Recycle Save
The Earth
BAY MULCH, INC.

Why Vegetative Food Waste Does Not Belong in Landfills and Incinerators

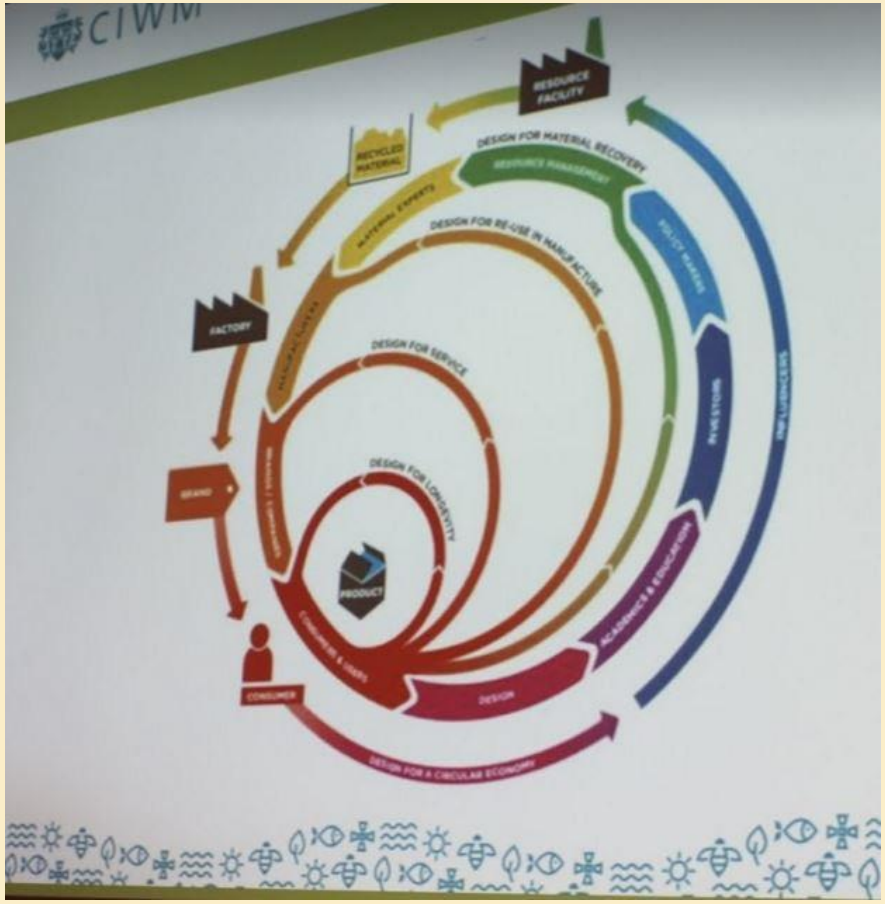
Submitted by: Eve Spengler

Eve Spengler

Class of 2013: MA Patel College of Global Sustainability

MSc Entrepreneurship in Applied Technologies

PCGS Ambassador, ACG Cup Competitions and Fintech, USF Student Green Energy Fund Council helping secure 60+ Hydration Stations, Arbor Day Key-Note Speaker



- **John Quinn, President of Chartered Institution of Wastes Management**
- **Speaking on the Circular Economy**

The Natural Resources Defense Council

- **“40% of the food in the USA which makes it to grocery markets and restaurants goes uneaten.”**

Catch Up Florida!

Bay Mulch Inc. can help meet our 75% Recycling Goals

Over half the States in the USA have Vegetative Waste Diversion Bans and Mandates

