THE INFLUENCE OF ANGLE OF TILT OF THE SEPARATORS AND THE AIR COURSE VELOCITY ABOUT QUALITATIVE COEFFICIENT AND THE EXPLOATATION AT THE CLEANING AND SORTING OF THE CORN PULSES

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Abstract: *This work aims at supplying optimum ways of peeling (cleaning) and sorting the wheat seeds. There has been used an experimental a stand made of two bodies out of which the higher one having adjustable angle of tilt (1…8°), and the lower one having a fixed angle of slope (15°). The machine also has a centrifugal ventilator which we have measured five values of the air-blast velocity like: 2, 3; 3; 5; 6* and *7 m/s.*

Keywords*: tilt angle, air velocity, cleaning and sorting of corn*

1. Introduction

The experimental stand used at the researches is destine to cleaning and sorting after the geometrical size (width and depth) and after the aerodynamic proprieties of the cereals, technique plants, obtained from the combines or threshers. The cleaning and the sorting are done until at the condition degree foresee in the standards in vigor for the products – goods.

2. Material and method

The experimental researches are done for corn of autumn at the three debits of feeding for the experimental stand, three air course velocity, regulate by the cooling machine and for four values of the angle of tiltβ, of the inferior separators of the superior framework with separators. The three air course velocities are: v_1=5 m/s; v_2=6 m/s; v_3=7 m/s. The four values of the β angle are: β_1=2°; β_2=4°; β_3=6°; β_4=8°.

At the experimental stand (fig.1) are used: the caliber, the measuring cord, the precision balance, balance type suitcase, chronometer, dynamometer balance, cup anemometer.

2.1. The establishing of the separation degree of the big impurities p from the initial mass of pulses in function of the inferior separator of superior framework

The separation degree of the big impurities and breaches p, represent the percentage of pulses and the big impurities calculate in report with initial mass of pulses (%).

The determinations are done at the feeding debit q = 1kg/s and $v_a = v_1 = 5$ m/s, for angle of tilt α=4°of a superior framework separator and for the angle of tilt β of the inferior separator of the same framework: 2, 4, 6, 8°.

Example:

$\alpha = 4^0$ and $\beta = 2^0$
- are gathered the big impurities;
- are gathered in bags and then are weighed the quantity of the big impurities *p*;
- are calculated in percentage the medium values for *p*;

- for β = 4, 6, 8^0 are proceeded similar;
- are marked the graph *p = f(β),* for α = 4° and *Vair=5 m/s*.

For each of the air course velocity values Vair are marked the adequate graphs.

Each of the previous determination presented are done for corn in three repetitions.

2.2. The establishing of the separation coefficient ε of the little pulses from the initial mass of pulses in function of the inclination of the inferior separator of superior framework separators

The separation coefficient of little pulses ***ε*** from the initial mass of pulses, represent the report between the quantity of the little pulses effective separate from the separator of the length L and the quantity of pulses who are may separated through the separator (the last represented the quantity of the little pulses who are find in the initial material) [2], [3], [5], [6].

At the each test are timed the necessary time for effectuate this, with a view of determination of the work capacity.

Then are determinate the work capacity of the machine with the relation:

$$Q = 3600\frac{m}{t} \qquad (1)$$

where: *Q* – work capacity of the machine (kg/h);

m – quantity of the conditioned barley (kg);

t – necessary time for each experimental determination (s).

Then is determinate the separation coefficient of the little pulses ε from the initial mass of pulses, with relation:

$$\varepsilon = \frac{1}{1 + \frac{b \cdot c \cdot Q}{L}} \qquad (2)$$

where: *ε* – separation coefficient of the little pulses from the initial mass of pulses (%);

b – separator width (mm);

c – content of the little pulses from initial mass, at each determination (kg);

L – separator length (mm).

Are marked the graphs *ε = f (β)*.

Each from the previous presented determinations is done for corn in three repetitions.

2.3. The establishing of the separation degrees of the little impurities c and the big impurities p of the separation coefficient of the little pulses from the initial mass of pulses ε in function of the air course velocity at the three debits of feeding

The separation degree of the little impurities *c*, represent the pulses and the little impurities percentage calculate in report with initial mass of pulses (%) [1], [4].

The determinations are done for each from the five air course velocity values. at each of the three feeding debits considered. Are marked graphs: $c=f(V_{air})$ (figures 7, 8, 9, 10 – superior curves); $p=f(V_{air})$ (figures 11, 12, 13, 14); $\varepsilon=f(V_{air})$ (figures 7, 8, 9, 10 – inferior curves) for each of three feeding debits for corn.

