

Effects of P fertilizing practices on soil P pools – temporal variations within a ten-year field experiment

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The application of organic residues like compost and manure in crop production is a common fertilization practice and important for P recycling in agriculture. The nutrient release from those substances varies widely and depends, among other from the composition of the material, stability of organic substances, soil properties and type of cropping systems. Also organic materials, especially composted products, contain a considerably part of P in the inorganic fraction (Frossard et al. 2002). In a field experiment which was established in autumn 1998 the effects of organic, inorganic and combined organic x inorganic fertilization on soil and plant characteristics were investigated for maritime climate conditions. The organic fertilizers (cattle manure and biowaste compost) were applied at a rate of 30 t ha⁻¹ in autumn 1998, 2001, 2004, and 2007. The inorganic fertilizers (TSP and TSP/biomass-ash) were applied once a year. In autumn 2008, after ten years of experimental time the P contents in soil reflect the different treatments. In the treatment without any P supply the soil P contents were found to be considerably lower than in the treatments with combined organic and inorganic fertilization (see table 1). However, compared to the values in autumn 2004 (Eichler-Löbermann et al. 2007) the high soluble P contents in soil (Pw and Pdl) changed only slightly. Notable differences were found in dependence of the sampling date. In March, with the beginning vegetation period the Pw and Pdl contents in soil were higher than in September after the crop harvest. Differences between the sampling dates were less pronounced for Pox and the degree of P saturation (DPS). According the analyses of variance and the estimation of the effect size (eta-squared), the impact of the organic fertilizers on soil P fractions were more pronounced than the mineral fertilization. Spatial differences in P resulting from former cropping practices were also visible after ten years.

Table 1: P supply with fertilizers after 10 experimental years and the effects on soil characteristics

organic	inorganic	P supply (kg/ha)	Pw (mg/kg soil)	DPS%
	without	0	0.93	42.1
without	TSP	215	1.25	47.4
	TSP/ash	232	1.17	47.1
	without	264	1.23	45.7
cattle manure	TSP	479	1.48	49.9
	TSP/ash	496	1.40	49.1
	without	296	1.42	49.7
biowaste compost	TSP	511	1.71	52.8
	TSP/ash	528	1.61	50.5
<i>LSD (0.05)</i>			<i>0.15</i>	<i>3.8</i>

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