MIXTOX: Mixture toxicity of metals and pesticides for Collembola

This project was part of a larger EU-funded project called MIXTOX, which ran from 1 October 1997 till 31 September 2000, and which will continue till the end of 2004. Main aim of MIXTOX was developing new concepts for the evaluation of mixture toxicity in soil. Mixture toxicity studies with the collembolan *Folsomia candida* were performed in a natural, well defined, loamy sand soil (LUFA 2.2 soil), and effects on the survival, growth and reproduction of the collembolans were determined after a defined exposure period (4 weeks). Tests were performed on binary mixtures of metals (cadmium, copper, lead and zinc) and on complex mixtures of all four metals and of copper and the pesticides carbenzazim and iprodion. All mixture toxicity tests were always be accompanied by (simultaneous) tests on the individual chemicals. To determine bioavailable fractions, soils were extracted with water or 0.01 M CaCl₂. Metal analysis was performed by AAS. Toxicity of the chemicals, both single and in the mixture, will be related to total and bioavailable soil concentrations and to internal concentrations in the animals. For the statistical evaluation of mixture toxicity data, the Toxic Unit approach is taken as a starting point and advanced mathematical techniques are applied. First results show that mixtures of two metals generally act additive or antagonistic on growth and reproduction of the Collembola, but that at low concentration levels synergism may occur. Besides this effect-level effect on mixture toxicity, in some cases also an effect was seen of the ratio of the two elements in a mixture. Results of the work on the mixture with copper and the pesticides showed that both pesticides had no or only a slight effect on reproduction at concentrations as high as 1000 mg/kg dry soil. On the basis of that, further studies were performed on a mixture two other pesticides: parathion and propiconazole. Based on the results of this project, new concepts for the ecotoxicological risk assessment of mixtures in the soil will be developed.

Duration:

1997-2004

Participants:

Marina Bongers, Kees van Gestel