

EFFECT OF TYPE OF POTATOES HARVESTING MACHINE OVER THE QUALITY INDICES OF TESTED MACHINES

INFLUENȚA TIPULUI DE MAȘINĂ DE RECOLTAT CARTOFI ASUPRA VALORII INDICILOR CALITATIVI DE LUCRU REALIZAȚI DE MAȘINILE ÎNCERCATE

LAZĂR C.S.¹, ROȘCA R.², COJOCARIU P.²

¹Strunga Mayoralty, county Iași

²University of Agricultural Sciences and Veterinary Medicine Iași

Abstract. *In this experiment three types of potatoes harvesting machines were tested: the E-684 potatoes harvesting machine; the Dewulf RDT 1700 potatoes harvesting combine; the CRC-2 potatoes harvesting combine. The experiments were developed in average conditions regarding the working depth of the dislocation coulter, the soil clay content, humidity and penetration resistance. The working speed was 3.43 km/h. Several quality indices were evaluated during the experiments: loss of tubers in and on the soil; tubers injury index; amount of impurities in the mass of harvested potatoes. Based on the experimental results it was concluded that all the three tested potatoes harvesting machines achieved adequate values of the quality indices, the Dewulf RDT 1700 potatoes harvesting machine being ranked first.*

Key words: quality, potatoes harvesting, harvesting machines.

Rezumat. *În experiența întreprinsă s-au folosit trei tipuri de mașini de recoltat cartofi: mașina de recoltat și încărcat cartofi E-684; combina de recoltat cartofi CRC-2; combina de recoltat cartofi Dewulf RDT 1700. Experimentările au fost efectuate în condiții medii privind adâncimea de pătrundere în sol a brăzdarelor de dislocare, conținutul de argilă al solului, rezistența acestuia la penetrare și umiditatea lui. Viteza de deplasare a agregatelor a fost de 3,43 km/h. La încercările efectuate cu cele trei tipuri de mașini de recoltat cartofi s-au determinat mai mulți indici de calitate ai lucrării executate: pierderile de tuberculi în sol și pe sol; gradul de vătămare a tuberculilor; impuritățile rămase în masa de cartofi recoltați. Pe baza rezultatelor obținute în cadrul experimentărilor s-a stabilit că toți indicii de calitate ai lucrării de recoltat cartofi sunt corespunzători pentru toate cele trei tipuri de mașini încercate, pe primul loc situându-se combina Dewulf RDT 1700.*

Cuvinte cheie: calitate, recoltat cartofi, mașini de recoltat.

INTRODUCTION

Potato is an important alimentary plant, used for producing fodder or for industrialization. After corn, maize and rice, potato is the most important plant for the populations of many regions on earth.

Potato harvesting and conditioning is the most expensive technological

sequence, requiring the highest work and energy consumption. Important production losses occur during harvesting.

The production level quality are highly dependent upon the harvesting quality. This is the reason why the paper is referring to the testing of some types of potatoes harvesting machines, in order to establish whether these achieve the imposed agro technical requirements relative to the quality indices of the potato harvesting operation

MATERIAL AND METHOD

Three types of potatoes harvesting machines were tested: the E-684 potatoes harvesting and loading machine; the Dewulf RDT 1700 potatoes harvesting combine; the CRC-2 potatoes harvesting combine. The U-650 tractor was used as a power source.

The experiments were developed on a cambic chernozem type of soil, with the following features: clay content - 31.5%; penetration resistance - 19 daN/cm²; humidity - 15%. The stalk quantity was 0.108 kg/m² and the weeds quantity was 0.182 kg/m². The potatoes were from the Sante variety. The real working speed was 3.43 km/h.

RESULTS AND DISCUSSIONS

The experimental test were aimed to evaluate the effect of the type of potato harvesting machine over the harvesting quality indices: loss of tubers in and on the soil; tubers' injury index; amount of impurities in the mass of harvested potatoes.

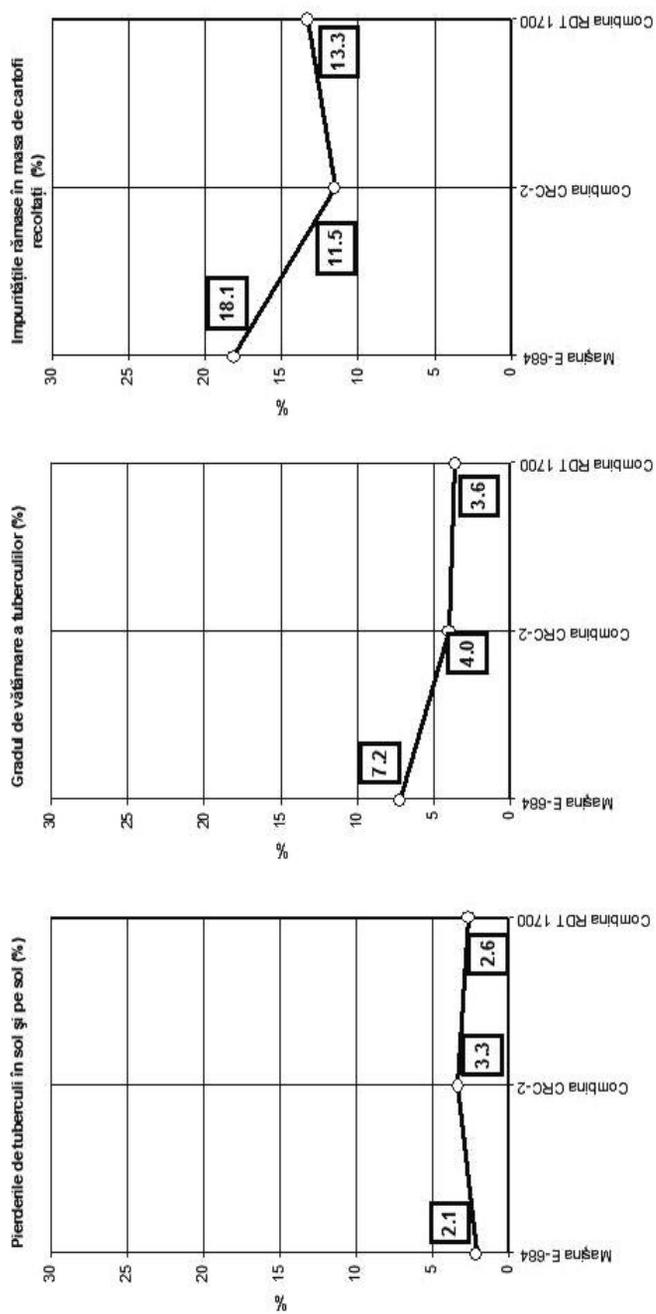
The experimental results are shown in table 1 and figure 1.

