

# Plant Epicuticular Waxes: Function, Production, and Genetics

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## I. INTRODUCTION

Essentially all aerial plant surfaces are covered by epicuticular waxes that form an important interface between a plant and its environment. These epicuticular waxes have diverse crystallization patterns, chemical compositions, and relative abundance that change with plant age, development, and environment. The physical and chemical properties of these surface waxes play an important role in plant resistance to a variety of biotic and abiotic stresses, including those caused by fungal pathogens, phytophagous insects, drought, solar radiation, freezing temperatures, mechanical abrasion, and anthropogenic influences such as acid rain and ozone. In addition, epicuticular waxes also influence the uptake and efficiency of plant growth regulators, pesticides, and herbicides.

In addition to their ecological importance, plant epicuticular waxes also have significant industrial value. For example, plant epicuticular wax extracts are used in a variety of industrial products such as polishing agents, candles, cosmetics, protective coatings, lubricants, and medicinals. Carnuba wax extracted from the leaves of tree of life (*Copernicia cerifera* Mart.) is a familiar industrial plant wax. Others include bayberry wax from *Myrica* species, candelilla wax from *Euphorbia* species, reed wax from Esparto grass (*Stipa tenacissima* L.), fir wax from Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco), and cane wax from sugar cane (*Saccharum officinarum* L.). Comprehensive information on industrial plant waxes is available in a review by Bennett (1975).

Epicuticular waxes often contribute to the esthetic value of many ornamental plants. For example, epicuticular wax crystals on needles of Colorado blue spruce (*Picea pungens* Engelm. var. *glauca*) give the plant an attractive glaucous whitish-blue coloration. By comparison, non-crystalline epicuticular waxes that form smooth layers over leaf surfaces of Japanese cleyera (*Ternstroemia gymnanthera* (Wright & Arn.) T. Sprague) create an attractive glossy appearance.