

Tannic acid leaching of denitrifying bioreactor woodchips

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Introduction

Oak wood (*Quercus rubra*) is a possible source of woodchips to be used in the denitrifying bioreactors. However, Oak wood is known to contain high amounts tannic acid which might be toxic to living organisms when leached in excess concentrations. The **objective** was to evaluate the tannic acid concentration and true color of leachate from Oak, Ash, and a blend of hardwood chip.

Methods

Plexiglas® bioreactor cells (fig. 1) were filled with either Oak (*Quercus rubra*), Ash, or a generic hardwood blend (MHW) of woodchips (D_{50} median particle size: 17 mm; total porosity 65%; $n=3$). They each received drainage water at an 8 hr hydraulic retention time for ≈ 85 d.

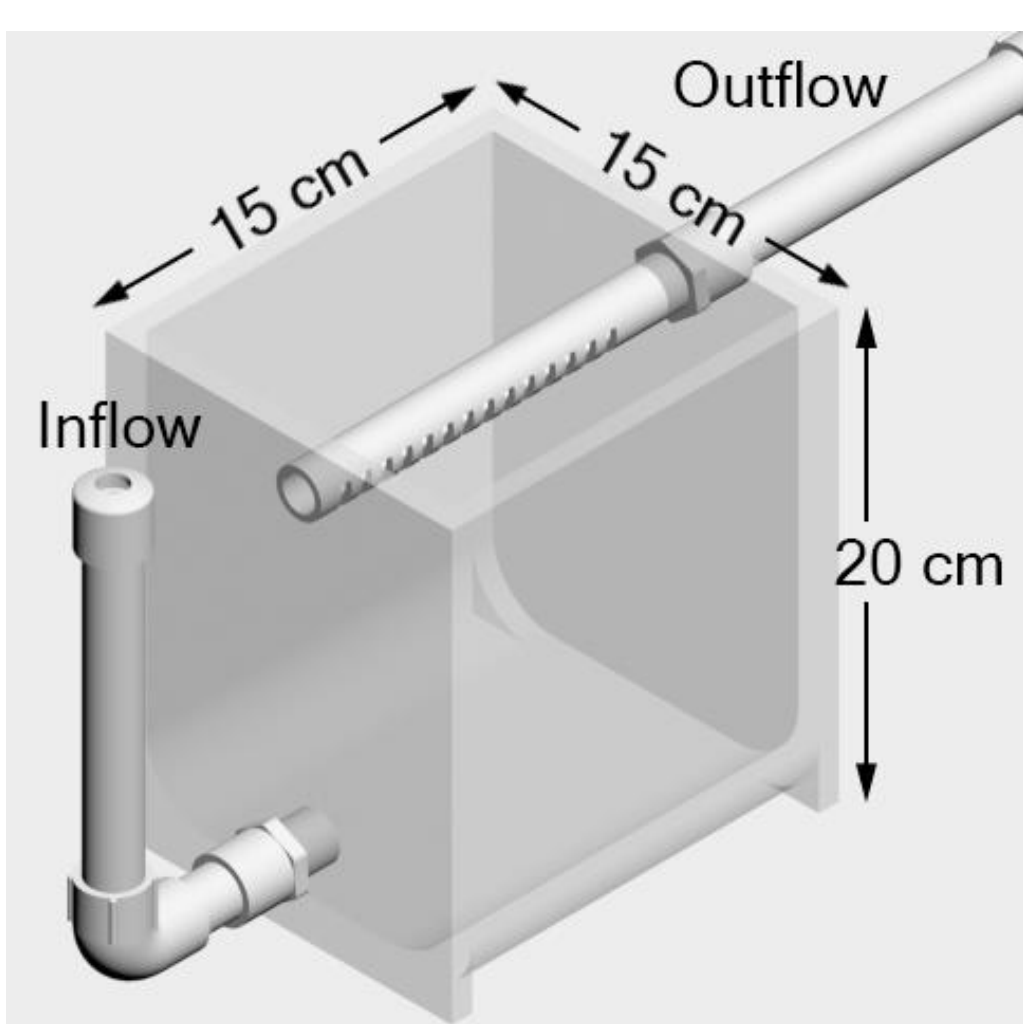
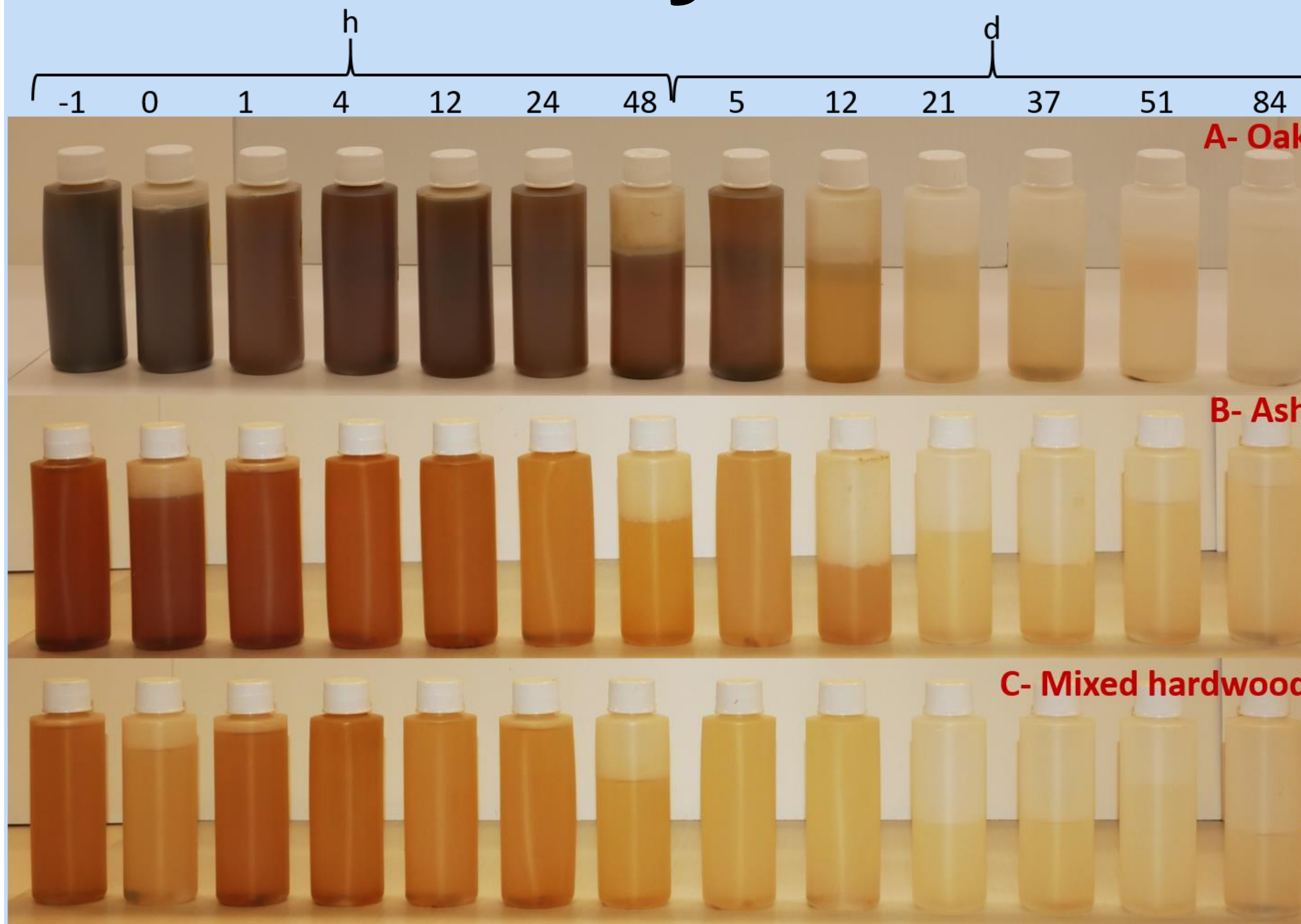


Figure 1. The rectangular Plexiglas® bioreactor cell(s)



Figure 2. The experimental set up

Oak leached higher concentrations of tannic acid than two other woods, but the outflows were eventually similar.



