Deficiency in plant-available phosphorus is considered to be a major limiting factor to food production in many agricultural soils. Mineral resources are necessary to restore soil phosphorus content. In regions where conventional fertilizers are not used due to cost limitations or to mitigate adverse environmental effects, local sources of phosphate rock are being increasingly recognized for potential use as alternative phosphorus fertilizers. The main obstacle associated with using directly applied ground phosphate rock is that the phosphate released is often unable to supply sufficient plant-available phosphorus for crop uptake. Plant and microbial-based mechanisms are low-cost, appropriate technologies to enhance the solubilization and increase the agronomic effectiveness of phosphate rock. Common mechanisms of phosphate rock dissolution including proton and organic acid production will be reviewed for both plants and microorganisms. This review will also address possibilities for future research directions and applications to agriculture, as well as highlight ongoing research at the University of Guelph, Guelph, Canada.

Keywords
agriculture, microorganisms, phosphate rock, phosphorus, rhizosphere, solubilization.