Closed-loop Campus: Vermicompost at UCR Celeste Geary University of California Carbon Neutrality Initiative Fellowship

Introduction

Soil health is an incredibly important resource for our planet as it is the basis for plant health. These plants, in turn, feed us and sequester CO2 . While conventional farming methods strip the soil of its nutrients with pesticides, chemicals, and inorganic fertilizers, compost can restore these vital nutrients to the soil. Conventional farming is the second greatest contributor to climate change. Many conventional farms claim that other farming methods have low yields and high rates of pests. However, through integrated pest management, crop rotation, and composting, crops can flourish. In the meantime, consumers of the produce don't have to worry about all the negative environmental impacts their meal just had. This project entails teaching students, who live both on and off campus, accessible ways to compost in their residences through workshops. Workshops will be held in the R'Garden primarily. This project focuses on carrying out Sustainable Development Goal 11: UN Sustainable Cities and Communities. Compost generated may be returned to the R'Garden or used at students' residences for small, urban gardens.

Materials and Methods

• Zoom

- Vermicompost Speaker from the city of Riverside's Waste Department
- Google Slides

We used Google Slides to create a digital zine

Conclusions

This project did not accomplish as much as I would have liked. However, I do feel I did the best I could under the circumstances.

Vermicomposting is an accessible, efficient way for homes to compost and I hope that message was received by UCR's students. Composting at the R'Garden would be very beneficial to soil health and reduce a lot of food waste. I hope that this is possible for the institution in the future.

with a section on vermicompost. We also hosted a Zoom call with a speaker from Riverside's Waste Department to talk about food waste and vermicomposting.

Results and Outcomes

This project shifted a lot from what I originally submitted it to be. Because of financial limitations, it was extremely difficult to get the vermicomposting bin in the R'Garden up and running. Much of the things that needed to take place for this project to be a success needed to happen through the institution. There was not sufficient communication between the institution, the R'Garden, and me to get the vermicompost bin going.

Once I recognized the challenges I faced



Future Goals

I hope to be able to host composting workshops in the R'Garden once we are able to gather in person again. I also hope to implement a composting system for the R'Garden.



Project Goals

Personal Goals:

- Further my understanding of CNI
- Work directly with the Office of Sustainability and R'Garden to develop a relationship
- Communicate with UCR students about Vermicomposting

CNI Goals:

institutionally, I tried to downsize the project. We were going to hold vermicompost workshops in the R'Garden during spring 2020, but our plans were disrupted due to Covid-19. What we were able to do instead was hold a virtual Vermicompost workshop. We also created a digital "Green Zine" with a section on vermicompost.



If you're interested in adding worms to the mix, then *vermicomposting* is for you! Worms convert organic waste into natural fertilizer. Castings, or worm poop, are teeming with microbes that help continue the decomposition process. When added to your garden's soil, these castings provide much needed nutrients and close the food loop at your house.

Although you may have not eaten that food in its initial form, you eventually will. Worms eat your food scraps. Castings then provide nutrition to plants in your garden. Finally, you are able to harvest from your garden and enjoy the nutritious fruits of your (and the worms') labor.



Red Wigglers Eisenia foetida

Can I use any kind of worm to start my vermicompost bin?

Unfortunately, no. The most common kind of worm used in vermicomposting here in North America is the Red Wiggler (Eisenia foetida). These worms are surface dwellers that don't bury themselves too deep and therefore will do well in your somewhat shallow bin. They are optimal feeders at room temperature. Red Wigglers can eat their body weight in food in one day. That means, if you have one pound of worms in your compost bin, these worms can theoretically go through one pound of food in a day!

Worms can eat anything I can, right?

Worms can digest much of the food we eat. However, you do want to stay away from the following foods: *meat*, dairy, citrus, hot peppers, and onions. You also want to refrain from feeding them too much starch. These foods will make your worm bin smell, hurt the worms, or both!

All I have to do is feed my worms a pound of food a day and I'm good?

It's not quite that simple. We will get into the how-to over the next few pages.



If it is not possible to get the vermicompost bin up and running due to institutional reasons, I hope that the community garden section can implement a vermicompost system on a smaller scale.



Literature Cited

Ogden Publications, Inc. "A Step-by-Step Guide to Vermicomposting." Mother Earth News,

www.motherearthnews.com/organic-gardening/guide-to-vermicompos ting-zmaz83jazshe.

Pocock, Jennifer. "How Vermicomposting Works." HowStuffWorks, HowStuffWorks, 30 June 2008, home.howstuffworks.com/vermicomposting1.htm.

