APPLICATIONS OF VERMICOMPOST IN AGRICULTURAL AND HORTICULTURAL

 One of the main goals of every organic farmer is to build long-term soil fertility and tilth by feeding the soil with a variety of natural amendments. The regular addition of compost is one of the best ways to enhance the soil's organic and humic content, which helps to build a fertile soil structure. This soil structure makes better use of water and nutrients. It is easier to till and, overall, is better able to achieve optimum yields on a long-term basis.

Since compost has already decomposed, its impacts are much more long-lasting than crop residues and green or animal manures that rapidly degrade when added to the soil. Composting also gives farmers a way to recycle manures and plant residues that otherwise might present some environmental problems.

Compost is produced through the activity of aerobic (oxygen requiring) microorganisms. These microbes require oxygen, moisture, and food in order to grow and multiply. When these factors are maintained at optimal levels, the natural decomposition process is greatly accelerated. The microbes generate heat, water vapor, and carbon dioxide as they transform raw materials into a stable soil conditioner.

Compost has the unique ability to improve the properties of soils and growing media physically (structurally), chemically (nutritionally), and biologically. Other compost benefits include:

* + Improves the soil structure, porosity, and density, thus creating a better plant root environment
	+ Increases infiltration and permeability of heavy soils, thus reducing erosion and runoff
	+ Improves water holding capacity, thus reducing water loss and leaching in sandy soils
	+ Supplies a variety of macro and micronutrients
	+ May control or suppress certain soil-borne plant pathogens
	+ Supplies significant quantities of organic matter
	+ Improves cation exchange capacity (CEC) of soils and growing media, thus improving their ability to hold nutrients for plant use
	+ Supplies beneficial microorganisms to soils and growing media
	+ Improves and stabilizes soil pH
* Can bind and degrade specific pollutants.

Although the most common way to produce compost is using microorganisms, compost can be also produced using worms. This is called worm compost or vermicompost. This kind of compost is a highly valued, and is often called black gold. This is because there are not many farmers involved in worm compost production and it takes time to produce.

What is Vermicompost?

Vermicompost is the product or process of composting using various worms, usually red wigglers, white worms, and other earthworms, to create a heterogeneous mixture of decomposing vegetable or food waste, bedding materials, and vermicast, which are also called worm castings, worm humus or worm manure. It is the end-product of the breakdown of organic matter by an earthworm. These castings have been shown to contain reduced levels of contaminants and a higher saturation of nutrients than do organic materials before vermicomposting.

Containing water-soluble nutrients, vermicompost is an excellent, nutrient-rich organic fertilizer and soil conditioner. While there are nutrients in worm castings, the real benefit to worm castings are the millions of beneficial microbes that they contain. Those microbes eat organic matter in the soil and release available plant nutrients. Fungi in the castings form symbiotic relationships to transport water and nutrients to the roots. They can also hold water in the soil and help with water management. Worm castings have at least 10 times more microbes than soil or regular compost. While vermicomposting is generally known as a nutrient rich source of organic compost used in farming and small scale sustainable, organic farming, the process of vermicasting is being studied as a treatment for organic waste in sewage and wastewater plants around the world.

Worms eat food scraps, which become compost as they pass through the worm's body. Compost exits the worm through its tail end. This compost can then be used to grow plants. Vermicompost is good for plants because the worms are eating nutrient-rich fruit and vegetable scraps and turning them into nutrient-rich compost.



*Manual and machinery fruit harvest*

The Idea of Using Worms to Produce a Compost

For millions of years, worms have been hard at work breaking down organic materials and returning nutrients to the soil. Worms could eat any organic material. However, for the compost the best sources are raw fruit and vegetable scraps. Orange rinds and other citrus fruits, which are too acidic, and can attract fruit flies, should be avoided as well as cooked food and meat.

In addition to compost, the worms produce worm juice. This juice is also loaded with beneficial microorganisms which can be watered down and added to any kind of crops, even flowers. Some farmers are using the juice in modified hydroponic systems and calling it vermiponics.

