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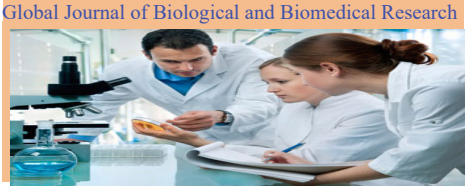

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Investigation on the effect of crown layers on floral biology

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ABOUT THE STUDY

Thirteen species, numerous botanic variants, cultivars, and natural hybrids of the genus *Aesculus* (Hippocastanaceae), most of which grow in temperate areas, are found throughout the Northern Hemisphere. *Aesculus*, *Calothyrsus*, *Macrothyrsus*, *Parryana*, and *Pavia* are the five parts into which the species are divided. The huge, rounded *Aesculus indica* Wall (Indian horse chestnut) tree belongs to the genus *Calothyrsus*. In the woodlands and shady valleys of Northern Afghanistan, Pakistan, Kashmir, North India, and Nepal, *A. indica* is widespread along the Himalayan lowlands at elevations of 1000 m–3000 m.

The *Aesculus* species that is most susceptible to climate changes is *A. indica*. Its permissible pH range is the broadest, ranging from 6.1 to 7.5. It is frequently cultivated as a shade tree for parks, arboreta, college campuses, and residential gardens. Buffer strips are also advised for it. *A. indica's* bark has been utilised as a tonic due to its astringent qualities. The wood is used to produce packing cases, tea boxes, decorative items, as well as kitchenware and pans.

The reproductive strategy of the genus *Aesculus* is uncommon, with a high proportion of functionally staminate blooms and a low ratio of mature seeds to microspores. Andromonecious organisms are characterised by their biology of blossoming (having perfect and staminate flowers on the same plant). Functionally staminate flowers, according to researchers, have a vestigial gynoecium with an underdeveloped ovary and a truncated style. Androecium and gynoecium are fully developed in finished flowers. In *A. hippocastanum* and *A. pavia*, where only two plants out of hundreds had functionally female flowers, pistillate inflorescences were sporadic. In *Aesculus*, female-fertile flower proportions can be as low as 0.1%.

However, no research has been done on the reproductive efforts made by various tree species under the crown. The crown layers of the tree can have different levels of reproductive success. Possible presumptions include the uneven distribution of photosynthates in the crown layers, the impact of sunlight on fruit and seed germination, and variations in the efficiency of pollination and fertilisation in the crown layers. Researchers using *A. turbinata* found that the panicles from the upper crown, which are probably receiving the most photosynthetically active radiation, were longer, had more flowers per panicle, and had a higher sex ratio. Furthermore, photosynthesis and the availability of light are crucial for fruit development.

The amount of male flowers and perfect blossoms in an inflorescence differs significantly according to the andromonoecious sex expression in *A. indica*. The overproduction of male flowers increases pollinator appeal and serves as a pollen donor to fertilise other hermaphrodite flowers, which improves the fitness of both the population's male and female members. According to a study done by former employees, staminate flowers may offer two selected benefits. They first offer an excess of pollen that improves male health. Additionally, staminate flowers enhance floral display, which boosts pollinator activity and increases female health. With the exception of the staminate flowers' inadequate pistil development, perfect blooms and staminate flowers were morphologically similar. More in-depth research is needed to comprehend the floral sexual dimorphism in this species.

A. indica is an outcrossing and self-incompatible species. A method for ovary reserve, excess male flower production serves as an attractant for pollinators and a pollen provider. The main pollination strategy used by *A. indica* is anemophily (also known as entomophily). We discovered that crown layers significantly affect the output of flowers, fruit, and seeds. This is probably because crown layers have varying costs associated with reproduction. The next study in *A. indica* looks at floral dimorphism, ovule-abortion, and productivity of crown layers.