The separation coefficient of little pulses from initial mass ε is establish with relation (2) after the established the separation degrees for the little impurities *c* and respectively for the big impurities *p* and after the preliminary established the work capacity of machine *Q* with relation (2).

The angles of tilt values of the two separators, *α* and *β* are combine between them: *α= 4°* and *β = 2°, 4°, 6°, 8°*. Also the determinations are done in three repetitions.

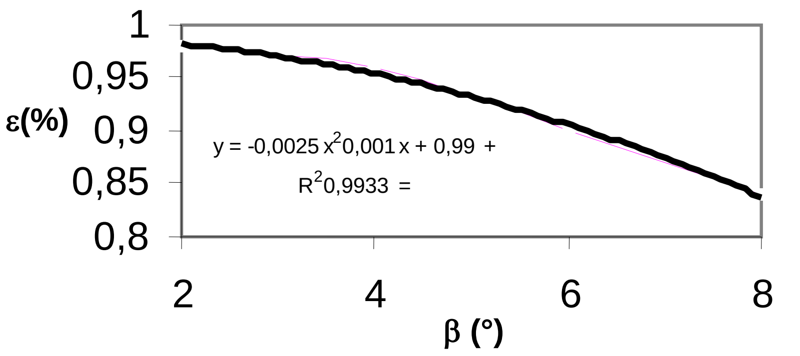

Fig.1.Correlation between the angle of tilt of an inferior separator of a superior framework β, for a angle of tilt of a superior separator of this framework of the separation of the little pulses from initial mass of pulses ε at $V_{air} = 5$ m/s

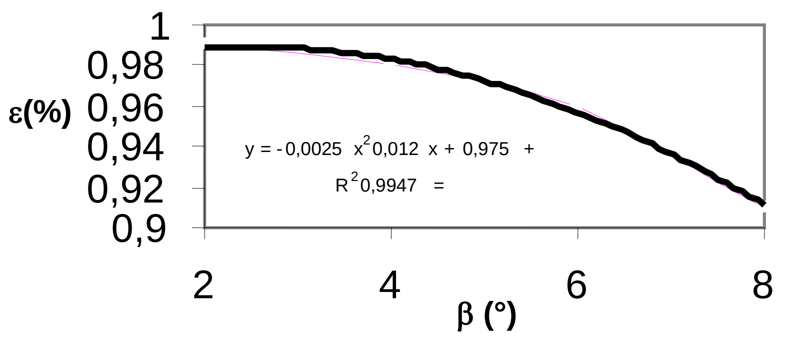

Fig.2. Correlation between the angle of tilt of an inferior separator of a superior framework β, for a angle of tilt of a superior separator of this framework of the separation of the little pulses from initial mass of pulses ε at $V_{air} = 6$ m/s

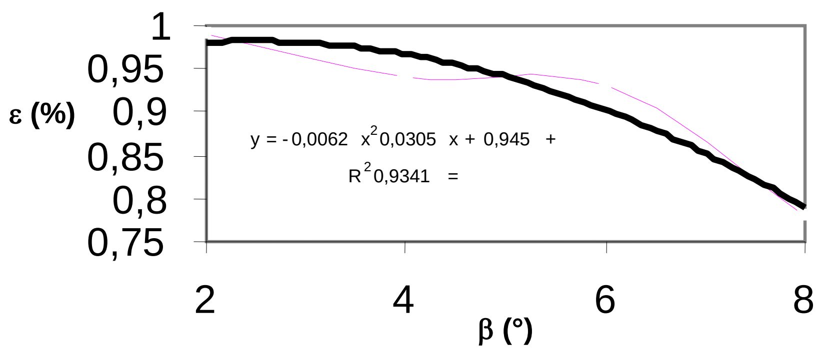

Fig.3. Correlation between the angle of tilt of an inferior separator of a superior framework β, for a angle of tilt of a superior separator of this framework of the separation of the little pulses from initial mass of pulses ε at $V_{air} = 7$ m/s

