Gas Chromatographic Method Development For Determination Of Chlorpyrifos And Its Metabolite

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Grape (Vitis vinifera) production is widespread in the Mediterranean area. Grapes are used directly but are mainly destined for wine. The grapevine is subject to attack numerous plant and animal parasites (1). Currently, the use of organochlorine pesticides has been banned or restricted after evidence of their toxicity, persistence and bioaccumulation in environmental matrices. Thus, substitutes of the organochlorine pesticides such as organophosphorus pesticides (OPPs) are being used in large amounts in the European Union (EU) and the USA (2).

Grapevines are normally subject to fungi (Botrytis cinerea, Plasmopara viticola,) or insect attacks (such as Lobesia botrana). Among the different products used for the control of these pests and diseases, chlorpyrifos (for Lobesia botrana) is commonly utilized in the vineyards (3). Chlorpyrifos (O,O-diethyl O-3,5,6-trichloro-2-pyridyl phosphorothioate) is an organophosphate pesticide that is commonly used as an anticholinesterase insecticide. Many organophosphates readily undergo conversion from thions (P=S) to oxons (P=O). Conversion occurs in the environment under the influence of oxygen and light and in the body chiefly by the action of liver microsomes (4). On the other hand, transformation products of OPPs are often more toxic than parent pesticides. These compounds are biotransformed by different reactions that take place within the organisms such as a variety of hydrolyses and oxidations. Hence, the determination of these metabolites in such samples was of great interest. When high metabolite concentrations are found in the sample, the analysis method accompanying by a number of different separation techniques can be conducted to provide more accurate results for analyte of interest. Lehotay et al demonstrated the effectiveness of QuEChERs method for more than 200 pesticides in lettuce, orange and several other matrixes (5).

Türkiye is one of the outcoming producer of wine. In this study a new method was developed for the separation and quantification of chlorpyrifos and its metabolite chlorpyrifos-oxon (O,O-diethyl-O [3,5,6 trichloro-2 pyridinyl] phosphate) in wine samples. The method is based on using liquid extraction with acetonitrile, followed by dispersive solid phase extraction using primary secondary amine. The validation parameters of the method was evaluated.

References