatoes.

1- The use of postharvest heat treatment, as hot water dip, which is especially good alternative for decay control since such treatment can control pathogen on and below the surface of the product providing potentially greater decay control than contact samitizers and fungidices (Cantwell, 1991). Other benifit from heat treatment is the reduction of the activity of certain enzyme associated with deterioration (Cantwell, 1991).

2- Furthermore, stress was made on the, possible use to other method of reduce postharvest decay, softening and degradation. Calcium spray and dip was reported by many workers to modify cell wall strength and improve quality (Wills *et al.*, 1989). Therefore, calcium chloride and calcium sulfate were used as a postharvest dip to evaluate its effect on the keeping quality of tomato fruits thruogh the reduction of softening and deterioration rates.

B- Residual content of tomato fruits sprayed with some selected pesticides.

1- The detection of pesticide residues in the fresh tomato as a function of time between application and havest date are of interest to the public health. Therefore, investigations were carried out to study the effect of harvesting dates after pesticide application to monitor the best time that give the least legal and safe amount of residues.

REVIEW OF LITERATURE

A- Effect of some postharvest treatments on the storability and keeping quality of tomatoes

Many pre-harvest and postharvest factors influence the composition and quality of fresh horticultural crops. These factors include genetic factors which relay on the importance of selecting new improved varieties out of the numerous varieties introduced every year. Moreaover cultural practices including fertilization and water supply have effect on the nutritional composition of the harvested fruits and vegetables.

Horticultural crops show various disorder symptoms that have been attributed to some mineral deficiences. Calcium has been associated with more deficiency disorders than other minerals. Some of these disorders such as blossom end rot in tomatoes, can be readily eliminated by the application of calcium salts as pre-harvest spray (Wills *et al.*, 1989). Laboratory studies with calcium solution infiltration have shown that the technique can markedly block the initiation of ripening in a number of climacteric fruits such as tomatoes and apple (Wills *et al.*, 1989). It has been found by Atta-Aly (1989) that chelating calcium ion (Ca^{++}) with EDTA application to fruits of the non-ripening tomato mutant lines (*rin* and *nor*) induced all ripening parameters of both non-ripening mutant lines. This was also evident when EDTA was supplied to the nutrient solution in which plants of both mutant lines were grown (Atta-Aly and El-Beltagy, 1992). These findings undoughtedly support the idea that Ca^{++} was behined the non-ripening behaviour of both *rin*

and *nor* mutants and strongly suggested that Ca^{++} may control the ripening of ubnormal and normal fruits and in subsequent fruit colour, firmness and other quality parameters.

It was also evident that Ca^{++} solubilization increase in fruit as ripening progress (Rigney and Wills, 1981). Therefore exogenous Ca^{++} application to the harvested , reduces Ca^{++} solubilization and increase its binding ability and subsequently reduces fruit loss in fruit firmness. A substantial amount of added calcium bind with pectic substances in the middle lamella and with membranes generally, and may prevent disorders by strengthening structural component of the cell without alleviation of the original cause of the disorder (Wills *et al.*, 1989).

Calcium has been shown to affect the activity of enzyme systems and metabolic sequence in plant tissues. The addition of calcium to intact fruit and fruit slices generally suppress respiration (Wills *et al.*, 1989). The ability of calcium to regulate the various systems had led to the speculation that calcium may have the role in controlling the initiation of normal fruit ripening process. It is also possible that calcium prevent or delay appearance of some physiological disorders by maintaining fruit or cell normal metabolism.

Environmental contaminants and polutants as well as residues of agricultural chemicals have bearing effects on the safety of fruits and vegetables which represent a health hazard and are of interest to consumers.