



“Gheorghe Asachi” Technical University of Iasi, Romania



CO-DESIGN FOR A CIRCULAR APPROACH IN GREEN TECHNOLOGIES: ADAPTATION OF REUSED BUILDING MATERIAL AS GROWING SUBSTRATE FOR SOILLESS CULTIVATION OF LETTUCE (*Lactuca sativa* var. *capitata*)

Sara Rizzo^{1*}, Francesca Cappellaro², Mattia Accorsi³, Francesco Orsini³,
Giorgio Gianquinto³, Alessandra Bonoli¹

¹University of Bologna, Department of Civil, Chemical, Environmental, and Materials Engineering, DICAM,
via Terracini 28, 40138, Bologna Italy

²ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development,
SSPT-USER-RISE via Martiri Monte Sole 4, 40129 Bologna, Italy

³Research Centre on Urban Environment for Agriculture and Biodiversity (ResCUE-AB), Department of Agricultural Sciences,
Alma Mater Studiorum - viale Fanin, 44 - 40127 Bologna

Abstract

Improving the awareness of the responsibility of our actions is the basis of achieving the ambitious aim of waste management and prevention established by the European Waste Framework Directive 2008/98/CE and the most recent Circular Economy Package. Circular Economy is connected both to improve manufacturing technologies and also educate people towards responsible consumption and waste reduction. Due to its educational and institutional role, universities provide a context to rethink not only at our technological system through the adoption of eco-innovation, but also to reconsider the entire system of our values through the education of the society in many aspects of sustainability. Most sustainability education courses co-generate knowledge in an explorative way through inter- and trans-disciplinary methodologies. A Living-lab of sustainability called Terracini in Transizione is ongoing at the School of Engineering and Architecture of University of Bologna. This Living-lab offers new opportunities and useful feedback to research and teaching, as well as contributing to the engagement of engineering students. As a result of the Living-lab, various experimental green technologies for Urban Resilience have been co-designed by students, researchers and professors. In order to strengthen the sustainability of the proposed solutions, some of them are being constructed using recycled materials. The aim is to close the cycle of utilized materials, and the hereby presented experiment focuses on testing the water and rooting capacity of innovative recycled materials as substrates for edible plants cultivation in innovative green technologies (e.g. soilless cultivation). Tested substrates include a control (mix of perlite-vermiculite) and recycled substrates, either made of crushed plasterboard panels, synthetic wadding or panels of rockwool. The present study addresses the definition of the hydraulic properties of the substrates and their effect on the yield of hydroponically grown lettuce (*Lactuca sativa*).

Key words: circular approach, green technologies, lettuce, soilless growing, waste and water management

Received: February, 2017; Revised final: July, 2017; Accepted: August, 2017

* Author to whom all correspondence should be addressed: e-mail: sararizzo@gmail.com; sara.rizzo2@unibo.it; Phone: +39 3495648721