Deltamethrin residues through the food chain industries

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DOI: 10.5073/jka.2010.425.499

Abstract

Deltamethrin is one of the authorized active ingredients for post-harvest use to protect stored grains in Europe. It has been used since many years alone or in combination with a synergist. It is included in the Annex 1 of the directive 91/414/CE since 2003. During the post-Annex I inclusion phase, a complete dossier has been submitted for deltamethrin-containing products (the K-Obiol range) including residue studies on numerous crops, and extensive data to support human and environmental risk assessment. The regulation 396/2005/CE gives European MRL of 2 mg/kg in cereals; the same value has been set by the CODEX Alimentarius, furthermore it fixes the value of 0.3 mg/kg as maximum residue level in flour. Nevertheless, commercial processors have sometimes been reluctant to include plant protection products on their lists of approved products for farm/supermarket protocols without supportive data concerning the effects of residues on the quality of processed foods. Consequently, a wide range of crops treated with deltamethrin have been tested over many years. Deltamethrin effects and residues levels have been followed through the processes leading to the manufacture of beer, bread and pasta (post-harvest treatment with K-Obiol products at a max 0.5 mg deltamethrin/kg).

Pasta processing industry (2002): Wheat, complying with the semolina and pasta quality standards, has been treated with deltamethrin (K-Obiol ULV6 at 84 or 42 mL/t). Treated wheat has been stored in cells for 1 month then production of semolina, milling derivatives and pasta has been performed. No residue of deltamethrin has been found in the semolina or in pasta made from semolina as shows in the Figure 1.

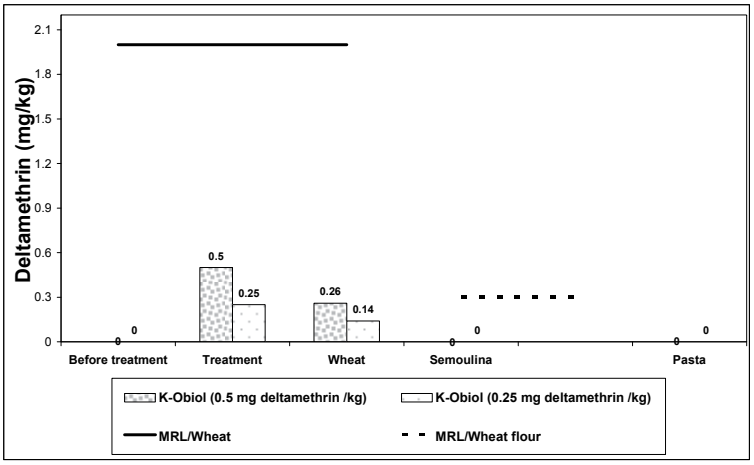

Figure 1 Residue of deltamethrin in cereals, semolina and pasta.

Beer processing industry (1999): Spring barley, complying with the brewery quality standards, has been treated with deltamethrin (K-Obiol ULV6 at 84 mL/t). Then malting and brewing have been performed one month after the treatment. There are no detectable residues in either wort or beer. The presence of deltamethrin in barley before malting (soaking and germination), and brewing (brewing and fermentation) does not influence these processes. No difference can be tasted between beer brewed with treated barley and reference (Fig. 2).

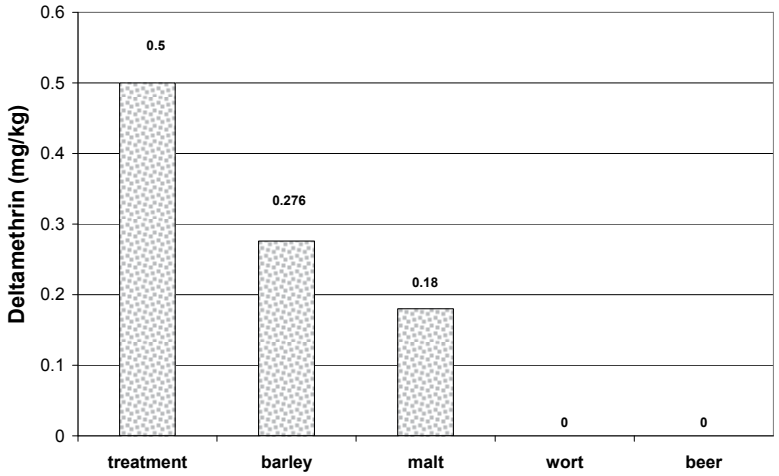

Figure 2 Residue of deltamethrin in cereals, wort, malt and beer.

Bread processing industry (2002-2003): Wheat has been treated with deltamethrin (K-Obiol ULV6 at 84 or 42 mL/t) after quality control of the grain then milling and bread making have been performed 15 days, 3, 6 and 12 months after the application. Protection of wheat during storage did not change the quality and characteristics of the dough (during kneading or fermentation) or those of the bread (appearance of the crust, crumb and texture) (Fig. 3).

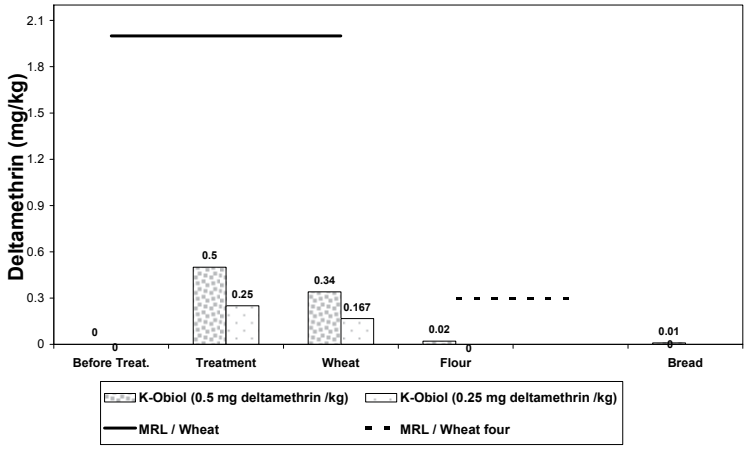

Figure 3 Residue of deltamethrin in cereals, flour and bread – 15 days after the application.

It has been demonstrated through the food chain that the treatment of stored grain with deltamethrin does not affect the main processing procedures. Furthermore, based on the current European MRL it has been concluded that the intended uses of deltamethrin do not cause any unacceptable risk to consumers due to chronic or acute exposure to residues through food. As the level of deltamethrin found in the manufactured products is very low or below the limit of quantification (below the European MRL), it can be confirmed that there is no unacceptable risk for the consumer. In conclusion, the use of deltamethrin to protect grain is effective, reliable and meets the requirements of the food industries.

Keywords: Deltamethrin, Residue, Food chain industries, Insecticide