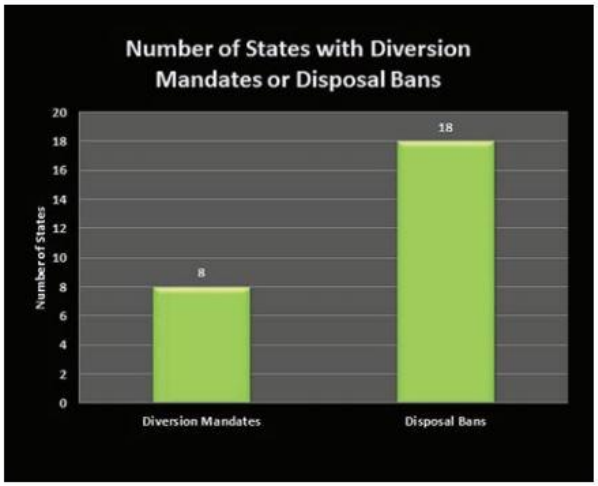
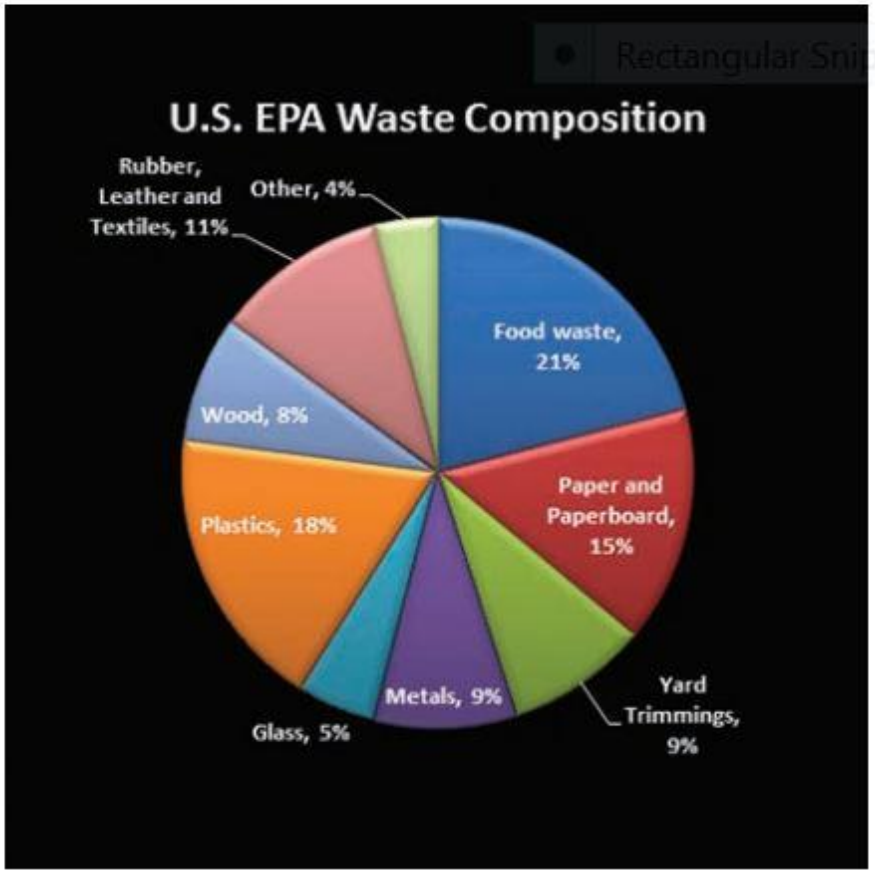


Figure 3:
The demand for organics diversion is driven primarily by state initiatives.

Figure 1: Food comprises the largest percentage of disposed waste in the U.S.
Figure courtesy of U.S. EPA.




Food is NEVER Garbage
Food is a Recyclable
& Recoverable Resource

Bio Natural Soil (BNS)

Bay Mulch Organics Recycling Transforms Vegetative Food Waste into SOIL: High-Quality, Low Cost, Nutrient Rich, pH Balanced, Peat Free, Bark Free, USDA Certified Organic

Bay Mulch Organics Recycling
Plant City, Florida

Recycle
Save
The Earth
BAY MULCH, INC.