Vanderlinden, Colleen. "Vermicomposting: How to Set Up a Worm Bin." The Spruce, www.thespruce.com/vermicomposting-setting-up-a-worm-bin-25395 03.

- Lower the amount of food waste from students at UCR
- Effectively UCR students teach to vermicompost

 Layering is an effective way to begin your bin. First, put in your carbon-rich materials and moisten them a bit so they are as wet as a well wrung-out sponge. Then, add a layer of soil. Next, add your worms. Finally, add a bit of food scraps to one section of the bin. Congrats, you're finished! Harvesting Castings Each worm bin is different, but generally, you'll be able to harvest your worm castings every 4-6 months. Your castings should be dark, crumbly, and smell of earth. When you're getting ready to harvest, start feeding your worms in the section opposite of the castings in order to ensure they stay in the bin. Opaque storage bin - a holes around the top for (15 - 50 gal.) Food scraps (N-rich material) Dry leaves, shredded newspaper, cardboard, coco coir (C-rich material) Red Wigglers Soil Meterials Meterials Red Wigglers Soil Moist, C-rich materials 	Lasagna Method	Materials
 Food scraps (N-rich material) Dry leaves, shredded newspaper, cardboard, coco coir (C-rich material) Red Wigglers Soil 	Layering is an effective way to begin your bin. First, put in your carbon-rich materials and	 Opaque storage bin – add holes around the top for a (15 – 50 gal.)
 sponge. Hich, add a layer of soil. Next, add your worms. Finally, add a bit of food scraps to one section of the bin. Congrats, you're finished! Red Wigglers Soil Red Wigglers Soil When you're getting ready to harvest, start feeding your worms in the section opposite of the castings in order to ensure they stay in the bin. 	moisten them a bit so they are as wet as a well wrung-out sponge. Then, add a layer of	 Food scraps (N-rich material) Dry leaves, shredded
 to one section of the bin. Congrats, you're finished! Red Wigglers Soil Red Wigglers Soil Worms worms in the section opposite of the castings in order to ensure they stay in the bin. 	soil. Next, add your worms. Finally, add a bit of food scraps	newspaper, cardboard, coco coir (C=rich material)
Harvesting CastingsEach worm bin is different, but generally, you'll be able to harvest your worm castings every 4–6 months. Your castings should be dark, crumbly, and smell of earth. When you're getting ready to harvest, start feeding your worms in the section opposite of the castings in order to ensure they stay in the bin.Were they stay in the bin.	to one section of the bin. Congrats, you're finished!	 Red Wigglers Soil
Each worm bin is different, but generally, you'll be able to harvest your worm castings every 4–6 months. Your castings should be dark, crumbly, and smell of earth. When you're getting ready to harvest, start feeding your worms in the section opposite of the castings in order to ensure they stay in the bin.	Harvesting Castings	and the second second
Your castings should be dark, crumbly, and smell of earth. When you're getting ready to harvest, start feeding your worms in the section opposite of the castings in order to ensure they stay in the bin.	Each worm bin is different, but generally, you'll be able to harvest your worm castings every 4–6 months.	worms
harvest, start feeding your worms in the section opposite of the castings in order to ensure they stay in the bin.	Your castings should be dark, crumbly, and smell of earth. When you're getting ready to	N-rich materials
soil Soil Soil Moist, C-rich materials	harvest, start feeding your	Red Wigglers
ensure they stay in the bin.	of the castings in order to	Soil
	ensure they stay in the bin.	Moist, C-rich materials
		~

Tips & Tricks Don't overfeed! It's easier to overfeed your worms than you may

think. The best thing to do is observe your compost comrades for a little while to see how quickly they go through the scraps you give them. If you overfeed them, you run several risks: rotting food, overheating your compost bin or making your bin too wet. Any one of these things is liable to kill your worms and make your compost stink.

Cate of Keep adding carbon! Make sure you're adding enough carbon (dry leaves,

shredded newspaper or cardboard). Carbon helps with the moisture levels of your compost. Fruits and vegetables are high in water content and can make your bin more wet than you'd like. Remember, you want the materials in your bin to feel as wet as a *well wrung-out*

🔹 Mind the temperature! 🚺

Worms are happiest when it's between 50-85°F. Remember that the outside air temperature is not necessarily the temperature inside your worm bin. Their temperature danger zone is $\langle 32^{\circ}F \text{ and } \rangle 95^{\circ}F$. When it starts getting hot, give your bin shelter and try covering u the top layer with a sheet of wet newspaper.

Acknowledgements

UCR | Office of Sustainability Oscar Corona R'Garden