Sorption of castor toxin by soil components and other materials. (S02-jaynes104122-Poster)

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Abstract:

Castor beans contain ricin, an extremely toxic protein. Soil constituents, such as silicate clays and organic matter, effectively sorb many substances and may lessen the harmful effects of ricin dispersal. The objectives were: examine ricin sorption to soil constituents and other materials; evaluate pH and other factors; and predict ricin sorption by natural soils. Batch adsorption isotherms were prepared by adding ricin to clays and other samples. Enzyme-linked-immunoassay (ELISA) techniques were used to measure ricin concentrations. Montmorillonite sorbed ~400 mg ricin/g and was the most effective sorbent. Ricin (~400 mg/g) retained after passing through montmorillonite films was 99.9% at pH 4, 78.6% at pH 7 and 16.1% at pH 10. XRD revealed interlayer expansion of montmorillonite at pH 4 and 7, but not at pH 10. Intermediate (~100 mg/g) ricin sorption was measured for Fe oxides, humic acid and calcite. Kaolinite sorbed ~20 mg/g ricin, but no sorption was noted for activated cocoanut charcoal, concrete or quartz sand. Acid or neutral soils rich in 2:1 clays can effectively mitigate ricin dispersal, whereas, alkaline, sandy, or kaolinitic soils would be less

effective.

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Presentation Information:

Presentation Date: Wednesday, November 13, 2002
Presentation Time: 2:00-4:00 pm
Poster Board Number: 1420

Keywords:

ricin sorption, montmorillonite, kaolinite, enzyme-linked immunoassay (ELISA)