



THE SCIENCE OF COMPOST

“While our ancestors realized that compost was helpful for growing plants and improving soil health, they did not know how or why it worked. Our knowledge about the science of composting comes from research conducted during the past 50 years – relatively recent compared to the 2000 plus years that humans have been composting.”

~University of Illinois Extension: The Science of Composting

What is compost?

Managed decomposition



What is compost?

Carbon + Nitrogen + Water + Air + Time + “Other Good Stuff”



Carbon

Carbon = Browns

Examples: newspaper, cardboard (not shiny), paper towel/ toilet paper rolls, dryer lint, egg shells, cardboard egg cartons, sawdust, tea bags, shredded brown paper bags, pine needles, hay, coffee filters, end of season plants, branches, dry leaves

Nitrogen

Nitrogen = Greens

Examples: fruit or vegetable peels and cores, coffee grounds, all non-meat/non-dairy food scraps, manures (not pet waste), lawn clippings, green leaves

Carbon : Nitrogen

30:1 to start

(finished compost ~ 10:1)

C : N

Carbon : Nitrogen

Some examples 



Average Carbon-to-Nitrogen (C:N) Ratios for Organic Materials			
GREENS/ NITROGEN	C:N RATIO	BROWNS/ CARBON	C:N RATIO
Pig manure	5-7:1	Leaves	30-80:1
Poultry manure (fresh)	10:1	Cornstalks	60:1
Alfalfa or sweet clover hay	12:1	Straw	40-100:1
Vegetable scraps	12-20:1	Bark	100-130:1
Poultry manure with litter	13-18:1	Paper	150-200:1
Coffee grounds	20:1	Sawdust	400:1
Grass clippings	12-25:1	Wood chips	800:1
Cow manure	20:1		
Horse manure	25:1		
Horse manure with litter	30-60:1		

SOURCE: Clemson Extension Master Gardener Program

But what does this mean?

TABLE 1. Carbon:Nitrogen Ratios

MATERIAL	C:N RATIO
Corn stalks	50-100:1
Fruit waste	35:1
Grass clippings	12-25:1
Hay, green	25:1
Leaves, ash, black elder and elm	21-28:1
Leaves, pine	60-100:1
Leaves, other	30-80:1
Manure, horse and cow	20-25:1
Paper	170-200:1
Sawdust	200-500:1
Seaweed	19:1
Straw	40-100:2
Vegetable waste	12-25:1
Weeds	25:1
Wood chips	500-700:1

Carbon : Nitrogen

- A high C:N ratio = celery. It's good for you, but takes a while to eat.
 - It also creates a temporary deficit of N. (think about it...high C would be like eating through cardboard, or newspaper, or bark).
- On the other hand, a low C:N ratio = chocolate cake.
 - Unfortunately for us, chocolate cake has little nutritional benefit and it's the same for the low C:N ratio inputs



versus



Carbon : Nitrogen

Possible problems:

- If your compost mix has too much carbon, it will not heat up and your scraps won't decompose.
- If your mix has too much nitrogen, it may become too hot, killing compost microorganisms.

Carbon : Nitrogen

Use a Compost Mix Calculator

Choose a material. Enter a cubic foot measurement. Press TAB. The Total C:N ratio for your recipe will appear.

Aim for a TOTAL C:N RATIO of 30. (25-30 is good. 20-40 is OK.)

Material	CuFt	LbWet	%H2O	available %C	available %N	available Lb C	available Lb N	available C:N
Vegetable Waste 11:1	01	58.7	87	34.75	3.2	2.65	0.24	10.86
Dairy Cow Manure 13:1	01	54	80	37.93	3	4.1	0.32	12.64
Office Paper 129:1	03	33.33	20	25.76	0.2	6.87	0.05	128.82
Leaves loose-dry 47:1	8	29.63	15	42.22	0.9	10.63	0.23	46.91
TOTALS:						24.25	0.85	28.59

For a total C:N Ratio of 29:1 mix
01 part(s) Vegetable Waste
01 part(s) Dairy Cow Manure
03 part(s) Office Paper
8 part(s) Leaves loose-dry

Particle Size

Right particle size < 2" preferred

(0.5 – 1.5" most rapid breakdown)



Cornell Composting

Things you should NOT include



- bones,
- fish scraps,
- dairy,
- fat,
- plants treated with pesticide,
- perennial weeds or diseased plants

What is compost?

