THE SEPARATION OF FOREIGN BODIES IN THE TUBERRCULI QUANTITY AND THE MECHANIZED ROOTS

SĂRĂCIN ION, OLIMPIA PANDIA, BOZGĂ ION, MARIN GHEORGHE

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ABSTRACT

In the quantity of tubers and root crops obtained at harvest there are vegetable scraps, clods or adherent soil to tubers and unhealthy, sick and tainted tubers. According to some data, the overall content of the earth in fresh potatoes destined for sorting is harvested over a 10-20% by the weight of tubers and it can sometimes reach values of 30-40%. Before being used in different purposes: for storage, consumer, industrial, material, marketing, seed potato tubers or roots crops harvested with machines or combine are undergoing complex surgery cleaning, sorting, packing and conditioning.

The machines used for this purpose must provide sorting in fractions according to their mass, following the valid rules. Taking into account the variety of species and geometric shapes, the machines used for this purpose must ensure possibilities to adjust the main parameters of working bodies, ensuring accuracy and sort.

INTRODUCTION

During the processing operations of tubers and root vegetables, the most important one is the sorting by various factions after the sizes, and these must satisfy the requirements of the various standards in force, or other rules depending on destination.

The choosing of the hole size sorting is an approximative one and it can be done using the variable curves of the tubers mass, depending on their size, writing on the orderly geometric points corresponding to the boundaries of fractions obtained according to their mass and after determining the thickness, the breadth and the length of the tubers corresponding to the limited mass imposed. Such are obtained the limits of the fractions after their size, meaning the dimensions of the openings of the sorting.

When you sort according to thickness and width, the differences between the values of the sorting holes are smaller than when you sort by length. Sorting according to length is not used, because the working bodies like screening machines would require big dimensions.

MATERIAL AND METHOD

For tests we mainly used in potato tubers from species grown on the land in the area of Grădinari, Olt County.

The sorting process is mainly influenced by the physical and mechanical properties of the potato tubers and the physical-mechanical properties and chemical properties of the soils.

1. The main physical and mechanical properties of potato tubers

The main physical and mechanical properties which determine, in some degree, the sorting process and influence the operations of processing potatoes after harvesting are: geometric linear dimensions, geometric shape, mass, friction coefficient (rolling and sliding) on surfaces of different materials, elasticity and resistance to impact and crushing.

These properties depend on the variety of potatoes, pedo-climatic conditions, duration of harvesting, production of potatoes. Knowing these properties is particularly important because it is useful in the design of transportation in order not to cause personal injuries, in the proper choice of materials and labour power, in the the maximum drop height and speed by throwing from an organ to another, at the choice of the maximum angle of incline conveyors and appreciate the maximum high storage in silos not to crush bottom tubers, in

determining the form and dimensions of the heap, in relation to the quantity of potatoes stored loose in a short span of time, etc.

-Linear geometric Dimensions

The potato tubers of regular form are distinguisged, as a rule (as seeds), through three dimensions: l-length; b- width and c-thickness, which are measured in three directions at right angles to each other.

-Geometric shape

The potato tubers have different geometric shapes, of which the most characteristic are: spherical, ellipsoidal or lengthened.

-Individual Weight.

RESULTS

The individual tubers have masses ranging in broad limits, usually of 10-200 g. The research of a large number of varieties regarding the existence of a dependence between thedimensions and the mass of tubers has been established that there is an addiction that can be expressed in the more general form, by power function.

$$m = Al^{\alpha} = Bb^{\beta} = Cc^{\gamma} \qquad (1.1)$$

where a, |3, y, A, B, C are the coefficients determined experimentally for each potato variety by the method of least squares. The subsequent researches showed that power relations of the general form (1.1) can be expressed through expressions that correspond to the shape of the cube-shaped parable:

