

Omics technologies used in pesticide residue detection and mitigation in crop

ABSTRACT

In agriculture, the convenience and efficacy of chemical pesticides have become inevitable to manage cultivated crop production. Here, we review the worldwide use of pesticides based on their categories, mode of actions and toxicity. Excessive use of pesticides may lead to hazardous pesticide residues in crops, causing adverse effects on human health and the environment. A wide range of high-tech-analytical methods are available to analyze pesticide residues. However, they are mostly time-consuming and inconvenient for on-site detection, calling for the development of biosensors that detect cellular changes in crops. Such new detection methods that combine biological and physicochemical knowledge may overcome the shortage in current farming to develop sustainable systems that support environmental and human health. This review also comprehensively compiles domestic pesticide residues removal tips from vegetables and fruits. Synthetic pesticide alternatives such as biopesticide and Nano pesticide are greener to the environment. However, its safety assessment for large-scale application needs careful evaluation. Lastly, we strongly call for reversions of pesticide application trends based on the changing climate, which is lacking in the current scenario.