

THE USE OF AN INTEGRATED PLANNING GUIDE TO STEER PHYTOREMEDIATION PROJECTS TOWARDS SUSTAINABILITY USING THE EXAMPLE OF *AMARANTHUS* TO REMEDiate TOXAPHENE POLLUTED SOILS IN CHIANDEGA, NICARAGUA

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Abstract

Soil pollution by pesticides is a serious problem, especially in developing countries where incentives are limited to remediate these soils. Toxaphene was a widely used insecticide during the 1950s – 1980s, but even after a total ban on its use in 2001 there are still many harmful consequences that can be observed. High levels of toxaphene on agriculture fields in Nicaragua continues to be a threat to local inhabitants and wildlife and to the surrounding ecosystems. Phytoremediation is one of the methods used for cleaning polluted soils. It requires growing plants in-situ and relies on their ability to absorb and accumulate or degrade toxic elements. Some advantages are environmental safety and cost-effectiveness.

Amaranthus was investigated as a primary candidate for the phytoremediation project. Beside this, some other plants, such as Cucurbita pepo, Spinacia oleracea, Medicago sativa, were reported to be able to successfully absorb common persistent organic pollutants. In addition, uptake mechanisms and patterns of distribution of toxic elements in plants were studied to determine further use of plants.

To assess the viability and sustainability potential of implementing Amaranthus for phytoremediation, an Integrated Planning Guide (IPG) was used. The IPG uses a number of principles and concepts to provide guidelines for bioremediation actions. As a result, several conclusions and suggestions were produced, the most important being: Amaranthus has a potential for toxaphene uptake and has a high yield and historical significance; locally available poultry manure can be used as a fertilizer for Amaranthus; a monoculture should be avoided while growing Amaranthus; local community is the main driver of success and beneficiary of the project. Further research should be undertaken on this matter to improve the understanding of key factors for the success of the project.

Keywords

Phytoremediation; Toxaphene; Amaranthus; Integrated Planning Guide; Developing countries;