IMPLEMENTING CELLULAR AUTOMATA METHOD IN THE SEPARATION

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Summary: The practical application in which the cellular automates will be used is represented by the peas, pods and other impurities' separating process. The way the peas react to the sloping strip has been studied with the simulation programs.
It was established there that an important role is held by the oscillating movement of the band and the way in which the impact between the pea bean and band is made.

1. GENERAL CONSIDERATION

Automatic calculation algorithms using cell can be easily implemented when using matrix calculation.
Making a cell requires automatic algorithm based on choosing a suitable programming language. The case was chosen because in this language MATLAB language, matrix calculation is easy to use. In Matlab, matrices and images can be converted between them, which facilitates simulation clearly show evolution.

2. MODELING DESCRIPTION

Image display simulation is performed at each simulation cycle by the expression: [4], [5]

$$set(imh,'cdata',cat(3,cel1,cel2,cel3)) \quad (1)$$

imh is the RGB image and function as () defines a massive array of three objects:*cel1,cel2,cel3*.
Using the simulation program to study the band indicator K_{ns} separators for different sizes of the impact area. This indicator was defined as the ratio of unseparated grain amount (driven clusters and impurities) and separate the grains:

$$K_{ns} = \frac{\text{Unseparated grain amount}}{\text{Quantity separate grains}} \quad (2)$$

The indicator was set by saving two quantities in each cycle simulation program, using the relations: [1]

$$nr\_boab\_n = sum(cel3_{n,j}) + nr\_boab\_s$$
$$nr\_boab\_s = sum(cel3_{n,j}) + nr\_boab\_j \quad (3)$$

The diagrams in Figures 1...4 developments quantities are given different objects depending on the number of simulation steps.

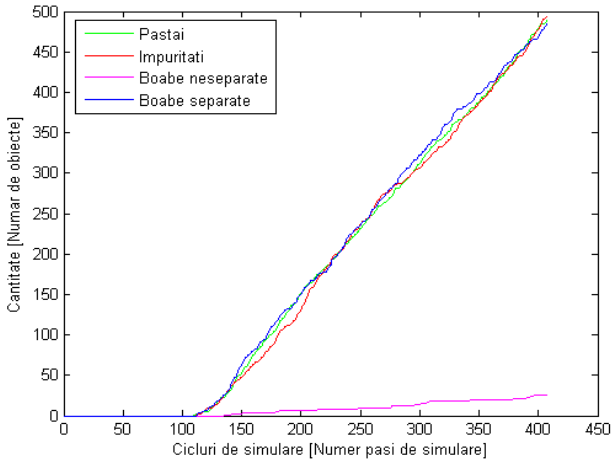

Fig.1 .Diagram of segregation for development k_{imp} = 30/250.

Dimension impact area (D_{imp}) is defined relative to the overall size of the band separators (D_{tot}) using the relationship: [1]

$$k_{imp} = \frac{D_{imp}}{D_{tot}} \tag{4}$$

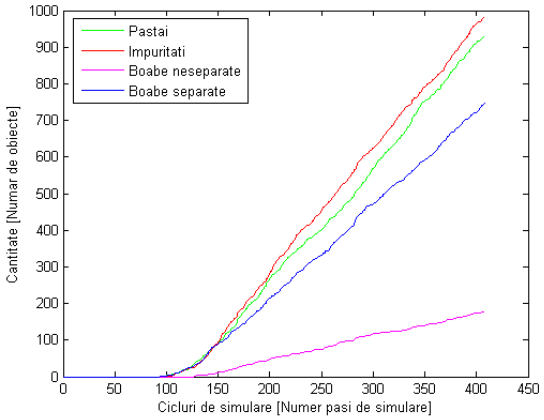

Fig.2. Diagram of segregation for development k_{imp} = 60/250.