A- Oakwood
B- Ash wood
C- Mixed hard wood

Results

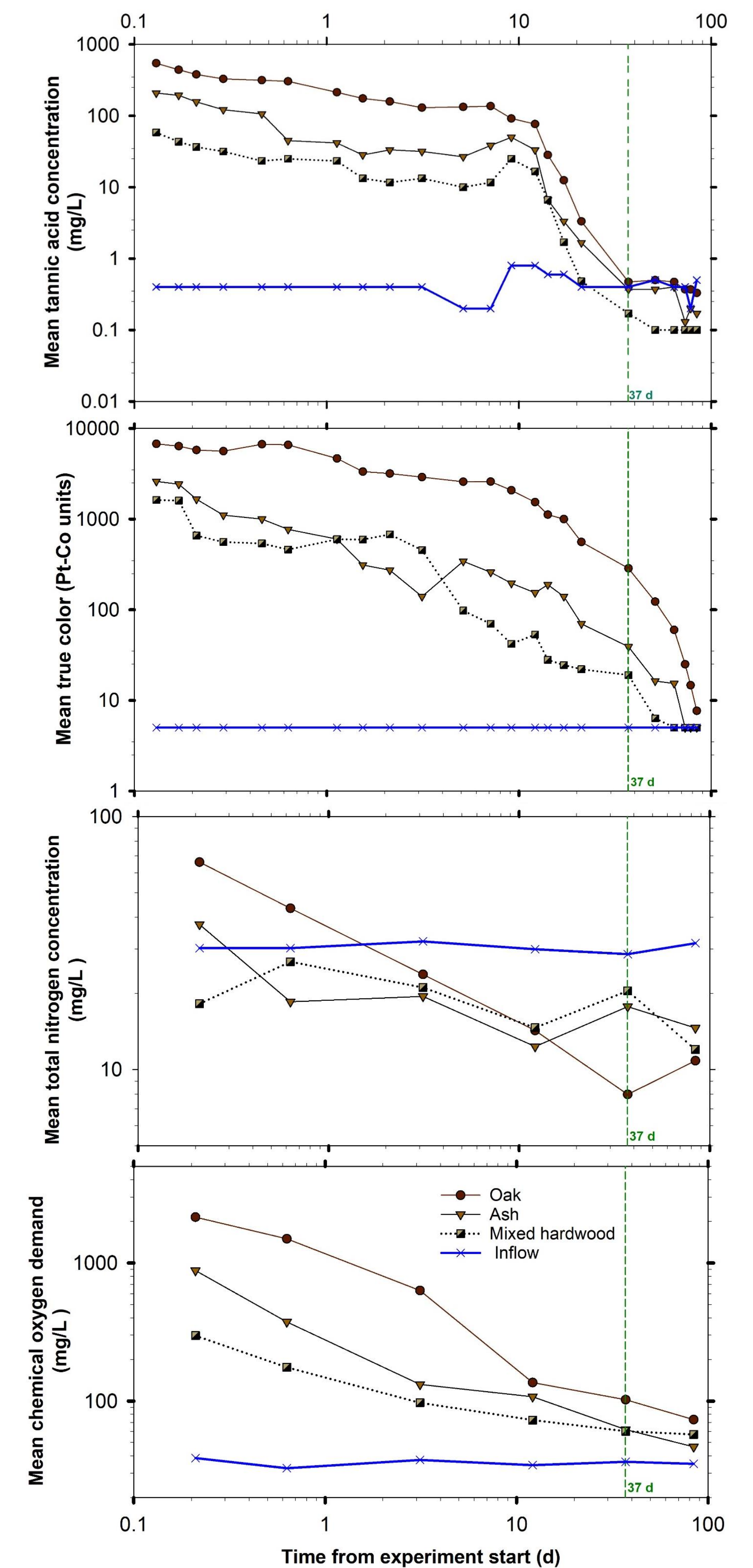


Figure 3. Mean tannic acid (a), true color (b), chemical oxygen demand (c) and total nitrogen (d) in the leachate of oak, ash, and mixed hardwood chips over an 84-d test (≈ 240 cumulative pore volumes; $n = 3$).