Earthworms leave soil 5-11% richer in the essential plant nutrients of nitrogen, phosphorus and potassium than when they first ingest it. As an organic fertilizer, vermicompost is a substitute for synthetic fertilizer in soil-enriched vegetable production. As a soil conditioner, vermicompost is superior to traditional compost due to its ability to improve the soil structure and to incre

வேளாண் மற்றும் தோட்டக்கலைகளில் வெர்மிகாம்போஸ்டின்

ஒவ்வொரு கரிம விவசாயியின் முக்கிய குறிக்கோள்களில் ஒன்று, பல்வேறு வகையான இயற்கை திருத்தங்களுடன் மண்ணுக்கு உணவளிப்பதன் மூலம் நீண்ட கால மண் வளத்தையும் சாயலையும் உருவாக்குவதாகும். உரம் தொடர்ந்து சேர்ப்பது மண்ணின் கரிம மற்றும் ஈரப்பதத்தை மேம்படுத்துவதற்கான சிறந்த வழிகளில் ஒன்றாகும், இது வளமான மண்ணின் கட்டமைப்பை உருவாக்க உதவுகிறது. இந்த மண் அமைப்பு நீர் மற்றும் ஊட்டச்சத்துக்களை சிறப்பாக பயன்படுத்துகிறது. இது வரை எளிதானது மற்றும் ஒட்டுமொத்தமாக, நீண்ட கால அடிப்படையில் உகந்த விளைச்சலை அடைய முடியும்.

உரம் ஏற்கனவே சிதைந்துவிட்டதால், அதன் தாக்கங்கள் பயிர் எச்சங்கள் மற்றும் பச்சை அல்லது விலங்கு உரங்களை விட மிக நீண்ட காலம் நீடிக்கும், அவை மண்ணில் சேர்க்கும்போது விரைவாக சிதைந்துவிடும். உரம் மறுசுழற்சி செய்வதற்கும், சில சுற்றுச்சூழல் பிரச்சினைகளை ஏற்படுத்தக்கூடிய தாவர எச்சங்களை மறுசுழற்சி செய்வதற்கும் விவசாயிகளுக்கு ஒரு வழி அளிக்கிறது.

ஏரோபிக் (ஆக்ஸிஜன் தேவைப்படும்) நுண்ணுயிரிகளின் செயல்பாட்டின் மூலம் உரம் தயாரிக்கப்படுகிறது. இந்த நுண்ணுயிரிகளுக்கு ஆக்ஸிஜன், ஈரப்பதம் மற்றும் உணவு தேவை மற்றும் வளர வேண்டும். இந்த காரணிகள் உகந்த மட்டங்களில் பராமரிக்கப்படும்போது, ​​இயற்கை சிதைவு செயல்முறை பெரிதும் துரிதப்படுத்தப்படுகிறது. மூலப்பொருட்களை நிலையான மண் கண்டிஷனராக மாற்றுவதால் நுண்ணுயிரிகள் வெப்பம், நீராவி மற்றும் கார்பன் டை ஆக்சைடு ஆகியவற்றை உருவாக்குகின்றன.

மண்ணின் பண்புகள் மற்றும் வளர்ந்து வரும் ஊடகங்களை உடல் ரீதியாக (கட்டமைப்பு ரீதியாக), வேதியியல் ரீதியாக (ஊட்டச்சத்து) மற்றும் உயிரியல் ரீதியாக மேம்படுத்தும் தனித்துவமான திறனை உரம் கொண்டுள்ளது. பிற உரம் நன்மைகள் பின்வருமாறு:

மண்ணின் அமைப்பு, போரோசிட்டி மற்றும் அடர்த்தி ஆகியவற்றை மேம்படுத்துகிறது, இதனால் ஒரு சிறந்த தாவர வேர் சூழலை உருவாக்குகிறது

கனமான மண்ணின் ஊடுருவல் மற்றும் ஊடுருவலை அதிகரிக்கிறது, இதனால் அரிப்பு மற்றும் ஓட்டம் குறைகிறது

நீர் வைத்திருக்கும் திறனை மேம்படுத்துகிறது, இதனால் நீர் இழப்பு குறைகிறது மற்றும் மணல் மண்ணில் வெளியேறும்