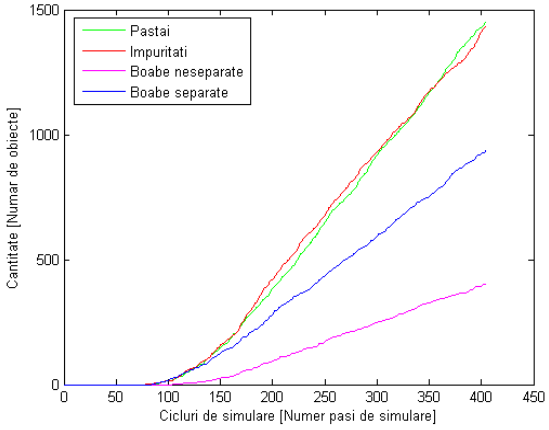

Fig.3. Diagram of segregation for development k_{imp} = 90/250.

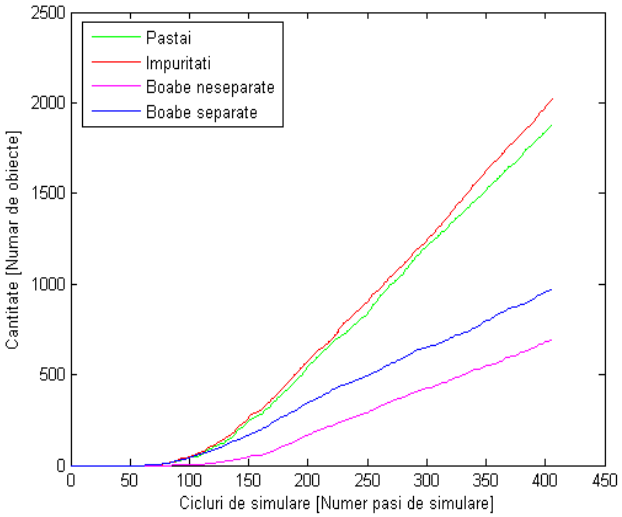

Fig.4. Diagram of segregation for development k_{imp} = 120/250.

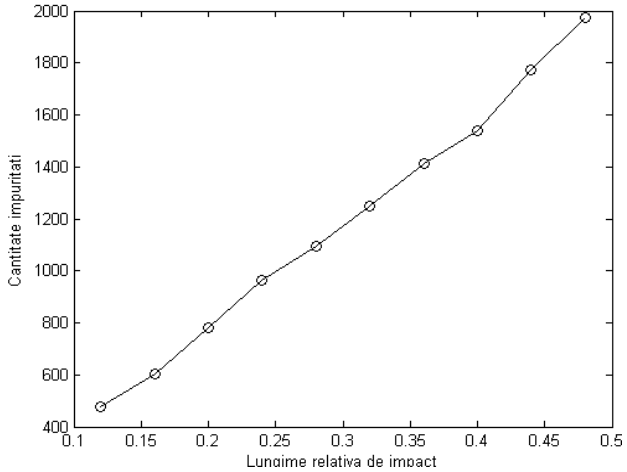

Fig.5. Diagram of segregation for development according k_{imp} impurities.

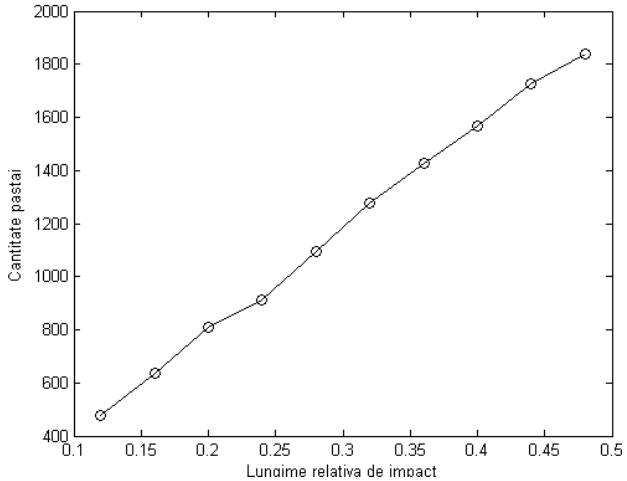

Fig.6. Diagram of segregation for pod development according k_{imp}.

