

energy conservation law is impossible to avoid. The intensity variation can be compensated by an adequate sensitivity shift of the retina, and the third maximum loss cannot be compensated at all.

At the present time, the “Reper-NN” Research and Development Enterprise – is the only one of the kind, which produces trifocal diffractive-refractive intraocular lenses “Record-3” with a rectangular profile diffractive relief (the lenses “Record-2” are a bifocal variant of the same design). These lenses are a co-design of the Nizhny Novgorod State University named after N.I. Lobachevsky (computer modeling and concrete construction calculation) and the “Reper-NN” Research and Development Enterprise (fabrication method and production). The first clinical trials of the “Record-2” lenses and the world’s first successful clinical trials of trifocal lenses (“Record-3”) have been carried out in the Cheboksary Branch of the FSU IMTC “Eye Microsurgery” named after the Academician S.N.Fyodorov [1]. The results of these trials (about a hundred patients) testify that the patients with a bifocal eye-lens “Record-2” see equally well both nearby and distantly, and the patients with a trifocal eye-lens “Record-3” see equally well nearby, distantly and in between intervals. The area of the distances corresponding to a poor image focus has significantly decreased. The questionnaire survey of the patients has proved their satisfaction with the surgery results – a person with a trifocal intraocular lens has got an opportunity to see well distantly (to drive a car), read a book and watch TV without glasses on.

Therefore, a trifocal intraocular lens, principally exceeding all the existing bifocal lenses in its functional characteristics, has been calculated, designed and for the first time in the world manufactured on the “Reper-NN” shop floor in collaboration with the

Nizhny Novgorod State University named after N.I. Lobachevsky. There is no trifocal lens efficient analogue in the world for the time being. The lens has successfully passed the first clinical trials.

References

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PEA PLANTS’ SUBSTRATE HEAVY METALS CUMULATION RESISTANCE PROMOTION BY MEANS OF SEEDS TREATMENT WITH SUPER-LOW DOSAGE OF SALICYLIC ACID

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The investigations of heavy metals content (Pb, Ni, Cd) in pea plants with the pre-treatment of the seeds with salicylic acid has been carried out. The induced plants’ growth in the media rich in heavy metals has been investigated. It has been established that the treated plants accumulate toxic compounds in a less degree compared to the control and retain the ability to healthy growth in polluted media. It is offered to treat the seeds with salicylic acid in the concentration of $2 \cdot 10^{-8}$ M before planting.

Table 1. Heavy metals content in plants and MCL for their vegetable forages.

Substance	HM content in plants, mg/kg				MCL in vegetable forages of natural humidity, mg/kg
	Non-treated with SA		Treated with SA		
	смесь Кноппа	Knop’s mixture + Pb, Hg, Cd	Knop’s mixture	Knop’s mixture + Pb, Hg, Cd	
Cadmium	<0,004	0,42	<0,004	0,10	0,3
Lead	<0,012	8,52	<0,012	2,26	5,0
Nickel	0,058	12,32	0,058	1,17	3,0

Cultivated plants intensively absorb special substances from the soil solution. The pea family plants can accumulate a considerable amount of metals, the dangerous for animal bodies heavy metals (HM) (with the density of 5 g/cm^3) among them. Taking into account a regular increase of not used in the metabolic process substances’ concentration, a health hazard for people or animals making use of such contaminated products can emerge in the following food links [2].

In connection with the abovementioned the laboratory research on the study of physiological growth

and the ability to toxic metals accumulation by the pea plants’ organs at the pre-sowing treatment of the seeds with salicylic acid (SA) with the concentration of $2 \cdot 10^{-8}$ M [1] was carried out. The investigations of heavy metals’ - Pb, Ni, Cd - content were carried out in the accredited by the scientific research testing laboratory of the Orel State Agrarian University according to standard practice [3]. The valuation of the physiological state of the plants was performed visually. For the heavy metal standard the limits of their concentrations promoting normal regulation of functions in plants are taken.



Pic. Development of pea plants against the background of heavy metals:
1 – non-treated with SA; 2 – treated with SA.

The studied plants varied in their ability to accumulate heavy metals. At the pre-treatment with SA the toxic metals accumulation in the quantities not exceeding the MCL (maximum concentration limit) was registered in the tissues. At that nickel was accumulated in the maximal concentrations, and cadmium – in the minimal ones. In the nutrient solution with a high concentration of HM the non-treated plants accumulated the metals in the concentrations considerably exceeding the MCL. The data of the table show that the lead content in this variant exceeded the norm 1,7 times, and nickel – 4,1 times. As the results of visual observations testify, a high HM concentration in the nutrient mixture without the plants' pre-stimulation with super-low SA dosages leads to the inhibition of growth processes (pic.).

According to the analysis results the plants grow better and accumulate a less amount of HM when using super-low dosages of endogenous stimulants of nonspecific resistance, which salicylic acid is referred to. This method allows obtaining the envi-

ronmentally sound forage crop at a high technogenous load.

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Shot report

USE PERSPECTIVES OF MULTIFUNCTIONAL SPACE SYSTEM OF RUSSIAN-BELARUSIAN FEDERAL STATE FOR HUMAN PURPOSE

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The article is devoted to the possibilities of perspective multifunctional space system of the federal state of Russia and Belarus to the benefit of maintenance support of Russian and Belarusian specialists' education, training and retraining process. Both general problems connected with the Federal State multi-

functional space system creation and the problems of its application for human purposes, in the interest of Russian and Belarusian citizens' training using a distant mode of study in particular, have been considered in the article.

In the modern stage of the Federal State development an effective economic cohesion of Belarus and Russia is impossible without the creation of an integrated information and educational space affording an opportunity to get and apply the data throughout the whole collaboration spectrum operatively. Taking into account the current level of the space systems and technologies development one can legally speak nowadays on the paramount role, which the space-