

Survey of pesticide residues, metals and THC on hemp inflorescences cultivated in Italy

G. Amendola¹, B. Bocca¹, V. Picardo¹, V. Tudino², B. Battistini¹, D. Attard Barbini¹, P. Pelosi¹ and R. Costi²

¹ Environment and Health Department, *Istituto Superiore di Sanità*, Rome, Italy

² Dipartimento di Chimica e Tecnologie del Farmaco, "Sapienza" Università di Roma, Italy

e-mail: graziella.amendola@iss.it

Recently in Europe, areas destined to cultivation of *Canapa Sativa* have grown exponentially, from 8000 to 33000 hectares only on 2019. Italy is fourth in Europe for hemp production; this encouraged an increase in marketing and consumption of hemp-based food products. Therefore, it is important to evaluate the tetrahydrocannabinol (THC) levels, as well as the presence of pesticide residues and metals, in order to protect the public health.

Despite the Reg. (UE) n.1307/2013 set that the varieties of *Canapa Sativa* allowed for cultivation must have the total THC content not exceeding 0.2% with tolerance up to 0.6 %, the Maximum Residue Level (MRL) has been set in Italy only on Genuary 2020 at 2 mg/kg for hemp-based food products.

As for pesticide residues, the MRLs set in Reg. (EU) n.396/2005 refer exclusively to hemp seeds and its derivatives. The hemp inflorescences, that are now widely used in the production of herbal teas, beer and candies are not yet regulated.

Cannabis Sativa L. has phytodepuration qualities and so it is used in soils or with fertilizers containing heavy metals, accumulating contaminants in the root and leaf system of the plant. Since inflorescences are used as an aroma for electronic cigarettes, exposure to metals through the respiratory system can be important.

A survey was conducted on thirty-one samples of sativa hemp inflorescences, collected in cultivation areas from different Italian regions. Results of these analysis will be discussed.

The extraction of cannabinoids was performed with ethanol under reflux. The level of THC was determined by HPLC after extraction, showing a total content less than 0.5%. The HPLC analyses were conducted using an analytical column C18 and an UV detector (220 nm), by isocratic elution with acetonitrile/water 80:20 (0.1% TFA).

A screening of 200 pesticide compounds was carried out on all the collected samples, using the QUECHERS method combined with analysis in GC-MS/MS and LC-MS/MS. In several samples were found one or more fungicide and/or insecticide residues, at different levels.

The concentration of metals as Aluminium (Al), Arsenic (As), Cadmium (Cd), Cobalt (Co), Chrome (Cr), Copper (Cu), Mercury (Hg), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Antimony (Sb), Lead (Pb) and Zinc (Zn) in 28 samples was determined by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Before the analysis, the samples were microwave digested with ultrapure acids. Accuracy and precision of the method was carried on various certified Reference Materials (CRMs).