A Sustainable Business Supporting 38 Full Time Green Jobs at Living Wages

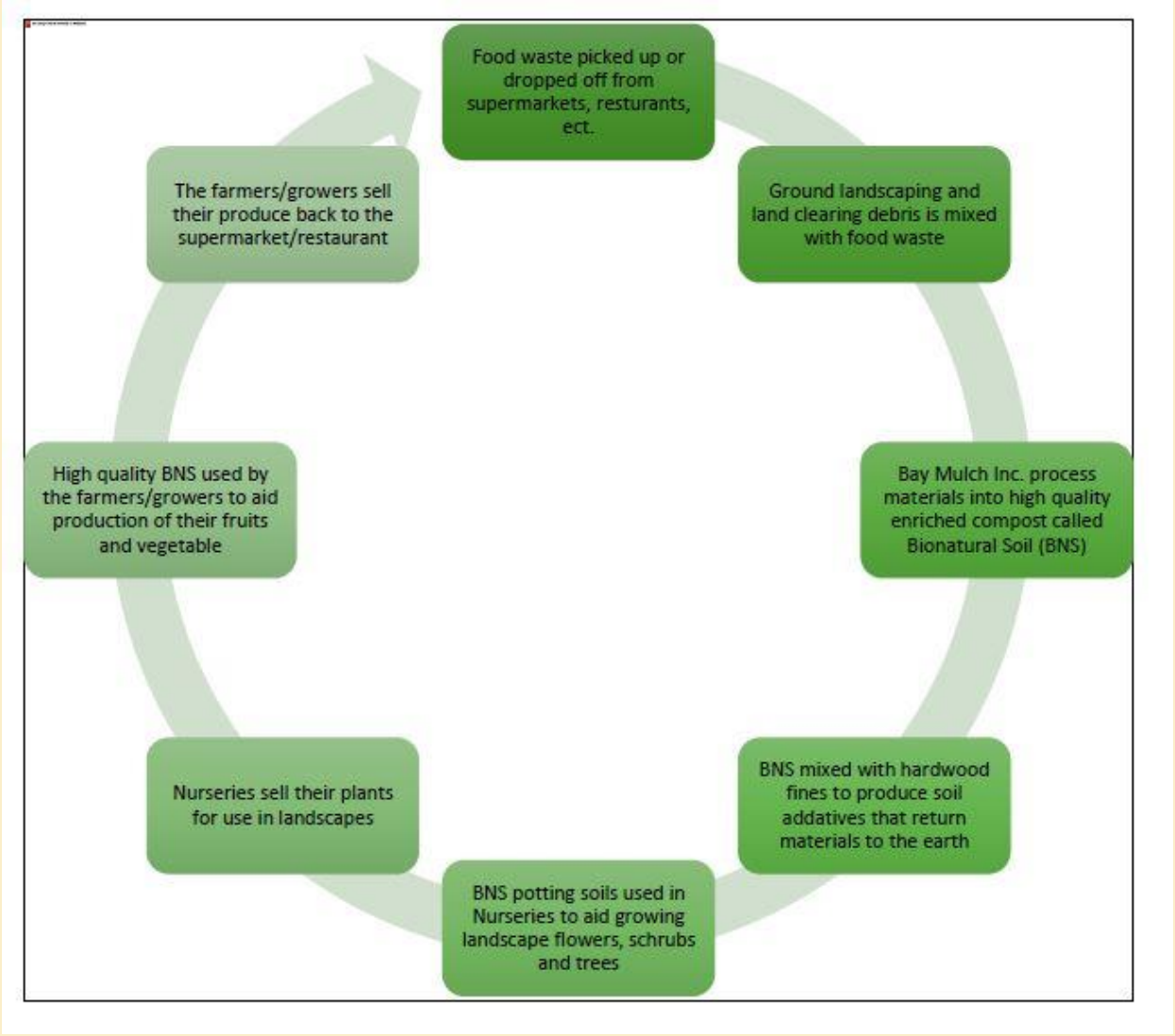
Maximum Productivity: Positive End USE

"the purest form of recycling imaginable is composting!" ~eve

80/20
BNS
Blueberry
Mix

BAY MULCH Inc Organics Recycling

Circle of Life



Vegetative Food Waste Guidelines

Set Zero Waste Goals

Filled roll carts are placed outside by our customers on collection days

Food Waste Collection Services

- Bay Mulch Organics Recycling owns a fleet of specialized collection vehicles for the efficient handling of food waste
- We provide roll carts to our customers

Rear-mounted cart lift

System capable of lifting three carts at once

Composting

- Bay Mulch Inc was founded by Tom Kirkland 19 years ago.
- Bay Mulch Organics Recycling operates 42 acres in Plant City Florida, is a licensed and permitted facility in full compliance.
- With a proven method, Bay Mulch Organics Recycling utilizes Harvest Quest's Catalyst inoculant and Modified Static Aerobic Pile (MSAP) composting methodology, and allows us to operate our facility without odors and nuisance vectors such as flies and scavenging birds.
- The finished compost is of the highest quality and is approved as an input by the USDA National Organic Program.

AMERICERT INTERNATIONAL (fka OIA NORTH AMERICA)
2603 NW 13th ST. #228, Gainesville FL 32609
Ph: 352-336-5700 ** Fax: 866-325-8261**Email: Americert@gmail.com

USDA NATIONAL ORGANIC PROGRAM ORGANIC INPUTS REGISTRY APPROVAL

Operation Name:	Bay Mulch, Inc.
Certificate Type:	USDA National Organic Program Approved Inputs Registry
Operation Address	Phys: 1603 S. Forbes Road, Plant City, FL 33566. Mail: P.O. Box 291496 Tampa, Fl. 33687

Effective Date:	March 6, 2015.	AI Client Number:	022315AI.
Registration Number:	030615(2)IRR.	AI Application Number:	022315AI.

Americert International, a USDA National Organic Program accredited certification body, has determined, after a review of the operation's organic compliance plan and review of the operation's policies, procedures, and practices, that the above listed operation has demonstrated that the products listed on the attached registration addendum comply with the United States Department of Agriculture National Organic Program Final Rule, the Organic Foods Production Act of 1990, and qualifies to represent its products as allowed for use in organic production when used in compliance with the restrictions (if any) listed on the registration addendum. This registration is valid for one year from the date of issuance unless revoked or suspended during the annual period. Questions about the continued and current validity of this registration should be directed to Americert International.

Name and Title of AI Official Issuing Registration on Behalf of Americert International :	Jonathan Austin, Technical Director
Signature:	
Date:	March 6, 2015.

***PLEASE SEE REGISTRATION ADDENDUM FOR LIST OF APPROVED PRODUCTS* AND APPLICABLE RESTRICTIONS**
***BE SURE TO CHECK WITH YOUR CERTIFIER AND RECEIVE CERTIFIER APPROVAL* FOR ANY NEW INPUT INTENDED FOR USE ON A CERTIFIED ORGANIC PRODUCTION SITE**

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Ph: 352-336-5700 ** Fax: 866-325-8261**Email: Americert@gmail.com

USDA NATIONAL ORGANIC PROGRAM ORGANIC INPUTS REGISTRY ADDENDUM DETAILS OF PRODUCTS REGISTRED

(NOT A SUBSTITUTE FOR AUTHENTICATED REGISTRATION APPROVAL: NOT VALID WITHOUT COPY OF REGISTRATION APPROVAL FORM)

Operation Name:	Bay Mulch, Inc.

Effective Date:	March 6, 2015.	AI Client Number:	022315AI.
Registration Number:	030615(2)IRR.	AI Application Number:	022315IR.

Product	Classification	Restrictions on Use
Bio-Natural Soil 80/20 Berry Mix.	Allowed-Fully Composted Plant and Animal Materials.	None.
Bio-Natural Soil	Allowed-Fully Composted Plant and Animal Materials.	None.

