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Bioremediation: Microbiology of pesticide and inoculation of biofilter in the field of agriculture

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Introduction: In Quebec, vegetable crops occupy about 50914 hectares. Several pesticides are used in these cultures and these products pose risks to human health and the environment. According to studies done in Quebec in 2001, 49% of private wells near the potato crop fields have been found contaminated by pesticides.

Hypothesis: The repeated contamination of pesticides to the soil stimulates the growth of microorganisms able of degrading.

Aim: The objective is to identify microbiological variables responsible for the degradation of pesticides in the process of bioremediation using bio-filters and specifically to identify microorganisms capable of growing in soil treated with pesticides, confirm their in vitro ability to degrade pesticides and confirm in situ potential inoculation of the biofilter at the farm.

Methods:

- DNA extraction from soil using commercial kits
- Illumina MiSeq 16S rRNA sequencing for microbiome analysis
- Standard bioinformatics analysis of MiSeq data
- Isolation/screening of strains from soil samples to isolate potential pesticide degraders; growth characterization on standard minimal media with pesticides
- Genomic characterization of isolated strains by 16S rRNA sequence analysis
- Pesticide degradation potential analysis by in vitro growth and HPLC analysis of culture supernatants

Results: Illumina sequencing results showed that the Proteobacteria and Firmicutes are the two most in soil treated with pesticides groups. After in vitro confirm their ability to degrade pesticides, these microorganisms will serve as inoculum for testing in the field using sterile biofilters, then treated with different concentrations of pesticides.

Conclusion: The results of this project will help to adopt a new strategy to reduce the contamination of water resources and improve the quality of aquatic ecosystems and irrigated crops.

Biography

Asmaa Agoussar has completed her Master's degree from Cadi Ayyad University and she is currently pursuing her second Master's degree from University of Montreal, Canada.

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