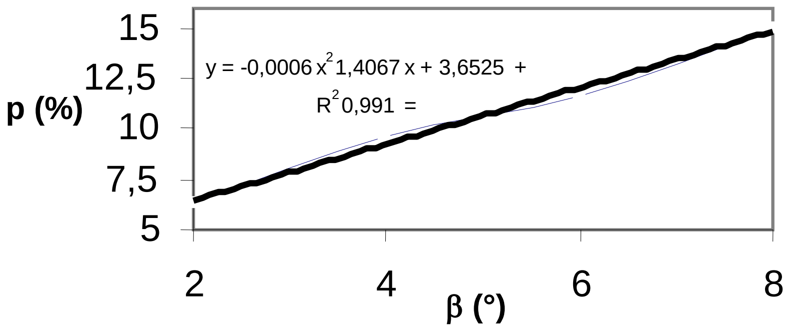

Fig.4.Correlation between the angle of tilt of an inferior separator of a superior framework β, for a angle of tilt of a superior separator of the same framework $\alpha = 4^0$ and the separation degree of the big impurities *p* at $V_{air} = 5$ m/s

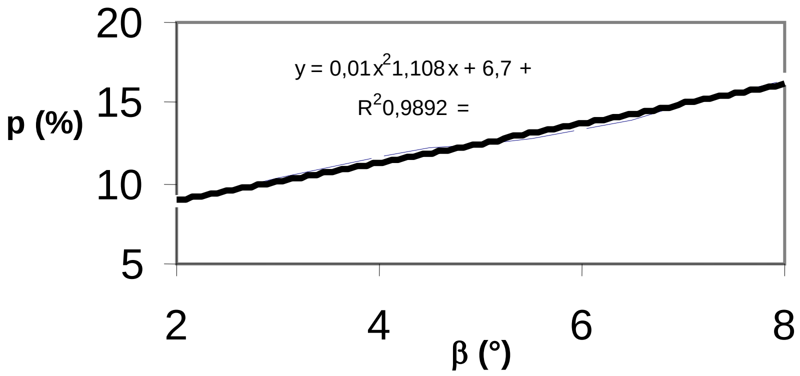

Fig.5.Correlation between the angle of tilt of an inferior separator of a superior framework β, for a angle of tilt of a superior separator of this framework $\alpha = 4^0$ and the separation degree of the big impurities *p* at $V_{air} = 6$ m/s

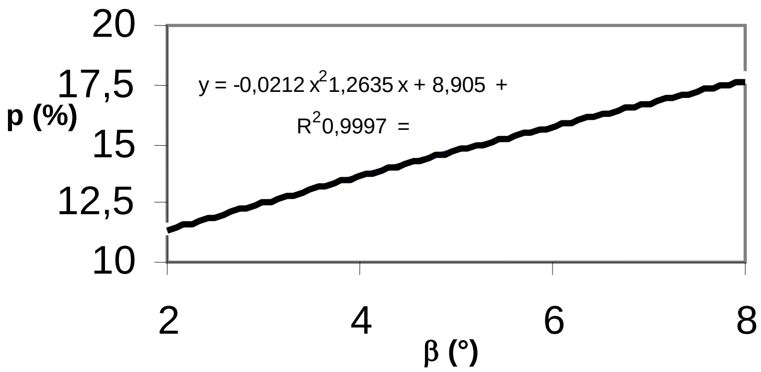

Fig.6.Correlation between the angle of tilt of an inferior separator of a superior framework β, for a angle of tilt of a superior separator of this framework $\alpha = 4^0$ and the separation degree of the big impurities *p* at $V_{air} = 7$ m/s

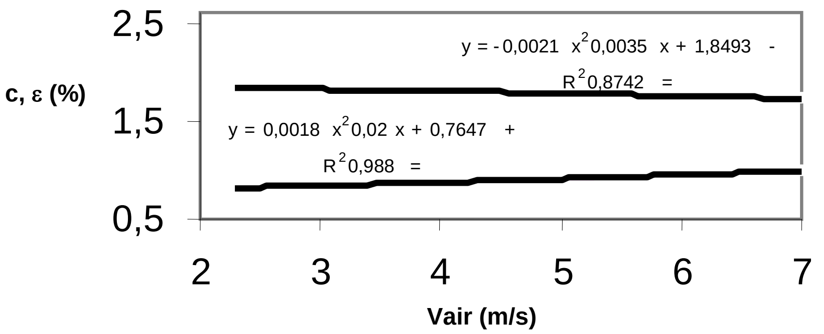

Fig.7.Correlation between air course velocity V_{air} and separation degree of the little impurities *c*, respectively the separation pulses from pulses initial mass ε for the debit of 1kg/s, the separation inclination $\alpha = 4^0$ and inferior separator inclination $\beta = 2^0$