LAST RENEWED:	>>>>>>>>>>>>>>>>>>>>	LAST ONSITE:	N/A
NEXT RENEWAL:	02.23.16.	NEXT ONSITE:	N/A
INTERIM UPDATE:	>>>>>>>>>>>>>>>>>>>>	AI Approval:	JLA 3.06.15

Food Not Suitable For Human Consumption is Perfect for Recycling and Composting into Soil

Keep Food Safety in Mind

Figure 1. Contribution of different food categories to estimated domestically-acquired illnesses and deaths, 1998-2008*

*Chart does not show 5% of illnesses and 2% of deaths attributed to other commodities. In addition, 1% of illnesses and 25% of deaths were not attributed to commodities; these were caused by pathogens not in the outbreak database, mainly *Taxoplasma* and *Vibrio vulnificus*.

Source: Painter JA, Hoekstra RM, Ayers T, Tauxe RV, Braden CR, Angulo FJ, Griffin PM. Attribution of foodborne illnesses, hospitalizations, and deaths to food commodities by using outbreak data, United States, 1998–2008. Emerg Infect Dis [Internet]. 2013 Mar [date cited]. http://dx.doi.org/10.3201/eid1903.111866

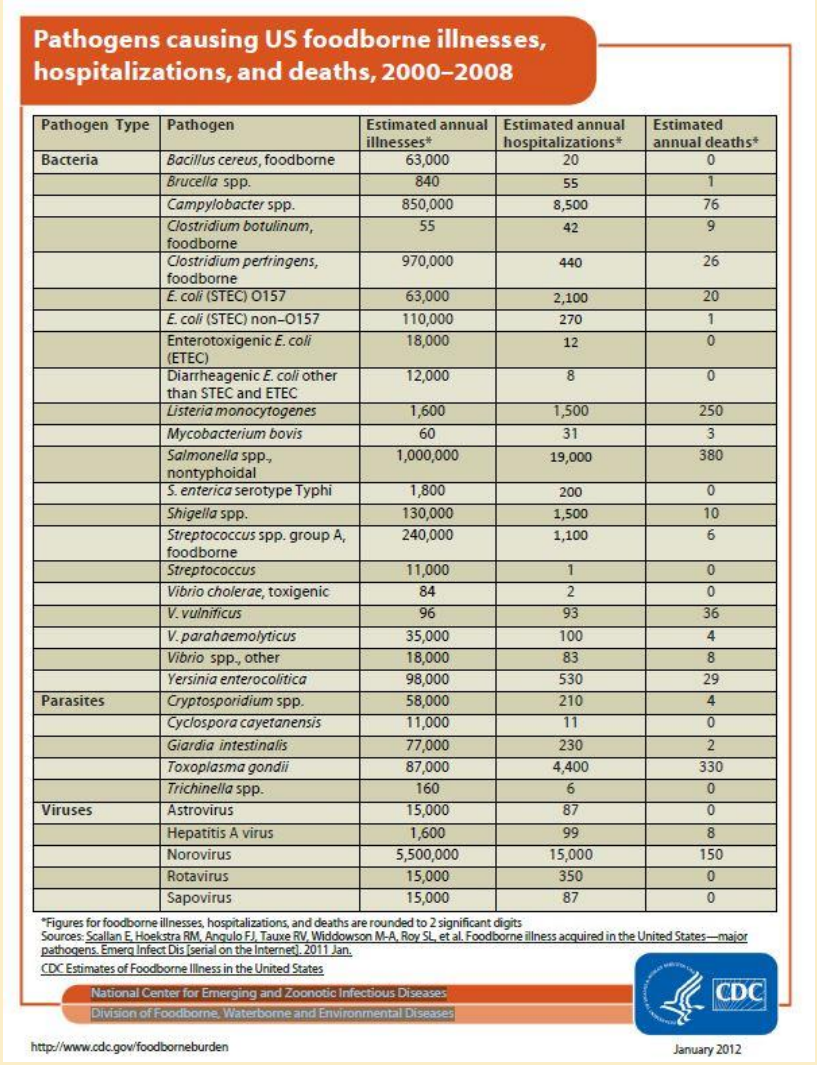
Uncooked Produce

Can Be Dangerous and Carry Risks of Salmonella, Ecoli and other Illnesses

Cryptosporidium	Intestinal cryptosporidiosis	2-10 days	Diarrhea (usually watery), stomach cramps, upset stomach, slight fever	May be remitting and relapsing over weeks to months	Uncooked food or food contaminated by an ill food handler after cooking, contaminated drinking water
Cyclospora cayetanensis	Cyclosporiasis	1-14 days, usually at least 1 week	Diarrhea (usually watery), loss of appetite, substantial loss of weight, stomach cramps, nausea, vomiting, fatigue	May be remitting and relapsing over weeks to months	Various types of fresh produce (imported berries, lettuce, basil)
***E. coli* (*Escherichia coli*) producing toxin**	*E. coli* infection (common cause of "travelers' diarrhea")	1-3 days	Watery diarrhea, abdominal cramps, some vomiting	3-7 or more days	Water or food contaminated with human feces
***E. coli* O157:H7**	Hemorrhagic colitis or *E. coli* O157:H7 infection	1-8 days	Severe (often bloody) diarrhea, abdominal pain and vomiting. Usually, little or no fever is present. More common in children 4 years or younger. Can lead to kidney failure	5-10 days	Undercooked beef (especially hamburger), unpasteurized milk and juice, raw fruits and vegetables (e.g. sprouts), and contaminated water
Hepatitis A	Hepatitis	28 days average (15-50 days)	Diarrhea, dark urine, jaundice, and flu-like symptoms, i.e., fever, headache, nausea, and abdominal pain	Variable, 2 weeks-3 months	Raw produce, contaminated drinking water, uncooked foods and cooked foods that are not reheated after contact with an infected food handler; shellfish from contaminated waters
Listeria monocytogenes	Listeriosis	9-48 hrs for gastro-intestinal symptoms, 2-6 weeks for invasive disease	Fever, muscle aches, and nausea or diarrhea. Pregnant women may have mild flu-like illness, and infection can lead to premature delivery or stillbirth. The elderly or immunocompromised patients may develop bacteremia or meningitis	Variable	Unpasteurized milk, soft cheeses made with unpasteurized milk, ready-to-eat deli meats