பல்வேறு வகையான மேக்ரோ மற்றும் நுண்ணூட்டச்சத்துக்களை வழங்குகிறது

மண்ணால் பரவும் தாவர நோய்க்கிருமிகளைக் கட்டுப்படுத்தலாம் அல்லது அடக்கலாம்

குறிப்பிடத்தக்க அளவு கரிமப்பொருட்களை வழங்குகிறது

மண் மற்றும் வளர்ந்து வரும் ஊடகங்களின் கேஷன் பரிமாற்ற திறனை (சி.இ.சி) மேம்படுத்துகிறது, இதனால் தாவர பயன்பாட்டிற்கான ஊட்டச்சத்துக்களை வைத்திருக்கும் திறனை மேம்படுத்துகிறது

மண் மற்றும் வளர்ந்து வரும் ஊடகங்களுக்கு நன்மை பயக்கும் நுண்ணுயிரிகளை வழங்குகிறது

மண்ணின் pH ஐ மேம்படுத்துகிறது மற்றும் உறுதிப்படுத்துகிறது

Specific குறிப்பிட்ட மாசுபடுத்திகளை பிணைக்க மற்றும் சீரழிக்க முடியும்.

உரம் தயாரிப்பதற்கான பொதுவான வழி நுண்ணுயிரிகளைப் பயன்படுத்துவதாக இருந்தாலும், புழுக்களைப் பயன்படுத்தி உரம் தயாரிக்கவும் முடியும். இது புழு உரம் அல்லது மண்புழு உரம் என்று அழைக்கப்படுகிறது. இந்த வகையான உரம் மிகவும் மதிப்பு வாய்ந்தது, இது பெரும்பாலும் கருப்பு தங்கம் என்று அழைக்கப்படுகிறது. புழு உரம் உற்பத்தியில் அதிக விவசாயிகள் ஈடுபடாததால், உற்பத்தி செய்ய நேரம் எடுக்கும்.ase its water-holding capacity.

Financial supports – Eligibility for financial support.

The Government is promoting organic fertilizers by providing financial assistance under the following schemes:-

* Under **[Paramparagat Krishi Vikas Yojana](https://vikaspedia.in/agriculture/policies-and-schemes/crops-related/krishi-unnati-yojana/paramparagat-krishi-vikas-yojana) (PKVY)** financial assistance is provided for promotion of  Organic farming through adoption of organic village by cluster approach and PGS certification. Assistance of Rs 50,000 per hectare/ 3 years is given, out of which Rs. 31,000 (62%) is provided to the farmers directly through DBT, for inputs (bio-fertilizers, biopesticides, vermicompost, botanical extracts etc) production/ procurement, post harvest management etc.
* [**Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)**](https://asfac.assam.gov.in/portlets/mission-organic-value-chain-development-for-north-east-region#:~:text=Mission%20Organic%20Value%20Chain%20Development%20for%20North%20East%20Region%20(MOVCD,%2C%20Assam%2C%20Manipur%2C%20Meghalaya%2C)**:** Farmers are given assistance of Rs25000/ ha/ 3 years for both onfarm & off-farm organic inputs, and seeds/ planting material.
* Under[**Mission for Integrated Development of Horticulture**](http://midh.gov.in/) financial assistance is provided for setting up vermicompost units @50% of the cost subject to a maximum of Rs.30,000/- per beneficiary.
* [**National Mission on Oilseeds and Oil Palm (NMOOP)**](https://nmoop.gov.in/)**:** Financial assistance@ 50% subsidy to the tune of Rs. 300/- per ha is being provided for different components including bio-fertilizers, supply of Rhizobium culture/Phosphate Solubilising Bacteria (PSB)/ Zinc Solubilising Bacteria(ZSB)/ Azatobacter/ Mycorrhiza and vermi compost.
* [**National Food Security Mission**](https://vikaspedia.in/agriculture/policies-and-schemes/crops-related/krishi-unnati-yojana/national-food-security-mission)**(NFSM):** Under NFSM, financial assistance is provided for promotion of Bio-Fertilizer (Rhizobium/ PSB) @50% of the cost limited to Rs.300 per ha
* Under [**National Project on Management of Soil Health and Fertility (NPMSHF)**](https://nmsa.dac.gov.in/) under the National Mission for [Sustainable Agriculture](https://vikaspedia.in/agriculture/national-schemes-for-farmers/sustainable-agriculture), there is provision for promotion of organic fertilizer up to Rs.500/- per hectare.
* Assistance is also available for organic fertilizers under [Rashtriya Krishi Vikas Yojana](https://vikaspedia.in/agriculture/policies-and-schemes/crops-related/rashtriya-krishi-vikas-yojana-1/rashtriya-krishi-vikas-yojana)(RKVY).

