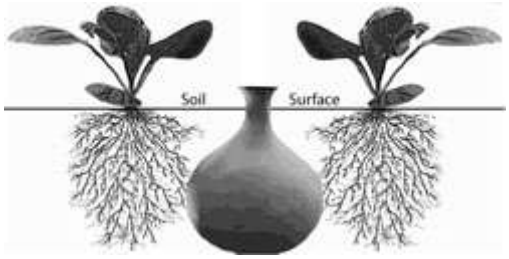
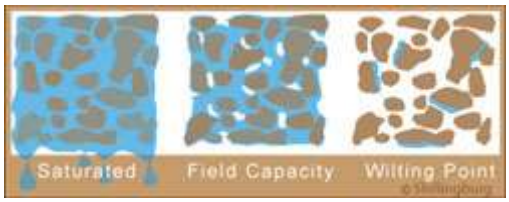
Ollas: Unglazed Clay Pots for Garden Irrigation

Burying unglazed clay pots filled with water is an ancient method of plant irrigation. Clay vessels or pots made from low fire terra cotta clay are porous enough to allow water to pass through them when buried in soil. The rate of water flow varies depending on the soil water potential - the soil's affinity for water - and by the plants' uptake of water through their roots.



The micro-pores of the clay pot allows water to seep into the surrounding soil. The water seepage is regulated by the water needs of any nearby plant. When the plant's water demands have been fulfilled and the soil is moist, the water seepage from the clay pot will stop. When the soil becomes dry, water seepage will begin again. This seepage is controlled by soil moisture tension.

This process occurs at atmospheric pressure and requires no timers or pressure regulators to maintain soil moisture at near field capacity. That is the amount of water soil will hold in its pore spaces without gravity pulling it downward to deeper levels.



Modern systems, even surface drip irrigation systems lose more water to evaporation and are more likely to clog than ollas. When ollas are used properly, plant roots will proliferate around the moist clay jar, intercepting water before it can move through the soil by capillary action. This water intercepted by plant roots will then be used in the plant transpiration stream. This results in almost 100% of applied irrigation water being absorbed by the plants.

Olla irrigation solves problems for gardeners who cannot irrigate frequently, and is excellent for plants that should not be irrigated frequently. Ollas allow gardeners to irrigate infrequently while still maintaining the health and beauty of their garden plants. This irrigation system is widespread in arid and semi-arid regions where water is scarce or intermittent. The ollas need frequent filling with clean water to work well for plant irrigation.

History

Olla, according to the Spanish English dictionary means "pot" and was used by Spanish speaking countries as a cooking pot. These clay pots were initially used by ancient Latin American cultures to cool water by evaporation. The techniques used to cool the water by evaporation have allowed for a great way to irrigate the garden and provide water directly to the roots of your plants.

Writings from China in the first century BC describe a method of irrigation where a unglazed clay pot is buried in the soil.

Usage

To use ollas in a garden or farm, one buries the olla in the soil leaving the top slightly protruding from the soil (ideally the neck of the olla is glazed to prevent evaporation or it should be reasonable to apply a surface mulch that covers the neck of the olla without spilling into the opening). The olla is filled with water and the opening is then capped (with a rock, clay plate or other available material to prevent mosquito breeding, soil intrusion and evaporation).

Proper plant and olla selection is important. Woody plants may break the pottery jars as their woody roots grow in diameter. Herbaceous plants are less likely to damage ollas.

Olla porosity, size, and shape must be matched to plant water needs, root size and root distribution. Deeply rooted plants benefit from deeper ollas, shallow rooted plants are more efficiently irrigated with shallow ollas. The diameter of the olla may also be chosen to match the diameter of the plant cluster. Shallow, broad, ollas will provide adequate irrigation for clumps of grasses and annuals.

Capacities of 5 liters to 12 liters have been described with 10-12 liter volumes being used to irrigate vine crops (tomatoes, curcurbits, etc.).

