

Non-target impact of deltamethrin on soil arthropods of maize fields under conventional and no-tillage cultivation

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Abstract

Abstract: Deltamethrin is a commonly used insecticide for controlling its key maize pest, the fall armyworm *Spodoptera frugiperda* (Lep., Noctuidae). Its toxicological profile is well known, but its impact on arthropods widely reported as bioindicators, mainly springtails (Collembola) and mites (Oribatida), is yet to be assessed in tropical maize fields. The treatments used to circumvent this shortcoming were conventional cultivation and no-tillage cultivation (with a pre-sowing application of 2,4-D and glyphosate) systems with or without deltamethrin spraying. The deltamethrin residue analysis of soil samples by gas chromatography did not detect the insecticide 24 h after it was sprayed on the maize fields. There was no significant overall effect of deltamethrin based on principal component analysis. However, repeated-measures analyses of variance detected significant impact of deltamethrin in a species of Nitidulidae (Coleoptera). The cultivation system also provided significant impact on Oribatida and Gamasida soil mites and on the same Nitidulidae species referred above, which were more abundant in the conventional cultivation system. Springtails were also significantly affected by the cultivation system showing greater abundance in the conventional system, except Podumorpha. Analyses using only high taxonomic levels did not allow the detection of impact in the ant assemblage assessed. The results suggest that the impact of deltamethrin on soil arthropods from tropical fields varies among species and is lower than expected. The cultivation system imposes more drastic effects on arthropod assemblage.

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