

A comparison of enzymatic degradation of *myo*- and *scyllo*-inositol hexakisphosphate

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Abstract

Inositol phosphates are the most dominant form of organic phosphorus compounds in soils. Four stereoisomers of inositol hexakisphosphate (IP₆) (*myo*-, *scyllo*-, *D-chiro*-, and *neo*-) are known to exist in the environment, with *myo*-IP₆ being the most common. Inositol hexakisphosphates are less labile than other organic P compounds and hence accumulate in the environment, with *scyllo*-IP₆ presumed to be more recalcitrant than *myo*-IP₆. Understanding the relative rates of degradation of various stereoisomers allows quantification of their relative impacts on water quality. We employed ion chromatography and NMR methods to quantify the products of *scyllo*-inositol hexakisphosphate degradation in the presence of phytase enzymes (from *Apergilus niger* and wheat) and to compare the degradation pathways to those of *myo*-IP₆¹. Based on the decay characteristics and isomer composition, our data supports the working hypothesis that *scyllo*-IP₆ decays more slowly than *myo*-IP₆ under the same conditions. Furthermore, the products of *scyllo*-IP₆ degradation are unique to those of *myo*-IP₆. Additional degradation studies on other enzymes including enzyme specificity of different stereoisomers are underway. These findings fill in knowledge gaps regarding the environmental fate and residence time of these common organic phosphorus compounds.

[1] Sun et al. (2017) *Soil Sci. Soc. Am. J.* **81**, 61-75