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Enabling a comparison of the mineralization of various chemicals in different soils – quantifying the influence of soil humidity

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Environmental factors, such as soil moisture, affect microbial activity in soils and the subsequent degradation of chemicals. Several methods used to characterize soil water content are gravimetric water content, percentage of water holding capacity (% WHC), water potential, volumetric water content and percentage of water filled porosity. To our knowledge, only few studies addressing pesticide degradation in different soils equilibrate soil material at defined water potentials. The German pesticide registration authority suggests in the guideline for pesticide degradation studies that in disturbed soils, equilibration should occur at 40 % water holding capacity. In contrast we present a method which is based on soil water potential and soil density. According to our results maximum aerobic pesticide mineralization occurs at a water tension of pF=2.18. While the comparison between increasing soil water and parent compound, sum of metabolites and non-extractable ^{14}C-residues yielded no correlations, our results demonstrated a conclusive correlation between relative pesticide mineralization (= mineralization in relation to pesticide mineralization at optimal soil humidity) and increasing soil water content of a newly defined soil water pool which is limited by defined water tensions. In addition this enables us to compare the relative aerobic mineralization of various chemicals in different soil directly. We expect that this finding will enable us in future to identify soil parameters affecting the bioavailability and thus the degradability of chemicals in soils.