

EFFECT OF SOIL PREPARATION TO THE QUALITY OF THE POTATOE COLLECTOR AND THE AMOUNT OF DAMAGE TO POTATOES

Vplyv prípravy pôdy na kvalitu práce zberača zemiakov a výšku poškodenia

Frančák, J

Korenko, M

Slovak University of Agriculture

Булгаков В. М

National Agricultural University of Ukraine

Práca rieši problematiku znižovania poškodenia zemiakových hľúz pri zbere. Poškodenie skúma pri rovnakej zberovej technike, zhodnej pestovateľskej technológii, ale pri rozdielnych pôdnych podmienkach (ľahká pôda a ťažká ílovitá pôda s obsahom hrúd a kameňa).

The work solves the issue of reducing damage of the potato tubers at harvest. Damage to examine the same harvesting techniques, consistent cultivation technology, but in different soil conditions (light and medium heavy clay soil containing lumps and stones).

Introduction

Potatoes for ensuring the quality of growth and development of the required nutritional need good agrotechnics (soil preparation in the autumn and before planting preparation in spring). This is the autumn plowing down of manure at a dose of 35 to 45 t ha⁻¹ medium, or deep plowing. The spring is loosening the soil with incorporation of fertilizers. In hard rocky soil, or clay layers is necessary stone elimination.

Material and methods

To assess the quality of the potatoes on the technology of soil preparation and the traits was selected farm with a long tradition of potato cultivation. It is located in the southern part of Slovakia, all of its area is grown under irrigation.

Investigation of the potato collector quality work was done by the collector of potatoes in the three years 2009, 2010 and 2011. The production technology had been over the evaluated years, the same as:

- plowing stubble after cereals,
- application of manure (40 t. ha⁻¹),
- manure plow down by deep plowing,
- tillage in the spring by rotary mower (associated with the incorporation of fertilizers),
- planting by planter with spoon planting mechanism,
- scorn potato by rotary machining mechanism,
- chemical protection (as required),
- irrigation belt irrigators,
- two-line collection Grimme potato harvester.

During evaluation was changed only cultivation plot. First and third year was soil light, sandy with sufficient humus content. Second was used heavy soil, lumpy with a higher content of clay and

stone parts. In that soil was during outstanding water rates created lumps. To the technology was not included stone elimination of soil and lumps. Plots were in one urban area, 1.5 km air distance from each other. The damage was verified according to the methodology of the State Technical and Testing Institute for Agriculture in Bratislava.

Total average damage of potatoes from the measured section Z_p :

$$Z_p = 0,1 \times P_p + 0,5 \times S_p + 1,0 \times T_p, \text{ kg} \quad [1]$$

where: T_p - severe damage (greater than 5 mm, or cut tubers),

S_p - moderate damage (from 0.5 to 5.0 mm depth of the tubers),

P_p - surface damage (up to 0.5 mm depth of the tubers).

The percentage of damaged tubers harvested P_z :

$$P_z = \frac{Z_p}{U} \times 100, \% \quad [2]$$

where: U - is the yield of the measured section

Samples of potato tubers were taken from the vehicle, 10 samples from one plot along their transverse deployment. Damage was visually evaluated under laboratory conditions. Interline distance grown potatoes was 900 mm.

Results and Discussion

At present, when the potatoes are grown in Slovakia on an area 10 600 ha is necessary to maintain the highest possible yield and quality of production, in order to the farms to be resisted competitive pressure. This requires in addition of high-quality technology, planting materials, fertilizers and organic fertilizers selection of appropriate cultivation of plots, or their quality preparation.



Figure 1 Two-line potato harvester Grimme SE 170-60



Figure 2 Trailer HW 80

In 2011, was the average potato yields 22.6 t ha^{-1} . Top farmers achieved yields 35 to 45 t ha^{-1}

¹. Harvesting of potatoes was carried out, two-line potato harvester Grimme SE 170-60 in aggregation with tractor John Deere the 6930 Transport to potatoe store by 9 t lorry Š-706.

Six days before the harvest was mechanically damaged potato leaves by rotary grinder. In all three years was verified one variant Agria, medium early, consumerist, high quality and popular with purchasers.

Measurements:

Year 2009

Harvest of the measured plots was 23.8 t ha⁻¹, plot size was 23.8 ha.

Table 1

Damage of the potatoes

Sample weight		Severe damage		Middle damage		Damage to the surface		Overall average damage	Percentage of damage
kg	%	kg	%	kg	%	kg	%	kg	%
43.05	100	1.78	4.0	1.2	2.9	0.5	1.2	2.19	5.08

Yield was found out by digging tests. Damage was calculated by the arithmetic mean of 10 samples. Soil properties were very good, therefore the collected material was at least damaged. Important was the low percentage of severely damaged tubers.

