

# NUTRIENT RECOVERY WITH SOURCE SEPARATION OF URINE – ENVIRONMENTAL BENEFITS AND FERTILIZER POTENTIAL

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## BACKGROUND

Source separated human urine and faeces are nutrient-rich biomasses and could be utilised more efficiently as fertilisers. Many factors, however, are hindering the nutrient recovery on a large scale. For example, the logistical chain, including storage, transport and spreading, as well as legislative barriers require solutions as well.

## OBJECTIVES AND ACTIONS

The feasibility of source separation of urine, management and potential as a fertilizer was examined in this study. The fertilizer efficiency of source-separated urine was tested in field-scale experiments. Additionally nutrient potential as well as environmental impacts of source-separation in three alternative scenarios were examined using mass balance calculation and comparative LCA.

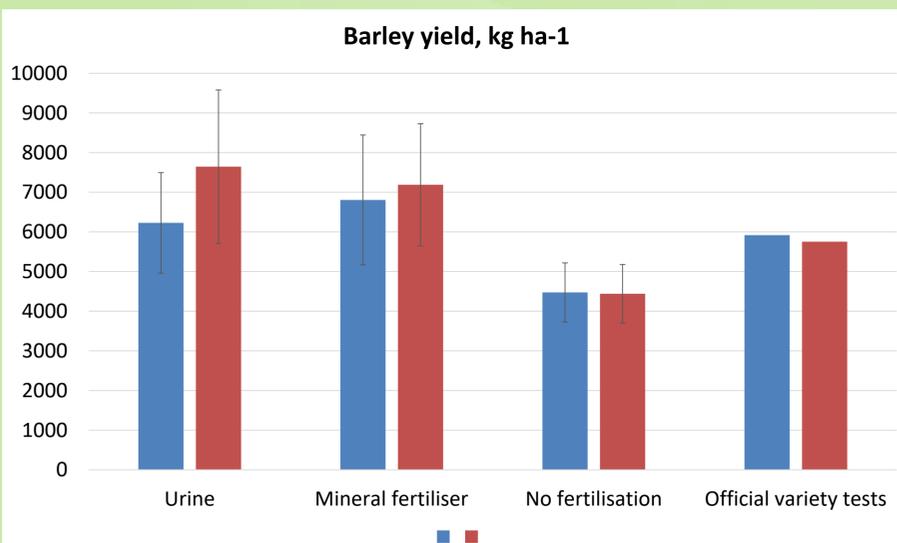


Figure 1. Total grain yield ( $\pm$ SD) of barley (*Hordeum vulgare*, var. Wolmari and Harbinger) (kg ha<sup>-1</sup>) with urine, mineral fertiliser and non-fertilised treatments.

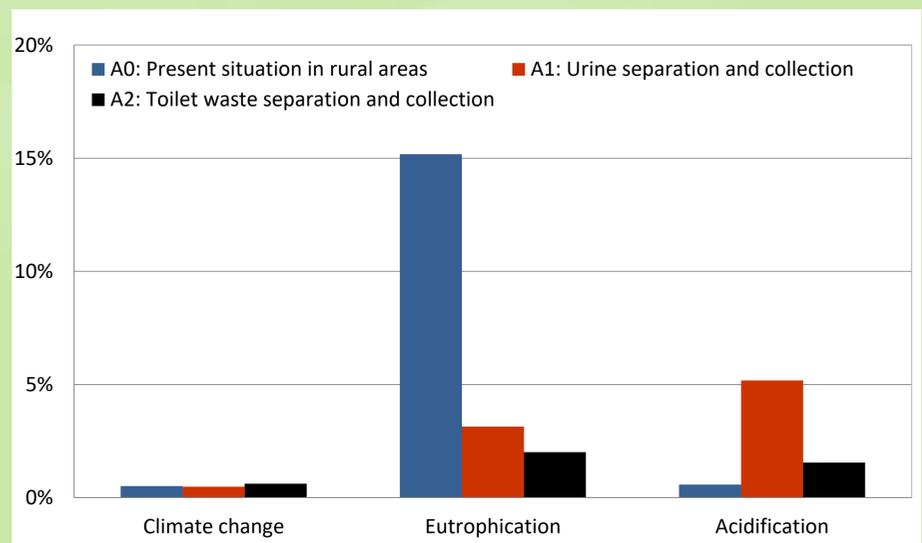


Figure 2. Environmental impacts of source separation of urine normalized by the European average annual emissions of the consumption.

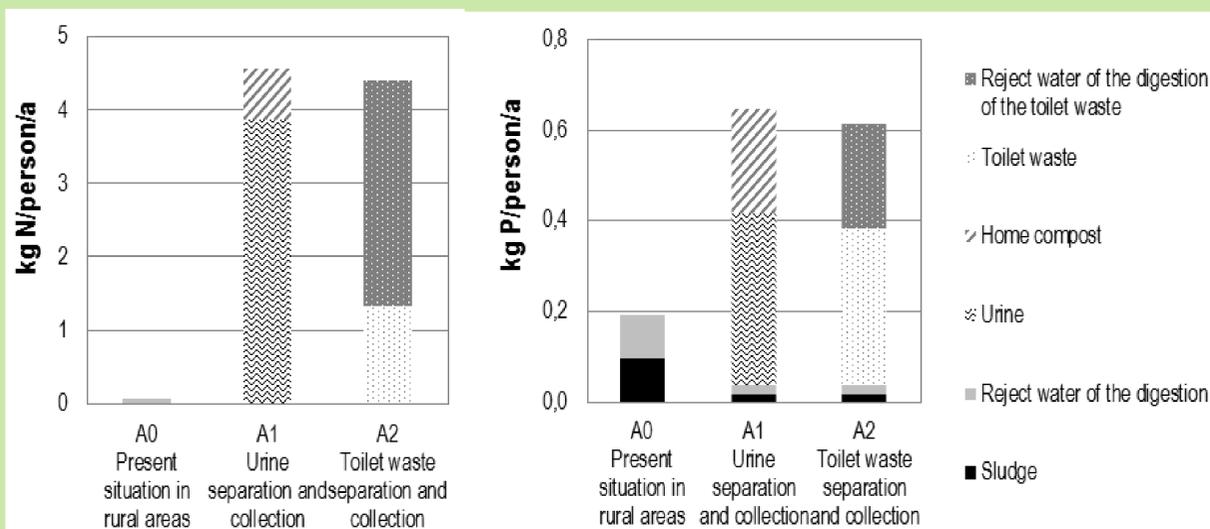


Figure 3. The nutrient potential of alternative scenarios with source separation of urine compared to the present onsite wastewater treatment methods in rural areas.

## RESULTS

Four times more P and over ten times more N could be recovered with source separation and utilisation of urine

Eutrophication impact is reduced down to one fifth

Urine was found to be as effective as mineral fertiliser

## CONCLUSIONS

Based on the results, environmental and economic benefits support the source separation and fertiliser use of urine. There are, however, strong opinions also against the fertiliser use of urine. Therefore, the acceptance of urine as a fertiliser and alternative technologies for nutrient recovery should be promoted.

Ongoing project: [www.hierakka.fi](http://www.hierakka.fi)