

**EFFECT OF DIFFERENT STORAGE  
CONDITIONS ON THE PROPERTIES AND  
QUALITY OF ONION BULBS**

**By**

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**B. Sc. Agric. Sci. (Agricultural Engineering), Fac. of Agric., Gezira Univ., Sudan, 1999  
M. Sc. in Agricultural Engineering, Fac. of Agriculture, Khartoum Univ., Sudan, 2004**

**THESIS**

**Submitted in Partial Fulfillment of the  
Requirements for the Degree of**

**DOCTOR OF PHILOSOPHY**

**In**

**Agricultural Sciences  
(Agricultural Engineering)**

**Department of Agricultural Engineering  
Faculty of Agriculture  
Cairo University  
EGYPT**

**2014**



## **APPROVAL SHEET**

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DEDICATION  
TO  
SOUL OF MY FATHER  
TO MY  
MOTHER  
CHILDREN  
MY WIFE  
BROTHERS  
SISTERS  
WITH MY GOOD WISHES, IN  
RECOGNITION OF THEIR efforts



## *ACKNOWLEDGEMENT*

*Thanks and praise to the Merciful Allah, who gave me the patience to conduct this research.*

*I would like to express my deepest appreciation and sincere gratitude to my supervisor Dr. Mohamed Hashim Hatem, Professor of Agricultural Engineering, Faculty of Agriculture, Cairo University for his encouragement, advice and guidance through this work.*

*Also I wish to thank Dr. Said Abdalla Shehata, Professor of Vegetable Crops, Faculty of Agriculture, Cairo University for his supervision, great help, valuable suggestion and unlimited help.*

*To Dr. Yousry Bayoumy, lecturer of Agricultural Engineering, Faculty of Agriculture, Cairo University for his supervision, faithful help and experienced guiding.*

*I'm deeply indebted to Dr. Karima Farouk who facilitated the experimental work to be conducted at laboratory of Improving Competitiveness of Some Vegetables for Exports Project (CIEVC), Faculty of Agriculture, Cairo University.*

*Thanks are also extended to the staff members of Department of Agricultural Engineering, Faculty of Agriculture, University of Cairo.*

*Special thanks are extended to my friends and colleagues.*

*Finally my thanks and appreciation to my family for their patience, moral support and encouragement during the study period*



|                                                                                                             |                               |
|-------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Name of Candidate:</b> Babiker Ali Abaker Eshag                                                          | <b>Degree:</b> Ph.D.          |
| <b>Title of Thesis:</b> Effect of different storage conditions on the properties and quality of onion bulbs |                               |
| <b>Supervisors:</b> Dr. Mohamed Hashim Hatem<br>Dr. Said Abdalla Shehata<br>Dr. Yousry Bayoumy Abdelhay     |                               |
| <b>Department:</b> Agricultural Engineering                                                                 | <b>Approval:</b> 26/ 10/ 2014 |

### ABSTRACT

Onion is one of the important commercial vegetable crops grown on a large scale in many countries. As the onion bulbs are to be stored for long period for use during off-season, a considerable loss occurs by way of deteriorating, sprouting, and moisture evaporation during storage. The objective of this study were to study the effect of storage conditions on the properties and the quality parameters of onion bulbs, in objective to keep quality, reduce losses, prolong shelf life, keep the price stable during the year. The properties of onion bulbs as affected by storage conditions are equatorial and polar diameter, compression strength, hardness, dry matter, total soluble solids and total carbohydrates. The quality parameters of the onion bulbs to be studied were weight loss, deterioration, sprouting and marketable percentage. The results indicated that, the average temperature in center of onion pile during the storage period ranged between 16.73 to 28.61 °C for the forced ventilation, where it was ranged between 18.18 to 31.03 °C for the natural ventilation, while in traditional storage system ranged between 19.52 to 32.93 °C. The highest mean of hardness value was recorded at natural ventilation (128.8 N) in the first season. Where the highest hardness value was observed at forced and natural ventilation in the second season (168.7 and 167.5 N, respectively), respectively. The highest dry matter percentage was recorded in natural ventilation 17.11% and the lowest dry matter percentage was recorded in the traditional storage system (16.52%), While, the dry matter percentage was insignificantly difference between treatments in the second season, The highest TSS percentage was recorded in traditional storage and natural ventilation (14.13 and 13.94%, respectively) in the first season, and 14.40% at forced ventilation in the second season. On the other hand, the highest carbohydrates percentage (7.48%) was recorded in natural ventilation in the first season. Whereas, the higher carbohydrates percentage was recorded in forced and natural ventilation (8.08 and 8.05% respectively) in the second season.

The bulbs stored under natural ventilation showed lowest moisture loss recorded in natural ventilation storage system (2.825 %) in the first season and (1.715%) in forced ventilation in the second season, and lowest percentage of deterioration (6.549%) was recorded in the first season, while forced ventilation recorded (0.813%) in the second season, whereas the lowest percentage of sprouting recorded in forced ventilation (1.470 and 0.3414%) in both season respectively. Also the highest marketable percentage was recoded in forced ventilation system 85.31% and the lowest percentage was recorded in traditional storage system (81.51%). The natural ventilation system obtained higher net return (922.27 LE/ton) in comparison with the net return in forced ventilation (466.50), whereas lowest net return of 461.30 LE/ton was obtained in traditional storage system. According to above results, natural ventilated with perforated pipes can be recommended for farmers.

**Key words:** storage systems, onion bulbs, temperature, relative humidity, forced ventilation, natural ventilation, traditional system, onion pile, deterioration, hardness, total soluble solids



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