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Irrigating with Ollas

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Introduction

Desert gardening presents a host of challenges including: poor soils, high temperatures, intense sun, low humidity, and frequent winds. All of these factors are compounded by an arid to semi-arid climate with little rainfall, which makes proper irrigation a vital component for any successful gardening endeavor.

Drip irrigation is widely accepted as the one of the most efficient systems to irrigate in desert gardens and landscapes because it minimizes water loss from evaporation or run off by delivering measured amounts of water directly to the soil (Schuch, 2016). However, drip irrigation may be ill suited for remote areas with low technology and/or unpressurized and unfiltered water systems. Drip systems can be costly, damaged, and emitters can be easily blocked with sediment, salt, and several insects (Ezekiel et al., 2017). Unreliable or impractical water sources for irrigation may discourage those wanting to develop a garden. For these situations, utilizing the ancient method of olla irrigation may be an option.

What is olla irrigation?

Olla (pronounced oy-ya) is Spanish for clay pot. Olla irrigation is a conservation irrigation system, which may save between 60 – 70% of water when compared to the conventional watering-can irrigation system (Ezekiel et. al., 2017). Curtis Smith, New Mexico State University Cooperative Extension Horticulture Specialist says the technology is equal to or slightly superior to drip irrigation depending on how drip irrigation is used because the water from the olla goes straight to the plant and no water is lost.

Conquistadors brought the olla system to the American Southwest, and it was widely used by Indigenous People and Hispanics (Smith, 2005). The technique all but disappeared with the introduction of modern irrigation systems but may be making a comeback due to their simplicity – both in form and function.

How does olla irrigation work?

The science behind ollas is straightforward; utilizing the fundamental principle of soil-moisture tension where water moves from areas of high concentration to low. An olla filled with water will initially have a much higher concentration than the soil outside. Unglazed clay pots are porous enough to allow water to seep through the walls of the olla, and fill the pore spaces of the surrounding soil until it reaches field capacity allowing roots to uptake water. If ollas are kept sufficiently full it will ensure that soil in the delivery area is always at field capacity.

Photo 1. Terracotta pot with the drain hole covered with a piece of tile and secured with food grade silicone. Note the water seeping through the walls of the pot into the soil.

Photo 2. Covered olla buried in the ground.

Traditional ollas are shaped like a round jug with a long neck. These vessels are typically created by artisans, and are often expensive. A more economical approach is to modify basic terracotta clay pots so they hold water. This can be accomplished by covering the drain hole with a piece of tile and some water tight adhesive such as a food grade silicone (Photo 1). To create a larger olla, the edges of two pots can be glued together, with the drain hole on one pot remaining open in order to fill.

Regardless of the shape or type of clay pot, the entire vessel is buried in the ground with the opening exposed, but covered, to allow for refilling which is traditionally done by hand as needed (Photo 2). Similar to other irrigation systems, the frequency with which they need to be re-filled will vary with the soil type, weather, and type of plants. An alternative for those who prefer a more hands-off approach have developed ways to attach irrigation tubing to ollas in succession, then utilize gravity flow from a larger water tank to keep them filled. Either method is compatible with utilizing rainwater collection or water delivery service if running water is not available.

Likewise, plants utilize water based on a pressure gradient that develops as a result of transpiration. Water is taken up by the roots and pulled through the vascular system in response to evaporation that occurs through stomata. Some of the external driving forces behind transpiration are temperature, wind, and light intensity. Since olla irrigation provides a consistent amount of water to the soil, plants within proximity to the vessel will always have access to the correct amount of water regardless of external factors, without danger of over or under watering. In fact, many roots will find their way to the source, encircling the olla itself, and taking water directly from the clay pot (Photo 3).

Photo 3. Exhumed olla showing the roots growing towards the source and encircling the olla.

Research is limited with respect to an ideal spacing for

olla placement. But one study of maize production under olla irrigation suggests a spacing of up to 20-30 cm may be sufficient (Ezekiel et al. 2017). Other anecdotal evidence suggest a diameter roughly twice the diameter of the olla itself. For example, an 8" flower pot olla can deliver water to plants up to 16" diameter surrounding it. Optimal spacing will depend on the soil type, plant type(s), and climate. Additionally, Smith suggests herbaceous plants like grasses, flowering plants, and many vegetables are ideal for ollas where woody plants such as trees and shrubs are not recommended because their roots are likely to break the pots.

Disadvantages of olla irrigation

While the list of advantages to using ollas in the garden is long, they do not come without their own set of disadvantages to consider. Since they must be buried in the ground, ollas take up their share of space in the garden, which can prove to be a challenge for very small gardens. Hand filling can be time consuming and unreliable if one forgets to check the ollas, or needs to go on vacation, etc. Salts may build in the olla and clog the pores of the olla. Additionally, seedlings and new transplants will need supplemental water for some time until their roots can find their way towards the olla in order to tap into the consistent water source. This can take up to a month or more before the plant is able to subsist on water from the olla alone.

Summary

Olla irrigation has been around for centuries. Sadly, olla irrigation nearly disappeared with modern irrigation systems. But for those that may not have the required resources or a practical water source, olla irrigation may be a solution to those problems. Olla irrigation is a simple technique that is rather inexpensive and easy to execute. Ollas are buried in soil and filled with water. Dry soil pulls water through the porous unglazed pots, moistening the soil surrounding the olla which irrigates the plants. While there are many advantages of olla irrigation, particularly those with unreliable or practical water sources, there are a few disadvantages. Perhaps the most obvious having to remember to fill the olla. Despite the few disadvantages, olla irrigation systems are a viable irrigation method worth trying for many desert gardeners.

More information about successful gardening can be found by reaching out to your local Cooperative Extension Master Gardeners and other publications such as "Ten Steps to a Successful Vegetable Garden" (DeGomez et al., 2015).

Resources

DeGomez, T., Oebker, N., & Call, R. 2015. Ten Steps to a Successful Vegetable Garden. The Basics. The University of Arizona College of Agriculture and Life Sciences AZ1435. Tucson, AZ.

Ezekiel, O., Ibrahim, I., & Kwatmen N. 2017. Effect of Radial Spacing on the Growth and Yield of Maize under Olla Irrigation. Global Journal of Science Frontier Research. Vol. 17:1. Pp. 83-88

Schuch, Ursula. 2016. Drip Irrigation: The Basics. The University of Arizona College of Agriculture and Life Sciences AZ1392. Tucson, AZ.

Smith, C. 2005. Buried Ollas Keep Plants Moist by Allowing Water to Seep into Ground. Albuquerque Journal. Published Interview. July 30, 2005.

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