

## ABSTRACT

**DISSERTATION:** Phytoremediation of Nitroglycerin in Smokeless Powders

**STUDENT:** Navid Asbaghi

**DEGREE:** Doctor of Education in Science

**COLLEGE:** Sciences and Humanities

**DATE:** July 2012

**PAGES:** 138

This study evaluated the feasibility of rhizosphere-enhanced phytoremediation in the removal of nitroglycerin (NG), as applied in commercial smokeless powder from soil. Double base smokeless powder was applied to soil mesocosms at rates of 0, 1.0, 5.0 and 10% (w/w). Nitroglycerin-contaminated mesocosms were seeded with oats (*Avena sativa*) or planted with live sedge plants (*Carex vulpinoidea*). In addition, composted biosolids were used as a soil treatment. Mesocosms were sampled at 7, 14, 30, and 60 days after initial planting. Determination of residual NG in the samples was performed using gas chromatography with an electron capture detector. Additionally, the populations of soil-borne bacteria were determined for each treatment. Microbial activity in the plant rhizosphere was a major contributor to NG decomposition in the soil. Only modest quantities of NG removal could be accounted for by abiotic processes such as sorption. Nitroglycerin decomposition by photolytic processes was observed; however, this effect is considered to be a minor contribution to NG removal from soil. Soil

bacterial numbers remained relatively constant regardless of the rate of SP application (1% and 10%). The data also indicate that addition of CB amendment to soil imparted a positive effect in NG decomposition and/or removal from soil. Additional study is needed to determine which of the plants studied was/were superior in NG removal from soil.