Investigation of Photodegradation of Imidacloprid in Surface Water Environment under 312 nm UVB in 4, 7 and 9 pH

ABSTRACT

Background: Imidacloprid is a type of neonicotinoid insecticide widely used for agricultural treatments since the 1990s. They have been found to contribute to harmful contamination for surface and subsurface water when used for agricultural purposes, thus finding remedies or alternatives to the NEOs is critical.

Objective: The study investigates the photodegradation of Imidacloprid in surface water from Cumberland River under different pH conditions (pH 4, 7, and 9).

Methods: The effects of light with differing wavelengths were examined using natural single ultraviolet B (UVB) light source. Surface Water from Cumberland River has been used in the experiments. Analysis of the degradation was carried out using LC-MS Machine.

Results: The results indicated that UVB played a key role in the photodegradation of Imidacloprid . The degradations of Imidacloprid under the light source followed the first-order kinetics. The half-life of Imidacloprid in Surface Water when exposed to 312 nm UVB at pH 4, 7 and 9 was found to be 50, 58, and 50 minutes respectively.

Conclusion: The results indicate that Imidacloprid degradation is statistically independent on the surface water pH.

Recommendation: It would be of great benefit to understand the influence of pH in combination with other factors such as temperature, presence of minerals. It is also recommended that other degradation pathways should be explored. This includes hydrolysis, aerobic and anaerobic degradation.