Soil organic matter – composition, decomposition, mineralization and immobilization

 **SOIL ORGANIC MATTER** Substances containing carbon are organic matter. Soil organic matter consists of decomposing plant and animal residues. It also includes substances of organic origin either leaving or dead. Soil organic matter plays an important role in deciding / maintaining soil physical conditions. It also influences soil chemical properties especially cation exchange capacity. Organic matters supply the energy sources for soil micro organisms. Soil development is another aspect which is influenced by the soil organic matter. Plant tissue is the major source. Animals are considered as the secondary sources. They attack original plant tissues, contribute waste products and leave their own bodies after death. Factors affecting soil organic matter 1. Climate 2. Natural vegetation 3. Texture 4. Drainage 5. Cropping and Tillage 6. Crop rotations, residues and plant nutrients. 1. Climate: Temperature and rainfall exert a dominant influence on the amounts of N and organic matter found in soils. a) Temperature: The organic matter and N content of comparable soils tend to increase if one moves from warmer to cooler areas. The decomposition of organic matter is accelerated in warm climates as compared to cooler climates. For each 10°C decline in mean annual temperature, the total organic matter and N increases by two to three times. b) Rainfall: There is an increase in organic matter with an increase in rainfall. Under comparable conditions, the N and organic matter increase as the effective moisture becomes greater. 2. Natural Vegetation: The total organic matter is higher in soils developed under grasslands than those under forests. 3. Texture: Fine textured soils are generally higher in organic matter than coarse textured soils. 4. Drainage: Poorly drained soils because of their high moisture content and relatively poor aeration are much higher in organic matter and N than well drained soils. 5. Cropping and Tillage: The cropped lands have much low N and organic matter than comparable virgin soils. Modern conservation tillage practices helps to maintain high OM levels as compared to conventional tillage. 6. Rotations, residues and plant nutrients: Crop rotations of cereals with legumes results in higher soil organic matter. Higher organic matter levels, preferably where a crop rotation is followed. Composition of organic residues: Plant residues contain 75% moisture and 25% dry matter. This 25% is made up of Carbon (10-12%), Oxygen (9-10%) , Hydrogen (1.5-2.5%) , N(1-2%) and mineral matter (1-3%). Composition of plant tissues: Carbohydrates Celluloses 20-50% Hemicellulose 10-30% Starch, Sugar 1-5% Proteins 1-15% Fats, waxes, tannins 1-10% Lignins 10-30% Inorganic residues (mineral matter) 1. Water insolubles Proteins, Peptides Nitrogenous Peptones and S containing materials 2. Water solubles (No3, NH4 compounds) Soil organic residues Non Nitrogenous Carbohydrates (celluloses Hemicellulose, ,Starch, Sugar etc) Ether solubles (Fats, oils, waxes, resins etc) Lignins The organic matter is also classified on the basis of their rate of decomposition 1. Rapidly decomposed : Sugars, starches, proteins etc. 2. Less rapidly decomposed : Hemicelluloses, celluloses etc. 3. Very slowly decomposed : Fats, waxes, resins, lignins etc Decomposition of soil organic matter: Different organic residues contain different organic compounds. There is great variation in the rate of decomposition of organic residues. Sugars, starches and simple proteins are very rapidly decomposed. On the other hand Fats, waxes and lignins are very slowly decomposed. Hemicellulose, celluloses and protein are intermediate. Even though the composition may vary the end products are more or less the same. The general reactions taking place during decomposition are 1. Enzymatic oxidation of the bulk with the release of Co2 , water, energy and heat 2. Essential elements are released (N, P, S etc) and immobilized by a series of reactions. 3. Formation of compounds which are resistant to microbial action. Molecules very resistant to microbial action is formed either through modification of compounds or by microbial synthesis Under aerobic conditions the products formed are Co2, NH4, NO3 , H2PO4, SO4, H2O and essential plant nutrients like Ca, Mg, Fe, Cu, Zn etc. Under anaerobic conditions CH4, organic acids like lactic, propionic, butyric, NH4, various amine residues (R-NH2) H2S, ethylene (CH2=CH2) and humic substances. A. Decomposition of soluble substances: When glucose is decomposed under aerobic conditions the reaction is as under: Sugar + Oxygen →CO2 + H2O Under partially oxidized conditions, Sugar + Oxygen → Aliphatic acids (Acetic, formic etc.) or Hydroxy acids (Citric, lactic etc.) or Alcohols (ethyl alcohol etc.) Some of the reactions involved may be represented as under: C6H12O6 + 2O2 → 2CH3.COOH + 2CO2 + 2H2O 2C6H12O6 + 3O2 → C6H8O7 + 4H2O C6H12O6 + 2O2 → 2C2H5OH + 2CO2 Ammonification – organic N - Polypeptides – Peptides – amonoacids – NH3 