Noroviruses	Variously called viral gastroenteritis, winter diarrhea, acute non-bacterial gastroenteritis, food poisoning, and food infection	12-48 hrs	Nausea, vomiting, abdominal cramping, diarrhea, fever, headache. Diarrhea is more prevalent in adults, vomiting more common in children	12-60 hrs	Raw produce, contaminated drinking water, uncooked foods and cooked foods that are not reheated after contact with an infected food handler; shellfish from contaminated waters
Salmonella	Salmonellosis	6-48 hours	Diarrhea, fever, abdominal cramps, vomiting	4-7 days	Eggs, poultry, meat, unpasteurized milk or juice, cheese, contaminated raw fruits and vegetables
Shigella	Shigellosis or Bacillary dysentery	4-7 days	Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus	24-48 hrs	Raw produce, contaminated drinking water, uncooked foods and cooked foods that are not reheated after contact with an infected food handler

FDA Foodborne Illness-Causing Organisms in the U.S. WHAT YOU NEED TO KNOW

The Center for Disease Control in Atlanta Warns Foodborne Pathogens Can be Lethal



Pathogens causing US foodborne illnesses, hospitalizations, and deaths, 2000–2008

Pathogen Type	Pathogen	Estimated annual illnesses*	Estimated annual hospitalizations*	Estimated annual deaths*
Bacteria	*Bacillus cereus*, foodborne	63,000	20	0
	Brucella spp.	840	55	1
	Campylobacter spp.	850,000	8,500	76
	Clostridium botulinum, foodborne	55	42	9
	Clostridium perfringens, foodborne	970,000	440	26
	E. coli (STEC) O157	63,000	2,100	20
	E. coli (STEC) non–O157	110,000	270	1
	Enterotoxigenic *E. coli* (ETEC)	18,000	12	0
	Diarrheagenic *E. coli* other than STEC and ETEC	12,000	8	0
	Listeria monocytogenes	1,600	1,500	250
	Mycobacterium bovis	60	31	3
	Salmonella spp., nontyphoidal	1,000,000	19,000	380
	S. enterica serotype Typhi	1,800	200	0
	Shigella spp.	130,000	1,500	10
	Streptococcus spp. group A, foodborne	240,000	1,100	6
	Streptococcus	11,000	1	0
	Vibrio cholerae, toxigenic	84	2	0
	V. vulnificus	96	93	36
	V. parahaemolyticus	35,000	100	4
	Vibrio spp., other	18,000	83	8
	Yersinia enterocolitica	98,000	530	29
Parasites	*Cryptosporidium* spp.	58,000	210	4
	Cyclospora cayetanensis	11,000	11	0
	Giardia intestinalis	77,000	230	2
	Toxoplasma gondii	87,000	4,400	330
	Trichinella spp.	160	6	0
Viruses	Astrovirus	15,000	87	0
	Hepatitis A virus	1,600	99	8
	Norovirus	5,500,000	15,000	150
	Rotavirus	15,000	350	0
	Sapovirus	15,000	87	0

*Figures for foodborne illnesses, hospitalizations, and deaths are rounded to 2 significant digits

Sources: Scallan E, Hoekstra RM, Angulo FJ, Tauxe RV, Widdowson M-A, Roy SL, et al. Foodborne illness acquired in the United States—major pathogens. Emerg Infect Dis [serial on the Internet]. 2011 Jan.

CDC Estimates of Foodborne Illness in the United States

National Center for Emerging and Zoonotic Infectious Diseases

Division of Foodborne, Waterborne and Environmental Diseases

CDC

http://www.cdc.gov/foodborneburden

January 2012

Process Steps - Receiving

The food waste receiving area is located on a concrete pad, which provides an all-weather operating surface and easy to clean work space

A three-sided receiving bunker is constructed from ground yard waste

The bunker has a base layer to provide absorption of any free liquids

Receiving and mixing – Require investment in specialized equipment.

- The microbes within the Catalyst inoculant spread rapidly outward from the points of application initially populating the outer edges of the windrow just beneath the capping layer.

