

mgr inż. Andrzej Kwaśnica

Development of procedures for determining the origin of plant material by chromatographic and genetic methods

Field of science: Agricultural sciences

discipline: food and nutrition technology

date: 29.12.2023r.

As part of the work carried out, research was conducted on the profile of secondary metabolites of hemp - a plant whose cultivation and marketing are strictly controlled by law. Therefore, all related problems are of interest to Lab4Tox Ltd. as a forensic research entity.

As a result of the study, it was shown that the profile of secondary metabolites of hemp is strongly dependent not only on biological factors such as, for example, the variety, but also on purely physical factors such as drying or storage conditions. On the one hand, this makes it difficult and even impossible to indicate the origin of the sample, but at the same time it is a circumstance that makes comparative studies possible. Hemp biomass, once harvested, is subject to constant changes. These changes concern not only the content of volatile components (terpene fraction) but also the content of phytocannabinoids, which also undergo cycles of mutual transformation. This is determined by a huge number of combinations of many factors and their intensity. These processes, on the one hand, make it impossible to indicate specifically the variety or geographic source of origin, however, on the other hand, by imprinting their unique individual mark, they make it possible to establish the identity of the materials and compare them among themselves. The results of the work carried out have been implemented into the routine practice of Lab4Tox. sp. z o.o.

The possibility of using hemp phytosterols was equally tested. However, the sterol profile has not been shown to be able to differentiate samples of hemp-derived materials.

Work was also undertaken on genotyping hemp to individualize it. Twenty STRs were selected and tested, which were assumed to give the ability to differentiate materials from different varieties. Positive results have not been obtained. The reasons for the failure are not entirely clear. Obtaining an answer to this question would require significantly more extensive comparative studies, which is well beyond the capabilities of Lab4Tox. Ltd.

key words: cannabis, hemp, chromatography, DNA, essential oil, cannabidiol, tetrahydrocannabidiol, GCMS, LCMS, fitosteroles