or NH4 i) Ammonification: The transformation of organic nitrogenous compounds (amino acids, amides, ammonium compounds, nitrates etc.) into ammonia is called ammonification. This process occurs as a result of hydrolytic and oxidative enzymatic reaction under aerobic conditions by heterotrophic microbes. ii)Nitrification: The process of conversion of ammonia to nitrites (NO2) and then to nitrate (NO3 - ) is known as nitrification. It is an aerobic process by autotrophic bacteria. Ammonia Nitrite Nitrate NH NO NO ⎯Nitrosomon ⎯⎯ ⎯as→ ⎯Nitrobacte ⎯⎯⎯r→ − 3 2 3 The net reactions are as follows: NH4 + O2 → NO2 + 2H+ + H2O + energy NO2 + O2 → NO3 - + energy iii) Denitrification: The process, which involves conversion of soil nitrate into gaseous nitrogen or nitrous oxide, is called Denitrification. Water logging and high pH will increase N loss by Denitrification. Nitrate N gas Pseudomonas/ Bacillus ⎯⎯⎯⎯⎯ ⎯→ 2 2. Under anaerobic conditions: C6H12 O6 (Glucose) - Lactic acid, butyric acid Ethyl alcohol are formed Protein and other N compounds are converted into elemental N. B. Decomposition of Insoluble Substances i) Breakdown of Protein: During the course of decomposition of plant materials, the proteins are first hydrolyzed to a number of intermediate products. Aminization: The process of conversion of proteins to aminoacids. Ammonification: The process of conversion of aminoacids and amides to ammonia. ii) Breakdown of cellulose: The decomposition of the most abundant carbohydrates. Hydrolysis hydrolysis oxidation Cellulose ⇒ Cellobiose ⇒ Glucose⇒ Organic acids ⇒ CO2 + H2O (cellulase) (cellobiase) This reaction proceeds more slowly in acid soils than in neutral and alkaline soils. It is quite rapid in well aerated soils and comparatively slow in poorly aerated soils. iii) Breakdown of Hemicellulose: Decompose faster than cellulose and are first hydrolyzed to their components sugars and uronic acids. Sugars are attacked by microbes and are converted to organic acids, alcohols, carbon dioxide and water. The uronic acids are broken down to pentose and CO2. The newly synthesized hemicelluloses thus form a part of the humus. iv) Breakdown of Starch: It is chemically a glucose polymer and is first hydrolyzed to maltose by the action of amylases. Maltose is next converted to glucose by maltase. The process is represented as under: (C6H10O5)n +nH2O ⇒ n (C6H12O6) C. Decomposition of ether soluble substances: Fats →glycerol + fatty acids Glycerol →CO2 + water D. Decomposition of lignin: Lignin decomposes slowly, much slower than cellulose. Complete oxidation gives rise to CO2 and H2O. Sulphur containing organic compounds: Converted to SO4 -2 + H+ + energy by sulphur oxidizing bacteria. P containing organic compounds: Various micro organisms mineralize phospholipids and other organic P compounds in the presence of phosphates enzymets H2PO4 and HPO4 -2 depending on soil PH . Mineralisation: The biological conversion of organic forms of C, N, P and S to inorganic or mineral forms is called mineralization. Immobilization: The conversion of inorganic forms of C, N, P and S by the soil organism into organic forms is called Immobilization. Factors affecting decomposition 1. Temperature: Cold periods retard plant growth and organic matter decomposition. Warm summers may permit plant growth and humus accumulation. 2. Soil moisture: Extremes of both arid and anaerobic conditions reduce plant growth and microbial decomposition. Near or slightly wetter than field capacity moisture conditions are most favorable for both processes. 3. Nutrients: Lack of nutrients particularly N slows decomposition. 4. Soil pH: Most of the microbes grow best at pH 6 to 8, but are severely inhibited below pH 4.5 and above pH 8.5. 5. Soil Texture: Soils higher in clays tend to retain larger amounts of humus. 6. Other Factors: Toxic levels of elements (Al, Mn, B, Se, Cl), excessive soluble salts, shade and organic phytotoxins in plant materials. Role of organic matter 1.Organic matte creates a granular condition of soil which maintains favorable condition of aeration and permeability. 2.Water holding capacity of soil is increased and surface runoff, erosion etc., are reduced as there is good infiltration due to the addition of organic matter. 3.Surface mulching with coarse organic matter lowers wind erosion and lowers soil temperatures in the summer and keeps the soil warmer in winter. 4.Organic matter serves as a source of energy for the microbes and as a reservoir of nutrients that are essential for plant growth and also hormones, antibiotics. 5.Fresh Organic matter supplies food for earthworms, ants and rodents and makes soil P readily available in acid soils. 6.Organic acids released from decomposing organic matter help to reduce alkalinity in soils; organic acids along with released CO2 dissolve minerals and make them more available. 7.Humus (a highly decomposed organic matter) provides a storehouse for the exchangeable and available cations. 8.It acts as a buffering agent which checks rapid chemical changes in pH and soil reaction.

