

# Organic fertilizer

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**Organic fertilizers** are fertilizers derived from animal matter, animal excreta (manure), human excreta, and vegetable matter. (e.g. compost and crop residues).<sup>[1]</sup> Naturally occurring organic fertilizers include animal wastes from meat processing, peat, manure, slurry, and guano.

In contrast, the majority of fertilizers used in commercial farming are extracted from minerals (e.g., phosphate rock) or produced industrially (e.g., ammonia). Organic agriculture, a system of farming, allows for certain fertilizers and amendments and disallows others; that is also distinct from this topic.

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## Examples and sources

The main organic fertilizers are, peat, animal wastes (often from slaughter houses), plant wastes from agriculture, and treated sewage sludge.<sup>[1]</sup>

### Mineral

By some definitions, minerals are distinctly separate from organic materials. However, certain organic fertilizers and amendments are mined, specifically guano and peat, and other mined minerals are fossil products of animal activity, such as greensand (anaerobic marine deposits), some limestones (fossil shell deposits) and some rock phosphates, (fossil guano). Peat, a



A cement reservoir containing cow manure mixed with water. This is common in rural Hainan Province, China. Note the bucket on a stick that the farmer uses to apply the mixture.



Compost bin for small-scale production of organic fertilizer



A large commercial compost operation

precursor to coal, offers no nutritional value to the plants, but improves the soil by aeration and absorbing water; it is sometimes credited as being the most widely used organic fertilizer and by volume is the top organic amendment.

## Animal sources

These materials include the products of the slaughter of animals. Bloodmeal, bone meal, hides, hoofs, and horns are typical precursors.<sup>[1]</sup> fish meal, and feather meal are other sources.

Chicken litter, which consists of chicken manure mixed with sawdust, is an organic fertilizer that has been shown to better condition soil for harvest than synthesized fertilizer. Researchers at the Agricultural Research Service (ARS) studied the effects of using chicken litter, an organic fertilizer, versus synthetic fertilizers on cotton fields, and found that fields fertilized with chicken litter had a 12% increase in cotton yields over fields fertilized with synthetic fertilizer. In addition to higher yields, researchers valued commercially sold chicken litter at a \$17/ton premium (to a total valuation of \$78/ton) over the traditional valuations of \$61/ton due to value added as a soil conditioner.<sup>[2]</sup>



Peat is the most widely used organic amendment.

## Plant

*Processed* organic fertilizers include compost, humic acid, amino acids, and seaweed extracts. Other examples are natural enzyme-digested proteins. Decomposing crop residue (green manure) from prior years is another source of fertility.

Other ARS studies have found that algae used to capture nitrogen and phosphorus runoff from agricultural fields can not only prevent water contamination of these nutrients, but also can be used as an organic fertilizer. ARS scientists originally developed the "algal turf scrubber" to reduce nutrient runoff and increase quality of water flowing into streams, rivers, and lakes. They found that this nutrient-rich algae, once dried, can be applied to cucumber and corn seedlings and result in growth comparable to that seen using synthetic fertilizers.<sup>[3]</sup>

## Treated sewage sludge

Although night soil (from human excreta) was a traditional organic fertilizer, the main source of this type is nowadays treated sewage sludge, also known as biosolids.

Biosolids as soil amendment is only available to less than 1% of US agricultural land. Industrial pollutants in sewage sludge prevents recycling it as fertilizer. The USDA prohibits use of sewage sludge in organic agricultural operations in the U.S. due to industrial pollution, pharmaceuticals, hormones, heavy metals, and other factors.<sup>[4][5][6]</sup> The USDA now requires 3rd-party certification of high-nitrogen liquid organic fertilizers sold in the U.S.<sup>[7]</sup>

Sewage sludge use in organic agricultural operations in the U.S. has been extremely limited and rare due

to USDA prohibition of the practice (due to toxic metal accumulation, among other factors).<sup>[8][9][10]</sup>

## Urine

Animal sourced urea and urea-formaldehyde from urine are suitable for organic agriculture; however, synthetically produced urea is not.<sup>[11]</sup> The common thread that can be seen through these examples is that *organic* agriculture attempts to define itself through minimal processing (e.g., via chemical energy such as petroleum — see Haber process), as well as being naturally occurring or via natural biological processes such as composting.



Decomposing animal manure, an organic fertilizer source

## Others

- Alfalfa
- Ash<sup>[12]</sup>
- Blood meal
- Bone meal<sup>[13]</sup>
- Compost
- Cover crops
- Fish emulsion<sup>[14]</sup>
- Fish meal
- Manure
- Rock phosphate
- Raw Langbeinite
- Rockdust
- Unprocessed natural potassium sulfate
- Wood chips/sawdust<sup>[15]</sup>
- PROM

## See also

- Biofertilizer
- Organic hydroponic solutions
- Reuse of excreta

## References

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