

July 08-09, 2019 Vienna, Austria

J Food Nutr Popul Health 2019, Volume 03

4th Edition of International Conference on

Agriculture & Food Chemistry

Production of biochar from cashew nut shell to adsorb mycotoxins (aflatoxins and ochratoxin A) under different conditions for use in agriculture

Abderahim Ahmadou^{1,2,3,4,5,6}, Alfredo Napoli¹, Noel Durand^{1,2,3,4,5,6} and Didier Montet^{1,2,3,4,5,6}

¹CIRAD, France ²Qualisud, France

³Université de Montpellier, France

⁴Montpellier SupAgro, France

⁵Université d'Avignon, France

⁶Université de La Réunion, France

Background: Biochar is a microporous and adsorbent solid carbon product obtained from the pyrolysis of various organic materials (biomass, agricultural waste). Biochar is distinguished from vegetable charcoal by its manufacture methods. Biochar is used as the amendment in soils to give them favorable characteristics under certain conditions, i.e., absorption of water and its release at low speed. Some mycotoxins as aflatoxins are carcinogenic compounds resulting from the secondary metabolism of molds that develop on plants in the field and during their conservation. They are found at high level on some seeds and nuts in Africa. Ochratoxin A, member of mycotoxins is produced by various species of Aspergillus and Penicillium.

Objectives: The objective of this research was to study the adsorption of two main families of toxic mycotoxins (aflatoxins and ochratoxin A) by various biochars obtained from cashew nut shell produced in three pyrolysis conditions. The results indicate the correlations between the biochar properties and its adsorption capacity of mycotoxins.

Material & Methods: Three different biochars were produced from cashew nut shell at 400, 600 and 800°C and analyzed and characterized. They were tested at different pH (4.15, 6.54 and 9.05) and under different adsorption conditions (filtration, stirring) for their ability to capture aflatoxins and ochratoxin A.

Results: Results of this research demonstrated that the laboratory-made biochars prepared from cashew nut shell could adsorb ochratoxin A and aflatoxins. Sorption studies showed that biochars adsorbed aflatoxins more efficiently (near 100%) than ochratoxin A. Pyrolysis temperature, biochar mass used, pH and adsorption conditions (filtration/stirring) were the most important parameters for ochratoxin A sorption.

Conclusion: For ochratoxine A, an increase in the pyrolysis temperature caused a great increase in the adsorption rate while pH has a weak effect on sorption (2-5%). Biochar produced at 800°C adsorbed almost 98% of the ochratoxine A by stirring at pH 4.15 while its rate was 52.7% by filtration. Above to 25 mg of any biochar, adsorption of aflatoxins was 100% and it was thus impossible to quantify the effect of all other parameters (pyrolysis temperature, stirring or filtration, pH, biochar mass). All biochars have the same aflatoxin adsorption rates regardless of the conditions.

abderahim.ahmadou@cirad.fr