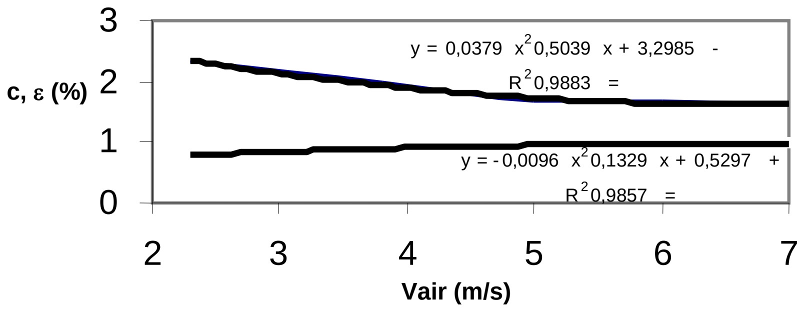

Fig.8. Correlation between air course velocity V_{air} and separation degree of the little impurities *c*, respectively the separation pulses from pulses initial mass ε for the debit of 1kg/s, the separation inclination $\alpha = 4^0$ and inferior separator inclination $\beta = 4^0$

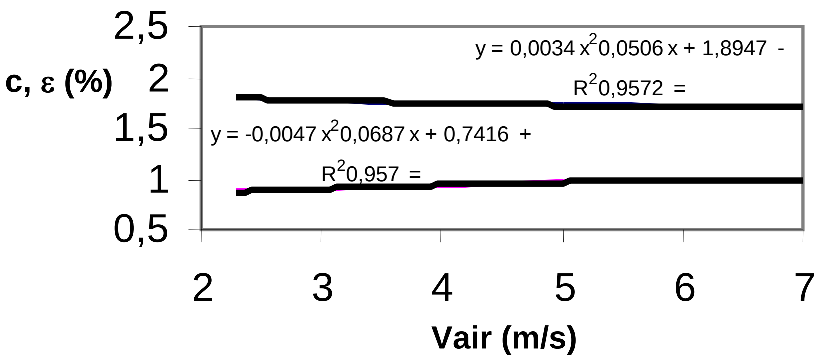

Fig.9. Correlation between air course velocity V_{air} and separation degree of the little impurities *c*, respectively the separation pulses from pulses initial mass ε for the debit of 1kg/s, the separation inclination $\alpha = 4^0$ and inferior separator inclination $\beta = 6^0$

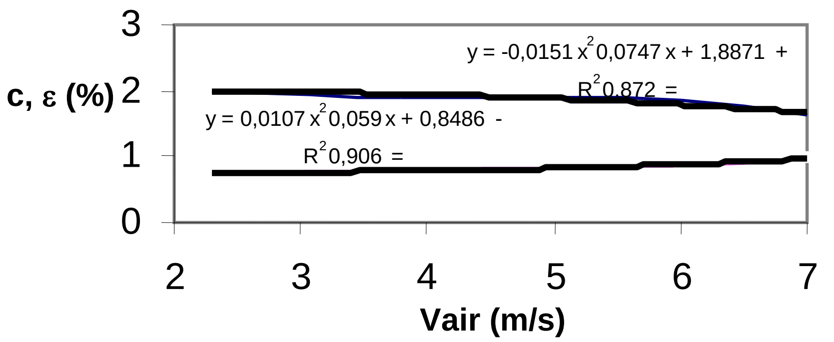

Fig.10. Correlation between air course velocity V_{air} and separation degree of the little impurities *c*, respectively the separation pulses from pulses initial mass ε for the debit of 1kg/s, the separation inclination $\alpha = 4^0$ and inferior separator inclination $\beta = 8^0$

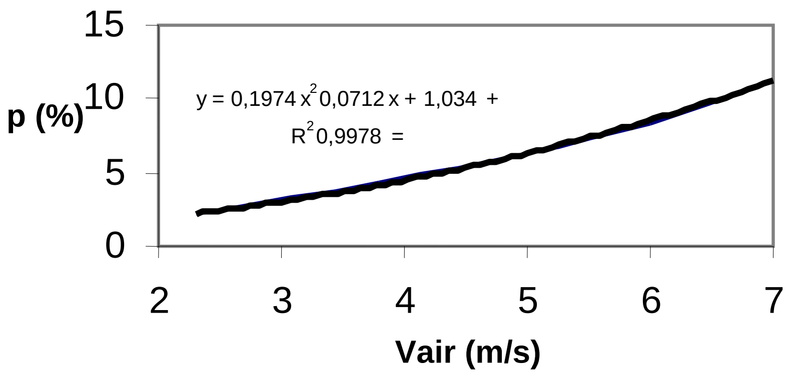

Fig.11. Correlation between air course velocity and the separation degree of big impurities *p* for debit of 1 kg/s, the superior separator inclination of superior framework $\alpha = 4^0$ and inferior separator inclination of superior framework $\beta = 2^0$