Carbon + Nitrogen + Water + Air + Time + “Other Good Stuff”

Water

- Rule of thumb: the more green material you put in, the less water you'll need to add.
- In general your compost should be moist, but not sopping wet.
- Looking for the consistency of a damp sponge.



Water

Signs of too much water:

- strong odor,
- flies/maggots,
- mold,
- water seeping out bottom or sides



Water

Signs of too little water:

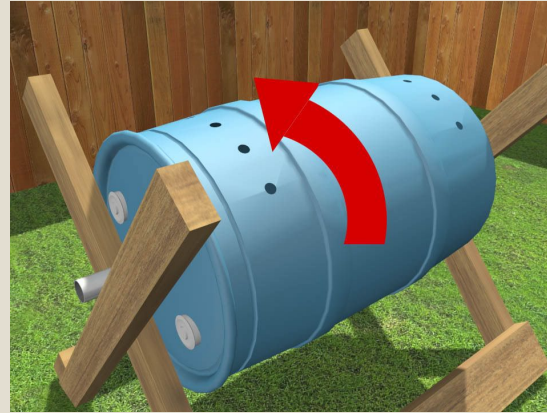
- looks dusty,
- fire ants present,
- might blow around in the wind



What is compost?

Carbon + Nitrogen + Water + Air + Time + “Other Good Stuff”

Air



Air

The microbes in the compost pile need oxygen to function.

Wait at least two-four days after you build your pile, check at least six inches into pile for moisture and temperature.

Turning should only happen every 3-5 weeks.

What is compost?

Carbon + Nitrogen + Water + Air + Time + “Other Good Stuff”

Time

A good, hot pile will reach at least 130°F (54°C) and stay there for two to four days.

When the temperature drops back down to about 100°, turn the pile. The temperature should climb again quickly.

Even when the hot pile has stopped heating up, it still needs to cure for a couple of weeks before it is ready for use.

Time

A complete pile will take somewhere between three months and two years, depending on how large it is, what is being added to it, how often it is being checked/turned, and the climatic conditions.

What is compost?

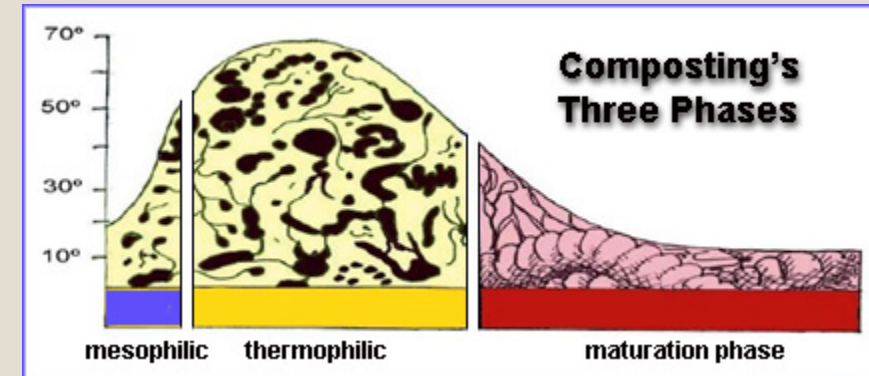
Carbon + Nitrogen + Water + Air + Time + “Other Good Stuff”

“The Good Stuff”

- Bacteria
- Fungi
- Macroorganisms

Bacteria Types

- Psychrophilic:
 - Temperature range: 55° - 70 °
- Mesophilic:
 - Temperature range: 70° - 100°
- Thermophilic:
 - Temperature range: 113° - 160°