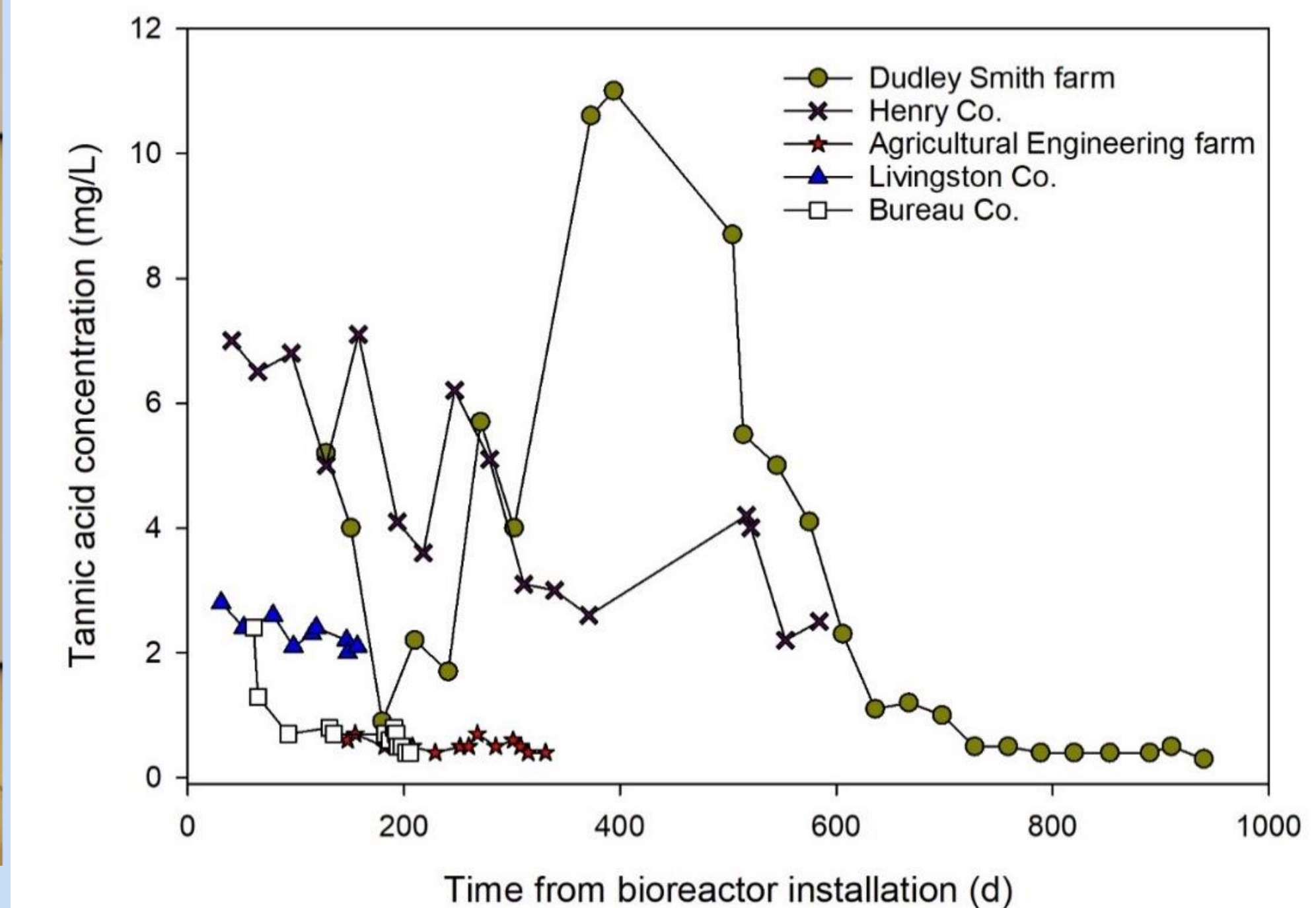


Figure 5. Tannic acid concentrations of field bioreactor outflow samples from five bioreactors in Illinois, USA.

Conclusion

Compared to ash wood and mixed hard wood oak wood showed a higher initial tannic acid, true color, chemical oxygen demand and the total nitrogen concentration but decreased to significantly low levels after 84 d from experiment start.

