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## Measures to increasing availability of phosphorous in organic farming

SAWAN KUSHWAH<sup>1</sup>, AKANKSHA SINGH<sup>2</sup>

<sup>1</sup>*bioRe Association, soil science, India*

<sup>2</sup>*Research Inst. of Organic Agriculture (FiBL), International Cooperation, Switzerland*

### Abstract

Phosphorus is a key nutrient for food production and essential for growth and development of food crops. Though phosphorous is abundant in the soil, more than 90 % of it is not available for plants. The low availability of phosphorous for plants is due to the fact it easily binds to other elements, making it unavailable for plant uptake. Hence, phosphorous is usually added as external fertiliser in agriculture. In organic farming as synthetic P fertilisers are prohibited, natural sources of phosphorous containing material are recommended (e.g., bone meal, guano, or rock phosphate). Among these available phosphorous sources, rock phosphate (RP) is one of the most promising. However, it is a challenge to extract phosphorous from RP to make it available to plants. It is specifically a challenge to find techniques for doing so that are suitable for local context. Our study region is located in central India, where we work with approx. 3000 organic cotton farmers. Cotton is the main cash crop for farmers in our region. Here we present results from a participatory approach, where we worked with farmers to find solutions to increase phosphorous availability from RP in organic cotton production. Through farmer workshops and field visits we first identified locally available products for acidulation of RP. The products identified were tamarind, tomato, mahua vinegar, gooseberry and buttermilk then we trialed these products in farmer fields to measure their effects. Buttermilk was identified as the most promising product. Being farmer driven, adoption potential of our technique was high; however, challenges remained. We will discuss the process and challenges of such participatory research approaches and ideas to improve their sustainability.

**Keywords:** Buttermilk, cotton, phosphorus, rock phosphate