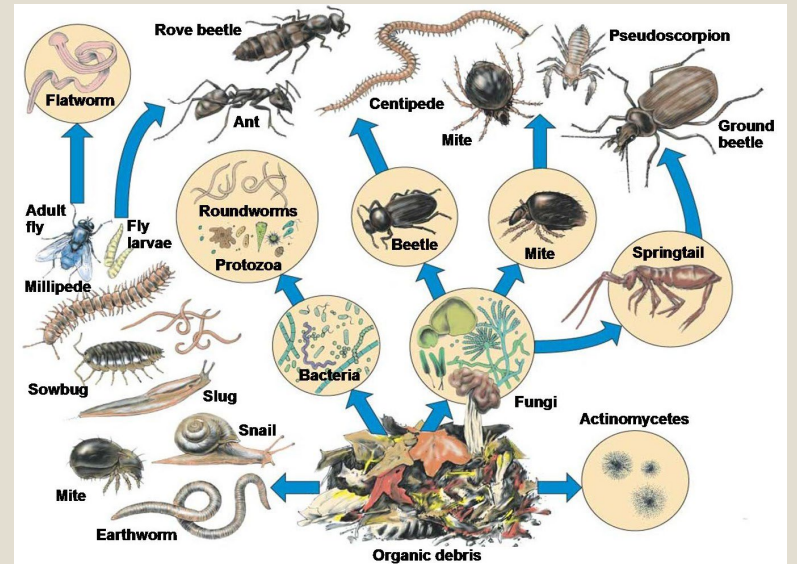


Fungi

- Fungi, which can be suppressed at high thermophilic temperatures, flourish as the temperature cools.
- Fungi plays an important role in breaking down tough lignin and cellulose, which can withstand even the high temperatures of hot composting.

Macroorganism

- Move in as the pile cools
- Large enough to be seen by the naked eye
- Active during the later stages of composting
- Dig, chew, digest and mix materials to transform it into more digestible forms for microorganisms



Types of Programs

- Onsite Composting
- Static Piles
- Windrows
- Vermiculture
- In-vessel composting

Types of Programs: Onsite Composting

- Typically for home use or small production area
- Can be small tumblers, three bin system, or something similar



Types of Programs: Aerated Static Piles

- Works relatively quickly (3 – 6 months)
- Has “bulking agent” added to the piles (wood chips or other loose material) or can use mechanical ventilation for larger piles



Types of Programs: Aerated Windrows

- Larger/community scale
- Designed to create product to sell
- Ideally 14-16' across and about 5 feet high. Use mechanical means to turn rows.
- Piles should be small enough to allow oxygen to flow, but large enough to create heat.



Types of Programs: Vermiculture

- Worm bins are easy to construct (or purchase)
- One pound of mature worms (approximately 800 -1,000 worms) can eat up to half a pound of organic material per day.
- It typically takes three to four months to produce usable worm castings. These can be used as potting soil. The other byproduct, known as “worm tea”, is used as a high quality liquid fertilizer for houseplants or gardens.



Types of Programs: In-vessel

- Less labor
- Compost created in just a few weeks (with a few more weeks necessary to cure)
- More mechanical knowledge needed
- More expensive
- Usually larger units (although small units do exist)





SITE DESIGN,
OPERATIONAL
CONSIDERATIONS,
AND CHALLENGES

Equipment

Chippers

Achieving particle size -



Chippers
Grinders
Shredders
Mulchers

Screeners

Achieving particle size -



Screeners
Screening buckets
Screening attachments

Turners



Wind row turner
Front end loader



Scalability



Operational Considerations

Safety

Compost materials, including compost itself, can be extremely heavy. This is partially due to its ability to retain and absorb water. It is important to educate all volunteers, staff, and the public about the dangers of exceeding the limits. Whether it is the limits of food waste bin weight (to reduce potential health risks to humans directly involved in lifting and maneuvering such heavy loads by hand) or the limits on a piece of equipment that may put someone life in danger. Often times, the mechanisms on the equipment used in some operations have extremely powerful and fast moving parts. But even pitchforks have safety risks, so its important to have best management practices for everyone to follow and receive training on.

