

Deep Pipe Irrigation

Deep pipe irrigation is commonly done with 1" to 3" diameter vertical pipe placed 12-18" deep into the soil under or near the crop plant or tree. The top of the pipe* should be covered with a cap or a screen disk. For large scale ecological restoration work we glue 1/8 inch galvanized screen disks to the top of the pipe with silicone caulk.

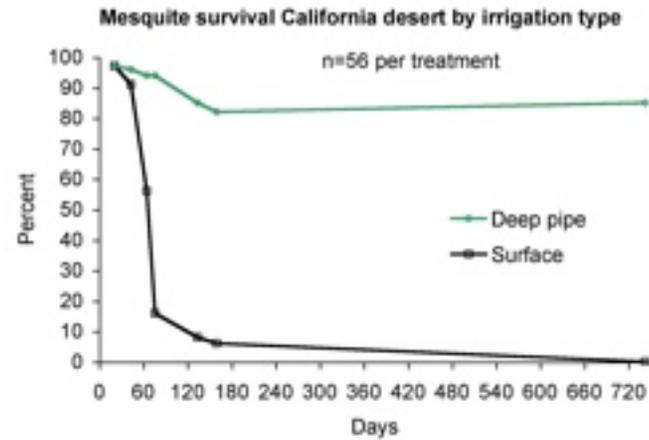
If a drip system can be setup the pipe can be smaller diameter (1/2"). We have set up a deep pipe irrigation system on a remote tank with battery-powered timer to irrigate once a week with excellent success.

A series of small holes should be drilled in the side of the pipe near the plant if a seed is used or if a small transplant with roots shorter than the pipe is planted.

**bamboo with the nodes drilled out, tube type plant containers, lath wired together, bundles of sticks, or a gravel column can also be used.*



Irrig x Inoculation Experiment with deep pipe irrigation. Inoculated seedling on right



The seed or seedling should be fairly close to the pipe (1-3 inches for a young plant). Several pipes may be used for a full grown tree. These can be arranged to encourage root growth to resist windthrow and minimize interference with inter-planted crops.

These may be filled with water bottles placed in the pipe (observed in Kenya), filled with water from a water truck or hose, or fitted with a drip emitter.

Deep pipe irrigation is better than surface or buried drip systems in several respects. First, it can be used with low quality water and low technology. Second, even in areas where the materials and technology for drip systems are available the deep pipe system provides the benefits

of buried drip, greater water use efficiency (due to reduced evaporation) and weed control; but the surface mounted deep delivery drip systems can be monitored and repaired much more easily. And, finally, the pipes can be collected at the end of the season for full field tillage operations to any depth desired.



Deep pipe drip very successful

Experiments in Africa and SDSU experiments in the California desert have demonstrated that deep pipe drip systems are much more efficient than surface drip or conventional surface irrigation.

Vine weight on the deep pipe drip system in Africa was more than double surface drip, and six times larger than conventional surface irrigation. Roots reached 100 cm horizontally with conventional surface irrigation, only 60 cm with surface drip, and 175 cm with deep pipe drip irrigation.

Deep pipes develop a much larger effective rooting volume and plants better adapted to survive on their own.

Survival of trees on deep pipes in the California desert has been excellent after modest irrigation (a total of a few gallons over the first two years) compared to total failure of surface irrigated trees given the same amount of water. After five years tree survival was excellent, and many trees were 15 feet tall. Deep pipes have also worked well on orchards.

A Commercial Deep Pipe

DeepDrip deep pipes designed for use with drip irrigation are now available at many retail outlets, including Home Depot. These come in three lengths and are well designed, well built and long lasting. They can also be fitted with a bottle.

www.deepdrip.com



Deep pipes saved my apple seedlings in the drought T. Trapp



Deep pipe at Anza Borrego Desert State Park restoration site, rainfall 3 inches a year

FURTHER READING

- Bainbridge, D. A. 2007. *A Guide for Desert and Dryland Restoration: New Hope for Arid Lands*. Island Press, Washington, DC.
- Bainbridge, D. A. 2006. Beyond drip irrigation – hyper efficient irrigation systems. Proceedings ASABE Annual International Meeting, Portland, Oregon. #062073. St. Joseph, Michigan 10 p.
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- Bainbridge, D.A., J. Tiszler, R. MacAller and M.F. Allen. 2001. Irrigation and surface mulch effects on transplant establishment. *Native Plants Journal*. 2(1):25-29.
- Sawaf, H.M. 1980. Attempts to improve the supplementary irrigation systems in orchards in some arid zones according to the root distribution patterns of fruit trees. In *Rainfed Agriculture in the Near East and North Africa*, 252-259. Rome, Italy: FAO.