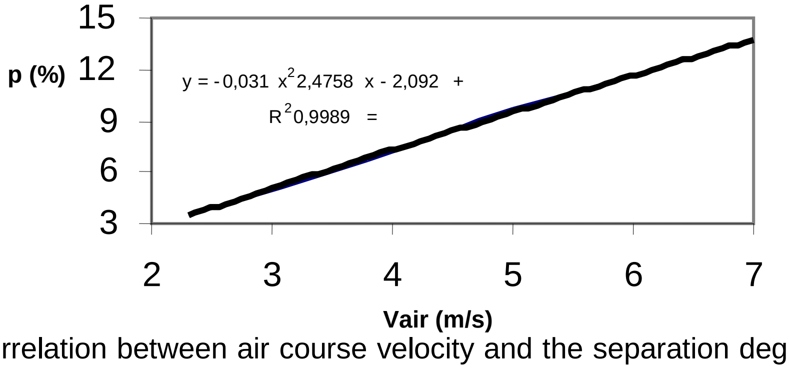

Fig.12. Correlation between air course velocity and the separation degree of big impurities *p* for debit of 1 kg/s, the superior separator inclination of superior framework $\alpha = 4^0$ and inferior separator inclination of superior framework $\beta = 4^0$

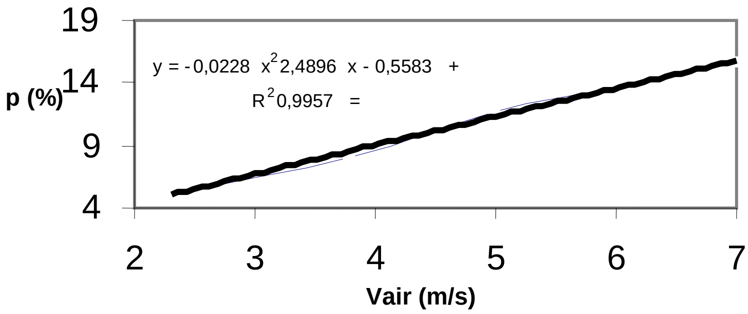

Fig.13. Correlation between air course velocity and the separation degree of big impurities *p* for debit of 1 kg/s, the superior separator inclination of superior framework $\alpha = 4^0$ and inferior separator inclination of superior framework $\beta = 6^0$

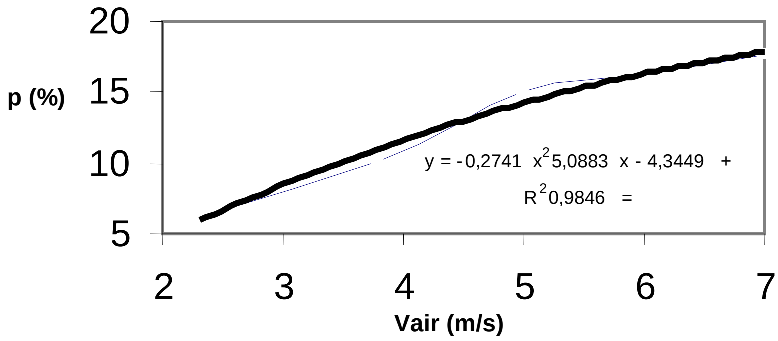

Fig.14. Correlation between air course velocity and the separation degree of big impurities *p* for debit of 1 kg/s, the superior separator inclination of superior framework $\alpha = 4^0$ and inferior separator inclination of superior framework $\beta = 8^0$

3. Conclusions

1. Parameters *p*, *c*, ε vary with the separators inclination and the air course velocities concordant the graphs from figures 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, but the variation mode is better appreciate of the integral rational function of second degree of shape ax^2+bx+c.
2. The correlation coefficient R^2 have the values very high, what demonstrate that the two curve the real one, and the theoretic one are identically or very close.

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