# Sources And Opportunities In Organic Waste Transformation

It is an undisputed fact that the world population is growing and has, in fact, topped [7 billion](https://www.census.gov/popclock/) people. Feeding those 7 billion people is a massive challenge for the infrastructure of every nation on our planet, with everything from finding sufficient land on which to farm and raise livestock, and providing nutrients for that land so that it will grow wholesome food, to transporting the harvested plants to processing plants and markets.

Another aspect of this food chain is the organic waste that is generated throughout the process. Organic waste is any type of material that is an unused byproduct of another process and has a cellulosic structure that can be broken down. Including everything from the stalks left over after the wheat has been harvested, to the manure generated by animals after their meals, organic waste is also multiplying at an increasing rate. With more space needed to occupy those 7 billion people, there is not much room left on planet earth for storing organic waste. Overflowing landfills and organically saturated soils which leach both nutrients and waste into local water supplies are only two of the many issues arising as we struggle to find creative solutions to handle the natural abundance of our organic waste.

This article takes a look at the three central types of organic waste- agricultural, industrial, and municipal- and examines the challenges and opportunities associated with organic waste generation.

## AGRICULTURAL WASTE

Agricultural waste includes livestock manure and a variety of compostable items, such as those grain stalks mentioned above. Once upon a time, farmers would set aside part of their land as a composting ground for the manure and compostable materials generated in the process of growing plants and raising animals. With 7 billion people on the planet, land is now at a premium and there are few farms left with space available to allow manure to decompose and compost to mature at a slow, natural rate. This has resulted in many farmers having their manure hauled elsewhere, a practice limited by the costly expense of transporting a moisture-laden material more than a few miles from the farm.

## INDUSTRIAL WASTE

The second type of organic waste is industrial. This includes the organic byproducts of processes in a variety of industries. Restaurants generate a large amount of organic waste, and according to restaurants.com, as much as [33 million tons of food](http://www.restaurants.com/blog/how-much-do-restaurants-waste/#.V0bsofkrJpi) are thrown out each year in the U.S. alone. Food spoilage in transit also generates organic waste at the distribution, market and grocery stages.

