

## **An eco-compatible nanoformulation for the reduction of pesticide environmental impacts**

*Monica GRANETTO, Politecnico di Torino*

The use of pesticides in agriculture has numerous advantages and is unavoidable in a growing population scenario, but is often linked to significant environmental drawbacks. Their uncontrolled use has progressively contributed to the pollution of the environmental matrices, in particular of soils and groundwater. In this work, an eco-compatible nanoformulation is presented, able to help controlling the environmental dispersion of dicamba, a highly soluble and moderately volatile herbicide. The proposed nanoformulation was developed using eco-compatible, low-cost materials, namely mineral particles and food-grade biopolymers, with the aim to reduce dicamba volatility and solubility. In this work, the results of laboratory and greenhouse tests are presented, comparing the efficacy of the nanoformulation against the pure herbicide and a commercial dicamba-based product. Volatilization tests were performed to assess the reduction of dicamba losses in air over 24 hours from pesticide solutions. Losses in air ranged between 47% for the pure dicamba to less than 5% for the commercial product and the nanoformulation. To assess the potential mobility in the subsoil, transport tests in saturated and unsaturated conditions were performed injecting in sand or soil-packed columns the herbicidal formulations. Pure dicamba and the commercial herbicide showed no retention within the columns, reaching 100% recover at the outflow. Conversely, for the nanoformulation the maximum recovery was 30% in unsaturated conditions, and 60% in saturated columns. Transport tests were performed at different scales, from small plexiglass columns (1.6cm diameter, 10cm length) up to a laboratory lysimeter (30cm diameter, 70cm length). A significantly reduced leaching of the nanoformulation compared to the pure compound and the commercial formulation was confirmed in all the set-ups used. The work was developed in the framework of Nanograss project, co-funded by Compagnia di San Paolo Foundation.