



Utilization of legacy P in soils, a strategic approach meeting the 40% loading reduction goal while sustaining agricultural production in the Lake Erie basin?

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Legacy phosphorus (P) in agricultural lands has been deemed the major source contributing to eutrophication of the Lake Erie. Canada and USA bilateral governments have set up a goal of 40% P loading reduction by 2025. Soil P draw-down (PDD) is a potential beneficial management practice for high P soils to overcome legacy P effect and mitigate soil P loss. A field experiment was conducted to assess the effects of PDD on crop yields, soil test P change, and soil P losses in both surface runoff and tile drainage under a corn-soybean rotation in a Brookston clay loam soil in a 9-year period from 2008 to 2016. Both yields of corn and soybean with PDD were highly identical to those with continuous P addition (CPA). Soil Olsen P with PDD declined with time at about 2.3 mg P kg⁻¹ year⁻¹, while with CPA it remained unchanged. Relative to CPA, PDD significantly decreased dissolved P and particular P losses, eventually the total P loss by 36%. In addition, farmers' production profitability increased by 15% through savings in investment for P fertilizer. The results indicate that utilization of soil legacy P can be an effective approach that enables us to reach the agri-P loading reduction goal, while improving production profitability and conserving world P resource.