

No water, no problem

In low-water landscapes, Mediterranean plants may be the answer, especially with compost added



Mediterranean plants are an ideal solution when customers are looking for plants that provide visual interest without needing a lot of water or fertilizer. Scientists have found that such plants will improve their performance, as shown, when composted organic matter is added to the soil.

By: Dan Sullivan, Jim Owen, Neil Bell and Judy Kowalski

The climate of Western Oregon provides an ideal environment for gardening. The conditions are suitable for a large range of ornamental plants, including both herbaceous and woody selections.

Landscapers here have a lot to celebrate. However, there are three emerging areas of difficulty they should keep in mind when they are creating landscapes for their clients.

The first is water. Water is becoming less available and more expensive in Oregon and throughout the country.

The second is fertilizers. The application of fertilizers — specifically nitrogen and phosphorus — is coming under greater scrutiny by municipalities and regulatory agencies. Those in the landscape trade will also testify that many home gardeners and professionals are interested in approaches that reduce water and fertilizer use in landscapes.

Finally, there's soil. The native soil around homes and buildings often takes a lot of abuse. It is often removed, compacted or otherwise degraded by urban construction activities. Soil remediation is usually required after construction, so that plants can establish successfully.

Tough sites, tougher plants

Without soil, food and water, plants don't have much of an opportunity to succeed. So how can these issues be solved?

Problems with the soil may be easiest to fix. When the ground is compacted, one can give plants a fighting chance to establish themselves by adding composted organic matter to the soil before putting any plants in the ground.

The compost will improve the soil's ability to accept and store water, while also increasing microbial activity, which is beneficial. What's more, the addition of compost also improves aeration and increases the availability of nutrients in the soil.

How much compost should be added? If the soil has been compacted by construction activity and is low in organic matter, then one should add up to 25 percent compost by volume.

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JULIE KOWALSKI / OREGON STATE UNIVERSITY

Scientists planted landscape plants in various plots at the North Willamette Research and Extension Center. Some plots were tilled and some were not. Some had compost added and others didn't. The researchers then compared how the plants in the different plots performed.

Table 1. Nutrient analysis of composts (dry wt. basis).

Compost Analysis	Unit	Biosolids compost	Yard debris compost	Preferred
Total N	%	1.8	1.4	above 1.2
Organic matter	%	80	50	above 40
C:N		23	19	15-25
P	%	1.0	0.3	
K	%	0.2	0.7	
pH		7.7	7.0	6 to 7.5
EC-(1:5)	mmhos/cm	1.6	0.9	less than 4

Compost analysis by Soil Control Lab, Watsonville, Calif. using standard methods (U.S. Composting Council, 2004).

Table 2. Soil nitrate-N (0-8 inches) under surface mulch layer.

Soil Amendment	Tillage	Soil NO ₃ -N
		ppm
Biosolids compost	No	43
	Till	
	Till	44
Yard debris compost	No till	12
	Till	12
No compost	No till	8
	Till	8

Soil samples collected Oct, 2009, 13 months after plant installation.

For most landscape installations, this translates into adding about 2 inches of compost, which works out to one cubic yard for every 150 square feet.

With healthy soil in place, there are still the issues with water and fertilizer to be solved. There's one approach that will help mitigate both of these issues, and that's to use hardy Mediterranean plants in the landscape.

The typical Mediterranean climate has a mild, wet winter and a pronounced period of summer drought. The Pacific Northwest has milder summer temperatures and a shorter drought than "typical" Mediterranean climate areas.

Our climate provides both opportunities and challenges for Mediterranean plant selection. Many Mediterranean plants that are adapted to our climate do not require supplemental summer watering or fertilizer after establishment. Some of these include *Arctostaphylos*, *Cistus*, and *Ceanothus*.

Backed by research

Researchers at Oregon State University's North Willamette Experiment Station (Aurora, Ore.) have confirmed that adding compost to the soil, and using drought-resistant Mediterranean plants, both result in healthier landscapes.

Scientists Dan Sullivan, Neil Bell and Jim Owen did a study in the fall of 2008 that evaluated the relative importance of pre-plant practices (tillage, compost application) and plant selection (conventional versus drought tolerant) on survival and growth of landscape plants in compacted, non-irrigated soil.

Prior to planting, the researchers compacted Willamette silt loam soil with a "parking lot" roller. Next, they added organic matter to some of the soil. They used either NewGro biosolids compost produced at the City of Newberg wastewater treatment facility, or a yard debris compost produced by Rexius.

Some plots were left without any



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compost as a control group.

After the compost (if any) was applied, some of the landscape plots were tilled and others were not. In the untilled plots, the compost acted as a top-layer mulch. The tilled plots were cultivated to a depth of 4-6 inches.

Once all of the landscape beds were prepared, the researchers planted standard landscape plants in some of the beds, and drought tolerant species in others. The four standard species were *Nandina domestica* 'Compacta', *Vinca major* 'Bowles', *Viburnum davidii*, and *Berberis thunbergii* 'Crimson Pygmy'. For drought-tolerant plants, the researchers used *Rosmarinus officinalis* 'Blue Spires', *Cistus* 'Bicolor Pink', *Ceanothus gloriosus* and *Caryopteris × clandonensis* 'First Choice'.

All selections were planted using an auger, nine inches deep, in holes six inches across. Afterwards, all the plots were mulched with 3 inches of fine Douglas fir bark.

Findings

The parking lot roller, intended to simulate the effects of construction activities, decreased soil pore space and increased soil bulk density of soil in the top six inches.

The addition of compost dramatically increased the rate of water infiltration into the soil. Shallow rototilling to 4-6 inches depth, however, did not improve soil porosity, and it had no effect on plant establishment or first-year growth.

Pre-plant compost application increased plant growth and quality of both standard and drought-tolerant landscape plants. Plant growth increased about two-fold, with either compost left on the soil surface (no tillage) or compost incorporated via roto-tilling.

The researchers measured plant quality through a visual assessment of color, form and overall aesthetic appeal. The best performing plants were the ones that went into soil that had compost added.

Two groundcover plants (*Vinca major* and *Ceanothus gloriosus*) grew

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more with the biosolids compost than with the yard debris compost (Table 2). Biosolids compost provided more plant-available nitrogen than the yard debris compost (Table 1). These groundcovers likely benefited from greater nutrient availability at the soil surface.

Two drawbacks were observed with compost application. First, there were more weeds, and the weeds grew faster. Second, some landscape plants rooted heavily in the fertile, loose, compost-amended soil just below the bark mulch, so there was some plant dieback and leaf burning in July 2009 (first summer after fall planting), when temperatures soared above 100 oF.

Overall, however, it was better to add compost in some manner (with or without tillage) than not to apply compost.

Researchers concluded that compost addition is a valuable part of soil preparation for sustainable landscapes. All plants tested benefitted from compost application.

The researchers continue to measure how the plants are responding to compost application. The landscape plots at the North Willamette Research and Extension Center will be viewable during upcoming landscape industry/nursery workshops and field days. Groups wanting to tour the landscape plots can contact the North Willamette Research and Extension Center staff at 503-678-1264. ☺

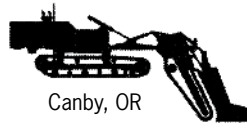
One can read more about "Improving Garden Soils with Organic Matter" by Neil Bell, Dan Sullivan, Linda Brewer, and John Hart in OSU Extension Bulletin EC 1561. The bulletin can be found in the OSU publications catalog at www.extension.oregonstate.edu/catalog/.



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