ABSTRACT

Recently serious attention has been given to the possibility of increasing agricultural production by controlling the post-harvesting losses. So the national income of Egypt can be increased by improving the methods of harvesting; handling; transporting; and storing of the agricultural products. The importance of knowing the suituble conditions for harvesting; right methods of handing; and storage for potatoes led us to study the changes in physical properties and behaviour of potatoes during storage time.

The main objective of this work was to study the changes in some physical characteristics, mechanical properties, and rheological properties under static loads of potato tubers (*Diamont and Santana varieties*) during storage ; Evaluating and comparison between cold store and Nawalla for potatoes seed after storage, this evaluated involved two phases:

1) storage phase, and 2) field production phase

The experimental work that was carried out revealed the following:

I- Studying the changes in physical characteristics include (dimensions; coefficient of spherical Shape; potato weight; calculated and measured volume; particle and bulk density; porosity; calculated and measured surface area; and specific gravity) during storage.

II- Studying the changes in mechanical properties of the potato tubers included (repose angle; coefficient of static friction on steel, wood, and rubber surfaces; firmness; penetration resistance; and impact damage height at (30, 60, and 90 cm) on steel sheet surface) during storage.

III- Studying changes in potato behaviour under static loads during storage: The total of 180 potatoes creep tests experimenters including, three load levels (10, 14, and 18 N), two stored temperature (Nawalla, and cold store 4 C°), three loading positions (L = Longitudinal, D = Radial, and T = Minimum axis),

and two varieties (Diamond and Santana) where each treatment was replicated five storage times (harvesting day, after curing, 25 days after curing, after 50, and after 75 days from storage). The four element model (Burgers' model) was used to analyze the creep data obtained to find model constants (k_1 = Instantaneous elasticity, N/mm; K_2 = Retarded elasticity, N/mm; C_1 = Free viscous element, N.min/mm; and C_2 = Retarded viscous element, N.min/mm) at different storage times during storage operation in Nawalla and Cold storage systems. A linear regression analysis equations were used to describe the creep constants as a function of storage time at two storage systems.

IV- Studying changes in the chemical properties of the potato tubers included (moisture content; and sugar concentration) due to the storage time.

V- Studying the storage evaluation of the potato tubers included (weight losses; defect percentage; number of sprouts per tuber; plant emergence percentage; and total yield).

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