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Scientists develop sustainable insecticide using nanotechnology

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A more effective and sustainable insecticide has been developed by Embrapa Meio Ambiente (SP) in partnership with the Chemistry Institute of the State University of Campinas (Unicamp) in Brazil. The researchers have developed a controlled release system for the insecticide thiamethoxam. The encapsulation was carried out in polymeric nanomicelles, structures smaller than one billionth of a meter, or more than 80 thousand times smaller than the thickness of a strand of hair.

Studies indicate that nanopesticides are more effective than conventional pesticides and may completely replace them in the near future. Nanomaterials have unique physical, chemical and biological properties, different from the characteristics of the same materials on a larger scale, due to the increase in the surface-to-volume ratio and quantum effects. Nanopesticides formulations use nanomaterials in their composition and that present high application efficiency and less toxic effects on the environment compared to conventional formulations of the same active ingredient.

Nanoencapsulation of the active ingredient results in a sustained release by the nanoparticles, high stability and specificity. The results indicated that the nanostructures were effective with a dose approximately two times lower compared to commercial formulations,â?• explains Embrapa analyst Marcia Assalin , coordinator of the study

The effectiveness of the nano insecticide was assessed by controlling, in greenhouses, the insect (Diaphorina citri) responsible for the spread of greening, also known as huanglongbing and HLB, caused by the bacterium Candidatus liberibacter spp . The disease affects all citrus plants and has no cure: once contaminated, it is not possible to eliminate the bacteria from the plant, which continues to act as a source of inoculum for the contamination of other plants. Citrus greening is one of the most important diseases affecting citrus today.

In addition to increasing efficiency, the new product can lead to a reduction in the number of applications, attenuation in the development of pest resistance to the insecticide, and a reduction in environmental impact and associated costs.

Nanotechnology plays a key role in promoting more sustainable agricultural practices through nano insecticides. According to Ljubica Tasic, a professor at Unicamp, the nano insecticide showed reduced toxicity to aquatic organisms used in ecotoxicity assessment studies (Raphidocelis subcapitata and Artemia salina).The effectiveness of the nanoinsecticide was assessed by controlling, in greenhouses, the insect (Â *Diaphorina citri)*Â responsible for the spread of greening, also known asÂ *huanglongbing*Â and HLB, caused by the bacteriumÂ Â *Candidatus liberibacter spp*Â . The disease affects all citrus plants and has no cure: once contaminated, it is not possible to eliminate the bacteria from the plant, which continues to act as a source of inoculum for the contamination of other plants.