$$m = A_l l^3 = B_l b^3 = C_l c^3 \qquad (1.2)$$

In these relations, a, b, c are inserted in (mm) and result in m (grams). For the study of the variety, the values of the two relations, determined at ungerminated potatoes after a period of storage (in February), are given in figure 1.
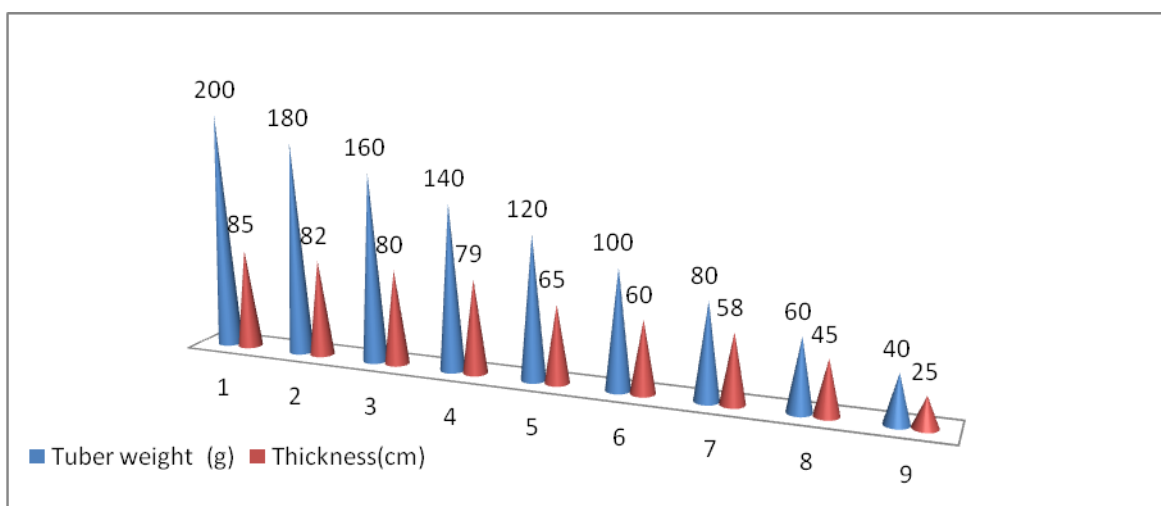

Figure. 1 Tuber mass thickness variation

Fhe friction coefficient on different materials

The movement of the potato tubers on the sorting work, is significantly influenced by the friction values. The values of these coefficients depend on the position of the longitudinal tuber axis towards the inclined surface where the rolling friction and sliding exist. The average values of those coefficients are listed in figure 2.
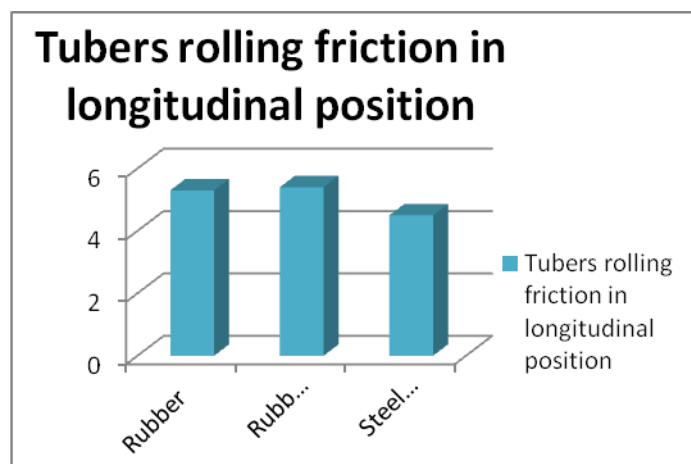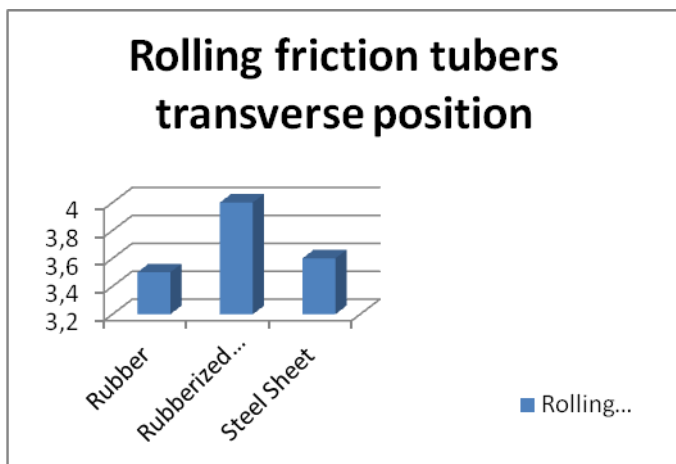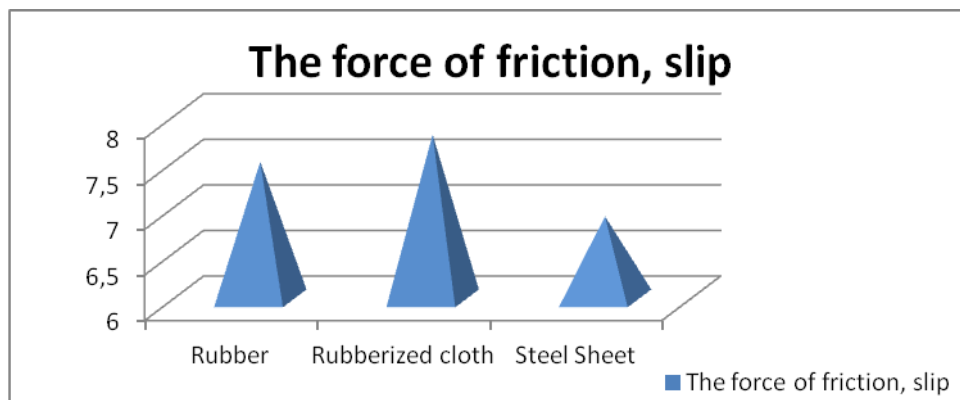
Figure. 2 The values of the friction coefficients of tubers on different materials

