

Bio-oil Production in the Field

Authors: LUXHØI, JESPER, BECH, NIELS, and BRUUN, SANDER

Source: BioScience, 57(6) : 469

Published By: American Institute of Biological Sciences

URL: <https://doi.org/10.1641/B570616>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Bio-oil Production in the Field

In the editorial "Green Plants, Fossil Fuels, and now Biofuels" (*BioScience* 56: 875), David Pimentel and Tad Patzek argue that bioethanol is a nonsustainable way to produce fuel from biomass. Their main argument is that the amount of energy from fossil fuel required to produce ethanol is larger than the energy contained in the ethanol, at least with current technology. The authors recommend giving priority to energy conservation and solar energy.

However, we want to call attention to a more sustainable method of biofuel production. Flash pyrolysis is a thermochemical process in which biomass is converted to bio-oil in an oxygen-free atmosphere. The energy requirement for heating is less than 15% of the heating value in the processed biomass. The flash pyrolysis process developed at the Technical University of Denmark is optimized to produce bio-oil from cereal straw directly in the field (Bech and Dam-Johansen 2006). This means that the high energy consumption for transportation of biomass to the processing plant is avoided, and approximately 55% of the energy from the processed straw ends up in the bio-oil. The remaining

organic material is turned into char and distributed in the field together with most nutrients. Char is generally very resistant to microbial degradation, which means that this carbon is sequestered in the soil. Some South American soils (*terra preta*, or dark earth), amended thousands of years ago with large amounts of anthropogenic char, currently contain up to 9% carbon, compared with 0.5% for plain soil from nearby areas (Marris 2006). In addition, the char has a long range of positive effects on factors associated with soil quality, which can help amend some of the detrimental effect that the removal of biomass has on soil quality. Hence, by integrating flash pyrolysis of biomass with char amendment, sustainable bio-

oil can be produced, carbon can be sequestered, and soil fertility can be improved.

JESPER LUXHØI

NIELS BECH

SANDER BRUUN

Jesper Luxhøi (e-mail:

jelu@life.ku.dk) and Sander Bruun are

associate professors of soil fertility in the

Plant and Soil Science Laboratory,

Department of Agricultural Sciences,

Faculty of Life Sciences, University of

Copenhagen, DK-1871

Frederiksberg, Denmark.

Niels Bech is a doctoral student study-

ing flash pyrolysis in the Department of

Chemical Engineering, Technical

University of Denmark, DK-2800

Kongens Lyngby, Denmark.

Letters to the Editor

BioScience

1444 I Street, NW, Suite 200

Washington, DC 20005

E-mail: bioscience@aibs.org

The staff of *BioScience* reserves the right to edit letters for clarity without notifying the author. Letters are published as space becomes available.

References cited

Bech N, Dam-Johansen K. 2006. A Method and a

Mobile Unit for Collecting and Pyrolysing

Biomass. PCT Application WO 2006/117006.

Geneva: World Intellectual Property

Organization.

Marris E. 2006. Putting the carbon back: Black is the

new green. *Nature* 442: 624–626.

doi:10.1641/B570616

Include this information when citing this material.

