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Guide to Using Urine Fertilizer for Home Gardens

Urine fertilization has ancient roots and is still practiced in many communities around the world. Human urine contains a wealth of vital plant nutrients, including nitrogen, phosphorus, potassium, magnesium, calcium, and sulfur. Instead of flushing these precious elements downstream, where they cause nutrient pollution and harmful algal blooms, we can reclaim these nutrients to grow gorgeous crops!

Fertilizing with urine also conserves water, by reducing the need to flush clean water. It's an ecological practice that anyone can do as a way to both care for our aquatic neighbors and grow more food!

This guide is not intended for people growing food commercially. If you are seeking to sell your harvest, consult with your local or state regulatory agencies about any permits that may be required.

Step 1: Collect

Collect your urine in a sealable, watertight container.

For those in the Brattleboro, VT area, the Rich Earth Institute offers supplies for enabling easy, efficient urine collection, including the 'Cubie & Funnel' stand-alone urine collection device. To purchase one from our Research Center contact julia@richearthinstitute.org

Learn how to DIY your own Cubie & Funnel with this video: tinyurl.com/UrineCollection

See our gallery of recommended additional supplies here: tinyurl.com/PeecyclingTools

ODOR TIP:

Minimize odors by adding white vinegar or citric acid to the urine collection container before any urine is added. We use 1-2 cups of white vinegar or 1 tablespoon of citric acid per 5-gallon container. Adding vinegar also helps reduce nitrogen loss (via ammonia volatilization) during short-term storage.
Adding vinegar lowers the pH of the urine, and this will affect the storage sanitization process. If you need to sanitize your urine using the storage method and would like to use vinegar, then the storage time should start when the urine's pH reaches 9.

Step 2: Sanitize (If Needed)

Will anyone outside your household eat your garden harvest?

YES

Sanitization is recommended.

When sharing produce outside the household, we recommend transparency about the use of urine fertilizer (this document can be helpful when answering questions!)

Store the urine in an airtight container at 68°F (20°C) or higher for six months (WHO guideline).

**Rather than using the storage method, the Rich Earth Institute uses pasteurization , heating the urine to 176°F (80°C) degrees for 1.5 minutes (US EPA method). This method is primarily for larger-scale settings, and not recommended for home use. Rich Earth is developing a small pasteurizer - if interested, inquire at info@richearthinstitute.org*

NO

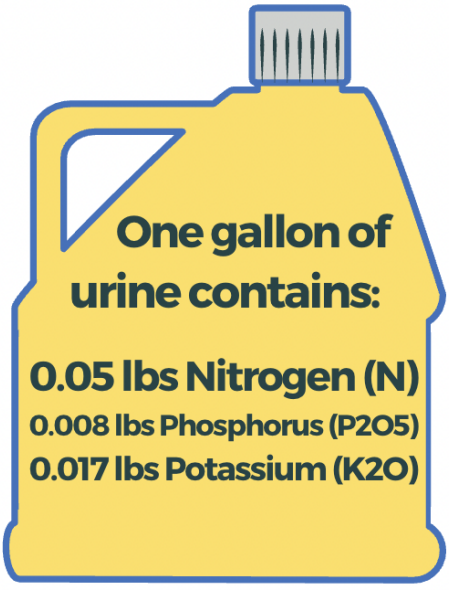
You do not need to sanitize your urine.

Many people use urine in their home gardens without any treatment. The World Health Organization supports this practice if the urine comes from the same household that will be eating the produce, and if the following guidelines are followed:

1. Wash hands after handling urine, or wear gloves
2. Follow best practices for application
3. Wait at least one month after fertilization to harvest crops that you'll eat raw

Constituent		mg/L
Nitrogen	N	5733.4
Potassium	K	1589.2
Sodium	Na	1469.1
Phosphorus	P	363.3
Sulfur	S	443.2
Calcium	Ca	23.3
Magnesium	Mg	7.1
Boron	B	1.9
Zinc	Zn	0.3
Iron	Fe	0.2
Copper	Cu	0.2
Aluminum	Al	<0.5
Nickel Ni	Ni	<0.02
Manganese	Mn	<0.01
Cadmium	Cd	<0.01
Lead	Pb	0.0
Chromium	Cr	0.0

Typical results from urine collected by Rich Earth Institute



Step 3: Fertilize

How Much?

Consider your plant's needs, the nutrients already in the soil, and how often you will apply.

If you apply too little urine, your crops will not grow as well as they could. If you apply too much, the extra nutrients can wash out of the soil and cause water pollution. To avoid over-applying, you need to make sure that you don't add more nutrients (especially nitrogen and phosphorus) than your crops can use.

Observation: Many gardeners apply urine whenever they judge plants to be growing slowly or turning yellow, which often indicates inadequate nitrogen. A rough guideline is to apply about a gallon of urine per 100 square feet every couple of weeks.

