

Using Compost and Composting Worms in Modified Desert Hugelkultur Garden Beds for Moisture Retention and Soil Fertility

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Purpose:

The purpose of this project is to demonstrate how compost produced in the home or backyard setting can be used in the creation of modified desert Hugelkultur garden beds for maximum moisture retention and soil fertility.

The method described in this project is best suited for individuals capable of moderate to heavy lifting, challenging digging, and raking, and possible wheel barrow use.

Tools needed for this project: a flat nose shovel; a digging fork; a rake (garden or bow) and a wheel barrow.

Background:

The method described in this project was developed by the author to address several of the challenges presented by arid, high-desert gardening such as lack of soil organic matter, compacted soils, lack of moisture retention, and soil erosion caused by wind and large rain events.

In order to address these challenges, this method of garden bed construction was developed as a hybrid of permaculture/Hugelkultur methods, John Jeavons' double-dig method, and the "waffle garden" method often utilized in agriculture by native southwest cultures. Using the Hugelkultur method of accumulating organic matter to build soil fertility, retain soil moisture and build soil fertility, a high-desert gardener can achieve incredible results.

Benefits of this type of bed include:

- Creating a "set it and forget it" garden bed – once the initial hard work has been done, the garden bed will provide a source of nutrients for your plants for years to come
- A great way to use larger carbonaceous materials or "course bulking materials" that have been screened out of your compost or is accumulated as yard "waste"
- High microbial activity in sub-soil of garden bed
- Buried subsurface material in the desert Hugelkultur bed acts like a sponge, retaining valuable moisture in high desert growing conditions
- Slow release of plant nutrients over time
- Creates a habitat for composting worms
- Bed is low-maintenance and requires little input over time

Hugel-what?? - A brief description of Hugelkultur:

Hugelkultur is a horticultural technique which uses permaculture garden beds created by the accumulation and mounding of compostable biomass plant material. The biomass in these beds slowly decompose over time, making nutrients available to plants, providing a source of soil organic matter and allowing for proper aeration in the bed due to the air space created by the various large particles of woody biomass.

This method has reputedly survived over hundreds of years in European nations as a method of low-tech, high out-put gardening, and is enjoying a resurgence thanks to the techniques set forth in permaculture gardening.



While the traditional style of Hugelkultur is a no-dig system, this modified method inverts the Hugelkultur, sinking the accumulated organic matter just above the sub-surface of the soil, rather than mounding materials into a hill on top of the soil.

Note that this system is a “modified” system specifically for high-desert arid growing conditions which experience monsoon rains. Why is this distinction important?

1. Modified desert Hugelkultur beds are sunken, not above ground, for maximum rainwater collection and moisture retention (mimicked after the traditional “waffle” gardens of the desert southwest)
2. Traditional Hugelkultur beds are not suited for climates that are characterized by moderate to heavy monsoon rains, such as most of New Mexico. The traditional style tends to stack material steeply which is at risk of sloughing off in heavy rain events. The modified version is sunken, thereby capturing moisture and holding organic materials in the bed, keeping the structure of the garden bed intact.
3. Though this process is initially labor-intensive, the result is highly-productive garden beds which require significantly less watering than comparable garden beds for many seasons.
4. This method incorporates finished compost which adds immediate soil organic matter, hummus and plant nutrients, and microorganism to the subsurface layers which aid in the further composting and breaking down of the compostable biomass layers at the bottom the bed.

Process:

The following photos and instructions demonstrate the steps necessary to create a modified desert Hugelkultur bed using yard detritus and compost produced from your own yard.

Step 1:

Ideally, the best time of year to create this type of bed is in the fall, after you have harvested the last of your summer crops from your designated garden space. You will then be able to dig before the ground freezes and the material will be settled and stable in time for spring planting. Select an existing garden bed or area in your yard for transitioning into a desert Hugelkultur beds. Begin with bare garden beds such as these:



(for reference, these garden beds are approximately 2.5' wide by 10' long)

Have your finished homemade compost, vermicompost and/or composting worms ready to go!





Step 2:

Remove any irrigation lines, hoses or sprinklers away from the bed. Using a flat-nose shovel, remove soil from garden bed and set directly outside of the bed. Be sure to stand outside of the bed to avoid soil compaction. Remove soil from top 6" to 12" of garden bed. Take care to keep edges of garden bed well-defined and remove any large rocks from the bed.

Step 3:

Taking care to not stand in the bed in order to avoid soil compaction, use a digging fork to perforate the soil in equal increments, creating aeration holes in the subsurface of the bed. This is adapted from the method of "double digging" from John Jeavons.