The mechanical resistance to compressive and impact

The mechanical resistance of the tubers directly influences their mechanical damage level in the sorting process and other machining processes.

The researches on the mechanical resistance to the clash of tubers on metallic surfaces showed that the appearance of fissures (destruction of tuber) occurs at speeds of 10 m/s clash and sometimes higher. At lower speeds the clash takes place on a partial injury of tubers, which can be visible on the outside.

The degree of injury depends on the speed of the clash, the surface on which the clash of tubers occurs, on the number of collisions, on the maturity and the potato variety. In other processes of processing potatoes there is a compressive strength R (daN) identified as being the compression force, which destroyed the tuber in order to apply the cvasistatica charge.
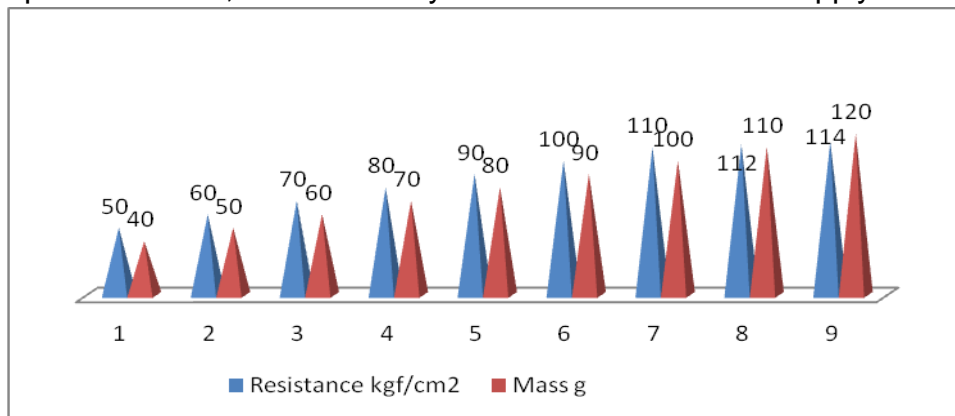

