Growing Woody Plants With Limited Water Resources©

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INTRODUCTION

In Washington State the Department of Ecology sets strict limits on the amount of water that a farm can use. While the producer owns the land, the waters of the state collectively belong to the public. A Water Right Permit is the legal authorization to use a predefined quantity of water for beneficial use, including irrigation. The vast majority of Washington's available water is legally spoken for. Farmers have seen population growth, conservation demands, shrinking snow packs, and demand by industry all put a strain on this limited resource. A water right is necessary if you plan to divert or withdraw any amount of water for any use from surface waters (water located above ground) such as lakes, rivers, streams, and springs, or from ground water.

While there are many Washington farms with valid Water Right Permits, obtaining a new one is very difficult. Currently there are 5,700 new Water Right applicants on file. Due to budget contractions Department of Ecology estimates that for the 2009–2011 budget cycle they will only be able to review 370 (down from 500) applications. There are cases where applicants have waited for years to have their application reviewed, let alone approved.

Exempt Water Right Permit. Department of Ecology does have a groundwater permit exemption (RCW 90.44.050) that allows the uses of small quantities of ground water to construct wells and develop their own water supply without obtaining a valid Water Right Permit. For industrial purposes, which would include commercial nurseries, producers can use up to 5,000 gal of water per day (no acreage limit). This water can also be stored in a cistern for later use. Although exempt ground water withdrawals don't require a Water Right Permit, they are always subject to state water law.

Municipal Water. The Washington State Department of Ecology states that there are no restrictions on the use of municipal water for irrigation. Retail garden centers often connect to municipal water to irrigate their stock. Table 1 lists the cost of municipal water. Municipal water could be stored in a water cistern to supplant irrigation water derived from an Exempt well.

Table 1. Cost of purchasing 1 inch of irrigation water (27,000 gallons) for overhead irrigation on nursery stock. (Numbers are from 2009.)

Seattle: $137/acre	Vancouver: $63/acre	Yakima: $47/acre
Olympia: $96/acre	Mt. Vernon: $60/acre	Ellensburg: $30/acre
Bellingham: $66/acre	Wenatchee: $48/acre	Spokane: $23/acre

Rain Water Collection. On 12 Oct. 2009, Department of Ecology issued an Interpretive Policy Statement stating that a Water Right Permit would not be required for collecting and storing rain water collected from rooftops or guzzlers. Approximately 0.62 gal/ft^2 of collection surface per in. of rainfall can be collected during a rain event. Once collected there are no water restrictions on the use the water. A water cistern can be built on farm ground and can be used to both capture and store water from the winter rains, or to serve as a storage reservoir during the summer months if irrigation demands are low. There are companies that manufacture 10,000–100,000 gal corrugated steel cisterns that can be erected on a farm to capture water.

In the Pacific Northwest, however, there is a typically a 3-month (mid-June through mid-September) period where little rain occurs. The initial expense ($10,000–$22,000) for these tanks and lack of rainfall probably precludes their widespread use for nurseries over an acre in size.

Department of Ecology also states that a landowner could dig a shallow pond to store rainfall directed from a roof. As long as the reservoir does exceed 10 acre-feet no permits are required. A quarter acre pond would cost $10,000 to dig and line with plastic. Holding 815,000 gal of water it could add an additional 6800 gal of water per day over a period of 4 months to the exempt water allocation.

NURSERY USES

Field Production. In-ground tree production is possible with limited irrigation. Deciduous tree producers growing liners can bury drip tape beneath the rows during planting. For finished trees, there are examples of conifer growers that either don't irrigate their fields or only apply water during the initial years of growth. Some of the largest Japanese maple growers in the Northwest consider dryland farming a sustainable practice that enhances the hardiness and vigor of their trees. Fields are shallow cultivated every 8–10 days to create a dry layer, or dust mulch, which acts as a barrier to further evaporation.

Finished-tree growers can utilize above-ground drip tape or tubing that will provide consistent, direct application of water to the root zones. Using low-flow drip tape (15 gph/100 ft) growers simply lay tape along tree rows to wet down the root zone. On hilly ground pressure compensating drip tape is advised. Field production would include trees and shrubs grown in fabric bags set into the ground. Fabric bags greatly reduce root circling as would occur in a hard-sided container and, yet, still allow for water absorption from the surrounding soil.

Container Production. Overhead irrigation has been the traditional method of supplying water to container nursery stock, especially for the 1- to 3-gal containers. Agricultural engineers suggest that no less than 1-acre inch of water (approximately 27,000 gal) be applied per day on each acre of container stock. If a nursery owner is fortunate to have a valid Water Right Permit or can connect to the public water supply, the use of impact sprinklers will continue.

For the larger pot sizes (5 gal and above) growers prefer drip irrigation. If the farm only has a permit exempt well, which limits water use to 5,000 gal/day, drip irrigation will have to be practiced.

An informal survey of Oregon and Washington canyard growers was conducted. For 1.5-in. caliper shade trees growers used 15-gal pots with a single low-volume

spray stake. Some growers reported moving this single stake over the course of the season to ensure even root distribution. For 2- to 2.5-in. caliper trees, a 25-gal pot is used, equipped with 2 spray stakes. With a 160° wetting pattern, spray stakes are placed near the edge of the container to ensure an even wetting pattern. Flow rates range from 5.5 to 11.5 gal/h. For hilly ground pressure compensating emitters are used.

With spray stakes, it is best to apply water in short segments over the course of the day. Single irrigation sets tend to force water all the way through the pot with little lateral flow. Growers reported using 3 cycles per day. With each successive cycle the wetting front moves 3–4 in. deeper in the container.

Depending upon the plant being grown in the pots, growers reported applying anywhere from 2–5 gal of water per day for 15-gal pots. Japanese maple growers reported using less water per day than growers raising larger red and Norway maples. Specimen growers raising trees in 45-gal pots reported using three stakes, delivering up to 10 gal of water per pot.

Pot-in-Pot Production. Pot-in-pot growers reported using drip systems almost exclusively. Liner pots range in size from 5 gal up to 25 gal. The smaller sizes (5–7 gal) are preferred for shrubs, while the larger sizes (10–25 gal) are used for trees. In relationship to above-ground pots, Pot-in-pot growers reported using less water. When the liner pots were smaller than 10 gal, growers reported using less than 1.0–1.5 gal of water per day. For shade trees in 15-gal liner pots, 1.5–2.0 gal of water was used per day.

ADDITIONAL READING

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LeBude, A.V. and **T.E. Bilderback.** 2007. Managing drought in nursery crops. North Carolina Cooperative Extension Service. Accessed August 2010. <http://www.ces.ncsu.edu/disaster/drought/nursery_crops.pdf>.

Washington State Department of Ecology, Water Resources: Water Rights. At: <http://www.ecy.wa.gov/programs/wr/rights/water-right-home.html>. Accessed August 2010.

Netafim USA, Fresno, CA. At: <http://www.netafimusa.com>.

John Deer Water Technologies, San Marcos, California. Accessed August 2010. < http: www.JohnDeerWater.com>.

QUESTIONS AND ANSWERS

Anonymous: What's involved in digging a hole that big?

Charles Brun: The grading department at the county indicated that anything more than 50 yd^3 of soil would require a grading permit and a SEPA permit.