

# Chamise (*Adenostoma fasciculatum*) Leaf Strategies<sup>1</sup>

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## Introduction

Microhabitat and preceding environmental conditions may predispose chamise (*Adenostoma fasciculatum*) to a specific post-fire response. Improving predictions of post-fire response may require knowledge of the general phenological status of the chamise stand. Morphological plasticity of chamise leaves can be observed in varying degrees in seedling and resprouting individuals. Mature chamise have small, linear shaped leaves. Seedlings and initial post-fire sprouts produce complex multi-lobed leaves that are replaced with simple leaf structure over time. The occurrence of complex leaves may be instructive for developing knowledge of post-fire response. Controlled studies were designed to determine how environmental factors affect chamise leaf complexity and longevity. Determine if complex juvenile leaf morphology found on resprouting chamise after fire is affected by insolation level and water. Preliminary analysis of the effects of insolation level and hydration on chamise leaf complexity is presented.

## Methods

Greenhouse grown chamise were treated with shade, water, nutrients, and pruning. After 6 months, new growth was evaluated for leaf complexity. Chamise leaves were sub-sampled from test plants to determine leaf morphology. Plants were divided into 4 equal above ground sections. Representative leaves in each third of the 4 sections were sampled and evaluated for complexity and measured (*fig. 1*). A total of 12 leaves were measured per plant. Chamise were described by the number and degree of complexity of leaves measured and by the position of the leaves along the stem. Youngest leaves were formed after the study was implemented and represent treatment effects.



**Figure 1**—Variability in chamise leaf morphology varies (a) among seedlings, (b) resprouting and mature plants.

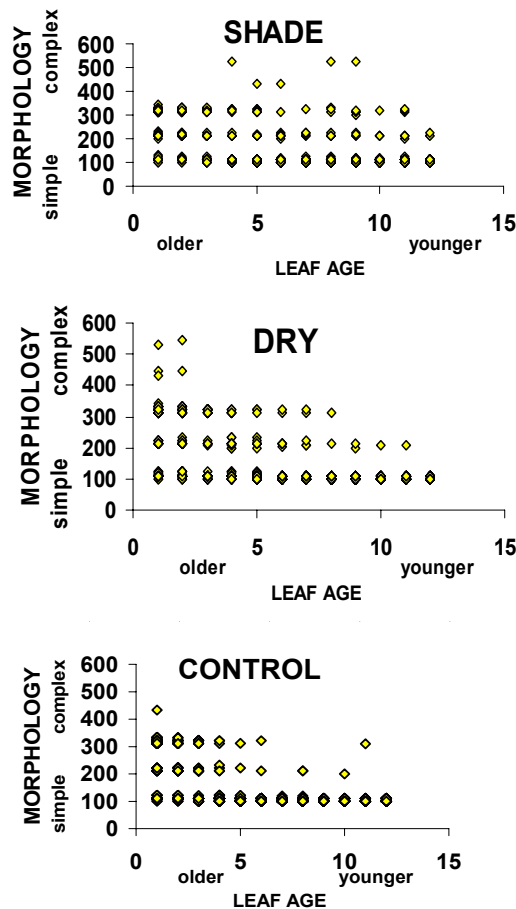
## Results

Chamise under shaded and well-hydrated conditions produced and retained more complex leaves. Plants with more light and less water began producing simple leaves sooner than shaded well-hydrated individuals. As time progressed after germination or following disturbance, production of leaf complexity decreased (*fig. 2*). Hot and dry

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conditions reduced complex leaf retention and survival. Shade and hydration appear to promote greater leaf complexity in chamise.



**Figure 2**—Leaf complexity decreased with time, yet was retained longer when a chamise was watered and shaded.

## Discussion

Highly evolved complex leaves may promote growth or competitive advantage but appear to increase the plants sensitivity to environmental conditions. Evaluating leaf morphological characteristics and expected environmental conditions after a burn may be useful for determining post fire recovery or diversity in chamise or mixed chaparral.

## References

- Hanes, T.L. 1965.** Ecological studies on two closely related chaparral shrubs in southern California. *Ecological Monographs* 35(2): 213–235.
- Horton, J.S.; Kraebel, C.J. 1955.** Development of vegetation after fire in the chamise chaparral of southern California. *Ecology* 36: 244–262.
- Jones, M.B.; Laude, H.M. 1960.** Relationships between sprouting in chamise and the physiological condition of the plant. *Journal of Range Management* 13: 210–214.
- Plumb, T.R. 1961.** Sprouting of chaparral by December after a wildfire in July. Tech. Paper No. 57. Forest Service, U. S. Department of Agriculture 12 p.
- Radosevich, S.R.; Conard, S.G. 1980.** Physiological control of chamise shoot grown after fire. *American Journal of Botany* 67(10): 1442–1447.