



# HerbClip™

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**File: ■ California Poppy (*Eschscholzia californica*)**

**HC 112328-742**

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**RE: California Poppy: Model Organism for Study of Morphogenesis and Secondary Metabolism**

Becker A, Yamada Y, Sato F. California poppy (*Eschscholzia californica*), the Papaveraceae golden girl model organism for evodevo and specialized metabolism. *Front Plant Sci.* March 2, 2023;14:1084358. doi: 10.3389/fpls.2023.1084358.

California poppy (*Eschscholzia californica*, Papaveraceae), the state flower of California, natively ranges from the Columbia River in Northern Oregon to Baja California. It has large flowers with four bright yellow and orange petals. The leaf size and shape depend on the leaves' positions and age. Because of its medicinal value, the Native Americans highly value California poppy. Its aerial parts and roots show a high concentration of alkaloids, mainly benzylisoquinolin (BIAs), such as benzophenanthridine, protopines, aporphine, simple benzylisoquinolines, and dihydro-intermediates. These BIAs possess antifungal, anxiolytic, analgesic, and sedative activities. Sanguinarine, the main alkaloid in the flower's root and cell cultures, has demonstrated herbivore deterrent activity and antimicrobial effects.

Because the plants are easy to cultivate, and efficient models for genetic transformations and cell cultures exist, California poppy provides practical advantages over other plants for studying the regulation, biosynthesis, and physiological effects of BIAs. However, the lack of some commercially important BIAs, such as morphinan and noscapine alkaloids, represent limitations. Still, the California poppy draft genome allows represents a useful platform to assess the BIA biosynthesis and regulation. California poppy cell culture systems, because they produce the significant BIAs and provide materials for molecular and biochemical genetic characterization, have also been used to study BIA pathways. These systems also prove useful to dissect BIA induction and its molecular mechanisms of phytopathogen defense.

The high level of genetic diversity of California poppy comes with the cost of being an obligate outcrossing botanical, but homozygous mutants can be created via sibling crossing. By combining two formally separated areas of research — morphogenesis and secondary metabolism regulation — California poppy may serve as a model organism. The authors declare no conflicts of interest.

—Gavin Van De Walle, MS, RD

Referenced article can be accessed at <https://www.frontiersin.org/journals/plant-science/articles/10.3389/fpls.2023.1084358/full>.

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