Native nanoobjects and technology of capsulation increasing their stability to environment unfavourable factors**.**

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In the before performed works (1-2) and published results of these investigations, some important peculiarities were elucidated concerning seeds functionalizing in the rest conditions, emergence from it and also the influence of polymeric cover on physiological processes underlying in the base of seeds sprouting (1-2). It was established in particular that ton the earliest stages of seed sprouting water inflow in the seed has an oscillating character whereas the polymeric covers disturbing water inflow rhythm regulates some physiological processes, in particular hydrolysis of some substances and velocity of hydrolysis products inclusion in the substances biosynthesis de nuovo. (4) The results of these investigations allowed us to consider the seed as an dissipative system and to elucidate the role of closed space between the rind and the seed germ where this dissipative system is realized (5).

Addressing to some analogies which are at present when nanotechnologies are used and some high effective materials obtaining in the production of drug media, sorbents,construction materials etc, especially in that part of technologies when the porous materials (having pores of nanosizes) are filled by the products of the same nature but lesser size, stabilizing by various ways and determining their unique properties and effects which have been reached in the course of seed treatment with the use of polymer covers, we have undertaken an attempt to consider the method of the seeds presowing preparation from the point of view of modern technologies.

Starting from the common concept of the seeds water regime (10) in the course of their ripening and transition to the rest state the germ dewatering is observed. As a result its volume decreases sharply. It seems that at the same time any closed space is formed between the rind and the germ. The seeds dewatering and close space formation lead to rind dewatering. Evidently that together with water in the course of dewatering in the closed space the metabolites and part of chemical compounds (or the products of their destruction) which inflow outside and possibly from the rind inside. In the closed space the emanated metabolite solvents , chemical substances and the products of their hydrolysis are mixed and may create in it aggregates of various structure and size including nanosizes. Starting of relaxation times hierarchy the probability rind pores filling with small particles is lighter as compared to larger particles. The last ones form in the closed space aggregates which provide the seed additive stability due to the limitation of water inflow outside through the rind in the closed space that provides the seed rest. This phenomenon is connected evidently to the stabilization of smaller particles in the rind pores. His case the system in common ordered and seed entropy decreases (9).
Inside of the closed space there are the ways connecting the germ to the rind inside surface and continuing possibly in all its (rind) thickness. By these canals (capillaries) the solved metabolites, chemical compounds and the products of their decomposition move to the rind inside surface and then deeper in it and close its pores, some of which are nanopores, proceeding of their dimensionality. Thus the ripening seed provides itself the minimal moisture access inside at the its transition into the rest state. The closing of these pores by metabolites, chemical substances and the produce of their destruction leads to the formation of specific structures where the rind pores are filled with small particles presenting the aggregates previously formed in the closed space and then transferred into the pores. Particles aggregation in the pores up to nanosizes leads to the formation of their high surface energy which weakly dissipates due to hypothesis on nanoparticles stabilization in the pores by agglomerates, formed from the larger particles in the closed space

which as if “hanging” over the pores. All this in common provides the nanoproperties to the system consisting in the seed stability.

It seems that the reasoning on the formation such of nanosystems are just because it possess the unique nanoproperties, namely high functionality. High functionality is reflected in the possibility of such nanostructures of the seed energy and mass transfer with the environment on the level which is necessary for the seed in the course of rest conditions and in the rest to create the seed reliability in the conditions of the environmental parameters weak fluctuations to keep the necessary low level of metabolism which is characteristic of resting seed and at last to realize the conditions of functionalizing of closrd space between the rind and the germ (5).

In the resting seed the level of metabolite processes is low (10). In the case of their proper keeping they do not lose their sowing properties and under the definite conditions (moisture, temperature) the seeds get out of the rest state and then sprouts. At the higher level of fluctuations the pores extend , superfluous surface energy of nanoparticles dissipates; as a result nanostructure destroys and water begin to inflow into the seed. When the seed contacts with water at the optimal temperatures for its sprouting water permeates through the closed pores. It entry through the closed space in the germ and activates the physiological processes lying in the bases of sprouting (hydrolysis of store substances, inclusion of hydrolysis products in metabolism of sprouting seed. As the germ watering increases its volume increases too, the volume of closed space decreases, the pressure in it increases and larger particles agglomerated in the closed space ”hanging” over the pores at the seed rest state “pressed out” the seed border. Metabolites and the products of destruction as well as the part of chemical substances which closed the pores at the seed transition into the rest state are thrown out, that provides the increase of the rate and the quantity of water inflow into the seed.

It’s apparently to ask the question if it’s necessary at such level of safety to increase it more by the seed treatment with polymers. Of course it’s necessary, especially for the seeds which have not the deep rest and placed in the conditions of often changing environment parameters in the period of the seeds sowing. At the extreme conditions of environment , polymer cover of the seeds having not deep rest preserve them of unfavorable conditions providing the additional safety. Under the favorable conditions the before developed mechanism operates. It consists in the hindering of water inflow in the seed, accumulation of the intermediate products of substances exchange which include in the biosynthesis process of the sprouting seed with the dissolution of polymer cover. Owing to realization of this mechanism the seed sowing energy increases as well as their laboratory and field sproutness.

Considering the previous authors reasoning it is obvious that polymeric covers in the period of polymers swelling do not hinder the pores release of small particles but they do not allow to include the mechanism of the larger particle “pressing out”, which formed in the closed space, through the pores and polymeric covers for the time of the cover full solution. Such effects are inherent to water-soluble film-forming polymers possessing high adhesion to the seed surface and high sorption capacity. Besides these polymers have to have high solubility under the creation of optimal conditions of environment for the seeds sowing. To such polymers providing fine-porous covers belong some water soluble polymers vinyl variety polymers, polysaccharide derivatives (cellulose, chitin) their mixtures etc (1-3).

Thus considering the seed unique adaptive properties, high reliability to environment factors action, the seed (as an dissipative system) can be considered as nanostructure possessing nanoproperties.

On the mechanism considered realizing in the resting seed and at the outcome from the rest it can be expected that these mechanisms promote the formation native seed. nanoobject-the seed. The

method of the seed treatment with polymers which use allows to increase the seed reliability to realize the mechanism regulating the velocity of water inflow into the seed and the processes underlying in the base of it sowing as well as the seed sprouting allows to consider it as a nanotechnology and polymeric cowers (depending on their nature, molecular mass, concentration etc)at the definite conditions the seeds presowing treatments as nanomaterial which allows to change significantly the properties of the seed as a native nanoobject.

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