Deposition and residues of azoxystrobin and imidacloprid on greenhouse lettuce with implications for human consumption

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Lettuce greenhouse experiments were carried out from March to June 2011 in order to analyze how pesticides behave from the time of application until their intake via human consumption taking into account the primary distribution of pesticides, field dissipation, and post-harvest processing. In addition, experimental conditions were used to evaluate a new dynamic plant uptake model comparing its results with the experimentally derived residues. One application of imidacloprid and two of azoxystrobin were conducted. For evaluating primary pesticide distribution, two approaches based on leaf area index and vegetation cover were used and results were compared with those obtained from a tracer test. High influence of lettuce density, growth stage and type of sprayer was observed in primary distribution showing that low densities or early growth stages implied high losses of pesticides on soil. Washed and unwashed samples of lettuce were taken and analyzed from application to harvest to evaluate removal of pesticides by food processing. Results show that residues found on the Spanish preharvest interval days were in all cases below officially set maximum residue limits, although it was observed that time between application and harvest is as important for residues as application amounts. An overall reduction of 40–60% of pesticides residues was obtained from washing lettuce. Experimentally derived residues were compared with modeled residues and deviate from 1.2 to 1.4 for imidacloprid and azoxystrobin, respectively, presenting good model predictions. Resulting human intake fractions range from 0.045kg intake kg applied⁻¹ for imidacloprid to 0.14kg intake kg applied⁻¹ for azoxystrobin.

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