



Legacy Phosphorus in Soils Sustained Crop Yields with Reduced Soil Phosphorus Loss for 14 Years

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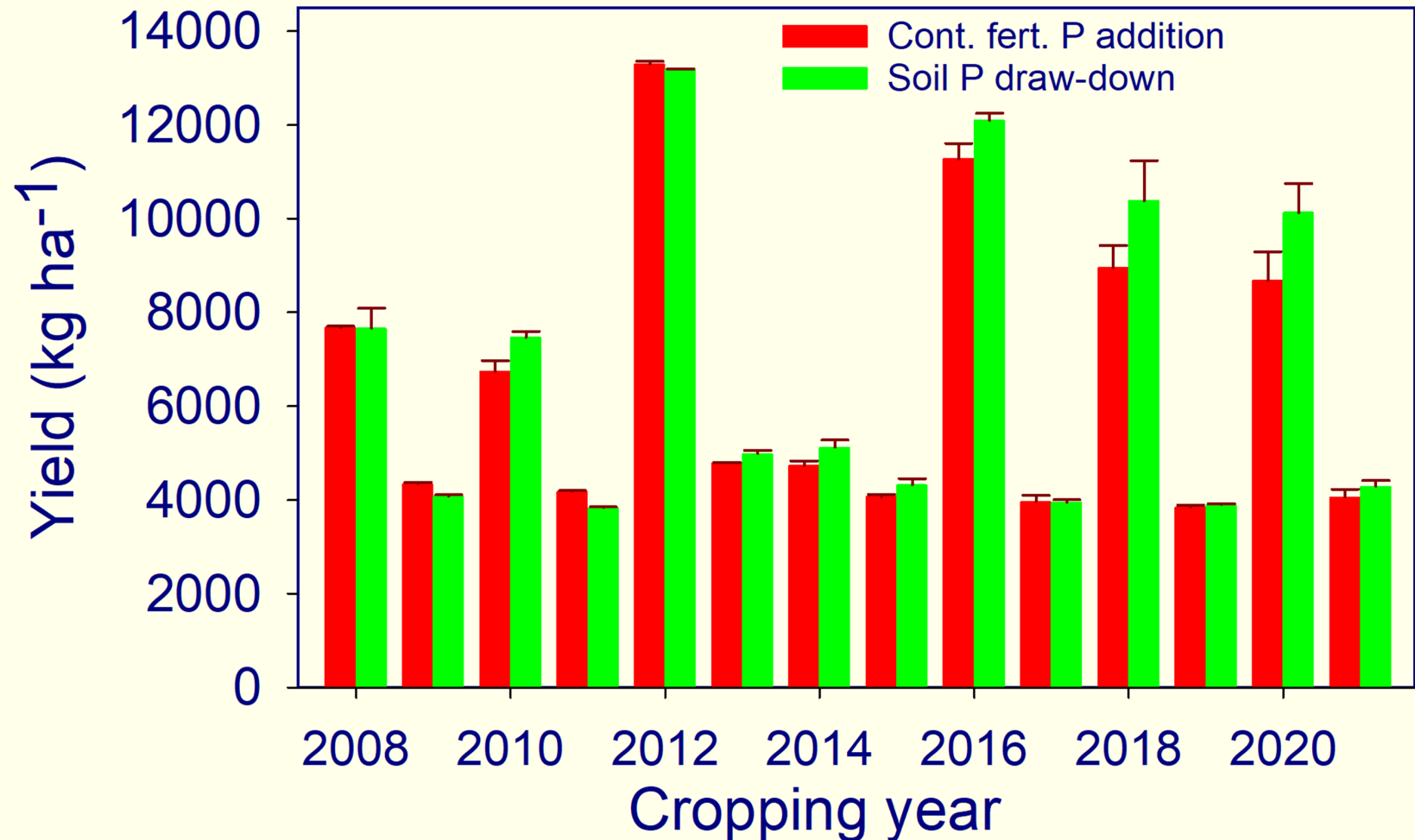
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Field Experiment

