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Carbon isotope fractionation of a s-triazine herbicide (simazine) by in vitro aerobic degradation in sandy soils

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In Australia, s-triazine herbicides, simazine and atrazine, [2-chloro-4-(ethylamino)-6-(isopropylamino)-1,3,5-triazine] are contaminants frequently detected in ground, surface and drinking waters. These herbicides are commonly used for post or pre-emergent control of broad leaf and grassy weeds. However, up until now, no systematic investigation of isotopic fractionation during triazine degradation has been undertaken. Compound specific stable carbon isotopic analysis (CSIA) has the potential to assess the degradation of s-triazine herbicides. In the present study the carbon isotope fractionations of simazine in three different types of sandy soils from south Western Australia by in vitro microbial aerobic degradation were assessed. Significant but small and similar isotopic shifts of simazine occurred during its degradation in a peaty sand (2.4 permil), in a pasture sand (2.3 permil) and in a.bluegum plantation sand (1.7 permil). The results imply that degradation of simazine in sandy soils can lead to carbon isotope fractionation which may be useful for assessing its source and its natural attenuation in the environment.