

Ambio

Electronic Supplementary Material

Title: Re-evaluation of the yield response to phosphorus fertilization based on meta-analyses of long-term field experiments

Authors: Uwe Buczko, Michael van Laak, Bettina Eichler-Löbermann, Wolfgang Gans, Ines Merbach, Kerstin Panten, Edgar Peiter, Thomas Reitz, Heide Spiegel, Sabine v. Tucher

Table S1 Details about the institutions performing the field experiments and the corresponding field sites

Institute	Contact	Field experiment	description	References
Helmholtz-Centre for Environmental Research (Helmholtz-Zentrum für Umweltforschung – UFZ)	Dr. Ines Merbach (ines.merbach@ufz.de)	Static Fertilization Experiment Bad Lauchstädt	Experiment conducted since 1902, focus on the effects of mineral and organic fertilizers on ecosystem processes and services, 18 different fertilization treatments	Merbach and Schulz (2012)
Mecklenburg-Vorpommern Research Centre for Agriculture and Fisheries (Landesforschungs-	Dr. Ines Bull (i.bull@lfa.mvnet.de)	Static P/K-Fertilization Experiment Gülzow	start in 1997, rotation: winter rape – winter wheat –	Boelcke (2007)

<p>nstalt für Landwirtschaft und Fischerei Mecklenburg- Vorpommern)</p>			<p>potato – winter barley, treatments with different P- and K- fertilization, only mineral fertilizers</p>	
<p>Agricultural research station Kamperhof (Landwirtschaftliche Versuchsanstalt Kamperhof) Mülheim / Ruhr</p>	<p>Dr. Martin Rex (rex@hk- kalke.de)</p>	<p>Hohensolms, Lehsen, Sieversen</p>	<p>Since 1994; fertilizer type, application in autumn or spring</p>	<p>Rex (1999)</p>
<p>Chair of Plant Nutrition, TU Munich (Lehrstuhl für Pflanzenernährung TU München)</p>	<p>Dr. Sabine von Tucher (tucher@wzw.tu m.de)</p>	<p>Static Research Station Freising-Dürnast 016+021/022</p>	<p>016 since 1978 application of P fertilizer and lime; 021/022 since 1979 application</p>	<p>von Tucher et al. (2016)</p>

			of P, mineral N and organic matter	
Austrian Agency for Health and Food Safety (Österreichische Agentur für Gesundheit und Ernährungssicherheit)	Dr. Heide Spiegel (adelheid.spiegel @ages.at)	Three long-term P-field experiments in Lower Austria (Fuchsenbigl, Rottenhaus and Zwettl)	Long-term P- field experiments conducted from 1956 to 2004 (Zwettl) / to 2014 (in Fuchsenbigl and Rottenhaus) studying the effects of different types (Super-P, Thomas-P, Hyper-P and quantities of P-	Spiegel et al. (2001); Lindentha l et al. (2003)

			fertilisation on crop and soil parameters	
Plant Nutrition Laboratory, Institute of Agricultural and Nutritional Sciences, Martin Luther University Halle - Wittenberg	Prof. Dr. Edgar Peiter (edgar.peiter@landw.uni-halle.de), Dr. Wolfgang Gans (wolfgang.gans@landw.uni-halle.de)	Phosphate Fertilization Experiment (Field D), J. Kühn- Field, Halle (Saale)	Experiment initiated 1949 by Karl Schmalfuß; Focus on different annual and triennial P application rates combined with the comparison of superphosph ate and basic slag	Gransee and Merbach (2000)
Julius Kühn Institute (JKI), Dept for Crop and Soil Science;	Dr. Kerstin Panten (kerstin.panten)	Long-term P- fertilization experiment in	From 1985- 1997; Variables:	Vogeler et al. (2009)

Julius Kühn-Institut (JKI), Institut für Pflanzenbau und Bodenkunde	@julius-kuehn.de)	Braunschweig	fertilizer type, amount, time of application	
Agricultural technology center Augustenberg (Landwirtschaftliche Technologiezentrum Augustenberg), Karlsruhe	Dr. Markus Mokry markus.mokry@ltz.bwl.de	Blaufelden, Schw. Gmünd, Emmendingen, Tuttlingen, Pfullendorf, Biberach, Ladenburg	Duration 1984 – 1993 Objective effectiveness of P-fertilization as a function of soil P and class divisions	Mokry (1996)
Landesbetrieb Landwirtschaft Hessen	Dr. Johannes Heyn / Dierk Koch dierk.koch@llh.hessen.de	11 sites in Hesse (see Table 1)	Various duration, starting in 1974; effectiveness of P fertilization as function of soil P	Schaumburg and Heyn (1996)

			content	
University of Rostock, Chair Agronomy	Prof. Bettina Eichler-Löbermann (bettina.eichler@uni-rostock.de)	since 1998 - split plot design whereas organic fertilization constitutes the main plots (applied every third year), mineral P fertilization constitutes the sub plots (applied every year), and management practice constitutes the sub-sub plots - three levels of organic fertilizers (zero, cattle manure,	Long-term P management strategies including organic and inorganic fertilizers	Requejo & Eichler-Löbermann (2014), Krey et al. (2013), Eichler-Löbermann et al. (2007) Eichler-Löbermann et al. (2008)

		biowaste compost), three levels of inorganic fertilizers (zero, TripleSuper autumn application, TripleSuper spring application/biom ass ash)		
--	--	---	--	--