Plant Nervous System

Faridah Qamaruz Zaman and Nurul Ayuni Mohd Nor

The Venus flytrap (*Dionaea muscipula: Droseraceae*) has one of the most rapid movements in the plant kingdom. It can catch insects with its toothed modified leaves that snap shut when triggered by prey, touching the tiny hairs on the inner leaf surface.

The rapid closure of the upper leaf happens in about 0.1 sec. This process involves mechanosensitive channels that are found in animal and plant cells as well as fungi and bacteria. Mechanosensitive ion channels in plants are activated by mechanical stress and these are transduced into electrical signals. When an insect touches the trigger hairs, these mechanosensors trigger a receptor potential which generate an electrical signal that acts as an action potential, similar to the nerve action potential of an animal or human. The action potential delivers the electrical signal to the midrib to activate the trap closing. The trap can stay closed for a few hours before opening if the prey is too small for digesting. When a prey is caught, the lobes seal tightly and for possibly a week to allow digestion to take place.

The reason why plants have developed pathways for electrical signal transmission is to respond to environmental stress factors. In biology, this effect is referred to as molecular or sensory memory. This similarity to the action potential also defines a simple neural network in plant responses enabling it to communicate efficiently over long distance.


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