FORK TO FIELD

PRODUCTIVE SANITATION

Productive sanitation is a paradigm shift from our current practice of disposal based sanitation that treats our bodily waste as quickly as possible and sends it on its way. Productive sanitation recognizes this waste as valuable resource streams that can be captured and treated to provide a safe, natural fertilizer.

Human urine and feces (composted feces are usually referred to as humanure) are being used in many parts of the world to aid farmers in meeting their crops' nutrient demands. In doing so, farmers benefit from the nutrients, and the community benefits from the increased control of human waste in the environment.

BENEFITS TO THE ENVIRONMENT

- Reduces dependence on synthetic fertilizer
- Alleviates dependence on finite phosphorus reserves
- Protects watersheds

FAQS

PATHOGENS

Urine is primarily sterile when it exits the body. Potential pathogens can be eliminated through extended storage, in an air tight container, for 6 months, at 68F or higher. When the urine is used for fertilization on personal plots, no storage is needed.

WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater. Vol. 4: Excreta and greywater use in agriculture. World Health Organization, Geneva, Switzerland, 2006 www.who.int/water_sanitation_health/wastewater/gsuweg4/en/index.html

PHARMACEUTICALS

"The micro-pollutants can be degraded better in the aerobic, biologically active soil layers with long retention times than in water bodies whose ecosystems are much more sensitive."

Practical Guidance on the Use of Urine in Crop Production. A. Richert et al. Stockholm Environment Institute, EcoSanRes Series, 2010-1. 2010

SALTS

Urine is a solution of salts, and salt stress can be a major constraint to plant production in arid areas. Given the high degree of precipitation in the Pacific Northwest, the concentration of soluable salts in the urine should not be a problem.

METALS

To a small extent urine contains trace metals. The amounts of harmful heavy metals in urine are miniscule and much lower than wastewater sludge or even farmyard manure.

WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater. Vol. 4: Excreta and greywater use in agriculture. World Health Organization, Geneva, Switzerland, 2006

THE GIVEBACK
NUTRIENT CYCLING PROJECT

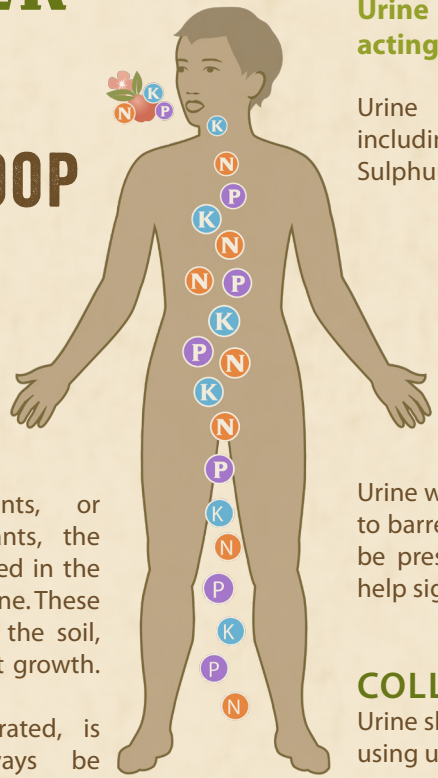
TheGiveBackProject.com

FERTILIZING with HUMAN URINE

WHY & HOW

HUMAN DERIVED FERTILIZER

CLOSE THE NUTRIENT LOOP



When we consume plants, or animals that consumed plants, the majority of nutrients embedded in the plants exit our bodies in our urine. These nutrients can be returned to the soil, via urine, to benefit new plant growth.

Urine can be locally generated, is renewable, and will always be increasing with population growth.

Each person, depending on food and beverage intake, releases an estimated 1-1.5 liters of urine each day, or about 500 liters each year. Each liter contains an estimated 5g of nitrogen.

1.5 liters can fertilize one square meter/day or an estimated .09 acres/year, depending on the crop.

If all of one's urine was captured over the year, it could fertilize enough crops to meet 60-90% of one's annual food needs.

URINE CAN PROVIDE COMPLETE NUTRITION FOR PLANTS

Urine is a well-balanced, nitrogen-rich, quick acting liquid fertilizer

Urine is 95% water but contains macronutrients including Nitrogen (N), Phosphorus (P), Potassium (K), Sulphur (S), Calcium (Ca) and Magnesium (Mg).

Nitrogen occurs in high concentration whereas phosphates and potassium occur in comparatively lower concentrations, in dissolved plant available forms.

Urine also contains beneficial micronutrients, essential for plant growth, but usually missing in synthetic fertilizers.

Urine will always work better in "living soils" compared to barren soils. The nitrogen converting bacteria must be present and soil amendments, such as compost, help significantly with this need.

COLLECTION

Urine should be captured separate from feces, using urinals or urine diverting toilets.

STORAGE

Urine should be stored in an air tight container, to avoid ammonia emissions.

Urine is very corrosive and therefore tanks should be made of resistant material, e.g. plastic or high quality concrete, while metals should be avoided.

The urine can also be "stored" in woody mulch (3" or more deep). The high carbon mulch will slow the release of the nitrogen.

APPLICATION

The total applied amount of urine and application rate depends on the nitrogen need of the plant, its root size and the soil.

In order to avoid leaching, and for climates with heavy rainfall or very sandy soils, frequent small applications are favorable but not essential.

If fertilizer is applied only once, this should be carried out prior to, or at the time of, sowing/planting.

DILUTION

Urine can be applied either neat or diluted, depending on the plant's needs. Dilution rates range from 1:1, water/urine ratio, up to 15:1. 3:1 is the most common.

TIMING

Urine's nutrients are best utilized if urine is applied before sowing/planting up until 2/3 -3/4 of the period between sowing and harvest. Once the crop enters its reproductive stage, it hardly takes up any more nutrients. Cease application 4 weeks prior to harvesting.

METHOD

Fertilize the soil, not the plant. It's best to apply urine close to the ground, directly incorporated or watered into the soil, in order to minimize ammonia losses. For example, urine can be distributed in small furrows that are immediately covered after application.