

## STUDIES CONCERNING THE EQUIPPING OF COMBINE HARVESTERS FOR TUBERS AND ROOTS WITH THE SORTING AND CLEANING SYSTEM

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**Key words:** mechanized harvesting, sorting, band separator, parametrically constructive.

### ABSTRACT

*The concerns about ensuring optimal forerunner conditions that should be carried out before the mixture, and about actual sorting using tape separator, led to the experimentation of different active ensembles, inserted in technological flows of some combine harvester potato models and prototypes .*

*It was possible both the testing of various experimental solutions for homogenizing eccentric rollers dividers and of conveyor separators, in real conditions of continues supply with a homogeneous product, in which the percentage of tubers vary continuously, and the establishing of the actual variable areas of the functional arrangements (rotation, amplitudes, linear displacement speed, power flows, etc.) or of the main constructive parameters (form rollers, the eccentricity value " e ", the crossing "S" space, the active length " l " of the active surface, the length of the transfer zone, the nature of the surface and the length of the lane dividers, the rake angle of the belt etc.).*

*Regardless of the assembly position of the combined system during the technological flow of the combine, an attempt was made, along with the constructive improvement of the components and the proper achievement sizing of the active surfaces for both homogeneous separator and headband sorter, in terms of interdependence between them, so as to ensure an appropriate fluency in their work, at a acceptable yield from the economic point of view.*

### INTRODUCTION

The concerns with regard to ensuring an adequate technological process to the pedoclimate conditions, specific to the potato traditional growing areas of our country (characterized mainly by the existence of a large quantity of clods and other foreign mass processed components during the mechanized harvest), imposed at the same time and the identification of optimal working postures-for these assemblies across the or toward the initial meaning of foodat the beginning of the end or final separation.

The structural and functional improvements, due to the partial results of the tests, led to results in ensuring an appropriate intensity of the separation of foreign bodies from the mass of tubers, and a productivity obtained through a medium capacity sorter.

The first experimental model, designed mainly for the completion of constructive solutions with special reference to the separation process on the principle of circular eccentric roller, spiral-shaped, smooth or profiled was conducted at INMA.

Based on the obtained results and the amendments of the power systems-smoothing, it was transformed into a prototype and tested in endurance during the whole period of the following year (1992).

### MATERIAL AND METHOD

The main technical characteristics of experimental sorting combined systems, the entered values reflecting research and practical results that have allowed, in the next steps, to the classification of the optimal components of the completed standard, according to the dimensional and functional extent able to reproduce, under real conditions, the complex process of gradual sort of a mixture of material-tuber-foreign material harvested with combines.

Principalele caracteristici constructive și de funcționare ale sistemelor combinate de

sortare, experimentate pe combine de recoltat cartof în perioada 1985-1987.

The main constructive characteristics and operations of the combined systems for sorting, experienced on potato harvested combines in the period 1985-1987.



**Figure.1. Experimental Model Sorting potato - IMC**

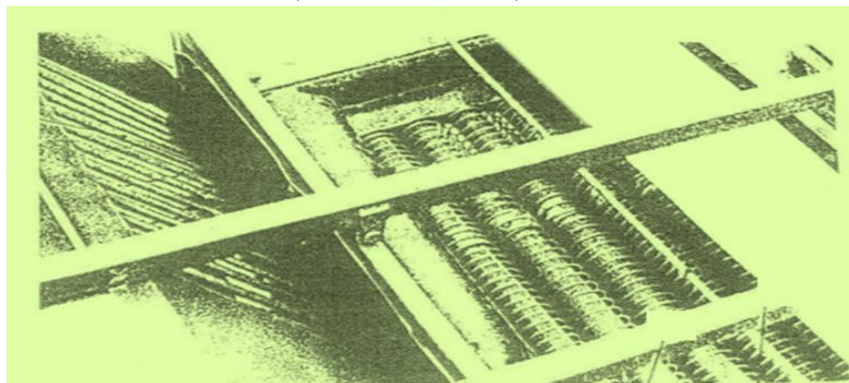
The measurements on the quality of the work have led to further completion, based on an experimental model of mobile sorting facility and calibrated potato-IMC of constructive optimized solutions which represent for the third temporary stage results of the experimental research in the boarded field made by the author.

