


Chapter 8

Role of Aerial and Edaphic Factors in the Invasive Success of *Justicia adhatoda* L. in Arid Environments

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ABSTRACT

*The invasive plant species are non-native and rapidly grow in heterogeneous environments may affect native species. The invasive plant, *Justicia adhatoda* L, shows complex growth patterns controlled by various above-ground and below-ground factors. The aerial factors include; environmental constraints and biotic relationships that determine the growth patterns, physiological processes and invasion of *Justicia adhatoda* L. Whereas, the edaphic factors also play a crucial role in root growth and plant health. An interaction of these two factors will help to understand the basic*

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mechanism of survival of Justicia adhatoda L. under different environmental constraints. This chapter will provide a complete review of the most challenging abiotic factors i.e., the drought that influence J. adhatoda growth patterns by combining current research and their practical applications. It emphasizes the importance of interactive strategies to manage invasive species and restoration ecology, while also providing insights into sustainable practices and novel research tools.

1. INTRODUCTION

1.1 *Justicia adhatoda*

Justicia adhatoda is a perennial, small evergreen, shrub that belongs to the family Acanthaceae, it has a wide distribution especially in India, Malaysia and Sri Lanka, but in Pakistan, Northern latitudes of Punjab is enriched with diversity of *Justicia adhatoda*. It was previously known as vasaka, later redefined as *Justicia adhatoda*. It mostly grows to a considerable height of about 1.5 m and possesses long and wide leaves (Figure 1). The leaves of *J. adhatoda* look dark green, but its most distinctive morphological feature is a white flower-forming spike (Isha et al. 2025). *Justicia adhatoda* is an erect shrub, leaves are simple, opposite and decussate. Flowers are bracteolate, white and sessile. The most outstanding features is the widespread occurrence of variously shaped cystoliths, acicular fibres and crystals in stem and leaf. The economic products obtained a yellow dye from the leaves of *Justicia adhatoda* L. (Kumar and Singh 2025).

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