Transportation

Do Not Exceed Limits! Your eyes will deceive you. What looks like a little pile of food actually weighs more than the vehicle you drive to work! What you think is only half full standard container is actually more than you and a friend can lift. Even the biggest truck need only be a quarter full of feedstock or compost to meet its intended limits. It is also important for the safety of any drivers transporting feedstock or compost to receive proper training in identifying the warning signs of system overload.

Record Keeping and Data Collection

1. Track pre-consumer food waste at the time of discard. Record waste on the logbook immediately.
2. If donating food to a food bank, record all food donations on the waste logbook immediately.
3. Record the type of food and the reason why it is being discarded on the logbook. These are the two most important pieces of information that will reveal opportunities for change.
4. Record how much is being wasted, the best option is to weigh the waste, and record its weight in the logbook.
6. If you do not have a scale, record the number of portions leftover or the volume (1/2 a pot, 2 gallons, etc.)
7. Chefs and Managers should review yesterday's waste logbook at the beginning of the following day's shift.
8. The top 5 waste items should be discussed with the team at a meeting. Ask the team for ideas to reduce those items.
9. Review progress on the Top 5 items every week until the amounts drop.
10. If you have time, keep an Excel spreadsheet with your daily waste totals so you can see progress.

Record Keeping and Data Collection

- Create database for overall operations, including schedules, recipes/ratios, recorded weights and volumes including finished product using Excel or other program you're comfortable with.
- Collect data on daily weather conditions, pile temperatures, moisture contents, and turning/mixing frequencies.
- Record any noticeable or reported issues such as odors or non-designed runoff.

Challenges

Regulations

It is important to research local regulations, state regulations, and federal regulations related to composting in order to gain an understanding of your entire community and surrounding area. Because Tribes are sovereign, it sometimes creates a misunderstanding by non-tribal and tribal members alike. Non-tribal members still have to follow their non-tribal laws. These regulations could be rules such as space limitations, design limitations, leachate management, odor control, and in some extreme cases they might regulate whether or not you can allow rain water to be absorbed and may even require prevention methods be put in place to stop it.

Neighbors

Avoid neighbors whenever possible! The most remote, but accessible location, is the best location. This will help avoid the potential for unnecessary conflicts. Most of the time, a composting operation is quiet and efficient, but that may not be the basis of a complaint. When managed properly, an effective system can avoid attracting other problems such as animals or contaminating air and water resources. Large scale commercial operations often have to worry about neighbors the most. They typically require a big lot and therefore have the biggest presence in the community. Small scale home or private operations generally should not have to worry about offending anyone. It is important to properly and fully evaluate the location of the site within the operating property.

Contamination and Smells

When developing your system, it may be beneficial to answer the following questions, which might prevent the need to mitigate early decisions later on.

1. Is there a need for a pad in the curing area or will a drivable surface over certain soil types and depth to water table be enough to protect the water table below a facility?
2. Is there infiltration into the soils in the areas that have a pad vs. don't have a pad? Is there a difference in the infiltration rates?
3. Is there even terrain or dramatic sloping changes within the site? Is there ability for retention ponds and decontamination ponds if the need arises?
4. Is the operation site centrally located within the property or is it adjacent to a neighboring private property or sensitive ecological site?
5. Is there a need for permanent cover or would the ability to adjust cover prove more beneficial not only for controlling contamination and smells, but also water and temperature

Land and Maintenance

It is important to complete a full and in-depth analysis of the land where your site is proposed. If you have an existing site, and that because of its design has historically caused interruptions to daily operations, then a re-evaluation of the site needs to be performed. Proper placement of operation areas will assist in minimizing maintenance and may help alleviate other potential losses or conflicts.

Weather and Water

Weather and the climate where you live play an important part in the planning and design stages of your operation. Your individual weather and climate where you live will determine what type of system works best for you, as well as, allow you to determine what custom additions or changes you would like made in order to maximize efficiency and production. The amount of natural water, rain and snow, is also an important factor to incorporate in decision making. Knowing this information will help make better choices when it comes to the type of cover used (if any), run-off and contamination concerns, potential groundwater or municipal water usage, and year round operations.

