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## **To the question of influence of genetically modified soy on living organisms**

**Aim.** To find out the mechanism of influence of water extraction of genetically modified and not ГМ to soy on the height of peas in the field and laboratory terms, influence of ррифосату on the height of plantlets and counterfoils of bobs ГМ to soy. **Methods.** Water extraction of soy was got in the process of boiling by 200 gs of bobs in 3 л of the distilled water during 1 hour **Results.** After sprinkling of peas by water extraction ГМ substantially the height of stem, length of counterfoil, amount of bobs and mass, diminished soy 1000 grains. Researches on piglets lasted in And, II and III generations. **Conclusions.** In basis of mechanism of action ГМ there is a presence soy in bobs biologically active toxic connections that is not in not ГМ to soy.

**Key words:** *genetically modified soy, water extraction of soy, acrospires, double-dish, ррифосату, piglets.*

Genetically modified soy is a high-protein culture, but about her use in foodstuffs for children and young people discuss in many countries of the world. And these discussions last, without regard to that in experiments on laboratory animals (mice, rats, hamsters) for feeding different them ГМ cultures as forage in composition a ration found out pathological changes in a liver, підшлунковій and щитоподібній glands, spleen and сім'яниках [9, 11, 14, 15]. At the same time violation of reproductive functions is set for rats, changes of hormonal balance and sterility in next generations [1-5]. Consumption ГМ results peas in changes in the immune system and fever of lungs for mice [13]. Supporters ГМ organisms assert that foreign genetic insertions concretely in ГМ soy is tested zymolysis in the digestive tract of animals and people, and that is why she can be used as food stuff.

In the experiments on pigs, in that the type of processes of digestion is near to human, conducted by us, it was set that of long duration feeding to the piglets from early age of transgene soy negatively influenced on their reproductive ability and small toxic operating on their liver and kidneys of the yet unidentified connections ГМ to soy and remain of ррифосату in her [7].

Before opening of the toxic operating on a liver and kidneys of pigs of the unidentified connections ГМ the researches of influence of water extraction conducted by us were induced soy ГМ to soy comparatively with the same extraction not ГМ soy on likeness, chitting and germination of grain of wheat, тритикале and ryes. Set, that water extraction from ГМ to soy by comparison to not ГМ does not influence soy on the marked criteria of estimation of grain a germination of that was at the level of 90-94%, as well as on the distilled water, but in future ГМ soy sharply in 1,9-2,5 раза repressed intensity of linear height of plantlets comparatively with not ГМ to soy [6].

For the receipt of water extraction ГМ and not ГМ it was weighed out soy for 25 gs of bobs of both variants and filled up in heat-resistant glass glasses, then added the distilled water for 300 mls, heated to boiling and boiled 30 min

An aim is inactivation of уреази, antitrypsin, antichymotrypsin and other antinourishing and bioactive substances. After boiling decoction was filtered through nylon fabric and thus got water extraction ГМ and not ГМ to soy [6].

In opening of інгібувальної action of the unidentified connections in water extraction ГМ we went out soy from that in solution the водорозчинні squirrel of bobs, that during boiling is denaturized, went across in the process of heating. Go across also ізофлавоїни, glycosides, phenic acids, but these acids are useful to the kidneys of animals, as prevent окиснювальному stress [8, 12]. From data of G.-E. S?ralini and other [10], general chemical composition of grain ГМ corn can not be certain in details, as the use of substantial equivalence not enough, to distinguish potential unknown toxins. Yes, in blood of people found out the presence of toxin ГМ egg-plants the sale of that is forbidden. Egg-plants contained the toxin got from the ground bacterium *Bacillus thugiensis* (Bt). Research is conducted in the university of Шербрука (Canada)[7].

In bobs ГМ there is a gene of bacterium *Agrobacterium soy tumefaciens*, that can synthesize own to the albumen and low-molecular toxic connections foreign for not ГМ to soy. In water solution from bobs ГМ bits and pieces of гліфосату and low-molecular toxic connections that does not collapse under act of high temperature in the process of boiling go across soy.