- This prolific microbial activity generates initial temperatures on the surface of the pile
- The microbes then work their way towards the center of the windrow breaking the contents down from the outside in
- This action increases the windrows natural chimney-effect, allowing sufficient air-flow into the pile

The Capping Layer Provides:

- maintaining a minimum of 131 degrees inside the windrow is essential and carefully monitored.
- vector attraction reduction by creating a physical barrier between the contents of the pile and the outside air.
- an instant biofilter providing excellent odor mitigation.
- it insulates the pile allowing for high temperatures to be achieved all the way to the edges of the mixed contents.
- protects the contents of the pile from external influences, such as heavy rainfall or extreme cold

- Following a further 14 days of composting the windrow is turned a second time. Again, moisture is redistributed and at this stage the windrow will be entering the final phase of composting.

- The properly controlled marriage between bacteria and compostable materials produces quality finished compost in 45 to 60 days.

Bay Mulch Organics Recycling

Bio-Natural Soil (BNS) and Custom Blends are Perfect for Growing Crops, Nursery Plants, Flowers, Shrubs, Trees & Restoring/Reclaiming Natural Areas

Midwest Laboratories, Inc.

13611 B Street • Omaha, Nebraska 68144-3693 • (402) 334-7770 • FAX (402) 334-9121 • www.midwestlabs.com

Lab #	2433384	Report of Analysis	Report Number: 15-233-4112
Account:	34447	THOMAS KIRKLAND BAY MULCH INC PO BOX 291496 TAMPA FL 33687	Robert Ferris Account Manager 402-829-9871
Date Sampled:			NUTRIENT ANALYSIS
Date Received:		2015-08-14	
Sample ID:		BNS	

			Analysis (as rec'd)	Analysis (dry weight)	Total content, lbs per ton (as rec'd)
NUTRIENTS					
Nitrogen					
Total Nitrogen		%	0.65	1.54	13.0
Organic Nitrogen		%	0.65	1.54	13.0
Ammonium Nitrogen		%	< 0.001	—	—
Nitrate Nitrogen		%	< 0.01	—	—
Major and Secondary Nutrients					
Phosphorus		%	0.11	0.26	2.2
Phosphorus as P2O5		%	0.25	0.59	5.0
Potassium		%	0.08	0.19	1.6
Potassium as K2O		%	< 0.1	—	—
Sulfur		%	0.07	0.17	1.4
Calcium		%	0.88	2.09	17.6
Magnesium		%	0.09	0.21	1.8
Sodium		%	0.010	0.024	0.2
Micronutrients					
Zinc		ppm	28.7	68	—
Iron		ppm	401	950	0.8
Manganese		ppm	45.1	107	—
Copper		ppm	< 20	—	—
Boron		ppm	< 20	—	—
OTHER PROPERTIES					
Moisture		%	57.80		
Total Solids		%	42.20		844.0
Organic Matter		%	24.00	56.87	480.0
Ash		%	18.00	42.65	360.0
C:N Ratio			18 : 1		
Total Carbon		%	11.90	28.20	
Chloride		%	< 0.01	—	
pH			7.0		
Conductivity 1:5 (Soluble Salts)		mS/cm	0.19		

Midwest Laboratories, Inc.

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Lab #	2433385	Report of Analysis	Report Number: 15-233-4114
Account:	34447	THOMAS KIRKLAND BAY MULCH INC PO BOX 291496 TAMPA FL 33687	Robert Ferris Account Manager 402-829-9871
Date Sampled:			NUTRIENT ANALYSIS
Date Received:		2015-08-14	
Sample ID:		50/50	

			Analysis (as rec'd)	Analysis (dry weight)	Total content, lbs per ton (as rec'd)
NUTRIENTS					
Nitrogen					
Total Nitrogen		%	0.44	0.98	8.8
Organic Nitrogen		%	0.44	0.98	8.8
Ammonium Nitrogen		%	< 0.001	—	—
Nitrate Nitrogen		%	< 0.01	—	—
Major and Secondary Nutrients					
Phosphorus		%	0.07	0.16	1.4
Phosphorus as P2O5		%	0.16	0.36	3.2
Potassium		%	0.18	0.40	3.6
Potassium as K2O		%	0.22	0.49	4.4
Sulfur		%	< 0.05	—	—
Calcium		%	0.63	1.41	12.6
Magnesium		%	0.07	0.16	1.4
Sodium		%	0.020	0.045	0.4
Micronutrients					
Zinc		ppm	< 20	—	—
Iron		ppm	261	584	0.5
Manganese		ppm	28.2	63	—
Copper		ppm	< 20	—	—
Boron		ppm	< 20	—	—
OTHER PROPERTIES					
Moisture		%	55.30		
Total Solids		%	44.70		894.0
Organic Matter		%	30.40	68.01	608.0
Ash		%	14.40	32.21	288.0
C:N Ratio			35 : 1		
Total Carbon		%	15.50	34.68	
Chloride		%	< 0.01	—	
pH			6.8		
Conductivity 1:5 (Soluble Salts)		mS/cm	0.77		

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CATION EXCHANGE:

How Bio-Natural Soil (BNS) RESTORES ROOT SYSTEMS OF AT-RISK PLANTS TO RESILIANCY AND RECAPTURES WHOLISTIC HEALTH

Soil, clay and sand is negatively charged. Naturally derived nutrients sourced from recycled vegetative food material and woody debris are positively charged, including magnesium, potassium, nitrogen and carbon. Plants grown in BNS enjoy the following essential benefits:

