

Chapter 5: Pharmacological Activities and Mechanisms of Action

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Abstract: *Celosia argentea*, is a traditional medicinal and nutraceutical herb used for a variety of therapeutic purposes in Ayurveda, Traditional Chinese and Indian Medicine, and other folk systems. The plant's broad pharmacological spectrum is attributed to its abundance of bioactive components, including flavonoids, saponins, alkaloids, phenolic acids, and betalains. The pharmacological actions and underlying mechanisms of action of *Celosia argentea* and its related species are thoroughly covered in this chapter. Significant antioxidant, anti-inflammatory, hepatoprotective, antidiabetic, anticancer, immunomodulatory, antibacterial, neuroprotective, and wound-healing potentials have been shown by experimental and clinical studies. Modulation of oxidative stress pathways, suppression of pro-inflammatory mediators (including important inflammatory mediators and transcription factors involved in cellular signaling), control of glucose and lipid metabolism, and strengthening of endogenous antioxidant defenses are the mechanisms responsible for these effects. *Celosia argentea* extracts have been demonstrated to stabilize cellular membranes, enhance insulin sensitivity, and cause tumor cells to undergo apoptosis, underscoring its practical significance in the treatment of chronic illnesses. The chapter incorporates knowledge from modern pharmacology and systems biology to further outline molecular targets and signaling cascades impacted by the phytoconstituents. Overall, the pharmacological data highlights *Celosia argentea* as a promising herbal nutraceutical with a wide range of therapeutic potential, supporting its functional food and pharmaceutical uses with more mechanistic and clinical validation.

Keywords: *Celosia argentea*, nutraceutical, antioxidants, anti-inflammatory, immunomodulatory.

5.1 Introduction

Medicinal plants have historically been a crucial part of traditional healthcare practices and are now being researched as potential sources of safe and effective nutraceuticals.