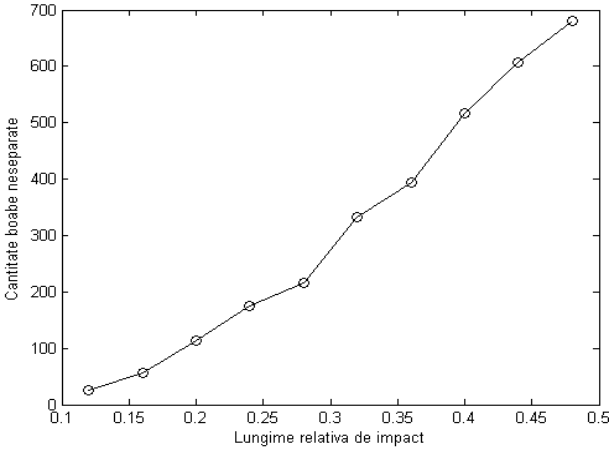

Fig.7. Diagram of segregation for development unseparated grain according k_{imp}.

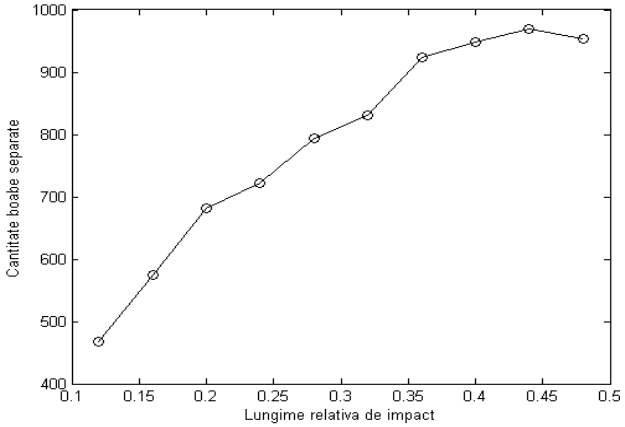

Fig.8. Diagram of segregation for development grains separated according kimp.

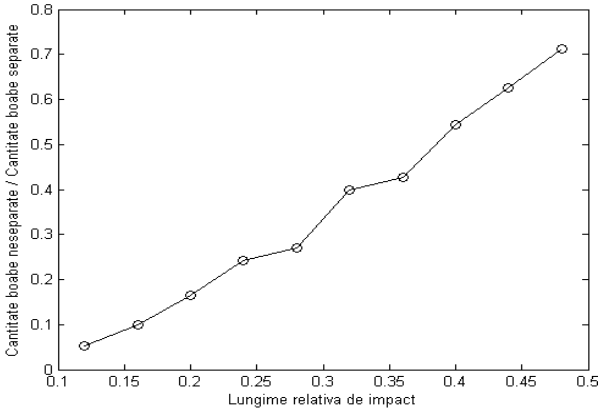

Fig.9. Chart progress indicator according K_{imp} K_{ns}.

3.CONCLUSIONS

Probabilistic processes, which involved a series of random variables can be studied using cellular models with the automatic. This process is separate bean pods and impurities occurs lane dividers in the doctoral thesis analyzed.

Program can be achieved using different parameters studied influence of the band separating construction (strip length, size of the impact amplitude oscillation band), the quality of separation. In this way the program can be used to optimize the design and functioning of these types of bands. In this context, to examine the influence of area size impact K_{imp} the quantities of objects involved in the process of separation.
From this analysis it appears that the number of unseparated grains increases with increasing impact area. This trend is explained by the fact that, as the area where seeds and pods are mixed tape is higher the greater the likelihood is driven bean pods or impurities. At some point, if the area grows more the number of separate grains begin to fall. Also be noted that a small impact area decreases the amount of processed material, reducing productivity lane dividers.
Original contribution brings this chapter, is a novelty application of modern simulation methods (cellular automata method), separating the analysis bands. Based on algorithms developed in this chapter, simulation programs can be made for any other process in which objects behave so random probability.

4. BIBLIOGRAPHY

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