Soil Test: A soil test will tell you how much N, P, K, and other nutrients you need to add to your soil for the specific plants you are growing. It will recommend how many pounds of each nutrient to apply per 1,000 ft2, and how often. You can then calculate how much urine it will take to satisfy your crop's fertilizer needs and apply that amount.
Because there is more nitrogen in urine than any other nutrient, use the nitrogen recommendation to calculate your application rate. If this amount of urine does not supply enough potassium or phosphorus, you can add compost, mineral fertilizer, or other fertilizer products.

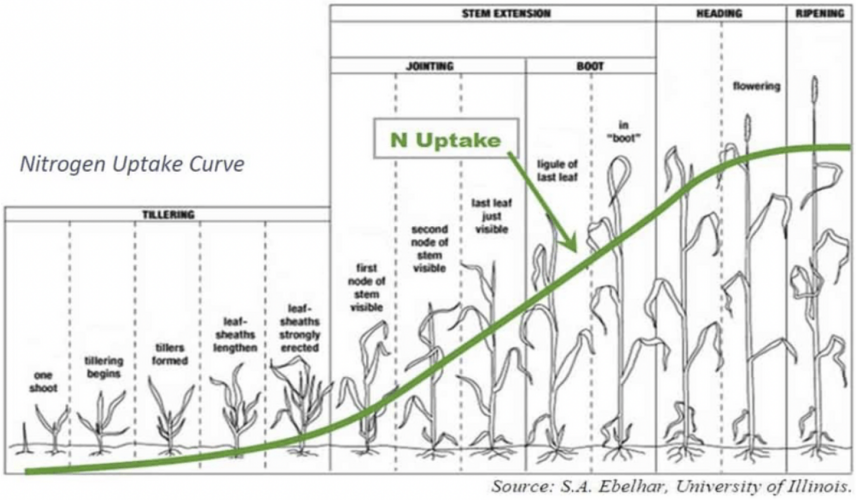
Most recommendation rates are for the entire growing season, but it's best if you can split your urine application into several smaller applications while the plants are growing. So don't forget to divide your total application amount by the number of times you plan to fertilize during the growing season.

When?

Apply when your plants are actively growing. The best time varies by crop, but it's generally after germination and before fruits/seeds appear.

If possible, apply in several small applications spread out over the growing period, rather than one large application.

Apply at least one month before harvesting crops that you'll eat raw.



Source: S.A. Ebelhar, University of Illinois.

How to apply?

1. Wear rubber gloves or wash hands after application.
2. Apply urine directly to the ground:
    - Pour the urine from your container (i.e. watering can) as close to the ground as possible.
    - Do not spray the urine
    - We do not recommend applying directly to leaves or stems, as this will result in near total loss of the nitrogen value*
3. Recommended patterns:
    - Annual plants: apply 4” (10 cm) from base
    - Row crops: apply in a strip or shallow furrow next to the row
    - Crops with space between plants: apply in a shallow hole next to each plant
    - Trees: apply in a circle around the tree that is the same diameter as the tree’s canopy
4. To prevent nitrogen loss, incorporate urine into moist soil using one or more of the following:
    - Cover the urine with moist soil after application
    - Irrigate immediately after application or apply during rain
    - Dilute the urine before application

DILUTION

If you follow the recommendations here and apply the right amount, undiluted urine will not harm your plants. However, dilution can be beneficial because it helps the urine soak into the ground, especially in dry soil.
There is no standard urine:water dilution level; different sources recommend different levels. These range from 1:1 to 1:30, with the 1:3 to 1:5 range being most common. Calculate and measure the amount of urine you need before dilution, then add the desired amount of water.

Some gardeners have found success with additional tools, such as the Oriaz Solar Dripper™, drip tape, and other irrigation/fertigation equipment.

Urine & Compost

If you want to maximize the fertilizer value of your urine, we suggest using it without composting, because some of the nutrients will be lost in the composting process. However, composting can be a good solution if you do not have storage space for liquid urine or if you prefer to handle it as compost. Adding urine to a compost pile also accelerates the composting process.

If you choose to compost urine, it's best to add it to high-carbon materials such as dead leaves, straw, paper, or sawdust. This will help reduce nitrogen losses. On the other hand, if your compost is mostly high-nitrogen material like kitchen scraps or green plants, you will lose more of the nitrogen in the urine during composting.

This is because urine is low in carbon (C) and very high in nitrogen (N), meaning it has a very low C:N ratio. That means it's best to mix it with compostable materials that have a high C content (high C:N ratio) like brown leaves to keep the ideal C:N ratio in the compost.

Community Science Survey

Take our survey so that we can continue to learn together!

This community science survey will contribute to a growing body of knowledge about where, how, and why people fertilize with urine in their home gardens around the world. While we know urine is used by many, we have little detailed information about specific practices. Your experiences will help us grow our understanding of how urine works for different crops, in varying conditions and will inform our educational efforts. Please take a few minutes (10-20) to complete this survey and share your experiences with the art, science, and practice of fertilizing with urine.

tinyurl.com/UrineMyGardenSurvey