Another source of industrial organic waste is through Dissolved Air Flotation, or DAF, technology, which is increasingly being used in a variety of industries to remove suspended solids, fats, oils and greases from water-based solutions. This method of capturing particles is more efficient than older methods, which required waiting until solids would naturally settle via gravity at the bottom of sludge ponds (also requiring a lot more space). DAF also allows for the early removal of non-biological pollutants, such as petrochemicals, which results in a sludge that is purely organic in nature. Examples where DAF technology is being used include fish farming, meat processing, and paper and pulp manufacturing. DAF is increasing the amount of potable water available, but it is also generating large amounts of thick organic sludge which must somehow be disposed of—or, ideally, recycled.

## MUNICIPAL WASTE

The third type of organic waste generated today is municipal waste. This is the trash that is collected by every city and town across each nation. According to the [EPA](https://www.epa.gov/smm/advancing-sustainable-materials-management-facts-and-figures), the U.S. generated 4.4 pounds of municipal waste per person per day in 2013, but only recycled or composted 34.3 percent of that material. Organic components make up over half of municipal waste, and include a variety of [biosolids](https://feeco.com/biosolids-processing/%22%20%5Ct%20%22_blank) ranging from lawn clippings and trimmed branches, to spoiled food and a wide assortment of paper and cardboard products. While many European communities [mandate](http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1275) the separation of all organic materials at the source (i.e., the home or business), this is not the case in the U.S., or in most countries around the world. Instead, the organic waste is mixed with inorganic garbage, sealed inside plastic bags, and dumped into overflowing landfills.

## PROCESSING ORGANIC WASTE INTO FERTILIZER

There are many nutrients hidden in all three types of organic waste, and these nutrients are urgently needed to fertilize the next generation of crops. Fortunately, there are some creative minds at work on innovative answers to harnessing organic waste. One such solution is processing those wastes through organics granulation, which involves the drying and granulation of that organic waste into fertilizer pellets. In addition to removing organic wastes from overburdened farms and landfills, organics granulation creates a much-needed product that revitalizes farmland and helps the earth maintain its ability to feed more than 7 billion people.

## FEECO’S EXPERIENCE IN TRANSFORMING ORGANIC WASTES INTO VALUABLE PRODUCTS

FEECO has worked with organic wastes since our founding in 1951. From then on, we’ve built a repertoire in turning agricultural, industrial, and municipal wastes into organic-based fertilizer products. From lab testing in the FEECO Innovation Center, to engineering, process development, design and equipment manufacturing, our team is highly skilled in the field of organics granulation.

The summary below highlights projects from our experience with each type of organic waste:

**Agricultural Waste.** FEECO supplied a turnkey organic fertilizer plant to Premium Standard Farms in Missouri, USA. The plant agglomerated raw and digested hog manure, using biogas to offset the heat requirements of the process. The overall set-up created a fertilizer-grade organic product that could be applied to fields with traditional fertilizer equipment. To read the complete project profile, [click here](https://feeco.com/bio-fertilizer-processing/).

**Industrial Waste.** Waste paper sludge is typically a landfilled byproduct as a result of industrial processing. Encap LLC recognized this waste problem and the opportunity in turning it into a useful, marketable product. That’s where FEECO stepped in. FEECO designed and manufactured a complete system to process the waste paper sludge and transform it into a variety of lawn and garden products. To read the complete project profile, [click here](https://feeco.com/complete-system-waste-value/).

**Municipal Waste.** FEECO has also designed bio-fertilizer granulation plants for food waste and biosolids to name a few. Each have been custom designed and built to suit the unique needs of the material being processed.

## CONCLUSION

FEECO’s organics granulation system is a sound solution to the problem of agricultural, industrial, and municipal waste generation and disposal. While most companies specialize in a single part of the process, FEECO offers customers a unique advantage in that we can provide them with a complete solution, including everything from feasibility testing in the FEECO Innovation Center, through the design and manufacturing of custom equipment.

Visit our [Organic Fertilizer System](https://feeco.com/organic-systems/) webpage to learn more about our equipment offerings, or contact a FEECO expert today. We look forward to learning more about your project.