



# The legacy of former drip-irrigation and pruning practices on two landscape shrubs: effects on growth and leaf morphology after two years

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## Introduction

Phoenix metropolitan landscapes tend to be densely planted and heavily irrigated to encourage rapid vegetative cover after installation. As a result, landscape shrubs are chronically sheared into various simple geometric shapes. Overtime, chronically sheared shrubs accumulate dead or bare stems with poor visual appearance. Landscape shrubs can be pruned to the ground to rejuvenate growth and appearance to improve this condition. However, growth rates after such severe renewal pruning may be dependent on previous irrigation and pruning practices that reflect a balance between rapid production of leaf area and efficient conservation of nutrients.

## Materials and Methods

In this study, growth rate and specific leaf mass (SLM; the ratio of leaf dry mass to leaf area) were measured on *Nerium oleander* 'Sister Agnes' and *Leucophyllum frutescens* var. green cloud shrubs subjected previously to three years of differential irrigation rates (high and low) and four pruning frequencies (six weeks, six months, annually, or not pruned as control) (Stabler, 2003) followed by two years of wintertime severe renewal pruning; one year with differential irrigation rates (high and low) followed by second year with equivalent irrigation (low).

Shrub sizes were measured repeatedly and growth volumes were estimated from size measurements by using geometric formula; *Nerium* was treated as an upright cylinder and *Leucophyllum* was treated as a truncated sphere (Mahkee, 2004).

## Results

- After two years, *Nerium* shrubs that had either been formerly pruned every six weeks or six months were smaller than those pruned annually or not pruned at all (Fig. 1,  $P = 0.0035$ ) while only *Leucophyllum* shrubs formerly pruned every six weeks were significantly smaller (Fig. 2,  $P = 0.0003$ ).
- SLM was highest for shrubs pruned annually and lowest for shrubs pruned every six weeks for both taxa (Fig. 3,  $P = 0.0066$ ; Fig. 4,  $P = 0.0058$ ).
- After two years, previous irrigation did not significantly effect growth and SLM of both shrub taxa (data not shown).

## Conclusions

The hysteric effect of pruning practices was longer lasting than differential irrigation rates. Frequent pruning could lead to smaller root systems that cannot acquire necessary resources, especially in mineral soils where nutrient availability is limiting, and can adversely affect shoot growth for as long as two years after cessation of frequent pruning.

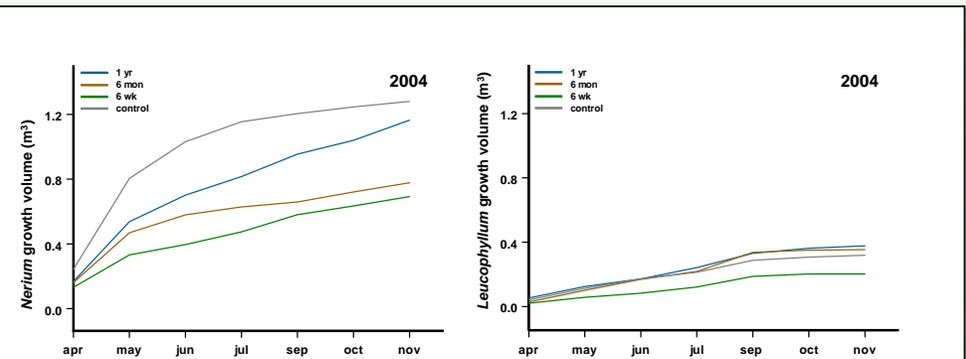


Figure 1. Re-growth of *Nerium* after severe renewal pruning,  $n = 24$  except  $n = 12$  for unpruned control shrubs.

Figure 2. Re-growth of *Leucophyllum* after severe renewal pruning,  $n = 24$  except  $n = 12$  for unpruned control shrubs.

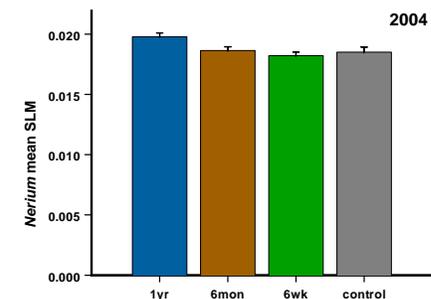


Figure 3. *Nerium* specific leaf mass (SLM) after two years of annual severe renewal pruning,  $n = 24$  except  $n = 12$  in unpruned control shrubs.

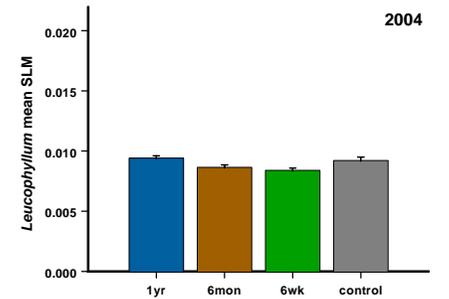


Figure 4. *Leucophyllum* specific leaf mass (SLM) after two years of annual severe renewal pruning,  $n = 24$  except  $n = 12$  for unpruned control shrubs.

## References

Stabler, LB (2003) Ecosystem response of urban plants in response to landscape management, *PhD Dissertation*, Arizona State University.

Mahkee, DK and CA Martin (2004) Growth of two landscape shrubs following severe pruning: Evidence of a hysteric effect of former irrigation and pruning practices, 6<sup>th</sup> Annual CAP LTER Poster Symposium.