Snoqualmie Indian Tribe

Cindy Spiry
Environmental and Natural Resources
Department Director

Snoqualmie Casino Opened November 2008



“We share the environment we live in, what affects one of us affects all of us,” said Jolene Williams, Snoqualmie Tribal Chair 2017. “The lessons passed down by our Elders tell us that we must be good stewards of the land...”



Solid Waste Code was Developed

- ▶ All Snoqualmie Tribal Facilities shall participate in a recycling program.
- ▶ All Snoqualmie Tribal Facilities shall be required to compost their food-waste as part of their overall recycling program.
- ▶ The Snoqualmie Casino shall participate in a kitchen grease recycling program.
- ▶ Funded by the EPA as part of the ISWMP development

Beginning Waste Reduction and Recycling Efforts

- ▶ Food waste composting
- ▶ Recycle fryer oil for bio-fuel



Additional Waste reduction efforts implemented

- ▶ Cardboard recycling
- ▶ Elimination of Styrofoam to-go containers and cups
- ▶ Buying recycled products
- ▶ Mixed recycling
- ▶ No more water bottles!



- ▶ We have a total of 2 on the casino floor and 3 on the service level for the employees.
- ▶ September 2018 - 1,383,557 water bottles saved since installation in 2012
- ▶ It is a huge savings for both the casino and the environment.

Beginning Food Waste Program at the Snoqualmie Casino

- ▶ Initial conversations about starting the composting program were met with some resistance
- ▶ We were able to show that the cost of composting is less than sending to the land fill
 - ▶ 2008 Garbage \$100/ton-Compost Cedar Grove \$50/ton
 - ▶ 2018 Garbage \$135/ton-Compost \$71/ton

Waste Sort

- ▶ 2009 we performed a waste sort at the Casino to see how the composting and other recycling programs were going.
 - ▶ Data was needed to inform our Integrated Solid Waste Management Plan (ISWMP), funded by the EPA.
 - ▶ We received assistance from the Tribal Solid Waste Advisory Network (TSWAN) with both the plan and the waste sort

12 hour waste sort

- ▶ Mid week sample
- ▶ Weighed and separated 25% of every bag of garbage
- ▶ Total weight was 489.4 lbs
- ▶ 359.8 lbs of compost + 37.9 lbs of other recyclables
- ▶ 397.7 lbs recyclable/compostable

Waste Assessment Contractors

Cascadia Consulting Group 206-343-9759	Gershman, Brickner & Bratton, Inc. 703-573-5800	Ridolfi 206-436-2758
SERA 303-494-1178	Green Solutions 360-897-2474	MSW Consultants 800-679-9220

Issues found

- ▶ Waste sort revealed some internal issues
- ▶ Only 18.75% of the waste was sampled was Non Recyclable Trash. This was all being sent to the landfill
- ▶ Why so much food waste in the garbage???

Compostable bags

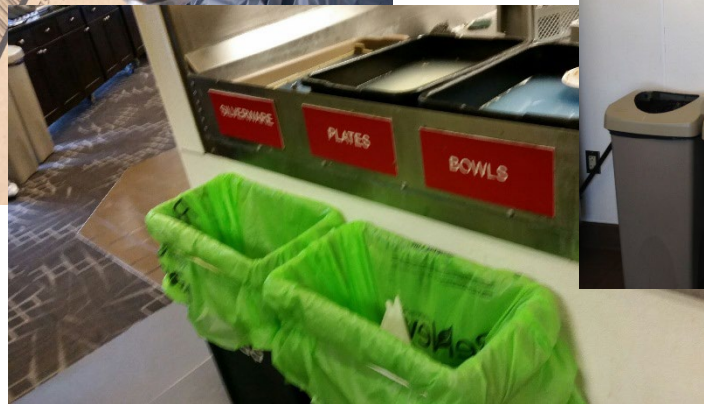


Challenges and Solutions

Recycling and Food Waste in Garbage



Double Bagging Solved the Problem



Steps to Improve our Program

The following steps are being taken to improve the Casino Composting and Recycling Program:

- ▶ Meetings with Snoqualmie Casino Food and Beverage Manager
- ▶ Meetings with Facilities Manager
- ▶ Preparing and gathering educational materials
- ▶ Preparing trainings with assistance from TSWAN
- ▶ Future employee orientation will include composting and recycling training
- ▶ Regular communication and assessments

