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AERODYNAMIC PROPERTIES OF SOYBEAN GRAIN AND ITS FOREIGN IMPURITIES

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Annotation: In this article, whole grain, broken grain, broken grain, grainy beans, non-grainy beans, stem beans, topon and other light varieties of "Amego", "Selector-201", "Oyjamol", "Soya" grown in our Republic the results obtained in the experiments to determine the parameters of the mixtures on the critical flight speed and the coefficient of sail are presented.

Key words: Shade, cleaning, collection, aerodynamic properties, slop, speed, legume, leaf, khas chop, loose grain.

In the grain cleaning part of the grain combine, their aerodynamic properties, i.e. critical flight speed and coefficient of sail, play an important role in the separation of grains, including foreign impurities in soybean grain, using air flow and winder.

When harvesting soybeans, the grain mixture entering the grain cleaning section of the combine contains lumps and light mixtures of grain, stem pieces, grain and non-grain legumes, and crushed leaves and stems. Grain, in turn, consists of whole grain, broken grain, and broken grain. Stem fragments can also be grouped into 50 mm, 50–100 mm, and greater than 100 mm groups.[1]

Based on this, when determining the critical flight speed of soybean grain and foreign compounds in it, grain, stem fragments, light mixtures and stem fragments were determined separately. In this study, the grain was divided into whole, hollow and broken grains, and broken grains were studied in the form of transversely fractured and longitudinally fractured grains. Stem pieces were also studied separately in groups up to 50 mm, 50-100 mm and larger than 100 mm.

To determine the critical flight speed of grain, an experimental copy of the sail classifier in the "Agricultural Machinery" laboratory of the National Research University "TIQXMMI" was used (Fig. 1).

The sailing classifier consists of a ventilator, a pipe, a sampler, a device for determining the speed of the air flow - an airfrometer, and a sample collector. The ventilator is driven by an electric motor and its number of rotations is changed by a frequency meter. Connecting and disconnecting the electric motor is done with buttons.

After determining the critical flight speed of the samples, their coefficient of sail was found using the following expression.

$$k_n = \frac{g}{V_{kp}^2} \quad (1)$$

Figure 1. Parus classifier

The data obtained in the experiments are summarized and presented in Table 1.

The results of the experiment revealed that the critical takeoff speed in grain sizes would range from 10.1 m/s to 15.2 M/s per grain size and weight. The same indicator is 6.0 m/S – 8.2 M/s in pus and relatively poorer grains. The critical flight rate was 6.3 - 8.8 M/s in longitudinal broken grains, while it was 8.8 - 12.7 M/s in transverse broken grains and was found to be 1.39-1.44 times larger than longitudinal grains.

Table 1.

Soybeans and foreign compounds in its composition

aerodynamic properties

№	Name of samples whose aerodynamic property has been determined	Aerodynamic properties of samples	
		critical flight speed, m/s	Parus coefficient, 1 / m
1	half a grain	10,1 - 15,2	0,042 - 0,09
2	Puch grain	6,0 - 8,2	0,14 - 0,27
3	Broken grain:		
	- longitudinally	6,3 - 8,8	0,12 - 0,24
	- transverse	8,8 - 12,7	0,06 - 0,12
4	Grain beans	6,8 - 10,4	0,09 - 0,21
5	Beans without grains	3,8 - 6,5	0,23 - 0,67
6	Stem pieces:		
	- up to 50 mm	2,2 - 6,3	0,24 – 2,02
	- up to 100 mm	6,5 - 12,7	0,06 – 0,23
	- greater than 100 mm	13,2 - 24,6	0,056 - 0,16
7	dust and foreign impurities	0,82 - 4,22	0,55 – 14,64

On the basis of these values of the critical flight speed (1), it was found that their parusity coefficient with an expression was calculated to be 0.042-0.09 m-1 in a split grain, 0.14 - 0.27 m-1 in a puch grain, 0.12 – 0.24 m-1 in a longitudinal broken grain, and 0.06 – 0.12 m-1 in a transverse broken grain. In this case, it was found that samples with a high critical flight rate have a small parusity coefficient, while samples with a small critical flight rate have a large parusiness coefficient.

The critical takeoff speed in grain pods was 6.8 - 10.4 M/s, the parusity coefficient was 0.09 - 0.21 m-1, and in grain - free pods the critical takeoff speed was 3.8 - 6.5 M/S and the Parus coefficient was 0.23-0.67 m-1.

Critical take - off rates ranged from 2.2 - 6.3 m/s on the stem slices up to 50 mm in size, 6.5 - 12.7 m/s on the stem slices 50 mm to 100 mm in size, and 13.2 – 24.6 m/s on the stem slices larger than 100 mm in size, with a parusiness coefficient of 0.24-2.02 m – 1, 0.06-0.23 m – 1 and 0.056-it was determined to be 0.16 M-1.

The smallest critical takeoff velocity and largest parusity coefficient were found to be in ballooning and light mixtures containing soybeans, with critical takeoff rates in the range of 0.82 - 4.22 m/s, and parusity ratios in the range of 0.55 – 14.64 m-1.

According to the results of the experiment, it turned out that the minimum flight speed is achieved by weak and broken grains, while the size is 6.0 M/s – 8.2 M/S and 6.3 - 8.8 M/s, the critical flight speed is 6.5 M/S and higher even on 50 mm and larger pieces of stems, which is almost the same This necessitates the development of new technical solutions to separate them by size in addition to airflow as part of the combine grain treatment.

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