

Water Conservation Landscaping: a Central Otago Planting Experience[©]

Jo Wakelin

Otago Polytechnic, P.O. Box 16, Cromwell 9342, Central Otago, New Zealand

Email: jo.wakelin@op.ac.nz

INTRODUCTION

In Central Otago, situated on the 45th parallel in the South Island of New Zealand, gardeners are struggling to come to terms with the increasing cost of water and summer water restrictions. As energy costs rise, so does the cost of water.

Traditional gardening in Central Otago is a temperate garden model with trees and shrubs around a lush lawn. As a result, annual water use in Central Otago is very high. Figures from the Central Otago District Council show average winter treatment of water in 2011 was 2,800 m³ per day but this increased to 14,500 m³ per day in the 2011/2012 summer (R. Bond, pers. commun., 7 June 2012). The hot, dry climate means many people irrigate their lawns and gardens, and often the pavements. During summer months more than 75% of the potable water supply (treated water) is used for irrigation.

The Central Otago District Council is installing water meters in the district to better manage demand for treated water, allocate the costs of producing water and protect the resource. There has been considerable reaction to this move.

SITUATION

Six years ago I began a project to landscape a completely bare site near Cromwell in Central Otago, at an altitude of 220 m. My focus and determination was to establish a garden which required no supplementary water in summer. I also began with the perspective that instead of trying to alter gardening conditions to suit the plants, I would search for species adapted to the local conditions. So what were the local conditions?

In short, windy, hot, cold, and dry, with light, stony, alkaline, and saline glacial outwash soils with the added bonus of large populations of rabbits.

The annual rainfall I have recorded at the very windswept valley floor site has shown a variation from a low of 288 mm up to 440 mm, with high potential evapotranspiration rates resulting in soil moisture deficits throughout the summer months. Rainfall is reasonably evenly spread between summer and winter but it is not uncommon to go for up to 8 weeks in midsummer without rain when there is day after day of temperatures well over 30°C.

Summer maximum temperatures are around 35°C and winter minimums to -14°C. There is an average of 174 ground frosts per year in the Cromwell area, and snow lies briefly most winters (GrowOtago online maps, n.d.).

My property adjoins the Department of Conservation Mahaka Katia scientific reserve where native vegetation growing between bare salt pans consists of species such as the virtually leafless shrub, *Carmichaelia petriei*, the diminutive *Convolvulus verecundis*, and *Atriplex buechananii*.

Clearly I needed to do some research on what might survive on my site.

What makes a plant water efficient? Plants native to dry environments around the world have developed a wide range of survival strategies from those of annual plants which simply disappear leaving only seed behind, to the very hairy, silvery leaves typical of so many drought loving species.

Other plants which evade a dry season have developed bulbs, corms, rhizomes, or tubers where they store carbohydrates to enable regrowth when autumn rains begin.

While some xerophytic species have small but thick leathery leaves with a smaller surface area and thick waxy cuticle to reduce transpiration losses, other plants such as various broom species dispense with leaves and rely on photosynthetic stems.

Deep tap roots are typical and this means planting a small grade is usually more successful.

TECHNIQUES

I have done most planting in early autumn after rain, and have depended on one long hose to water in the hole before planting. I do not cultivate the soil other than digging a good sized hole. I am particular about hardening plants well in the pot initially, and soaking each potted plant in a bucket before planting. When planting trees, a basin or depression is created around the tree. Fertiliser is not added, but plants are mulched heavily to a depth of 5-7 cm with pea gravel sourced from the gravel pit close by. There is no lawn, but interlinked gravelled pathways meander through the garden.

SUCSESSES

During my research and trialling of many species and cultivars I have adopted a policy of not replacing failures. I have been amazed by the ability of some species to establish over a very dry initial summer without any supplementary water, and clearly it was best to plant more of these.

The following plants were capable of establishing without supplementary water in the first summer:

