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ANALYSIS OF ROOT HARVESTING MACHINE SELECTION DEVICES

Ravshan Chorshanbiev
Senior Lecturer,
Karshi Engineering and Economics Institute,
Uzbekistan

Fayzilla Begimqulov
Candidate of Technical Sciences, Associate Professor
Karshi Engineering and Economic Institute
Uzbekistan

ABSTRACT: This article focuses on the analysis of the problems of the sieve process of root harvesting machines. Although the process of sifting the soil mixture and plant residues in the harvesting of root crops and the problems of improving the design of machines have been addressed before, the sieve devices of carrot digging machines in Uzbekistan have not yet been studied.

KEYWORDS: rootstock, harvesting, soil mixture, cuttings, mixture, separators, sieve body, soil sieve, elevator, parameter.

INTRODUCTION

Studies show that due to the variability of the physical and mechanical properties of the soil, during the harvesting of roots with buckets, hard lumps are formed, which remain inseparable from the roots and complicate the technological process of sifting, which leads to overloading machines.

Sieving efficiency also affects the quality of temporary stacking in harvesting technology and the post-harvest processing of roots. The guarantee of effective operation of the device for separating lumps and stones, which comes in the size of the ends, should be, among other conditions, that the mixture should not contain foreign plant residues or they should be in

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small quantities [1, 2]. A small bundle or separate stems and other plant debris that falls to the sorting point during sifting also poses a number of difficulties in post-harvest processing, including contamination of sorting working bodies, clogging of individual nodes of mechanisms, and consequently increased labor costs. At very high humidity, soil mixtures adhere to the surface of the sieve elements and reduce the accuracy of fraction separation by minimizing cracking.

Many working bodies have been established based on the data obtained as a result of the research. They are available in pneumatic, hydraulic and mechanical types. Although the construction of pneumatic and pneumomechanical separators [6, 7] is simple, it is not widely used due to high energy consumption, noise, dusting of the workplace.

THE MAIN FINDINGS AND RESULTS

Adequate quality cleaning of the mass in a humid environment with a soil mixture adhering to the roots is provided by hydraulic and hydromechanical separators [5, 7]. Experience in the use of such devices shows that the use of water treatment is economically inefficient and it is not advisable to apply in practice in root harvesting machines in conditions of high yield drop during harvesting. Therefore, we will focus more on mechanical principle separators.

Scientist G.D.Petrov proposed to create sieves suitable for the condition of the soil. Therefore, the working bodies are divided into three groups [6]:

- devices designed to separate the bottom from dry, fine-grained soils, operating on the principle of sifting the soil through a sieve, grid or other elements;

- devices for separation from coarse soils, the size of which is close to the size of the ends;

- devices for separation of wet (plastic) soils.

In the technological scheme of root-harvesting combines it is accepted to divide the sieves into two main groups according to the location and allowable second load [6, 7]:

1. Sieves for primary sifting of soil;

2. Sieves for secondary sifting of soil.

A.A. Sarokin proposed to divide the sieves working on the mechanical principle into 3 groups: working bodies performing sieve, working bodies performing ascending sieve, combined sieve working bodies.

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Primary sieves work on the principle of sifting the soil through a sieve or softening (crushing) the soil through cracks. Sieving of the soil takes place during the separation of fine particles of soil at optimal humidity, while softening (crushing) of the soil occurs during the separation of sticky soil. Softening (crushing) can be carried out at low velocities and large velocities (centrifugal sieve) of soil and working bodies.

Vibrating wire elevators, drum and roller combs, belt surfaces are typical for working types of sieves. These working bodies work unsatisfactorily in very moist soils, especially in medium and heavy sandy soils.

Various studies on the improvement of sieve working bodies in order to separate mixtures from very moist, especially medium and heavy sandy soils have led to the creation of centrifugal separators operating under the influence of centrifugal force to crush wet soil through cavities.

By studying the centrifugal separators in the form of a cup centrifuge, Maksimov B.I. engaged in [5]. This device rotates at a greater speed than the vertical axis, severely injuring the root ends, as the excavated mass flies at great speed along the entire length of the device and becomes clogged with plant debris. This does not provide optimal working conditions, because the soil is quickly sifted and therefore the ends are injured. When the rotation speed is reduced, the roots do not rise from the centrifuge cup, resulting in no sifting process [6].

The work of drum-screw type separators Petrov G.D. studied by. Their disadvantage is the high energy consumption and the fact that they cause a lot of injury when the ends are passed upwards, because all the excavated soil is transferred to it. In addition, a lifting and screening drum [8] has also been researched and developed by the scientist. Studies have shown that this device works unsatisfactorily and does not allow the ends to rise to the top of the drum.

Currently, many models of root harvesters operating on the principle of sieve of leading foreign companies, including European (Grimme DR-1500, Grimme SE 150-60, AVR SPIRIT 8200), as well as domestic (KKU-2A, KPK-3, KPK-2 , KIT-2) Rubber wire elevators are used in potato harvesting machines.

Wired elevators are installed at an angle not exceeding 200 ° to the horizon, and the distance between the wires is 22-25 mm. The gap between these elevators is much larger in England and the United States. The size of this intermediate distance is reduced using plastic and rubber coating to also preserve the small ends of the roots and ensure that they are less damaged. The use of brush separators in the separation of stone and lump mixtures gives good

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results [6]. Elastic rubbers are used to cover the working surfaces in order to reduce the distance and impact of the root ball transitions from one working body to another and to reduce their injury [6, 7]. In some cases, the width of the spacing is adjusted from 24 to 40 mm, depending on the size of the root system and the type of soil [5].

CONCLUSION

In soils with very high humidity or very dry, wired elevators do not always provide quality separation of soil mixtures. From the point of view of soil screening, different accelerators with different transmissions are used to overcome such shortcomings when wired elevators operate in adverse conditions.

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