An aim of researches is a study of the unidentified connections in water extraction from bobs ГМ and not ГМ soy and realization of researches in the field and laboratory terms.

Material and methods of researches. There were the sown peas in the field terms. After the receipt of friendly stair the area of sowing was divided into 3 identical areas by an area for 1 м2: on 1th to the area the puff surface of peas was sprinkled by the distilled water, on 2th - by water extraction not ГМ to soy, on 3th - by the same extraction ГМ to soy. Sprinkling conducted through a day to the complete forming of bobs. Water extraction of soy was prepared on every area on the above-mentioned methodology with some changes. Наважки of soy took for 200 gs and added 3 л of the distilled water. Boiling lasted 1 hour During sprinkling the distilled water and water extraction of soy of both variants considerable part of water and extraction got on earth. After ripening of peas from every area it was selected for 10 plants, characteristic for every variant. Plants undermined, not to injure a root. After it measured the height of stem, length of counterfoil, amount of bobs in particular large and small. 1000 grains determined mass of grains from 10 plants and mass.

Influence of sprinkling the distilled water and water extraction of soy of both variants (table. 1) is certain.

### 1. Peas with sprinkling the distilled water, by water extraction ГМ and not ГМ to soy (in 09.07.2013 is collection)

Indication	Height stems, mm	Length root, mm	Number of beans, pcs.			Weight 1000 grains, g
			total	in particular		
				big	small	
Sprinkling : by the distilled water (control)	77,7±2,2	12,2±0,7	5,2±0,6	3,9±0,4	1,3±0,5	275,0
водною витяжкою не ГМ сої	67,9±1,3	7,3±0,6	3,9±0,4	2,8±0,5	1,1±0,4	267,5
water extraction GM soya	55,5±1,9	5,4±0,2	2,6±0,2	1,2±0,3	1,4±0,3	230,0
P1 <	0,001	0,001	0,001	0,001		
P2 <	0,001	0,01	0,05	0,05		

About persuasiveness of інгібувальної, id est toxic action of water extraction ГМ to soy on a linear height, forming of grain of peas comparatively with a control variant and analogical extraction not ГМ the data resulted in a table testify soy. 1. it is unexposed інгібувальну action of water extraction ГМ to soy on the root of peas, as sprinkling of puff surface must in a greater degree influence on the height of stem and forming of grain. The obtained data ground in order to ratify toxic action of bits and pieces and метаболітів

disintegration of глифосату in grain ГМ to soy. For this determination laboratory researches are conducted with grain ГМ to soy. In particular, in double-dish plantlets are got on the distilled water. In every cup it was for 50 identical grains. After formation of plantlets the water distilled up to the top is inundated in a 1-шy cup, in 2-ry also up to the top 2% th solution of раундапу and in 3-тy - 4% th solution of раундапу. Water and solutions of раундапу were in the cups of 2 год, then they were angered and cups again covered lids. The height of sprouts in room terms lasted during a 6-8 twenty-four hours. After it measured length of plantlets and counterfoils (table. 2).

The analysis of the obtained data testifies that ГМ soy is adapted to 2% of th solution of раундапу, that is a worker and brought in on her sowing in the conditions of production. Sprinkle a puff surface this solution and him certain part through soil acts to the rootage that does not react on the adapted concentration of глифосату, while 4% th his solution represses the height of counterfoil of soy in the conditions of in vitro (see a table. 2). Such solution of глифосату not ГМ soy does not maintain - her plantlets turn yellow and a height ceases. Comparison of these data grounded to us to estimate ГМ soy in foodstuffs on other criteria.

