An overview of the development of furfural (Crop Guard^{R}) as a nematicide in South Africa

The chemistry of furfural within the soil and agricultural environment

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The nematicidal properties of furfural were discovered by Professor Rodriguez Kabana, Auburn University, Alabama in the late 1980's with international patents subsequently being lodged in 1991. Illovo Sugar Ltd, a South African sugar and downstream producer started development work on the active ingredient in 1995.

Furfural is a heterocyclic aromatic aldehyde that is produced from sugarcane via hydrolysis of bagasse and subsequent purification via distillation. To support commercial agricultural applications furfural has been formulated to generate an emulsifiable concentrate that supplies solubility up to 50% of active ingredient in water.

Extensive product movement studies within the soil have been completed to enable correct application of furfural within various agricultural processes. Product movement studies have shown that by modification of the quantity of irrigation water and rate of application furfural can be effectively positioned into various soil zones and soil types. The distribution profiles of furfural within the soil vary due to the soil classification, and initial moisture content. Distribution profiles of furfural within varying soil types will be shown.

Furfural interacts with the cuticle of the nematode, effectively stripping the protective layers which result in the cuticle swelling and disintegrating. Movement of the nematode is impeded and it subsequently dies through dehydration or attack by parasitic organisms. Due to its contact mode of action correct positioning of furfural is imperative for effective control.

Residue analyses have shown no levels of furfural above natural background levels are found within the plant or fruit even after multiple applications during the growing season.

GLP studies have shown that Furfural has a short half life and degrades initially through its oxidative and reductive analogs which are ultimately converted via the Krebs cycle to carbon dioxide and acetic acid.