Data Collection



CEDAR GROVE ORGANICS RECYCLING LLC
 7343 E. MARGINAL WAY S.
 SEATTLE, WA 98138
 Customer Service: (877) 994-4466
 Fax: (206) 832-5161 www.cedargroveorganics.com



Customer Pbr
 001127
 Invoice Date
 1/31/2018
 Invoice #
 000037500

Balance Forward	Payments	New Charges	Adjustments	Total Amount
2,828.78	-2,828.78	\$4,472.92	\$0.00	\$4,472.92

SNOQUALMIE CASINO

Date	Qty	Frequency	Description	PO Number	Amount
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01/27/18 Phone 1 - 473925 -2,828.78

Total Payments -2,828.78

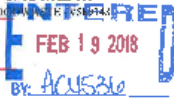
Site: 001127-001 - SNOQUALMIE CASINO - 37500 8E NORTH BEND WAY

Roll Off

Date	Qty	Description	Amount
01/31/18 - 01/31/18	1.00	RENT CHARGE-ROLL OFF-MONTHLY	72.10
01/31/18 - 01/31/18	1.00	RENT CHARGE-ROLL OFF-MONTHLY	97.25
01/02/18	1.00	FUEL SURCHARGE	52.53
01/03/18	1.00	LAND CHARGE - 20 YD ROLL OFF	175.10
01/03/18	1.75	TIPPING FEE-FOODWASTE - 4587-21	124.43
01/04/18	1.00	FUEL SURCHARGE	23.28
01/04/18	1.00	LAND CHARGE - 20 YD ROLL OFF	171.16
01/04/18	0.61	TIPPING FEE-FOODWASTE 434792	44.77
01/04/18	1.00	FUEL SURCHARGE	63.12
01/06/18	1.00	HAUL CHARGE - 8 YD ROLL OFF-YARD WASTE	25.65
01/06/18	5.48	TIPPING FEE- YARDWASTE - 858842	486.39
01/08/18	1.00	FUEL SURCHARGE	39.54
01/08/18	1.00	HAUL CHARGE - 20 YD ROLL OFF	175.10
01/08/18	1.91	TIPPING FEE- PINDO'S 1E - 458800	125.80
01/11/18	1.00	FUEL SURCHARGE	32.43
01/11/18	1.00	HAUL CHARGE - 20 YD ROLL OFF	175.10
01/11/18	1.00	TIPPING FEE- FOODWASTE 458844	125.4

Gr% Acct: 8234-720

Mgr Appr: [Signature]



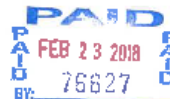
Add'l Appr: _____

CEDAR GROVE ORGANICS RECYCLING LLC
 7343 E. MARGINAL WAY S.
 SEATTLE, WA 98138
 Customer Service: (877) 994-4466
 Fax: (206) 832-5161 www.cedargroveorganics.com

Account Number	Invoice Date	Amount Due	Amount Forwarded
001127	1/31/2018	\$4,472.92	2,828.78



