

RADIOECOLOGICAL EVALUATION OF HYDROPONIC MEDICINAL RAW MATERIAL OF *HYPERICUM PERFORATUM* L.

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INTRODUCTION.

Contamination of environment by various wastes from industries, transports, agriculture and nuclear power stations is an actual subject for comprehensive study. Constantly, numerous radionuclides (RN) penetrate in the nature and accumulate extensively by plants and through ecological chain soil-plant-animal-human in pour into biogeochemical circulation resulting in their undesirable accumulation in the organism.

The investigations were conducted in Ararat Valley which is in the zone of technogenic tension with radius of 30 km from Armenian Nuclear Power Station. During the research was studied the accumulation of artificial (^{90}Sr , ^{137}Cs) and natural (U) RN in aerial flowering parts of *Hypericum* (*H.*) *perforatum* L. cultured in open air hydroponics. In hydroponic conditions plants were cultivated on volcanic slag and gravel substrates. As control was used plants grown in soil. Pharmacological value of *H. perforatum* L. is owing to the rich composition of biologically active compounds (flavonoids, hypericin, pseudohypericin, hyperforin, tannins, etc.) which have antiviral, anticancer, antioxidant, antidepressant, and other properties. *H. perforatum* L. is a perennial plant and registered in Armenia as a valuable herb in natural flora.

MATERIALS AND METHODS

Radiochemical analyses were carried out in the hydroponic (Yerevan 30km zone) area of technogenic influence of ANPS. The content of ^{90}Sr and ^{137}Cs in the medicinal raw material of *H. perforatum* was determined by the radiochemical method with low background radiometer UMF-1500. U was determined by means of extraction photometric method by application of arsenazo-III reagent. Obtained data were compared with Maximum Allowed Concentration (MAC).

RESULTS AND DISCUSSIONS

The researches indicated that, at the same radioecological stress, growth conditions have significant influence on accumulation of RN by plants.

Medicinal raw material of *H. perforatum* observed in soil conditions by the content of U, ^{90}Sr and ^{137}Cs exceeded 1.1; 1.1; 1.8 times hydroponic plants on gravel, and 1.1; 1.3; 1.7 times on volcanic slag respectively. The part of ^{90}Sr and ^{137}Cs in total β -activity in hydroponic plants was less compared with soil control: on volcanic slag 1.9 times and on gravel 1.8 times. In hydroponic and soil plants the accumulation of ^{137}Cs exceeded ^{90}Sr , while in control its content was 3.4 times higher. The medicinal raw material obtained from both hydroponic substrates did not show any significant differences by ^{137}Cs content, whereas the content of ^{90}Sr in plants received from gravel 1.2 times exceeded that of volcanic slag.

CONCLUSION

Consequently, the results of the study indicated that hydroponic plants from ecological aspects are much more pure than soil ones. Nevertheless, all studied variants of medicinal raw materials by the content of controlled artificial RN overall did not exceed the MAC and corresponds to the requirements of international standards.



PIC. HYPERICUM PERFORATUM IN OPEN AIR HYDROPONIC CONDITIONS

TABLE
THE CONTENT OF RADIONUCLIDS IN THE VEGETATIVE RAW MATERIALS OF HYPERICUM PERFORATUM L.

Cultivated conditions	U.10 ⁻⁶ %	^{90}Sr	^{137}Cs	Total β -activity
		Bq/kg		
Hydroponics, gravel	0.61	7.0	14.6	300
Hydroponics, volcanic slag	0.66	5.8	14.7	300
Soil (control)	0.70	7.6	25.8	260
MAC	---	100	400	---

Therefore, for receiving ecologically clean medicinal raw material of *H. perforatum* the hydroponic culture is more preferable.