

## HOW TO PRODUCE A POTENTIAL HIGH VALUE BIO-CHAR FROM THE WORST INVASIVE PLANT IN CANADA

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Phragmites Australis is a perennial plant, native to Eurasia, which is spreading worldwide, increasing fire hazards, and causing damage to wildlife and its surrounding habitat. Phragmites is classified as Canada's worst invasive plant due to the difficulty of achieving its full eradication. Phragmites plants are fast growing and can spread quickly through seeds or rhizomes. They must be processed locally to destroy seeds and rhizomes. For these reasons, mobile pyrolysis was selected as a destruction method that provides valuable bio-char. The aim of this work is to study the effect of different pre-treatment and post-treatment strategies on bio-char characteristics, such as metal content, surface area, and porosity. Several methods are used to characterize the structure and properties of bio-char and to identify potential applications: BET, proximate and ultimate analysis, as well as the calorific value and ICP-OES. The pre-treatments are both mechanical and chemical. Mechanical milling of the biomass reduces the particle size to 1 mm in order to achieve better external and internal mass transfer during chemical pre-treatment. Chemical treatments involve the use of deionized water as well as chemicals (acetic acid, hydrochloric acid, or sodium hydroxide) using two different types of pretreatment equipment, a Soxhlet extractor and a water bath. Pyrolysis is performed in a novel MFR (mechanically fluidized reactor) designed for mobility and operation under various pyrolysis conditions: the system can be used as batch or continuous, and it is possible to control the operating conditions in order to perform slow or fast pyrolysis. Post-treatment consists of partial oxidation using mild oxidants such as carbon dioxide. This was performed in the MFR reactor at high temperatures ranging from 800 to 900 °C. The activated bio-char is fully characterized using the same methods as for the raw bio-char.