Please take care to write your account number on your check



SNOQUALMIE CASINO
 ACCOUNTS PAYABLE
 37500 8E NORTH BEND WAY
 SNOQUALMIE, WA 98065-9260

EST \$2,900
 ACCRUED
 MONTHLY DISCOUNT 8234-720
 DATE WITHHOLDN ACUS36

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Foodwaste diverted to Cedar Grove 2016	by Ton	\$65.00 per	
1/2/2016	1.16		
1/5/2016	2.11		
1/7/2016	0.4		
1/7/2016	7.56		
1/9/2016	0.81		
1/12/2016	1.44		
1/14/2016	0.48		
1/16/2016	0.37		
1/19/2016	2.08		
1/21/2016	0.36		
1/26/2016	1.71		
1/30/2016	0.79	Jan	\$ 4,333.61
2/2/2016	1.76		
2/4/2016	0.56		
2/6/2016	1		
2/9/2016	1.71		
2/11/2016	0		
2/15/2016	3.34		
2/18/2016	0.3		
2/20/2016	1.19		
2/23/2016	1.82		
2/25/2016	1.02		
2/27/2016	0.96	Feb	\$ 2,882.47
3/1/2016	1.3		
3/3/2016	0		
3/5/2016	2.25		
3/8/2016	1.24		
3/10/2016	0.81		
3/12/2016	1.29		
3/15/2016	1		
3/17/2016	1.1		
3/19/2016	0		
3/22/160	0		
3/24/2016	2.59		
3/26/2016	1.02		
3/29/2016	0		
3/31/2016	1.8	March	\$ 3,127.97
4/2/2016	1		
4/5/2016	1.3		
4/7/2016	0.72		
4/9/2016	1		
4/11/2016	1.64		
4/11/2016	5.93		
4/14/2016	1.02		
4/19/2016	1.54		
4/21/2016	1		
4/23/2016	0.39		
4/26/2016	1.38		
4/28/2016	0.9		
4/30/2016	0.61	April	\$ 3,407.51
5/3/2016	1		
5/5/2016	1.53		
5/7/2016	0.45		
5/10/2016	2.13		
5/12/2016	0.85		
5/16/2016	1.56		
5/19/2016	1.06		
5/22/2016	1		
5/24/2016	1.51		
5/26/2016	1		
5/28/2016	1.61		

Compost Numbers

2016	2017	2018
198.01 tons	182.19 tons	Still Counting
65/ton	71/ton	71/ton



**Approximately
2000 tons of food
waste diverted
from the landfill
since opening in
2008**

Waste Oil

Fryer Oil Recycling

Approximately 182,640
gallons in 10 years



Snoqualmie Valley Foodbank

- ▶ Composting Partnership



Keys to success!

- ▶ Communication



- ▶ Education



- ▶ Partnerships





Questions?

Cindy Spiry

cindy@snoqualmietribe.us

Coquille Tribal Case Study

Vermicomposting at the Mill Casino



The Starting Point

- The Mill Casino and Resort has around 180 lodging rooms and four restaurants onsite – it is a major draw for the community.
- The Coquille Tribe does not have an environmental program (but they do have a very robust cultural program) and solid waste is a service provided through municipal services.
- Richard Rudder, the Mill facility director, wanted to figure out a way to reduce his monthly waste bill, turn food scraps into something useful, and put into practice the Tribe's values.
- And that is when he started chatting with a guest who had a passion for worms....

Why Vermicomposting?

- Unlike traditional composting, vermicomposting is not terribly labor intensive. Your red wigglers do most of the work – as long as you keep them happy! And that means five things: Cool, Moist, Dark, Food, and Air.
- It is a terrific way to get rid of food scraps.
- Vermicastings and worm tea are jam-packed with goodness that will make your plants sit up and smile.
- It is a pretty inexpensive approach and can be easily scaled up and down as needed.
- For educational purposes, a vermicomposting setup tends to be a bit more exciting for people to look at than a pile of composting scraps and leaves.

Initial Steps

In 2010 Richard began doing some preliminary research. He decided to start off with an approach you've probably seen before as it is easy, cheap, and the typical entry point for people interested in vermicomposting.

Since they had plenty of 5 gallon buckets hanging around the kitchens, they used several of those as their first 'worm farms'. They drilled some holes in for air, put in spigots to capture the runoff, and got themselves about one pound of red wigglers.

It didn't take him long to realize he was taking a major bite out of the kitchen scraps that had been ending up in their waste.



Moving to the Next Level

- Once Richard and his staff saw that the worms were doing a great job they decided they needed to look into a bigger – and less messy – approach.
- The thing about the plastic bin approach is you are going to get dirty and the worms do get a bit stressed when you remove them from time to time to get at the castings.
- So, with an overall investment of around \$3,000 Richard built this....



Continuous Flow System

These systems use the worms natural habit of moving up to find more food. By introducing the food at the top your worms don't have to move. They just hang out under that top layer where it is dark, cool, and moist, chomping away and dropping their casings below them – where you can collect them.