Figure 3. This resistance depends on the size of the tubers, taking into consideration the increasing size
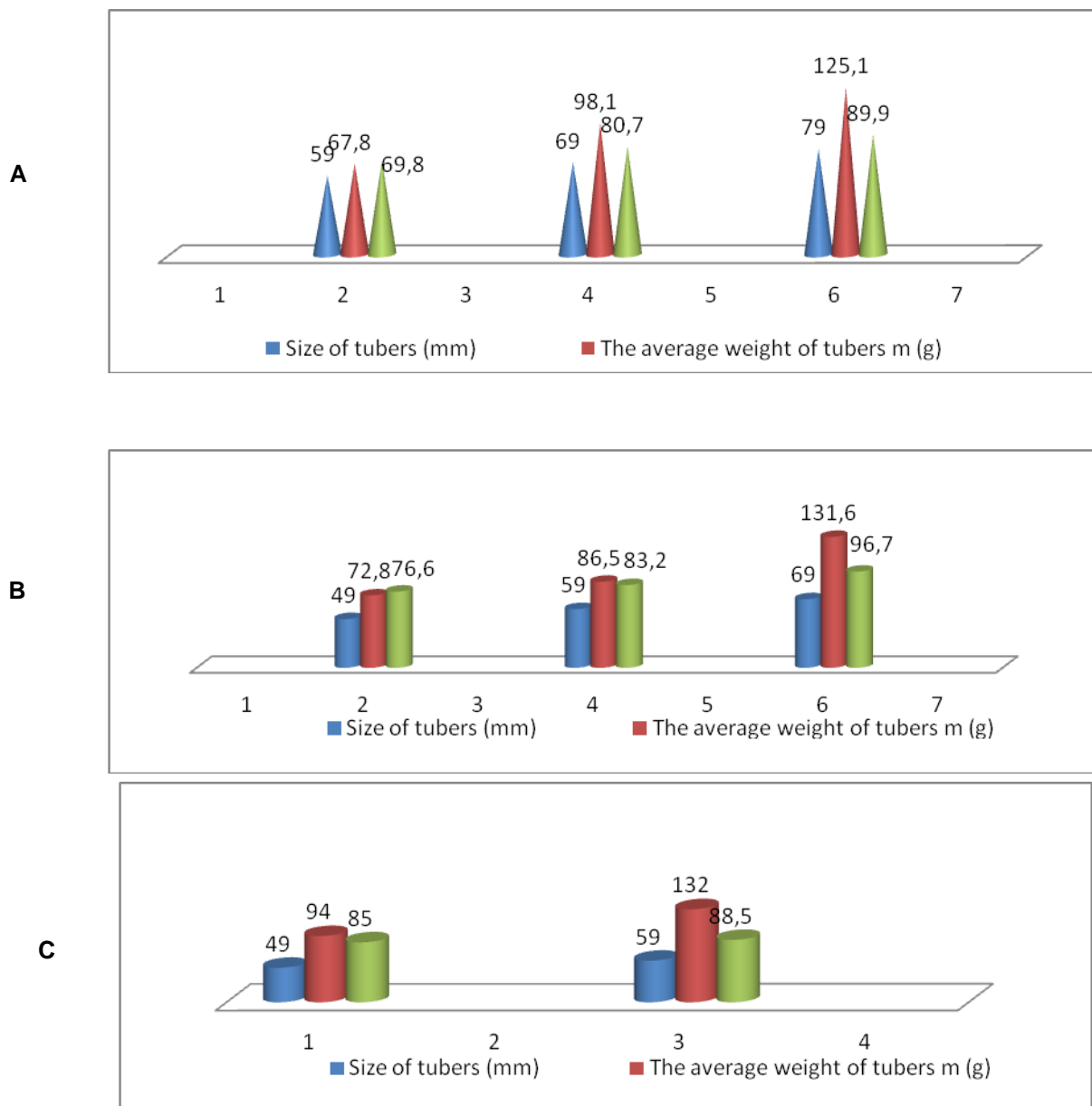
Figure 4 (A, B, C) . The compressive strength of tubers, the variety chosen, the direction of application of the vertical loads.

The hole size choice of sorting, as shown above, is an approximate choice of the size sorting holes which can be done using variable expansion curves tubers, depending on their geometric dimensions, writing on the ordinate the proper points of the limits of the fractions obtained according to the mass, and after determining the thickness, the bandwidth and length corresponding to the imposed.mass limits of tubers.