Olla plantings should be planted in clusters to maximize water use efficiency. While the planting group may be of one plant type, mixtures of grasses, annuals, biennials, and perennials may also be planted around a single buried olla. Mixtures of plant types may be used to create a more natural landscape. The olla clusters may themselves be clustered to create more expansive or linear plantings. Based on available research the following tables describe potential spacing of ollas based on a rough estimate of water spread:

Olla to Water Spread Ratio (inches)

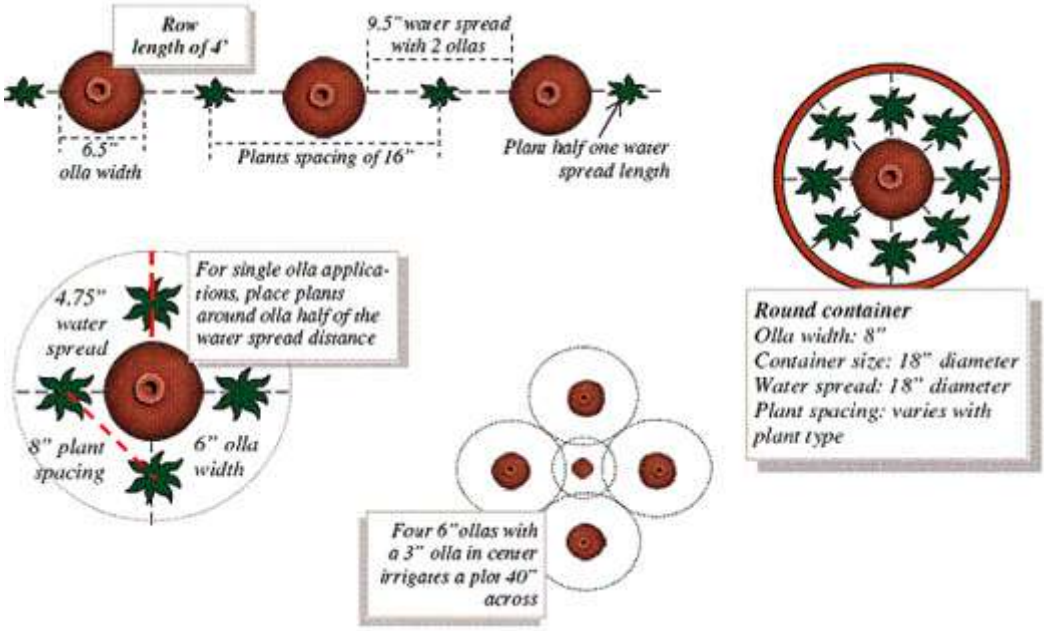
Olla Diameter	Water Spread Diamter	Ratio WS.d.:Olla.d.
6	9.5	1.583
8	18	2.250
6.5	9.5	1.462
6	9.75	1.625
11.8	39	3.305
	Average	**2.045**

Calculated Olla Spacing Based on Average WS.d.:Olla.d. (in. unless noted)

Olla	WS.d. = Olla Spacing	Radius	D (in feet)	R (in feet)
4	**8.2**	4.1	0.7	0.3
6	**12.3**	6.1	1.0	0.5
8	**16.4**	8.2	1.4	0.7
10	**20.4**	10.2	1.7	0.9
12	**24.5**	12.3	2.0	1.0
14	**28.6**	14.3	2.4	1.2
16	**32.7**	16.4	2.7	1.4
18	**36.8**	18.4	3.1	1.5
20	**40.9**	20.4	3.4	1.7
22	**45.0**	22.5	3.7	1.9
24	**49.1**	24.5	4.1	2.0

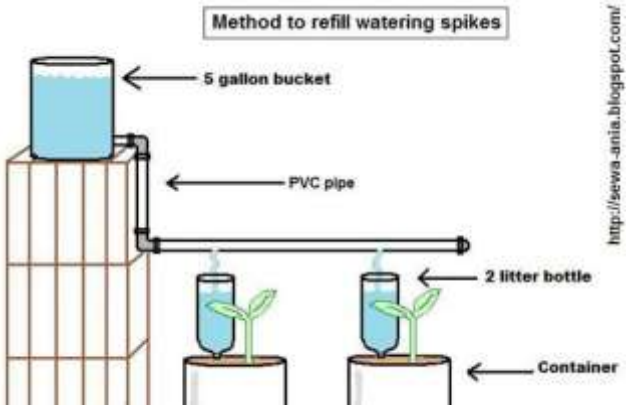
Additionally, John Bulten provides the following notes and diagram:

“Plant seeds or plants within 2” – 5” radius based on olla size.”



