

## **MAXIMUM RESIDUE LEVELS (MRLs) FOR PROCESSED PRODUCTS**

This paper is meant to clarify the FEDIOL interpretation of EU legislation with respect to Maximum Residue Levels (MRLs) of pesticides on processed products, like crude oils. Directive 90/642/EEC sets Maximum Residue Levels (MRLs) for pesticides in raw agricultural products. Specific MRLs for pesticides in processed products e.g. crude vegetable oils are not set in EU legislation. According to Directive 90/642/EC, when no MRL is set for a processed product, the maximum level has to be derived from the MRL of raw agricultural product, taking into account the concentration caused by drying process or the concentration or dilution caused by processing (Article 3).

In the oil extraction process, the concentration/dilution factors depend on the type of processing and the extent to which meal and crude oil pick up a specific pesticide during crushing. The solubility of a pesticide in water or fat, and in the solvents used in oil extraction, influences the concentration of a pesticide in the processed products.

For the reasons mentioned above, research is the only way to establish the processing factors accurately. This would take a long time because there are more than 1000 pesticides and about 20 different types of crude oils that are of economic interest to the oil industry. It is possible to estimate the allowed bandwidths of maximum residue levels in crude oils based on the chemical nature of the pesticides and on the oil content of the raw materials.

Pesticides with higher solubility in fat or in the extraction solvents may concentrate in crude oil. In this case the MRL for crude oil will be the seed MRL multiplied by a concentration factor. This factor is inversely related to the oil content of the seed or lower. In general the residue in crude oil of a fat soluble pesticide will fall between the seed MRL and the maximum level that would originate when multiplying by the concentration factor. The possible concentration effects of processing should be taken into account also in the cases when the MRL is set at the limit of determination (LOD). The reason for this is that in some case, undetectable traces of a substance might be present in the seeds, and concentration during processing might lead to detection of a residue in the crude oil.

One of the criteria that can be used to predict the fate of a certain pesticide during oil extraction is its polarity. The octanol-water partition coefficient ( $\log P_{ow}$ ) of a pesticide indicates whether a pesticide is water or fat-soluble. When a  $\log P_{ow}$  of a pesticide exceeds 4, the pesticide will be fat-soluble. When a  $\log P_{ow}$  of a pesticide is below 3, a pesticide will be water-soluble. Pesticides of the intermediary group, with a  $\log P_{ow}$  between 3 and 4, are partially water and partially fat-soluble.

Another factor to be taken into account is the affinity of the substance for the extraction solvent. In fact some water-soluble pesticides with a  $\log P_{ow}$  below 3, which are not expected to concentrate in the oil, can show the tendency to concentrate in the oil due to their solubility in solvents like e.g. hexane.