<i>Acacia rubida</i>	<i>Euphorbia rigida</i>
<i>Agapanthus</i> ‘Blue Mountain’	<i>Euphorbia spinosa</i>
<i>Agapanthus praecox</i> subsp. <i>orientalis</i> (syn. <i>A. orientalis</i>)	<i>Festuca coxii</i>
<i>Allium sphaerocephalon</i>	<i>Gaura lindheimeri</i>
<i>Anthemis punctata</i> subsp. <i>cupaniana</i>	<i>Gladiolus tristis</i>
<i>Artemisia</i> ‘Powis Castle’	<i>Grevillea</i> ‘Red Cloud’
<i>Asphodeline lutea</i>	<i>Grevillea victoriae</i>
<i>Asphodelus albus</i>	<i>Halimium</i> sp.
<i>Atriplex halimus</i>	<i>Helictotrichon sempervirens</i>
<i>Baccharis pilularis</i> ‘Twin Peaks’	<i>Iris</i> dwarf cultivars
<i>Ballota pseudodictamnus</i>	<i>Iris schachtii</i>
<i>Bergenia cordifolia</i>	<i>Iris suaveolens</i>
<i>Callistemon citrinus</i>	<i>Iris unguicularis</i> ‘Alba’
<i>Caryopteris</i> × <i>clandonensis</i>	<i>Lavandula angustifolia</i>
<i>Centranthus ruber</i>	<i>Lavandula lanata</i>
<i>Cerastium tomentosum</i>	<i>Lavandula</i> × <i>intermedia</i> cultivars
<i>Cistus</i> × <i>dansereaui</i> (syn. <i>C.</i> × <i>lusitanicus</i>)	<i>Marrubium incanum</i>
<i>Cistus salvifolius</i>	<i>Narcissus asturiensis</i>
<i>Cistus</i> × <i>hybridus</i>	<i>Nepeta tuberosa</i>
<i>Cistus populifolius</i>	<i>Papaver atlanticum</i> ‘Flore Pleno’
<i>Cistus</i> × <i>skanbergii</i>	<i>Phlomis fruticosa</i>
<i>Convolvulus cneorum</i>	<i>Phlomis italica</i>
<i>Crocus chrysanthus</i> cultivars	<i>Rosmarinus officinalis</i>
<i>Crocus sativus</i>	<i>Salvia apiana</i>
<i>Crocus serotinus</i> subsp. <i>salzmannii</i>	<i>Salvia sclarea</i>
<i>Cupressus sempervirens</i> ‘Totem Pole’	<i>Sedum</i> (Herbstfreude Group) ‘Herbstfreude’ (syn. <i>S.</i> ‘Autumn Joy’)
<i>Cyclamen coum</i>	<i>Sedum</i> ‘Bertram Anderson’
<i>Cyclamen hederifolium</i>	<i>Sedum</i> ‘Matrona’
<i>Cytisus</i> × <i>kewensis</i>	<i>Sedum</i> ‘Stardust’
<i>Elaeagnus</i> ‘Quicksilver’	<i>Sedum</i> ‘Vera Jameson’
<i>Euphorbia</i> ‘Blue Peaks’	<i>Verbena bonariensis</i>
<i>Euphorbia characias</i> subsp. <i>wulfenii</i>	<i>Yucca filamentosa</i>
<i>Euphorbia myrsinites</i>	

It is interesting to note that the *Atriplex* and *Convolvulus* genera present in the native flora in the adjoining salt pan reserve have exotic representatives doing well in the garden trial.

There are other species (e.g., *Olea europaea* cultivars, *Prunus lusitanica*) which have successfully established after irregular deep soakings in the first three summers but I have not included these.

There is also a range of local native species which have proven very drought hardy once established including local provenances of *Sophora microphylla*, *Poa cita*, and *Phormium cookianum*.

While the use of negative space is a useful design element in landscaping, it also has a practical physiological basis. I feel lower density planting reduces plant competition for water, and find many species have roots spreading far past their driplines (e.g., *Caryopteris* × *clandonensis*).

CONCLUSION

It is clearly possible with a combination of appropriate plant selection and associated water conservation gardening techniques to develop a beautiful and satisfying garden in a very dry, windy climate with a degree of winter cold. There is luxuriance and variety, colour, form, and texture in every season.

By using a palette of both local native plants and those from other parts of the world with similar climates, it is achievable to garden very successfully without supplementary summer water. And in fact, many water efficient species perform poorly with summer irrigation.

Appropriate labelling and grouped displays of truly dry preferring species by the nursery industry in retail outlets is a huge aid to customers seeking to use less water, but unsure where to start. Poor performance of dry loving species when planted alongside a plant requiring and receiving irrigation is discouraging to the public.

My garden trials and shift in perspective have shown that instead of trying to alter gardening conditions to suit the plants, there are many species well adapted to the local conditions. Dry conditions do not limit gardening possibilities.

Many further species are under propagation to be planted in the future, and I have been the grateful recipient of some wonderful gifts from IPPS members to be field tested for cold and drought hardiness.

Literature Cited

Bond, R. 2012. Water Services Manager, Central Otago District Council, 1 Dunorling Street, PO Box 122, Alexandra 9320 New Zealand. pers. comm., June 7, 2012.

GrowOTAGO online maps (n.d.). Retrieved 7 June 2012, from <<http://growotago.orc.govt.nz/>>

