THE 'DANCING' PLANT: *CODARIOCALYX MOTORIUS* (HOUTT.) OHASHI

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Codariocalyx motorius (or *Desmodium gyrans* (L.f.) DC.) also known as the 'dancing' plant, telegraph plant, or semaphore plant, belongs to the Fabaceae family. It is often listed as one of the top 10 most unusual plants in existence. The reason for the fascination of the plant is its ability to rotate its small leaflets which are at the base of each larger leaf following the warmth of the sun. In Sri Lanka, this plant is commonly known as "Praanajeewa" due to its movements resembling life within the plant.

Figure 1: A plant of C. motorius (http://www.karnivores.com)

C. motorius is a tropical Asian shrub which is widely distributed throughout South Asia including Sri Lanka, as well as in East and East-Southern regions of Asia.

This plant is famous for its rapid movement of leaflets and it exists within a period of about three to five minutes. The leaves move up and down rhythmically, as if the plant is dancing or sending out telegraphic messages. Therefore, the necessity of a time lapse camera to see the movements can be avoided, as the rapid movements are observable to the naked eye. The leaf system of *Codariocalyx motorius* consists of a terminal leaflet and a maximum of two lateral leaflets, all on the same stalk [4]. A set of one larger and two smaller leaflets are connected by a "hinge," which allows the leaflets to lift and rotate themselves. Moreover, the plant also produces small, purple coloured flowers.

Figure 2: Leaves of C. motorius (https://typicalgardener.files.wordpress.com)

However, the 'dancing' effect occurs only in the presence of sunlight. Two small lateral leaflets at the base of each larger leaf, move constantly along an elliptical path, sampling the intensity of sunlight, and directing the larger leaf to the area of most intensity allowing it to absorb the maximum energy from the sun. Sometimes, the plant will react to the slightest touch or small vibrations as well. Some people believe that they can get their 'dancing' plant to dance to music. This may occur as the plant reacts to the vibrations of the tune. In the evening or when it is dark, the leaves droop downwards, just like in most legumes.

Although rhythmic movements of the lateral leaflets in this plant have been studied intensively, its functional significance still remains unclear. The movements are due to swelling and shrinking of motor cells in pulvini at the base of these leaflets. Electrophysiological and chemical perturbation studies indicate that ion and water movements cause such swellings and shrinking across the cell membranes of the motor cells

Figure 3: Flowers of C. motorius (http://www.svetbiljaka.com)

located in the pulvinus at the leaflet base [1]. Electrical potentials across the motor cells oscillate and maintain a constant phase relationship with the leaflet positions. The fluctuations in the electrical potentials across the motor cells are due to the uptake and release of ions, especially K^+ and Cl^-. A considerable amount of K^+ is also shuttled from one part of the pulvinus to the other, acting as a cation reservoir. The motor cells oscillate between electrically polarized and depolarized states. The state of depolarization causes K^+ and H^+ efflux while hyperpolarization causes K^+ and H^+ influx into the cells. The K^+ fluxes are believed to be responsible for the osmotic movement of water across the pulvinus, which in turn results in volume changes in the pulvinus and the observable leaflet movement [4]. However, an extensive investigation regarding the functional significance of ultradian rhythms of this plant is still to be done.

The lateral leaflet oscillations of *C. motorius* are sensitive to external stimuli such as, sun light, temperature, vibrations, electromagnetic fields [5], DC currents or 27-MHz radio frequencies [3], which can affect the biological clock that regulates the ultradian rhythm of leaflet movements of the plant.

Codariocalyx motorius is documented as used for treating of many diseases. It has traditionally been used in Chinese Medicine to treat various ailments such as rheumatism, cough, malaria, pyrexia, dysentery, hepatitis, haemoptysis, etc. Its roots possess the highly active antioxidant substance which can be used for the treatment of oxidative stress-related diseases [2]. A juicy extract from leaves and flowers of this plant utilized as a home remedy to treat wounds. Interestingly, this plant also contains a wide variety of alkaloids that can be used to make pharmaceuticals. Furthermore, its stem and roots contain N,N-dimethyltryptamine and 5-methoxy-N,N-dimethyltryptamine. In addition, the 'dancing' plant can be grown in home gardens as a fascinating ornamental plant.

The plant is described in detail in Charles Darwin's *The Power of Movement in Plants* in 1880's. The book pointed out that *Codariocalyx motorius* as one of the natural wonders that will remain in science books and documentaries as a nature's mystery.

References

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