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IDENTIFICATION AND REDUCTION OF MICROBIOLOGICAL CONTAMINANTS IN HERBS

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Herbs and their products are widely used in the food, food supplements and pharmaceutical industries worldwide, so it is very important to ensure the quality and safety of raw materials and products. Depending on the external factors, various contaminants are found on the final plant material. This work emphasizes precisely the biological pollution that it is impossible to see with the naked eye. Bacteria, and their spores, molds, yeasts, viruses and other microorganisms on the plant, can complicate storage and quality assurance of raw materials. [1,2] The microbiological contamination of plants is inevitable, and therefore the permissible rates of non-pathogenic organisms are determined according to the nature of the use of herbs. However, the use of plants that have a tolerable amount of bacteria or mold has the potential to affect herbal product users with weaker immunity.

Moulds are widespread natural pollutants in the atmosphere. Researchers mention that leaves and other parts of the plant above the soil have high mould contamination. It is moulds and fungi that are potential allergens and manufacturers of mycotoxins. These chemicals are cancerogenic and quite stable and remain after the mould or fungus death. [3,4] Some types of moulds or bacteria on herbals are antibiotic resistant and can cause infections. [5]

The destruction of microbiology is a major challenge, as different microorganisms can survive under different conditions, and the chemical composition of the plant must be taken into account, without compromising the active components. Ethylene oxide was used to reduce contamination, but was banned in 1989. Gamma radiation is one of the alternatives to pollutants, but it is not fully investigated as to the quality of herbs. [6] In our research we tried other alternative methods – electroporation and cold plasma disinfection. The latter one is highly promising due to it is a nonthermal method that likely would reduce biological contamination of herbs without extreme chemical composition change. [7]

References

4. Posadzki, Paul, et al. "Contamination and Adulteration of Herbal Medicinal Products (HMPs): an Overview of Systematic Reviews." *European Journal of Clinical Pharmacology*, vol. 69, no. 3, 2012, pp. 295–307.
5. Kosalec, Ivan, et al. "Contaminants of Medicinal Herbs and Herbal Products." *Archives of Industrial Hygiene and Toxicology*, vol. 60, no. 4, Jan. 2009.
6. Sanzini, Elisabetta, et al. "Quality Control of Plant Food Supplements." *Food & Function*, vol. 2, no. 12, 2011, p. 740.
7. Rizzo, Inés, et al. "Assessment of Toxigenic Fungi on Argentinean Medicinal Herbs." *Microbiological Research*, vol. 159, no. 2, 2004, pp. 113–120.
8. Vidović, Senka, et al. "Screening of Changes in Content of Health Benefit Compounds, Antioxidant Activity and Microbiological Status of Medicinal Plants during the Production of Herbal Filter Tea." *Industrial Crops and Products*, vol. 50, 2013, pp. 338–345.
9. Kim, Mi-Jung, et al. "Effects of Gamma Irradiation on Microbial Contamination and Extraction Yields of Korean Medicinal Herbs." *Radiation Physics and Chemistry*, vol. 57, no. 1, 2000, pp. 55–58.
10. Mitra, A. et al., 2013. Inactivation of Surface-Borne Microorganisms and Increased Germination of Seed Specimen by Cold Atmospheric Plasma. *Food and Bioprocess Technology*, 7(3), pp.645–653.