

Storage and Release of Biosolids P on Poorly Drained Sandy Florida Rangelands Receiving Biosolids Application

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Previous soils-based biosolids research in the Upper St. Johns River Basin (USJRB) has focused primarily on comparisons of Class B biosolids to chemical fertilizers, highlighting the slower release and therefore positive nature of biosolids phosphorus (P) recycled via surface application to sandy rangelands. A watershed-level analysis concluded that repeated applications of biosolids increased P export to receiving water bodies, increasing eutrophication. This called into question the role of sandy USJRB Spodosols as a sink/source of biosolids-derived P. Two USJRB cattle ranches were instrumented to measure surface and groundwater concentrations of P across two growing seasons. The A horizons (0-15 cm) of select fields were sampled to determine soil-bound P along with Aluminum (Al), Iron (Fe), and Calcium (Ca). Select soils were also used to construct column experiments, isolating the vertical leaching component of these systems to better understand P loss from the topsoil. The more complex 3-D movement of high-P concentration groundwater was explored to gain insight into subsurface P transport. The utility of Soil Storage Phosphorus Capacity, a P risk tool that ratios soil P to soil Fe+Al, was explored in light of unexpectedly high soil Ca and the resulting strong Ca-P statistical correlations. Together the findings from these ranches demonstrates that P leaching from soils receiving biosolids application and transport in the shallow groundwater are likely substantial vectors of the overall P transport that was outlined in the watershed study.