Step 4:

Pile medium sized woody material (such as these fruit tree prunings here) on top of larger cut branches, chunks of wood (think rough firewood) and/or any other large bulking material. Be sure to water the material throughtouly with a hose between placement of each layer to assist with the decomposition process. You may also add a layer of your finished, unsifted compost on top of these foundational layers of compostable biomass plant material.



Example of woody, bulky yard waste materials that can be used to construct your desert Hugelkultur bed





Step 5: Next, add a lighter layer of material such as dead grass, straw or dead leaves; water down with hose.



Step 6: Collect handfuls of your composting worms (*Eisenia fetida*, “red wigglers”) and place lightly over most recent organic layer, evenly distributing composting worms over the bed. Sprinkle finished compost over top. Lightly water in.





Step 7:

You may repeat another layer of light material, compost and/or worms and worm castings, if enough stockpiled material exists or if there is still available space in your sunken bed.

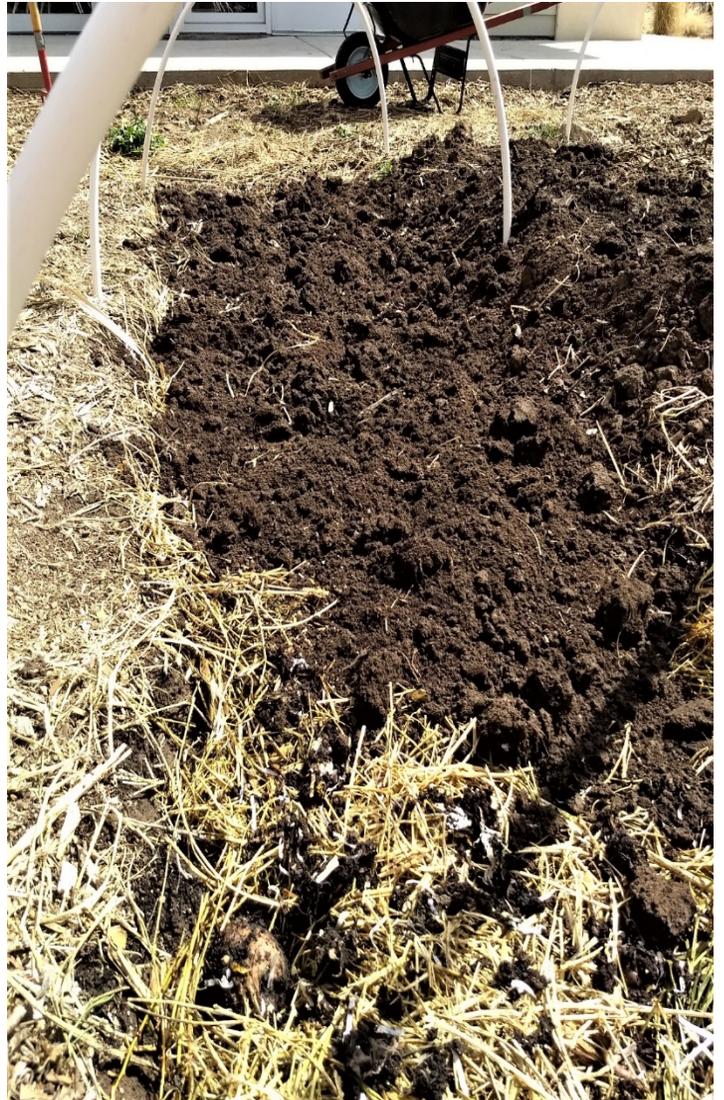
Step 8:

If composting worms were applied, allow approximately an hour for the worms to move down into the lower portion of the bed and then begin to lightly cover the desert Hugelkultur bed with the set aside soil. Evenly distribute the soil over the bed, breaking up any large chunks of soil and removing rocks, as needed.

When all the displaced soil has been replaced over the top of the bed, you may add another light layer of compost, if desired and available.

Rake the soil and compost evenly over the bed and cover with your preferred type of mulch. Replace irrigation, if desired.

Your finished bed will likely be slightly raised and mounded but will settle over the winter and will be closer to even with the surrounding soil level when you are ready to plant in the Spring.



Step 9:

In the Spring, or at least 2 months after your desert hügelkultur bed has been constructed, you may plant your garden bed. You should notice that this bed needs considerably less water than traditional raised beds but be sure to monitor moisture levels and water as necessary. Irrigation needs for these beds should significantly decrease during a typical New Mexico monsoon rain season and will likely not need any supplemental watering at all for this approximately one and half month period.

You may plant a variety of plants in this type of garden bed, though deep root crops are not recommended. Tomatoes, peppers, squash, cucumbers, and beans seem to thrive in these beds. Happy gardening!



Results after 2 seasons of desert hügelkultur bed preparation with homemade compost in an arid, high desert ecosystem.