- ✓ **Need less water to grow.**
- ✓ **Restore soil to a natural balance.**
- ✓ **Grow more resilient plants with stronger root systems.**
- ✓ **Perfectly suited for Organic Farming.**
- ✓ **Not adversely affected by average (to above) rainfall.**
- ✓ **May require less fertilizers, pesticides, herbicides and chemical additives, depending on variety of plant species being grown, previous use of the land, and commitment to maintenance regime.**
- ✓ **Results commonly visible in 1 growing season.**
- ✓ **Provides financial ROI within one year, cycle or series of growing seasons, depending on the unique requirements of the plant species being grown.**

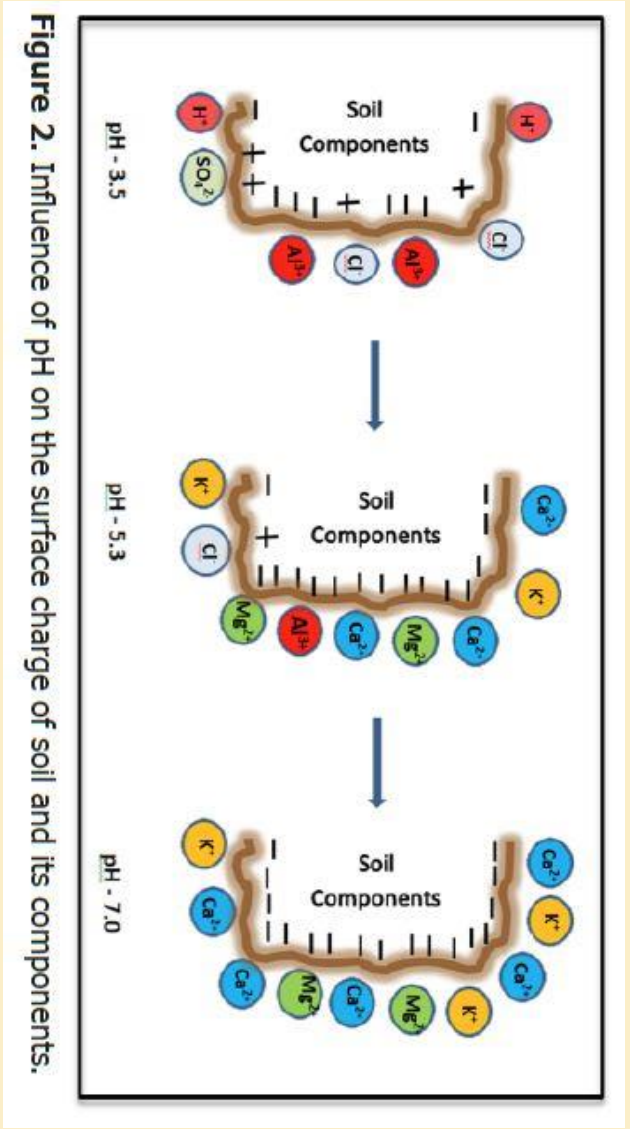


Figure 2. Influence of pH on the surface charge of soil and its components.

Independent Study by the University of GA Extension, Sonon, Kissel and Saha 2014

So Why Incorporate Food Waste?

- **Diverts vegetative waste away from landfills and incinerators;**
- **Reduces greenhouse gas emissions, and plants grown in this soil requires less water to grow;**
- **Diverted tons contribute to Florida mandated 75% recycling targets;**
- **Composting recycles organic matter and nutrients back to the soil;**
- **Redirects funds (tipping fees) to sustainable waste management practices;**
- **Speeds up the composting process by providing a more suitable Carbon to Nitrogen (C:N) ratio;**
- **Produces a higher value, more nutrient-rich compost product, without chemical run-off into the water stream.**

Proposed Addition to City of Tampa Ordinance

ARTICLE VIII. - FRANCHISES FOR COMMERCIAL SOLID WASTE COLLECTION SERVICES

Sec. 26-400. - Title.

This article shall be known and may be cited as the "City of Tampa Ordinance for Commercial Solid Waste Collection Services and Franchises."

McKay Bay Complex means the city's solid waste management facilities located near the intersection of Clark Street and 34th Street in the city. The McKay Bay Complex includes, but is not limited to, the McKay Bay Refuse-To-Energy Facility, a transfer station, a scale house, and associated structures and facilities.

McKay Bay Refuse-to-Energy Facility means the city's municipal waste combustor, which is located in the McKay Bay Complex. The McKay Bay Refuse-to-Energy Facility burns solid waste to generate electricity.

Processible waste means any combustible solid waste that can be processed lawfully in the McKay Bay Refuse-to-Energy Facility, including but not limited to, garbage, rubbish, cardboard, paper products, plastics, and food containers.

Recovered materials means metal, paper, glass, plastic, textile, (ADD) VEGATATIVE FOOD WASTE, or rubber materials that have known recycling potential, can be feasibly recycled, and have been diverted or source separated or have been removed from the solid waste stream for sale, use, or reuse as raw materials, whether or not the materials require subsequent processing or separation from each other, but not does not include materials destined for any use that constitutes disposal. Recovered materials as defined herein are not solid waste.

