

Penderia Cahaya Bio (Bio-Light Sensor) Daripada Tumbuhan *Mimosa pudica*

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BAB I

Synopsis

Mimosa pudica (*M. pudica*), a wild tropical plant was investigated their unique bio-sensor phenomena for bio-switching behavior of seismonastic and bio-photosensor of photonastic. Bio-switching behavior was observed for possible movement of their branch (petiole) to raise (ON) and drop (OFF) followed by leaves' movement to close (OFF) and open (ON) when external stimulation (such as touching, heat) triggered to the plant. Bio-photosensor was observed for possible movement of their leaves to open and close due to light intensity changes meanwhile the petiole is in raise position. From the observation carried out to the bio-switching behavior, logical states could be expressed that seems similarly to an electronic switching behavior (ON and OFF). The branch will immediately drop (OFF state) for less than 1 minute after external stimulation triggered to the plant. Recovery time from drop to raise position was observed from 20 to 30 minutes. For a bio-photosensor detection, by using the ultrasound transceiver (transmitter and receiver), leaves' movement (close and open) as a function of light intensities change was observed. This was carried out by measured ultrasound wave changes (increasing or decreasing) after crossed the leaves as detected by the receiver. The ultrasound flux changes was converted into the electrical current by the receiver. Therefore, leaves' movement will affect to flux changes as can be detected by current changes. This current change is proportional to ultrasound flux changes. An intense bulb lamp (polychromatic) with the adjustable intensity was used as a light source to mimic natural intensity radiation source from the sun. Beside that, for leaves' movement there is a region of light intensity that able to trigger leaves to start open (from closed) until they open completely, and inversely from open to close completely called as Window of Sensitivity (WoS) that was found to be about 40 to 230 lux.

Sinopsis

Mimosa pudica (*M. pudica*), sejenis tumbuhan liar yang tedapat di daerah tropika telah dikaji fenomena unik yang ada padanya iaitu kelakuan bio-penguisan daripada fenomena seismonastik dan kelakuan penderia cahaya bio daripada fenomena fotonastik. Kelakuan bio-penguisan telah dicerap untuk kemungkinan gerakan ranting daun *M. pudica* ke atas (ON) dan turun (OFF) yang diikuti oleh gerakan daun untuk menutup (OFF) dan membuka (ON) apabila rangsangan luaran (sentuhan, nyala api) diberikan kepada bahagian tanaman tersebut. Kelakuan penderia cahaya bio telah dicerap bagi kemungkinan gerakan daun untuk membuka (ON) dan menutup (OFF) sementara itu ranting daun tetap berada pada kedudukan naik (ON) apabila keamatan cahaya yang diterima oleh tanaman tersebut diubah. Daripada hasil pencerapan yang diperolehi, pernyataan logik dapat dituliskan yang serupa dengan kelakuan suis elektronik (ON dan OFF). Apabila bahagian tanaman terkena rangsangan luaran maka secara serta merta ranting daun akan turun dalam masa kurang daripada 1 minit. Sementara itu masa yang diperlukan oleh ranting untuk kembali kepada kedudukan semula adalah 20 – 30 minit. Untuk penderia cahaya bio, dengan menggunakan pemancar dan penerima *ultrasound*, gerakan daun (peratus daun menutup atau membuka) oleh perubahan keamatan cahaya telah dapat dirakamkan. Ini diperolehi dengan mengukur perubahan gelombang *ultrasound* yang diterima. Setiap gerakan daun akan diperolehi perubahan fluks gelombang yang merambat. Perubahan ini telah diubah ke dalam arus elektrik. Sehingga perubahan arus elektrik berkadaran dengan perubahan fluks gelombang. Bagi kajian ini lampu bulb (polikromatik) telah digunakan sebagai sumber cahaya untuk meniru sumber cahaya semula jadi daripada matahari. Di samping itu, bagi gerakan daun ada satu kawasan dimana dengan nilai keamatan tertentu daun akan mula membuka (dari keadaan menutup) sehingga membuka secara penuh serta daun akan mula menutup (daripada keadaan membuka) yang