## 2. Influence of глифосату comparatively with the distilled water on the linear height of plantlets and counterfoils ГМ to soy in double-dish (middle data)

Indication	Length	
	seedlings	root
Distilled water (similarity - 96%, number of grains - 50)	7,64	4,03
Treatment with glyphosate solution:		
2%	5,39	4,12
4%	5,06	3,50

Determined energy of height of grain ГМ and not ГМ to soy. Вистеляли the bottom of double-dish a double paper filter and placed for 50 grains ГМ and not ГМ to soy and added the distilled water to the full cover of grain. Cups covered and abandoned on 4 год for even набужнявння of bobs of soy. After it from cups poured out water, covered again lids and abandoned on a 6-8 twenty-four hours at a room temperature for determination of end-point of intensity of height of plantlets.

Results of researches. Energy of height of plantlets ГМ to soy comparatively with not ГМ soy was very high. It grounded to us to consider ГМ soy conditionally by a "hybrid culture". In fact it is known that a hybrid corn provides the higher productivity of grain on 20-30%. Genetically modified soy combines in itself genetic basis actually to soy as a main transmitter of heredity and genes of the ground bacterium *A. tumefaciens*. Such combination strengthens a synthesis both own squirrel of soy and foreign for her. At the same time the synthesis of toxic connections increases or them by the метаболітів genes of *A. tumefaciens*. These can explain diminishing of length of stems and counterfoils of plants of peas under act of water extraction ГМ to soy (protective function of plant).

Feeding to the piglets from 2-monthly age ГМ to soy in composition of ration negatively influenced on reproductive ability to the sapling/pl of pigs of I-III of generations [7].

Researches of reaction of acrospires of cereals and peas as cultures are conducted by us in the field terms on water extraction ГМ and not ГМ it is testified soy to the presence in ГМ to soy of the unexposed factors of negative influence. Such researches are not very materially an expense, that is why can be conducted on an analogical chart or with corresponding changes in any biological laboratory. At the same time ГМ soy it is expedient conditionally to reckon to the "hybrid culture" that combines in itself genetic basis actually to soy (as a main transmitter of heredity) and genes of the ground bacterium *A. tumefaciens*.

By the result of researches of G.-E. S?ralini and other there is a conclusion, that a consumption over of глифосату in water of the higher settled limits can bring to the pathological changes in a liver and kidneys of laboratory animals [10]. Violations over of biosynthesis, that can arise up through excessive expression of transgene of EPSPS in the corn of GM NK603, can bring to the comparative pathologies related to anomalous or unbalanced phenic acids of метаболітів or family connections. Other mutagene and metabolic

factors of food genetically modified organisms (ГМО) can not be remote. It is the article of future researches, in particular determination of presence of глифосату in fabrics of rats. Reproductive and inherited researches also add the new penetrating to these problems. G.-E. S?ralini and other consider that agricultural food ГМО and new pesticides needs to be estimated very carefully in long-term researches for determination of them potential toxic effects [10].

Laboratory and field researches and of long duration experiments are conducted by us on the sapling/pl of pigs during And, II and III of generations ground to draw conclusion, that in basis of mechanism of influence ГМ to soy on plants, organism of animals and people are mediated presence in grain ГМ to soy of the high-activity toxic connections synthesized by the genes of the ground bacterium *A. tumefaciens*. Bits and pieces of глифосату and him метаболітів in the bobs of soy can have a toxic action also.

ГМ soy after our researches conditionally belongs to the "hybrid" cultures with high biological activity of genetic basis of bacterium *A. tumefaciens*, that is why biologically active connections or метаболіти of partial or complete synthesis of these bacteria or them similar to must not be contained in foodstuffs for people.

### Conclusions

In basis of mechanism of action ГМ to soy on plants, organism of animals and people are mediated there is a presence in her bobs biologically the active toxic connections synthesized by the genome of the ground bacterium *A. tumefaciens*, and bits and pieces and to метаболіти disintegration of глифосату. ГМ soy needs to be conditionally reckoned to the hybrid cultures with high biological activity of genetic basis of bacterium *A. tumefaciens*, that is why biologically active connections or метаболіти of partial or complete synthesis of these bacteria or them similar to, and also bits and pieces and метаболіти глифосату must not be contained in foodstuffs for children and young people.

