Dissipation kinetics and effect of processing on clothianidin residues in cardamom (*Elettaria cardamomum* Maton)

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ABSTRACT: The dissipation behaviour of clothianidin (Dantop 50% WDG), a neonicotinoid insecticide, in fresh and cured cardamom capsules was studied following-application at 20 and 40 g a.i. ha⁻¹, respectively, in the plantation of Indian Cardamom Hills (ICH), Idukki, Kerala, India. A single laboratory UPLC-MS/MS method was developed and validated for the estimation of residues of clothianidin in fresh and cured cardamom. The recovery experiments were conducted at fortification levels of 0.01, 0.05 and 0.1 μg g⁻¹. The average recoveries obtained were 91.04 to 94.44 and 89.22 to 91.41 % for fresh and cured cardamom, respectively. The LOD and LOQ in both fresh and cured cardamom were found to be 0.005 and 0.01 μg g⁻¹, respectively. The initial deposits of clothianidin on fresh and cured cardamom were 1.96 and 5.24 μg g⁻¹, respectively, following application at the lower dose while the corresponding deposits were 4.13 and 10.61 μg g⁻¹ at the higher dose. For fresh and cured cardamom, the residues dissipated below the quantitation level of 0.01 μg g⁻¹ after 21 and 28 days at both the doses, respectively. The half-life of clothianidin in fresh and cured cardamom was 3.40 and 3.11 days at the lower dose and 3.42 and 3.45 days at the higher dose, respectively. The waiting periods of clothianidin on fresh and cured cardamom at the lower and higher doses were 18.41 and 22.09 days, and 21.16 and 27.54 days, respectively. The processing factor was evaluated at the lower dose and the mean processing factor was 2.90.

KEYWORDS: cardamom, clothianidin, dissipation, processing factor

INTRODUCTION

Cardamom (*Elettaria cardamomum* Maton), the queen of spices, is one of the most exotic and highly prized spices in the world. It thrives well in the tropical rain forests of Western Ghats of India. India accounts for the largest area under cardamom cultivation yet the productivity is low mainly due to the attack of diverse pests and diseases in all stages of the crop growth, necessitating frequent application of pesticides for their timely control (Kumaresan, 2008). It is reported that around 650 tons active ingredients of different pesticides were applied during 2009 season in Indian cardamom hills (Murugan et al., 2011). The residues of pesticides deposited during plant protection operations are a major concern and pesticide residue in spices have affected our exports (Bhardwaj et al., 2011). Management of pests in cardamom largely depend on the use of conventional, neurotoxic, broad-spectrum, synthetic chemical pesticides, such as organophosphates, carbamates, synthetic pyrethroids and a number of new chemical classes, such as neonicotinoids. Exposure to pesticides, both*

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