The olla pottery may become a decorative element in the landscape along with large rocks and flagstones. Portions of olla left exposed above ground should be glazed or treated to prevent evaporation.

Depending on factors such as the plant’s water needs, soil type, time of year, and environment ollas may need filling weekly or daily. Water usually takes between 24 and 72 hours to flow through an olla. Water should be added to an olla whenever the water level in the olla falls below 50% in order to avoid build up of salt residues along surfaces of the olla that may prevent desired seepage. Ollas may be recharged by a drip irrigation system, timed and sized to replace water lost from the ollas.



Ollas in a Raised Garden Bed

Positioning the ollas

Digging to submerge the ollas in the ground

The olla goes into the hole

Burying the ollas

Ollas are submerged; planting vegetables

A completed raised olla bed

Clay Capsule Watering

What is the Difference Between an Olla and a Clay Capsule?

Two clay flowerpots glued together create a porous capsule that can be used in the same way as a traditional olla. When connected to a continuous source of water at atmospheric pressure the capsule can deliver water volume as needed by the soil and plants.

A series of capsules can be installed with an elevated storage reservoir and control valves so that it can function as a low-pressure drip. The amount of “head pressure” in the water reservoir (height above level of the capsules) will determine the rate of flow along with system leakage and volume of air captured in the capsules and feeder lines.

In a single clay olla system maxmium water delivery rate depends on the ratio of subterranean water volume to cubic area of soil, clay wall porosity and olla surface area. In a continuously filled porous capsule system maximum water delivery depends on clay wall porosity and clay capsule surface area. Since the capsules are continuously filled the volume of subterranean water is less important.

Build a Clay Capsule

1: Build the clay pot. Just glue two unglazed flower pots (or a pot and a saucer) together.
2: Bury your clay pot into a bucket with just the top of the clay pot exposed. Use potting mix with dolomite.
3: Keep the clay pot filled with water.

Step 1: Build an Olla

Seal the hole in what will become the bottom section of the clay pot. We bought a ceramic floor tile from Home Depot for 99 cents and broke it up into little pieces. Apply lots of **waterproof silicon caulk** around the opening and then stick a piece of the broken floor tile over the hole. We also caulked the other side (pot's exterior) of this hole with more silicon caulk just to ensure that leakage won't be a problem.

Next you'll need to attach the two clay pots together. If you're using Gorilla Glue (recommended) you'll need to lightly wet one of the pots as shown in the centre picture below.



Recommended process is to first use 100% waterproof Gorilla Glue. Let the Gorilla Glue dry overnight, then put heavy amounts of silicon caulk over the connection (the Gorilla Glue leaves lots of tiny gaps). The end result is not very pretty, but it's watertight!

The finished product. You should paint the top of the capsules that will be exposed to sunlight with white paint. Since the top is now painted or glazed, evaporation will be greatly reduced.

Automated Olla Irrigation

The goal of this design is simplicity, leak-free ollas and gravity feed (no siphons).

Materials:
a) 1/4" poly pipe
b) 1/4" "T"
c) 1/4" x 1 1/4" Fender Washer
d) Plumbing Epoxy Putty (it's waterproof, easy to handle and safe for humans)
e) Silicon Caulk
f) Olla or clay capsule


The plumbing epoxy is used for everything except attaching and sealing the 2 clay pots together, for which silicon caulk is used. In the below right picture, that's grey epoxy putty shaped into what looks like a cone to make a leak-free connection. The all important goal is to prevent leaks.

You should put a 6mm (1/4") fender washer on each side of the fitting. It helps with the mechanism. The putty is applied to the hard plastic T and the metal washer.





The Ollas are gravity fed via a 12mm (1/2") poly pipe main line which branches off to the individual Ollas with 6mm (1/4") poly whips. Liquid fertiliser can be added directly to the barrels. It is worth insulating the barrels in hot / sunny weather, or if there's a danger of the water freezing.