

# CONTROLLED FERMENTATION STABILIZING URINE



The controlled, lacto-acid fermentation of urine that works in the absence of oxygen — contrary to the spontaneous, destructive decomposition process — aims to eliminate pathogens and to 'fix' nutrients. Stabilized urine neither releases ammonia nor CO<sub>2</sub>. There is a range of microbes suitable to inoculate (kick-start) this transformation process. The Nutrients Recovery utilizes a sauerkraut-based inoculant which can be self-sufficiently produced with simple means in all parts of the world where cabbage grows.



THE INGREDIENTS FOR LACTO-ACID FERMENTATION OF URINE WITH ACIDITY TESTING KIT

POSSIBLE INOCULANTS

1) *Bacillus subtilis* generated with hay infusion (water-soaked, dry weeds) which is a heat-resistant microbe that suppresses soil-born diseases and supports the formation of humus-making enzymes and hormones that nourish plant growth.

2) *Lactobacillus* cultures derived from homemade sauerkraut brine (pickled cabbage) form citric acid as result of anaerobic metabolism of sugar. The rising acidity — from pH 5.7 to around pH 4.0 — stops the harmful decomposition of complex organic matter<sup>1</sup> (including pathogens and putrescent germs) while the acid-resistant *lactobacillus* microbes convert the urea into microbial

protein. Lacto-fermentation takes place in closed, airtight containment (recycled milk bins) without any offensive emissions. Once the 'pickled' urine is added to the compost (carbon buffer), microbial protein is gobbled up by other microbes and made 'appetizing' to earth worms (rather than being released back into the atmosphere). Unique in this microbiological conversion is that the synthesis of humus (oxidative amonification) is greater than the concurring respiration of organic matter (degradation with smelly release of ammonia). The significant reduction of undesired respiration in Terra Pre-ta ultimately helps sequester CO<sub>2</sub> into the ground<sup>2</sup>.



THE FINAL pH TEST ENSURES THE INTEGRITY OF FERMENT

REFERENCES

<sup>1</sup> Waterless Collection of Human Excreta by Application of Lactic Acid Fermentation, Asrat Yemanah, M. Bulbo, H. Factura, C. Bucie, R. Otterpohl, 2012, Institute of Wastewater Management and Water Protection, Hamburg University of Technology. [http://www.drytoilet.org/dt2012/full\\_papers/4/Asrat\\_Yemaneh.pdf](http://www.drytoilet.org/dt2012/full_papers/4/Asrat_Yemaneh.pdf)

<sup>2</sup> Terra Preta Sanitation, Dorotee Spuhler and Robert Gensch, 2010, Institute of Wastewater Management and Water Protection, SSWM Sustainable Sanitation and Water Management, Basel. <http://www.sswm.info/category/implementation-tools/wastewater-treatment/hardware/processes/terra-preta-sanitation>