Article title	Effectiveness of Panda Hills phosphate rock compacted with triple superphosphate as source of phosphorus for rape, wheat, maize, and soybean
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Abstract	Greenhouse experiments were conducted to evaluate the agronomic effectiveness of Panda Hills phosphate rock (PPR) from southwest Tanzania, its mixture with triple superphosphate (TSP), and a compacted mixture of Panda PR and TSP (PPR+TSP) for wheat, rape, maize, and soybean on two United States soils (Hiwassee and Windthorst). The mixture of Panda PR and TSP was prepared by mixing ground TSP with Panda PR in proportions such that 50% of the total phosphorus (P) in the final mixture was from TSP. The compacted product (PPR+TSP) was prepared by compacting some of the blended mixture of Panda PR and TSP into pellets using a laboratory scale Carver press followed by crushing and screening. The P rates applied to Hiwassee soil were 0, 25, 50, and 100 mg P kg for each P source and test crop while on Windthorst soil only one rate of application (50 mg P kg) was applied to one test crop (rape). A lime treatment was also included on the Windthorst soil to enable evaluation of rape response to the different P sources under calcareous conditions. Wheat and rape were allowed to grow to maturity while maize and soybean were grown for six weeks only. The performance of the P sources as reflected by yield, P uptake and relative agronomic effectiveness (RAE) followed the order TSP>>(PPR+TSP)>(PPR)+(TSP)>>PPR for wheat, rape, maize, and soybean on Hiwassee soil. Panda PR was very ineffective in increasing grain or dry-matter yields of the test crops on this soil. The mixture of Panda PR and TSP as well as the compacted product increased wheat, maize, and soybean yields and P uptake significantly. The increases in yields were, however, largely attributed to the TSP component of the (PPR)+(TSP) mixture or its compacted product with little or no contribution from PPR. On the alkaline Windthorst soil, the performance of the P sources as reflected by rapeseed yield and RAE followed the order TSP= (PPR+TSP)>(PPR)+(TSP)>PPR. Remarkably compacted PPR and TSP was at par with TSP while PPR alone was 50% as effective as TSP in increasing rapeseed yield. Addition of lime drastically reduced the effective-ness of Panda PR, but it had little or no effect on the agronomic effectiveness of the (PPR)+(TSP) mixture or its compacted product.
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