When you sort according to thickness and width, the differences between the values of the sorting holes are smaller than when you sort by length. That's why, when you sort by length, you can expect a higher accuracy of the list, but basically, but the long separation of the tubers is not used, because the similar screening machines thing would be very bulky.

The quality of the listed potatoes appreciates its accuracy. The precision of sorting an "i" fraction is evaluated by the reliability sorting coefficient, denoted by pi ", which represents the ratio between the mass, m, corresponding to the demands of the fraction ,, i "and the mass of all obtained tubersin that fraction " mfi", expressed as a percentage, according to the relationship:

$$p_i = \frac{m_i}{m_{fi}} \cdot 100 \ (\%) \qquad\qquad (1.4)$$

The quality of the work of sorting as a whole is characterized by grossing overall accuracy (General or full) Adil ¬ "pt" defined by the relation:

$$p_t = \frac{\sum\limits_{1}^{n} m_i}{\sum\limits_{1}^{n} m_{fi}} \cdot 100 \ (\%) \qquad\qquad (1.5)$$

where, n "represents the number of draws in which performed the sorting weight of tubers. If it's fine account of (1.4), (1.5), then the relationship may also be expressed

$$p_t = \frac{\sum\limits_{1}^{n} p_i m_{fi}}{\sum\limits_{1}^{n} m_{fi}} \quad (\%) \qquad\qquad (1.6)$$

The values of the coefficient list accuracy can fl theoretical values and actual values. The actual values shall be determined experimentally for each car, researching samples from obfinute with these fractions and applying relationships (1.4) (1.6).
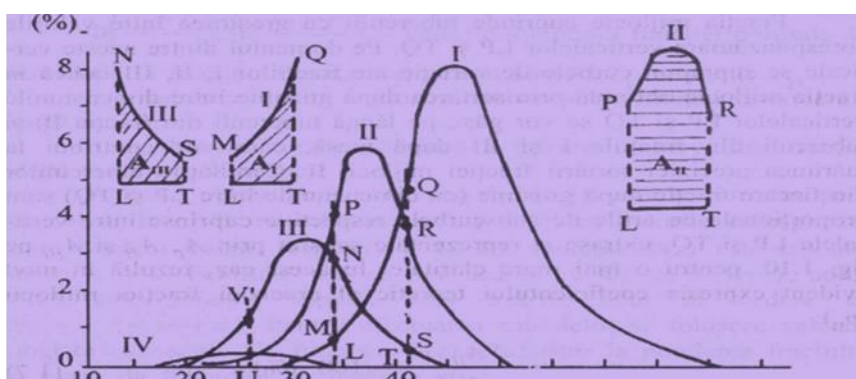

Figure.5. The curves of the variation of thickness distribution (c) tubers, the variety of fractions obtained Lorh, according to after eating; I big fraction (> 80 g); - middle fraction (50-80 g); HI- fraction (30-50 g); IV- fraction waste (very small tubercles < 30 g)

CONCLUSIONS

➤ Sorting process of the car is not unhealthy mechanic more than 1% of the total amount of tubers.

➤ Taking into account the great variety of geometrical forms and varieties of tubers, movies must be provided with the possibility to adjust the main parameters of sorting, which ensure the precision required of the list.

➤ Cars must work at their performance parameters so the sorting, as well as in the framework of the potatoes.

➤ Sorting Machines of the sort points must be equipped with devices to perform auxiliary operations such as retrieving cartofllor from the means of transport and powering the machine separation of impurities (Earth, stones, plant debris and lilor ¬ tubercu alterati, attacked etc.) of the mass of tubers, fractiilor carriage in containers, tubers sorted bags, boxes or means of transport

➢ Equipment components of the sort points to be down with the prevent convenient transport from one place to another, without disassembly.

➢ The ability of machines to a sorting must ensure the processing of at least 15-20 tons/h in an Exchange. In the case of complex lines of sorting-conditioning of the deposits, the ability of the General work should not be less than 5-10 t/h product initially.

➢ The cars that come into the complex sorting line-conditioning of the potatoes must have capacitating work related and must be provided with independent operation, so for any variant of the processing flow structure to ensure the possible transmissibility of tubers from one machine to another, within the line, without the use of manual labor.

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