Table 1

Effect of the harvesting machine type over the harvesting quality indices

Potatoes harvesting quality indices	Type of potatoes harvesting machine:		
	E-684 potatoes harvesting and loading machine	CRC-2 potatoes harvesting combine	Dewulf RDT 1700 potatoes harvesting combine
Loss of tubers in and on the soil, P _t (%)	2,1	3,3	2,6
Tubers' injury index, G _v (%)	7,2	4,0	3,6
Amount of impurities in the mass of harvested potatoes, I _c (%)	18,1	11,5	13,3

INDICII DE CALITATE AL LUCRĂRII



Tipurile de mașini de recoltat cartofi

Fig. 1. Effect of the harvesting machine type over the harvesting quality indices

Loss of tubers in and on the soil, P_t . Based on the experimental results it was established that the loss of tubers was comprised between 2.1% and 3.3%.

When analyzing the effect of the harvesting machine type, one can see that the E-684 harvesting machine recorded the lowest values (2.1%). The Dewulf RDT 1700 was ranked next, with 2.6% loss. The highest losses (3.3%) were recorded for the CRC harvesting combine.

Agro technical standards require that the loss of tubers when using either the harvesting and loading machine or the harvesting combines should not exceed 4% (Morărescu E. et al., 1974).

The experimental results show that all the tested machines have achieved the requirements of the standards when referring to this quality index.

Tubers' injury index, G_v . The analysis of the experimental results referring to the tubers' injury index led to the conclusion that, for the tested machines, the values of this index were comprised between 3.6 and 7.2%.

The lowest value of this index was achieved by the Dewulf RDT 1700 machine (3.6%).

The CRC-2 combine, with a slightly higher value (4.0%), occupied the second position. The highest tuber' injury index was recorded by the E-684 potatoes harvesting and loading machine (7.2%), a value which is nearly the double of the one achieved by the Dewulf RDT 1700 combine. The high tuber' injury index achieved by the E-684 machine should be remembered.

Agro technical standards require that the tuber's injury index should not exceed 8%, when harvesting combines or harvesting and loading machines are used (Toma Dr. et al., 1969).

When considering the experimental results, it is obvious that none of the tested machines did not surpass the above mentioned limit, but some remarks should be made: while the two combines achieved lower values of the tubers' injury index, the E-684 machine was very close to the upper limit of the considered criterion.

Amount of impurities in the mass of harvested potatoes, I_c . The experimental results show that the amount of impurities into the mass of potatoes that were harvested and loaded into the transporting vehicle was comprised between 11.5% and 18.1%.

The lowest amount of impurities was achieved in the case of the CRC-2 combine (11.5%). The Dewulf RDT 1700 was placed the second, with 13.3% impurities in the mass of harvested potatoes. The larger amount of impurities (18.1%) was recorded by the E-684 potatoes harvesting and loading machine, a value that is 4.8% higher than the one recorded by the Dewulf RDT 1700 combine; The amount of impurities for the Dewulf RDT 1700 combine is only 1.8% higher than the value obtained for the CRC-2 combine.

We consider that the large percentage of impurities obtained for the E-684 machine is due to the fact that impurities separation is achieved only by mechanical means, while the combines are provided with places for 4 or 6 workers, who manually separate the impurities. In the meantime, the use of 6 workers on the CRC-2 combine instead of only 4, on the Dewulf RDT 1700, explains the lower amount of impurities achieved by CRC-2. Moreover, compared to the Dewulf combine, the CRC-2 combine is equipped with two supplementary separation devices (besides the rolling grates, used on both combines mainly for soil separation): an elevator with a rubber carpet and flexible fingers, used for separating clods and stones; a separation device provided with two rubber discs, aiming to separate clods and small stones.

Agro technical requirements impose a maximum percent of impurities of 20% (Neagu Tr. et al., 1984). All the tested machines fulfilled these requirements.

CONCLUSIONS

Based on the analysis of the experimental results, aimed to evaluate the effect of potatoes harvesting machine over the harvesting quality indices, we concluded that all the tested machines fulfilled the agro technical requirements.

The Dewulf RDT 1700 combine, being ranked second, first and respectively second (at neither of the quality indices was it ranked the third), achieved the best results. The CRC-2 potatoes harvesting combine, which was ranked third, second and respectively first, took the second place (third place when considering tubers losses). The E-684 harvesting and loading machine achieved the worst quality indices, being ranked first, third and respectively third (third place when considering the tubers' injury index and amount of impurities).

Taking into account the above-mentioned specifications, we recommend the use of the Dewulf RDT 1700 potatoes harvesting combine. The CRC-2 combine could be also considered, if technical solutions are applied to reduce the losses of tubers.

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