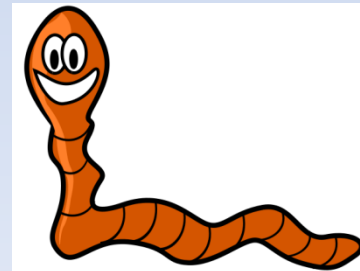
Richard achieved this by having a screen at the bottom (so leachate could drain and he would have extra air flow). He put a simple scraper operated by a winch that he could drag through the bottom layers and the castings would then fall out the screen.

As he harvested the castings he would then add more food (with plenty of carbon sources, like shredded paper, torn up egg cartoons, etc.) and the worms just kept munching away.

Variations on a Theme

A similar approach, without having to mess about with a scraper, is to take an assembly line approach.

- Lay out your bedding all along the screened bottom. Then add your food and worms to one side.
- As the worms eat through that portion you simply add more food next to it – the worms will migrate horizontally to the fresh pile of food.
- You then follow behind, collecting your worm castings. When you get to the other side, just reverse direction.



What They Did to Have Happy Worms

- Keep them cool: Worms can overheat, so avoid areas with heaters or lots of direct sunlight. Worms that get hot (or are fed hot food) have a tendency to migrate...which can get freaky.
- Keep them moist: They don't like heat...especially if it is a dry heat.
- Keep them in the dark: Really, they won't mind.
- Feed them: Basically, things that grow from the ground are food for worms (more on this later. Keep in mind you will need more 'browns' for your worms than you need for traditional composting.
- Give them some air: While you don't need to do the aeration, since the worms will do it for you, they do need air themselves so be sure to provide air holes.

Lessons Learned: Food

Good Food

Apple Cores

Onion Peels

Tea Bags

Coffee Grounds with Filter

Spoiled Vegetables and leftovers

Hair

Finger nails

Tissues and Paper Towels

Citrus* in smaller quantities and monitor the PH level

Bad food

Salty Foods

Oily Foods or Nut Butters

Pet Wastes

Meat

Dairy

Really spicy food

Rock dust- worms have gizzards and need rock dust to help digest food.

The Proof is in the Pudding

- They started off with 15 pounds of red wigglers. Within two years they had a million worms doing their thing.
- In those two years they processed 2,600 pounds of kitchen scraps that would have ended up in the trash.
- They saved over \$25,000 in waste disposal costs.
- A gallon of worm castings was selling for \$25 a pop from local sources. Now they had their own, in spades.
- And their employees liked stopping by to say hi to their wriggling colleagues.

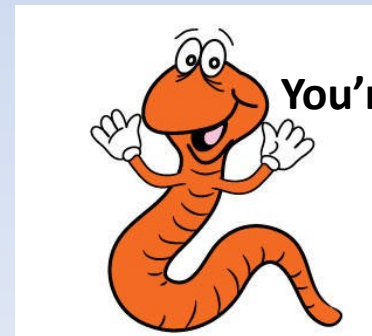


The Beauty of Worm Castings

When they harvested their first worm castings they discovered they had over 60 gallons they could use on site.

They then used the worm castings – and the worm tea they made – for landscaping around the casino as well as on their organic vegetable garden they started to provide veggies for their kitchen.

In the end they significantly reduced their food waste, saved money by making their own (and better) fertilizers for landscaping and gardening, and created a project they could highlight to their guests as an illustration of their commitment to traditional Coquille values.



You're welcome

A Few Good Resources

If you would like to do a bit more research on this approach I would suggest:

- This website has a good online instruction book and some really helpful videos that show how different bins work:
<http://www.wormfarmingrevealed.com/wormfarming.html>
- Here is a fun little video of converting a simple plastic bin system to a flow through system: <https://www.youtube.com/watch?v=JeCsshAAkfo>
- This site has some great articles and videos – focused on smaller, simpler household vermicomposting:
<http://www.cityfarmer.org/wormcomp61.html#wormcompost>
- CalRecycle has a lot of good resources for restaurants and businesses that want to be more sustainable (including funding and vermicomposting):
<http://www.calrecycle.ca.gov/Organics/Food/Restaurants/>