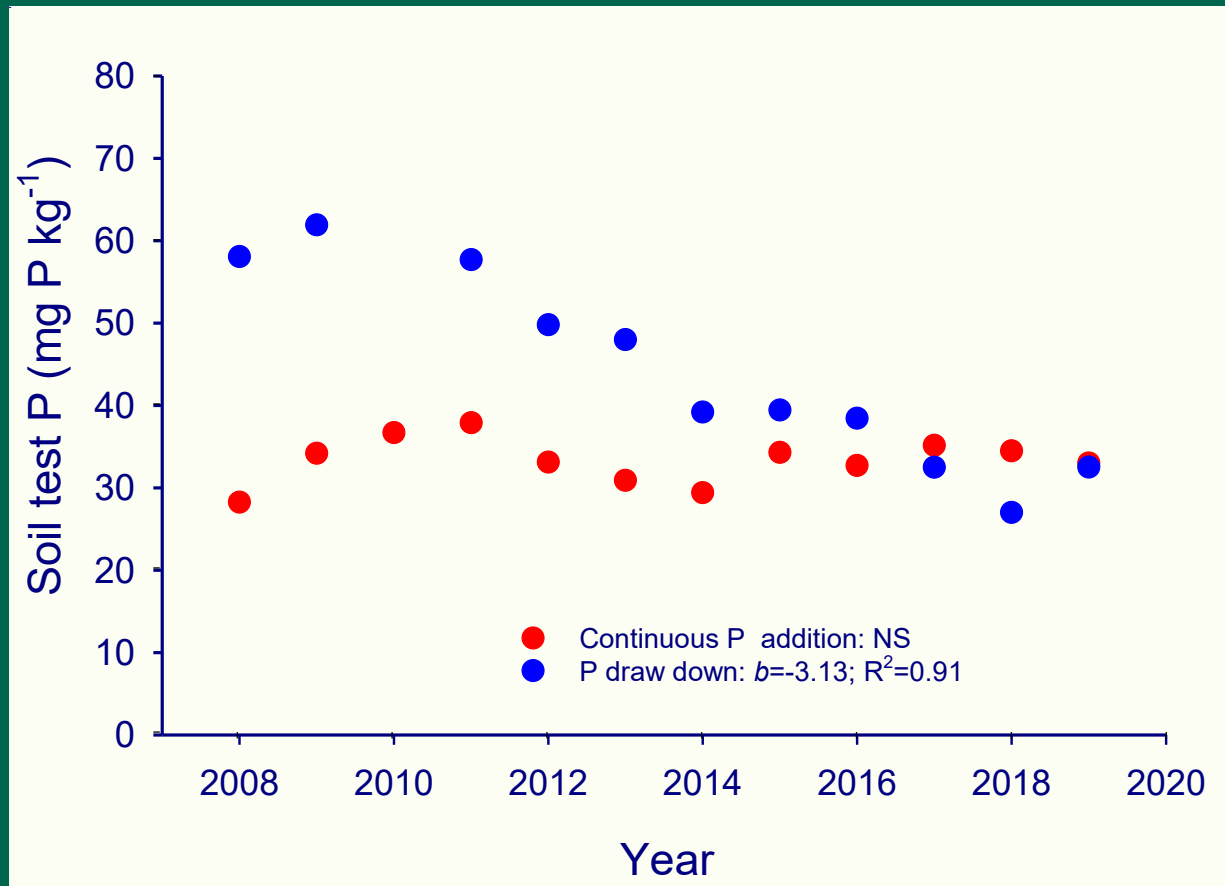


- Location: SW, ON, Canada
- Soil: Brookston clay loam
- Cropping system: corn-soybean rotation
- Experimental duration: 2008-2021
- Treatments:
 - ✓ Continuous fertilizer P addition, $50 \text{ kg P ha}^{-1} \text{ yr}^{-1}$ (corn phase only)
 - ✓ P draw-down, zero-P
 - ✓ N (200 kg N ha^{-1}) & K (100 kg K ha^{-1}) to both treatments

Legacy P in soils provided sufficient amount of P needs to sustain crop yields over 14 years, a clay loam soil



Changes in soil test P with corn-soybean rotation, 2008-2019



- Remained unchanged with continuous P addition (50 kg P ha⁻¹ rotation⁻¹)
- Decreased with draw-down at 3.1 mg kg⁻¹ yr⁻¹

Water quality studies: field set-up & on-site auto-water flow monitoring and sampling systems

