

THE STUDY OF SOME HEAVY METALS FROM TOBACCO

STUDIUL UNOR METALE GRELE DIN TUTUN

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Abstract. *The tobacco plant assimilates mineral substances from soil, water and air, pollution's degree of mineral substances having influence on the composition of those plants. The pollution agents include some chemical elements from the environment or administrated, as a consequence of the agricultural technologies applied. Especially, the pollution is due some pesticides, have metals and radioactive elements. These elements were determined in some Romanian tobaccos and Italian tobaccos. The effectuated determinations show values that could be integrated into normal values. A permanent control is necessary for every crop and thermic treatment for tobacco with a higher level, than accepted in international norms.*

Rezumat. *Planta de tutun asimilează substanțe minerale din sol, apă și aer, gradul de poluare al substanțelor minerale având influență asupra compoziției acelor plante. Agenții poluanți includ anumite elemente chimice din mediul înconjurător sau sunt administrate, ca o consecință a tehnologiilor agricole aplicate. Poluarea se datorează, în special unor pesticide, care posedă elemente cum ar fi metale grele sau elemente radioactive. Aceste elemente au fost determinate în câteva tutunuri românești și italiene. Determinările efectuate arată valori care pot fi cuprinse în valorile normale. Este necesar un control permanent a fiecărei culturi și tratament termic pentru tutunul care are un nivel mai ridicat decât cel acceptat în normele internaționale.*

Pesticides

The tobaccos pollution with different remanent amounts of pesticides, presents a special importance as long as pesticides exert their toxic action not only on diseases and pests, but also on animals and useful insects and there really is the risk to be affected even the human being, due the toxic residuals ingested with the food.

By treatments, in plants pass considerable amounts of pesticides, also, a part of them falling on the soil, accumulates and act positively or negatively (especially those that have cumulative remanence). The contact pesticides and the systemic ones, by their nature itself permeate in tobacco plants; some of them are metabolized and degraded in secondary and tertiary products, compounds that contain some chemical radicals or some elements that can generate secondary toxicological phenomenon. In the tobacco case, the pesticides residuals are transferred from tobacco in the smoke and from here to the smoker's body.[1].

It was determined that from the pesticides residuals existing in tobacco, in smoke pass in average of 10%, the variations being between 0% and 20%. In our country, at tobacco, in the diseases and pests treatment a number of chemical substances are used of which reminiscence is different. In the effectuated determinations, the detection of the organ-chlorinated, organ-phosphoric, carbonates, de-thio-carbanates pesticides residuals in the dry tobacco samples were traced, as well as the integration way in the maximal admitted limits.[2].

At Romanian tobaccos, a low content of pesticides residuals is dignified (table no. 1).

Table 1

The pesticides residuals content at the Romanian tobacco comparative with the tobacco from Italy (mg/kg)

No	The active substance name	Romanian tobacco	Italian tobacco	RFG norms
1	Organ-chlorinated	0.2-2.0	0.59-1.80	11
2	Aldrin	-	0.01-0.08	10
3	Organ-phosphoric	1.0-3.0	-	0.3-3.0
4	Carbanates	1.0-2.0	-	20
5	De-thio-carbanates	1.0-50.0	-	50.0

Also, the made analysis at a few imported tobacco breeds show moderate pesticides residuals levels integrating in the provided norms existing in different countries. The organ-phosphoric compounds are known as the most toxic from the insecticides, but that disintegrate in short time, especially if they are exposed at sunlight. The organ-chlorinated substances are more dangerous because of their long persistence and present a bio-concentration potential. So, one of these were forbidden and others have a reduced utilization.[3].

Heavy metals

The soil has the capacity to store the chemical elements, including heavy metals, and also the capacity to directly reset in circulation the respective elements, on the absorption of the plant or the migration of a part to the ground waters. When the soil charging with heavy metals is high, and the physico-chemical attributes of soils congregate the conditions of an intense mobilization, an excess transfer from soil in plants and waters takes place and from these to animals and people, sometimes at toxic levels for consummators.

The heavy metals present in soil and plant can act as microelements, some of them having a positive effect on the tobacco development, sometimes can be phyto-toxic according to the level of them or they can negatively influence the smoking taste. The main heavy metals with importance in the tobacco cropping are: Cu, Zn, Co, Pb, Mn, As, Hg, Cs, Li, Fe, Cd, Ni, Cr.

From a series of effectuated experiments, is confirmed the fact that the tobacco easily absorbs the metal and moves it into the leaves. Also, the heavy metals content was determined (Cd, Cr, Co, Cu, Ni, Pb) at some Romanian tobaccos and at some Italian breeds (table 2). Is ascertained at the Romanian tobacco, variability limits determined of metals comparable with the variability limits for the tobaccos from Italy.[4].

The content in heavy metal variations are according to the tobacco breed, the development stage of the plant, the crop technology, the crop area, the type of the soil, etc.

Mentionable is that the tobacco being cropped in acid soils (5.5-6.5), this facilitates the metal leach and a better absorption takes place. For these reasons, on the tobacco soils is recommended adding moderate amounts of calcium carbonate, that can determine the pH reduction with at least an unit, parallel with the 50% detracton of the Cd content from leaves.

Table 2

The heavy metals content at some Romanian and Italian tobaccos (mg/kg)					
No	Name	Romanian tobaccos			Italy tobacco
		Virginia	Burley	Oriental	
1	Cadmium	1-3	1.7-5.1	0.1-0.7	3.5-5.3
2	Cobalt	0.9-1.54	0.55	-	-
3	Chrome	0.9-1.54	0.9-1.54	-	1.42-1.8
4	Copper	14.0-21.0	14.0-21.0	-	-
5	Nickel	4.52	7.83	-	-
6	Lead	11.8-16.2	11.8-16.2	-	5.6-7.6

Generally, for the tobacco crop the fields close to the high ways, factories of plastics, chemical fertilizers and earth oil manufacture are avoided.

Radioactivity

Generally, the radioactivity level is determined only in case of nuclear accidents. According to the international norms recommended by FAO/OMS/AIEA concerning the consumption and sale of agro-alimentary products, for the first and following years from a major accident are accepted: 50 Bq/kg for Cs 134 and 100 Bq/kg for Cs 137.

The global radioactivity analysis and Cs 134 and Cs 137 at some Romanian and Italian tobaccos show values that integrate in the natural radioactivity found limits, for K 40, and for Cs, the level is under the admitted limits (table 3).

Table 3

The radioactivity levels at Romanian and Italian tobaccos (in Bq/kg)			
No	Radioactivity	Romanian tobacco	Italian tobacco
1	Global radioactivity	Under 5.7	5.7-23.2
2	Global radioactivity	Under 79.5	6.8-18.5
3	Cesium	Under 18.5	6.8-19.4
4	Cesium	Under 16.5	3.0-16.8

CONCLUSIONS AND RECOMMENDATIONS

The used pesticides in the tobacco cropping must be biodegradable and to not present a phyto-toxicity risk. A control of the pesticides content is necessary at each harvest and the thermic treatment of tobaccos with pesticides content above the admitted limit, extinction in cropping of some breeds with d=genetic resistance of different diseases and pests and avoiding acid and very acid soils in tobacco cropping, that allows the absorption of heavy metals.

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