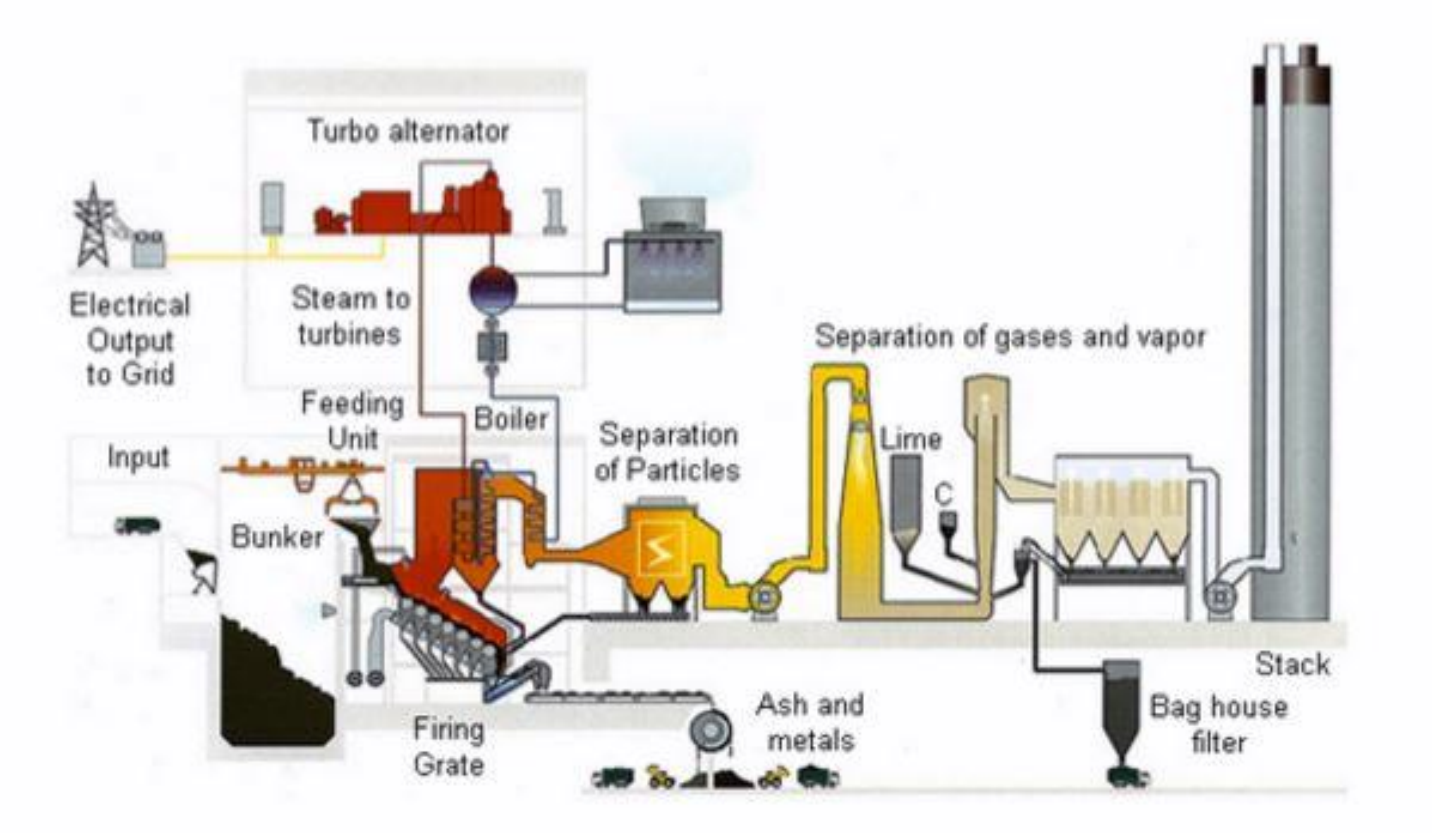
Recycling means any process by which solid waste or materials that would otherwise become solid waste are collected, separated or processed and reused or returned to use in the form of raw materials or products.

Regulation means the requirements in this article and the requirements established by the director relating to the storage, collection, transportation, disposal, and recycling of solid waste.

Rubbish means an accumulation of discarded paper, trash, rags, cans, bottles, boxes, or other waste material resulting from normal housekeeping activities and operations in commercial establishments.

Sludge includes the accumulated solids, residues, and precipitates generated as a result of waste treatment or processing, including wastewater treatment, water supply treatment, or operation of an air pollution control facility, and mixed liquids or solids pumped from septic tanks, grease traps, privies, portable toilets, or similar waste disposal appurtenances. Sludge may be a solid, liquid, or semi-solid waste, but does not include the treated effluent from a wastewater treatment plant facility.

Waste to Energy (WTE) Incinerators: Burning Food Actually Waste More Energy than they Generate



To work efficiently a WTE Incinerator must have fuel with an average heat content of 5500 btu/pounds. Food scraps have a heat content of only 2600 btu/pound. Food actually dilutes the fuel of an incinerator. ~efc.org/wte-incinerator-wastes- energy

Inspiration for Green Living!!!

For More Information

Please Contact:

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Recycle
Save
The Earth
BAY MULCH, INC.

Advancing Universal Technology LLC