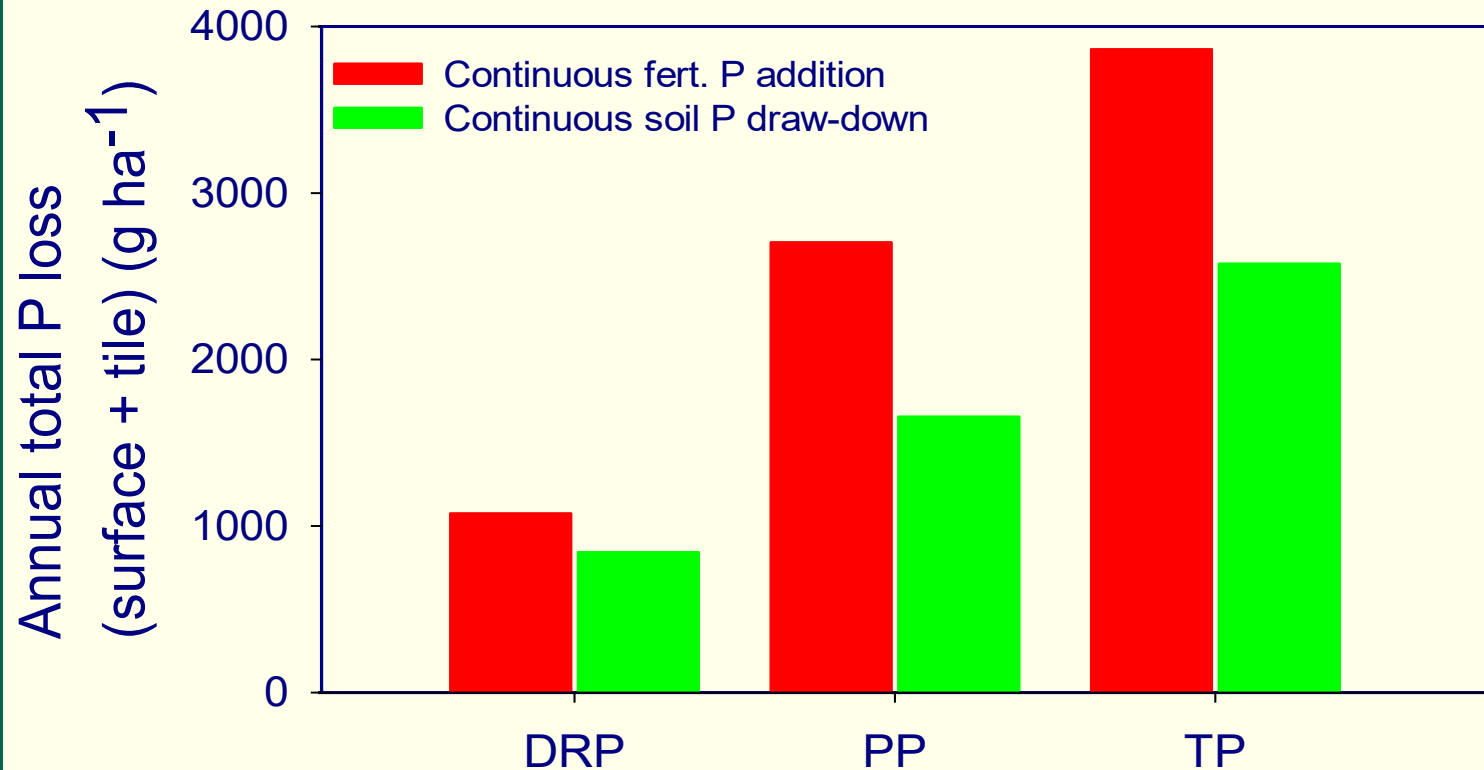


← Field site set-up



Auto-water flow (surface runoff and tile drainage) monitoring and sampling systems →

Annual total soil P loss (7-year mean, 2008-2014), soil P draw-down vs. continuous fertilizer P addition



Utilization of legacy P in soils reduced soil P loss by

- DRP - 22%
- PP - 39%
- TP - 33%

Conclusions

- Utilization of legacy P in soils under the study conditions can sustain crop yields for at least 14 years with significantly reduced soil P losses
- Soil test P decreased linearly with cropping year at $3.1 \text{ mg kg}^{-1} \text{ yr}^{-1}$, while it was maintained with continuous P addition at 50 kg P ha^{-1} per corn-soybean rotation

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