Year 2010

Harvest of the measured plots was 35.3 t ha⁻¹, plot size was 29.2 ha.

Table 2

Damage of the potatoes

Sample weight		Severe damage		Middle damage		Damage to the surface		Overall average damage	Percentage of damage
kg	%	kg	%	kg	%	kg	%	kg	%
56.1	100	8.1	14.7	2.95	5.25	3.3	5.9	9.3	16.5

The soil was heavy, clay, where the lumps were inadequate irrigation, also contained a large amount of stones. In preparing the soil before planting was used identical technology as in other years and was not made even stone elimination of soil. A major negative aspect was the high percentage of severely damaged tubers that sorting had to be scrapped to prevent material damage of taking over material.

Year 2011

Harvest of the measured plots was 30.8 t ha⁻¹, plot size was 18.2 ha.

The soil was light, sandy with good moisture, which had a positive impact on the quality of the harvested material. Important was the low percentage of severely damaged potatoes.

Table 3

Damage of the potatoes

Sample weight		Severe damage		Middle damage		Damage to the surface		Overall average damage	Percentage of damage
kg	%	kg	%	kg	%	kg	%	kg	%
47.6	100	2.7	5.7	-	-	2.5	5.2	2.72	5.72

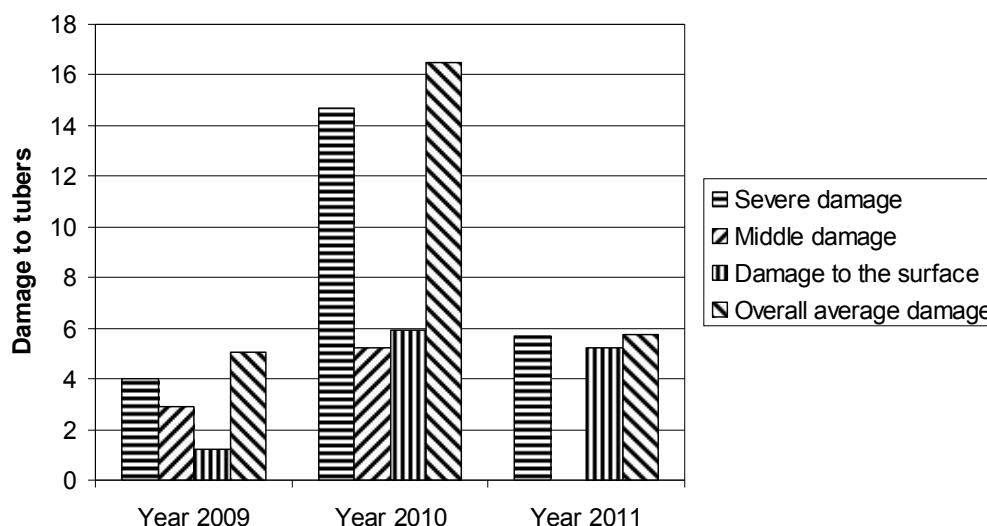


Figure 3 Graphical overview of potatoes damage

Conclusion

For these measurements resulted the following:

1. significant impact on the quality of work and reduce damage of the potatoes in the collection should used technique,
2. with the same technique is an important selection of the planting plots with low content lumps and stones,
3. in case of heavy soils is necessary to put to the cultivation technology elimination of stones and soil separation,
4. regular irrigation to prevent formation of lumps which in collection can greatly increase the damage of the potato tubers,
5. improve the quality of soil organic manures,
6. the important role plays human factor, operation of the machine and its professional ability.

References

1. Budyn, P. - Frančák, J. – Kielbasa, P. 2003. The influence of a soil type on certain parameters of Irg and Baszt potato varieties In: *Inżynieria Rolnicza*. - Roč. 7, č. 11 (2003), s. 29-34, ISSN 1429-7264
2. Frančák, J. - Budyn, P. - Korenko, M. – Simoník, J. 2001. Ekonomické hodnotenie uplatnenia techniky na pestovanie a zber zemiakov. In: *Ekonomika a efektívnosť poľnohospodárskej techniky*. Nitra : Slovenská poľnohospodárska univerzita, 2001. s. 24-28.- ISBN 80-7137-928-X
3. STN 470140: Skúšanie zberačov zemiakov
4. Žitňák, M. 2008. Efektívne využívanie dopravných prostriedkov pri zbere zemiakov. In: *Vozidla 2008 : nové trendy v konštrukcii a eksploatacie vozidiel*. – Nitra : SPU v Nitra, 2008, s. 175 – 180. ISBN 978-80-552-0106-1