

## DECONTAMINATION OF NATURAL HONEY BY IONIZING RADIATION

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Bee honey is usually contaminated with numerous microorganisms. Among them predominate osmophilic yeast, mainly the strains of *Saccharomyces*, *Schizosaccharomyces* and *Torula*. *Bacillus* and anaerobic *Clostridium* spores and small fragments of mould fungi may also appear in honey.

The effects of irradiation on antibiotic activity and 5-HMF content in the decontaminated honey are given in Table 2.

It has been observed that the antibiotic value increased from 1.8 to 2.6 on an average and the content of 5-HMF decrease from 1.34 to 0.96 mg/100 g.

Table 1. Effect of irradiation at a dose of 10 kGy on the number of microorganisms in honeys.

No	Total number of aerobic bacteria		Total number of yeast and moulds		Total number of Clostridium spores	
	before irradiation	after irradiation	before irradiation	after irradiation	before irradiation	after irradiation
1	11 000	10	900	20	10	10
2	460 000	<10	<10	<10	10 000	1 000
3	500	<10	<10	<10	100 000	10
4	50	10	10	<10	100	10
5	800	40	<10	<10	100	<10
6	60	<10	10	<10	100	<10
7	10	<10	10	<10	100	<10

The effect of radiation on microbiological decontamination of honeys is shown in Table 1.

Radiation at the dose of about 10 kGy decreases effectively the number of microorganisms and their

Table 2. The effect of irradiation on antibiotic activity and 5-HMF content in the tested honey samples.

Honey samples	Antibiotic activity		
	honey dilution inhibiting growth of standard strain <i>S. aureus</i> FDA 209 P	inhibine value in units	5-HMF content [mg/100g]
Before irradiation			
1	1:4	1	1.15
2	1:8	2	1.15
3	1:8	2	0.96
After irradiation			
1	1:16	3	1.15
2	1:16	3	0.86
3	1:8	2	0.86

The experiments have shown that the irradiation process decreases the number of aerobic bacteria and fungi (yeast and moulds) and anaerobic spores of *Clostridium* in honeys by 98.1% on an average.

antibiotic activity and stability (5-HMF), while does not influence the organoleptic value of honeys. This means that radiation treatment could be adapted in practice for the production of honey characterized by a high level of microbial purity.

## DECONTAMINATION OF MEDICAL HERBS BY IONIZING RADIATION

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A good quality of medical herbs, according to the pharmaceutical requirements, may be achieved by applying suitable methods of decontamination. In the communication, results of decontamination by irradiating medical herbs are presented. Table 1 is presenting the effect of irradiation on a number of microorganisms occurring in the medical herbs tested.

The results show that the applied radiation method to microbiological decontamination allows to achieve medical herbs of high purity.

Some of the pharmacological activities of medical herbs were investigated after irradiation (Table 2).

The diuretic action of Urogran and Betagran did not change after irradiation. The spasmolytic action



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Table 1. Microbiological decontamination of medical herbs by irradiation at a dose of 10 kGy.

Materials	Aerobic bacteria		Yeast and moulds		Bacillus spores	
	0 kGy	10 kGy	0 kGy	10 kGy	0 kGy	10 kGy
Urogran	500	10	20	<10	50	<10
Reumogran	8 500	30	40	<10	4 400	<10
Normogran	102 000	40	<10	<10	47 000	<10
Cholegran	150 000	50	3 100	<10	76 000	<10
Betagan	70 000	70	30	<10	<10	<10

of Urogran, Normogran and Cholegran was the same in nonirradiated and irradiated medical herbs. Irradiation of Normogran and Cholegran has no negative effect on the cholagogic action of these

The tests carried out throughout this study have indicated that the medical herbs show, after the exposure to ionizing radiation, identical therapeutically action as nonirradiated preparations.

Table 2. Pharmacological tests adapted to qualify medical herbs.

Medical herbs	Pharmacological activity					
	diuretic	spasmolythic	cholagogic	digestion improvement	antibacterial	anti inflammatory
Urogran	+	+			+	
Reumogran						+
Normogran		+	+			
Cholegran		+	+	+	+	
Betagan	+					

fitopreparations. Urogran and Cholegran are characterized, after irradiation, by a slightly higher antibacterial activity as compared with nonirradiated ones.

The dose of 10 kGy assured a proper purity of the investigated medical herbs.

## APPLICATION OF RADIATION TO THE PRODUCTION OF BAITS TO CONTROL CRAWLING INSECTS IN THE URBAN AREA

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A bait is any substance used to entice or to allure animals with a view to catching them. A bait formulation typically consist of an active ingredient that is mixed with food which acts as an attractant. Pests are killed by ingesting a lethal dose of the toxicant (addulticide and/or insect growth regulator).

The use of baits to control the pest of vertebrates (rodents, birds) and insects (cockroaches, ants, termites, etc.) is a technique that is thousands of years old. The Romans used bulbs of red squill plant mixed with foodstuffs to control rodents. A phosphorous paste bait was used to control cockroaches in London as early as 1858.

Baits are the fastest-growing product category in the pest control industry, particularly baits for the control of German cockroaches and Pharaoh's ants - the most ubiquitous urban pest insects. Examples of bait formulations in the USA are shown in Table 1.

Usage of food ingredients in baits requires precautions. Application of chemical substances as preservatives is very often risky because of decreasing bait palatability for insects, especially Pharaoh's ants. In Poland only sorbic acid is used at small concen-

trations to preserve bait from formulating period until radiation treatment (Table 2).

### Materials and Method

The baits decontamination by radiation was carried out in this Institute.

The baits were irradiated by an electron beam accelerator Elektronika (10 MeV, 10 kW) in the dose range 3 to 15 kGy.

Dosimetry of the irradiation process was used to commissioning of the facility, validation of the treatment procedures and process control. The absorbed dose was measured by a primary standard dosimeter, a water calorimeter, and by routine dosimeters.

The experiments were done with German cockroaches (*Blattella germanica*) and Pharaoh's ants (*Monomorium Pharaonis L.*).

The quantity of German cockroaches in each group (control and experimental) was 30 insects, put into an aquarium without and with baits. The experiments lasted for 34 hours, and deadliness of insects was observed.

The quantity of ants in each group was: 70 worker ants, 2 apterous females and 30 chrysalides. The



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