

Phthalates in Olive Oil Production Chain

Milena Marega¹, Konrad Grob², Sabrina Moret¹, Giorgia Purcaro³, Lanfranco Conte¹

1) Department of Food Science, University of Udine - Italy

2) Kantonaales Labor Zurich – Switzerland

3) Dipartimento Farmaco Chimico, University of Messina

Phthalates are dialkyl or alkyl/aryl esters of 1,2, benzenedicarboxylic acid. They are usually synthesized through the reaction of phthalic anhydride with an alcohol, usually with a carbon chain in the C₈-C₁₀ range, although alcohols with C₄, C₇, C₁₁ e C₁₃ chain lengths are also used for particular applications.

They are mainly used as plasticizers in the polymer industry, since they increase flexibility and workability of some polymeric materials, especially PVC products. Therefore, many commercial products contain these chemicals, including building materials, clothing, cosmetics, medical devices, pharmaceuticals, flooring and wall-covering, food packaging, etc.

Phthalates are ubiquitous environmental contaminants and since they are not chemically bonded to PVC, they can be easily released from the matrix into air by evaporation, or they can migrate in contact materials, especially in oily and fatty foodstuffs.

The aim of this research was to estimate both the contamination level of the olives before harvesting, and the presence of phthalates after each production step, in order to define critical points.

Olive samples were directly collected in the olive orchard from several areas of Italy, during fruit ripening.

Furthermore sampling was also carried out at mills, by collecting olives before and after washing, olive paste after grinding, malaxed pomace and oil. A procedure to extract phthalates from olive samples was developed, and then the extract was analysed by using GC-MS method with a PTV injector.

Attention was focused on three phthalates, namely di-isobutyl phthalate (DIBP), di-n-butyl phthalate (DBP), and di-(2-ethylhexyl) phthalate (DEHP). A higher contamination level was found more in olives collected at mills than in olives directly collected in the olive orchard. These results indicate that the contamination may occur during the harvest and the transport of the olives to the mill.

Furthermore, along the olive oil production chain an increase in phthalate levels was observed, probably due to the contact of the olives, paste and oil with pipes and other plastic materials. However, in most of the cases, contamination levels were lower than the EEC Directive 2007/19/CE suggested limits.

Different behaviours were highlighted, in relation to molecular weight and polarity: a series of phthalates were removed by the water used in some steps (e.g. in the decanter), while other higher molecular weigh phthalates were concentrated in the oil.