## **RESULTS AND DISCUSSION**

The experimental and prototype model of graded and calibrated potato machine was conceived aiming at extending the area of investigation on optimization of the technological process flow of the complex gradual separation by providing, for the first time, the tandem formed by uniformizator-separator roller and band separator.

The uniformizator-separator, from IMC, placed before the calibrator was done and tried, on its turn, in two versions: with metal spiral rollers and rubber roller eccentric.

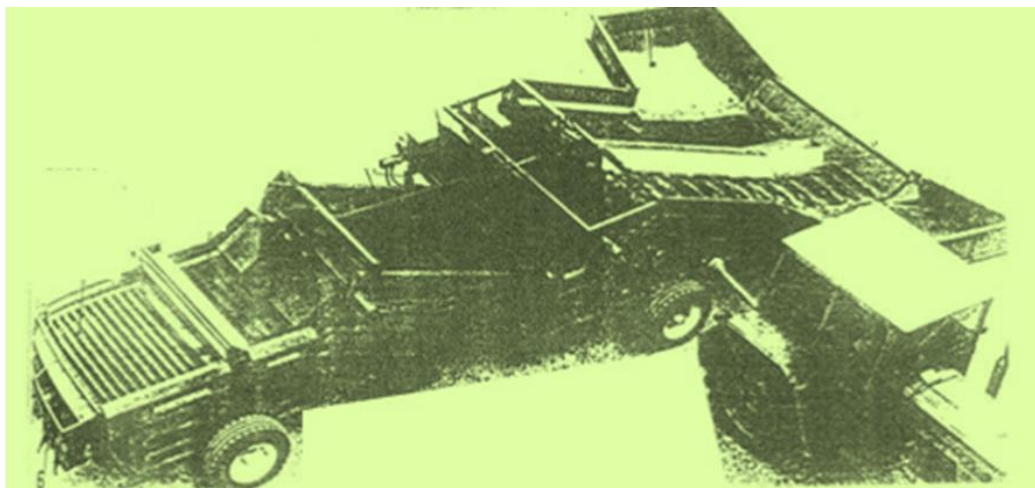
The adoption, in the framework of technological complex flow sorting, of the inclined-banded separator, brought about a series of tests to identify optime solutions for equipped surface of the belt itself, in order to increase the separation capacity of the foreign bodies and to ensure a continuous movement, without losses, of the tubers intended for study.



**Figure.2. Experimental model of mobile plant potato sorting ISC**

There has been tested a number of active surface strips with rubber fingers, similar to the rubber-banded combines, mounted on scapers, smooth strips.

In order to cover the full range of measurements necessary to the data bank as an experimental foundation for a specialized stand, able to reproduce the complex gradual separation process, there were done constructive changes and found possibilities for variation of the kinematic regimes (linear speeds, rotations, etc.).



**Figure.3. Experimental model of mobile plant for sorting and size of potato**

For this purpose, the involvement of the active functional assemblies tested has been carried out hydrostatically, with the possibility of continuous change of values contained in a coating working area.

The adjustments made to the power flow, rotations and to the tilting of the active branch of the separator, initially determined a relatively uniform distribution along the length of the active surface of the manual sorting.

Under the influence of the homogenizing belt evaluated throughout a development of the constant load and on the caliber width.

The research also highlighted a number of important issues, bordering the main constructive and functional elements, with sensible influence over the whole complex process of the characteristics that define the mechanical sorting by gradual separation of the foreign bodies from the mass of the potatoes.

### CONCLUSIONS

To the category of these major influence elements belong:

- The mutual location at the corresponding odds of the main active ensembles (homogenizing separator, belt separator, the transfer zone length etc.)
- The determination of the optimum values or of the beaches of variation, for the main assemblies of active bailiff that resolves the technological complex flow of gradual separation (eccentric roller speeds, linear speed of the active surface of the tread dividers, the rake angle of the tread, etc.)
- The identification of the interlinkages between the bailiff and constructive parameters of the stall and the the potato variety (the geometry of the eccentric rollers and the tread surface, the amount of additional mass attached to an active branch of the belt, etc.), with the power flow and the sorting out process.
- The use of inclined belt, in order to increase the separation capacity of the foreign bodies and to ensure a continuous movement of the tubers intended for theoretical study, without losses.

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