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«Evaluation of the process of pelleting for pre-sowing treatment of flax seeds»

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Relevance

- The study of natural ingredients for fertilizers with the activation of physiological processes in the seeds of flax.
- Analysis of methods and means of pre-sowing seed treatment.
- Mathematical modeling of the process of coating flax seeds with a loose layer for pelleting.
- Mathematical modeling of the process of deposition of particles of a mixture for pelleting on the surface of seeds in the process of dispersion.
- Development of pre-sowing seed treatment technology.

Solutions

- Method of electrophysical treatment of seeds with activation in the infrared range with wavelength 3...4 microns.
- Method of seed pelleting with expanded perlite and biohumus.
- The kinetics of seed pelletizing in the granular layer for pelleting leads to a spherical shape of the pellet, with adhesion occurring due to the stresses in the zone of contact between the solid particle and the granular perlite. The equation of the surface granules :

$$|z(x,\tau)| = \delta + b\sqrt{1-\left(\frac{x}{a}\right)^2}$$

where, ***z(x,τ)*** - the shape of the seed mate line in the plane over time; ***δ*** - thickness of the layer of the pellet, m. ; ***a*** the long semiaxis of the ellipsoid seed; ***b***– hort semiaxis of the ellipsoid seed; ***x*** - *pairing line.*

- The kinetics of particle deposition of the mixture for pelleting on the surface of seeds in the dispersion process is determined based on the process of particle deposition on the spherical surface of the pellet. Equation for determining the thickness of the dragee layer on the surface of the pellet :

$$\delta = R\theta\left(1-e^{-\beta\frac{\tau}{T}}\right), \quad \text{where}$$

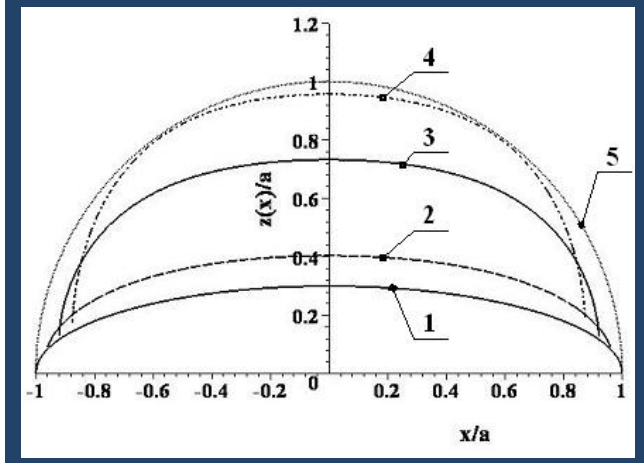
$$\theta = \left(\frac{R_0}{R}-1\right), \quad \beta = \ln\left[\theta\left(\theta-\frac{\delta_T}{R}\right)^{-1}\right].$$

τ – time; ***R*** – thickness of the layer for coating on the surface of the pellet, m; R_0 – radius of the sphere on which the adhesion process stops; ***T*** - technological period of time, s ; δ_T -technological thickness of the layer of the pellet, m.

- The technology of pre-sowing seed treatment occurs in two consecutive ways. IR irradiation to activate biological processes of seeds followed by pelleting with perlite and biohumus.

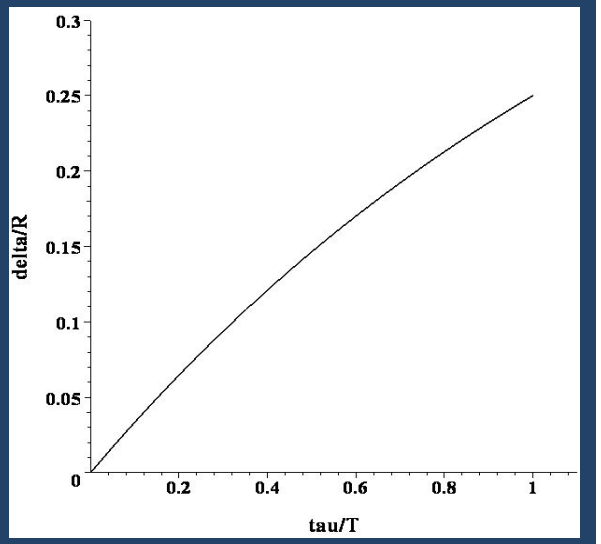
Findings

Changing the surface of the jelly beans with the change of time



1 – if τ = 0 (for the surface of the seed);
2 – if τ = 0.1T;
3 – if τ = 0.5T;
4 – if τ = 0.9T;
5 – for spherical surface

The dependence of the thickness of the layer on the time of time at a = 0.5, δ_T/R = 0.25.



Deceleration of the particle deposition process as a function of time ($d^2\delta/d\tau^2<0$), due to the limited amount of the mixture for pelleting in a dispersed medium

- The process of electrophysical treatment with IR radiation of seeds promotes activation of biochemical processes and increase of seed germination.
- The process of seed pelleting with perlite and biohumus, allows you to cover the seeds with a shell with the necessary components for plant nutrition during the growing season.
- The use of perlite will provide additional conditions for plant nutrition due to its hydrophobicity.
- The combination of all processes and natural components used in pre sowing seed treatment involves a technology that eliminates harmful effects on the environment.
- Field studies conducted with treated flax seeds of the Voskhod variety at the pre-sowing treatment plant (UPO-01) showed the results of increasing the yield of fiber by 5.7 C/ha and seeds by 1.6 C/ha.

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