Abstract

Background: The biobed is a simple biopurification system used to prevent the point-source pesticide contamination that occurs at farm level. The typical composition of the biomixture used in this system is soil, peat and straw in volumetric proportions of 1:1:2. The principal component is straw due to its positive effects on biological activity and thus pesticide degradation. However, access to straw can be limited in some regions, so it must be replaced by other more readily available lignocellulosic residues. Results: Therefore, two alternate lignocellulosic materials (barley husks and pine sawdust) were evaluated as partial substitutes for straw. The degradation of a repeatedly applied mixture of six pesticides by these alternates was assessed. The microbial respiration and fluorescein diacetate (FDA) hydrolysis activity were also assessed. The results showed that the highest degradation efficiency was found in mixtures containing straw and barley husks. Each biomixtures tested achieved a high degradation (50 to 90%) of all the pesticides used except iprodione. Repeated applications of pesticides resulted in a slowing of the degradation rate of all pesticide types in all biomixtures. FDA activity and microbial respiration were higher in the biomixtures containing barley husks and straw compared to the mixture with pine sawdust, a result consistent with the pesticide degradations observed. Conclusions: This paper demonstrates that the straw in the traditional biomixture can be partially replaced by other lignocellulosic materials to efficiently degrade a mixture of pesticides, even when the pesticides are added in successive applications and high concentrations.

Keywords

Biopurification system, biomixture, lignocellulosic materials, pesticide degradation.