Phosphorus Recovery from Storm Water Runoff with Seawater-Mixed Pervious Concrete for Reutilization as a Mineral Fertilizer

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It has been reported that, unless new deposits are discovered, the world’s phosphorus reserves will be depleted in 40 to 400 years. Nutrient over-enrichment primarily by phosphorous in stormwater runoff especially from agricultural area is a major non-point source pollution of concern. Therefore, phosphorus, as a non-renewal resource, needs to be recovered and reused for resource sustainability and it, as a water pollutant, needs to be removed for environmental protection. In this study, pervious concrete was designed and optimized to recover and remove aqueous phosphorus from stormwater runoff in the form of amorphous phosphates. Pervious concrete was made with seawater as the mixing water and contained fly ash as an admixture to enhance environmental sustainability in pervious concrete production. Recovered amorphous phosphates were mixed with alginate, a biopolymer, and the alginate-phosphate mixture was cross-linked in the shape of beads in calcium chloride solution. The produced alginate-phosphate beads were utilized as a mineral fertilizer for growth and development of beans (Phaseolus vulgaris).

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