### Bibliography

1. Ермакова И.В. Влияние сои с genome of EPSPS CP4 on физиологическое состояние и репродуктивные функции крыс in первых двух поколениях/of И.В. Ермакова//Современные проблемы sciences of и образования. - 2009. - № 5. - С. 15-21.
2. Ермакова И.В. Генетически модифицированная soy of приводит к снижению веса и увеличению смертности крысят первого поколения. Предварительные of исследования/of И.В. Ермакова//Экоинформ. - 2006. - № 1. - С. 3-6.
3. Ермакова И.В. Изучение физиологических и морфологических параметров in крыс и of их posterity at использовании диеты, содержащей soy by the с transgene of EPSPS CP4/И.В. Ермакова, И.В. Барсков//Современные проблемы sciences of и образования. Science Биологические. - 2008. - № 6. - С. 19-20.
4. Малыгин А.Г. Влияние соевой диеты on репродуктивные функции мышей/of А.Г. Малыгин//Современные проблемы sciences of и образования. Science Биологические. - 2008. - № 6. - С. 23.
5. Малыгин А.Г. Соевая диета подавляет репродуктивные функции грызунов/of А.Г. Малыгин, И.В. Ермакова//Современные проблемы sciences of и образования. Science Биологические. - 2008. - № 6. - С. 26.
6. Oppression of height of acrospires of wheat, тритикале and ryes under act of water extraction of раундапостійкої ГМ to soy comparatively with not ГМ by soy/of М. Ф. Кулик, О. In. Корнійчук, В.Д. Бугайов and other Вісн. аграр. sciences. - 2013. - № 6. - С. 21-24.
7. Reproductive ability and physiology state of liver and kidneys of pigs at of long duration feeding of раундапостійкої ГМ to soy/of М. Ф. Кулик, Я.М. Кулик, О. In. Корнійчук and other Вісн. аграр. sciences. - 2013. it is the Special producing, September. - С. 88-92.
8. Ferulic of acid, a natural protector against carbon tetrachloride - induced toxicity/of М. Srinivasan, R. Rukkumani, A. Ram Sudheer, V.P. Menon//Fundam. Clin. Pharmacol. - 2005. - 19. - P. 491-496.
9. Fine of structural analyses of pancreatic acinar cell nuclei from mice fed on of GM of soybean/ of М. Malatesta, M. Biggiogera, E. Manuali of et al.//Eur. J. Histochem. - 47. - 2003. - P. 385-388.

10. Long of term toxicity of an of Roundup of herbicide and an of Roundup - tolerant genetically modified maize. *Food Chem. Toxicol/G.-E. S?ralini, E. Clair, R. Mesnage of et al.* - 2012. - 50(11). - P. 4221-4231.
11. Puztai A. Report of of project coordinator on data produced at the of Rowett Research Institute. SOAEFD of flexible of Fund Project Ro 818/A. Puztai. - 22 October, 1998.
12. Rehman M. Attenuation of of oxidative stress, inflammation and early markers of tumor promotion by caffeic acid in of Fe - NTA of exposed kidneys of of Wistar of rats/of M. Rehman, S. Sultana//*Mol. Cell. Biochem.* - 2011. - 357. - P. 115-124.
13. Transgenic of expression of bean alpha - amylase in peas results in altered structure and immunogenicity/of V.E. Prescott, P.M. Campbell, A. Moore of et al.//*Journal of of of Agricultural of and of Food Chemistry.* - 53. - 2005. - P. 9023-9030.
14. Ultrastructural of analysis of testes from mice fed on genetically modified soybean/of L. Vecchio, B. Cisterna, M. Malatesta of et al.//*Eur. J. Histochem.* - 2003. - 48. - P. 449-453.
15. Ultrastructural, morphometrical and immunocytochemical analysis of hepatocyte nuclei from mice fed on genetically modified soybean/of M. Malatesta, C. Caporalony, S. Gavaudan of et al.//*Cell Struct. Funct.* - 27. - 2002. - P. 173-180..