TRANSMISSION OF ACTION POTENTIALS THROUGH INTERNODAL CELLS OF NITELLOPSIS OBTUSA: INVESTIGATION OF THE EFFECT OF GLUTAMATE

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Action potentials (APs) are inherent in both animals and plants and play a pivotal role in adaptive plant responses influencing changes in respiration, photosynthesis, and osmotic pressure. Glutamate (Glu), a key neurotransmitter, acts as a signalling molecule in plants, functioning both in the ambient environment and internally. For instance, an increase in external Glu levels increases the excitability of plant cells, resulting in APs with greater amplitude. The impact of these changes on AP transmission throughout the entire plant body is uncertain. Characean macroalgae offer a reliable model for studying cell-to-cell electrical signalling. The tandem of two cells in a thallus (internodal cell-multicellular node-internodal cell) offers a concise system for studying AP propagation in plants. This study focuses on the electrical signalling between tandem cells of *Nitellopsis obtusa* (Characeaen) and aims to investigate the effect of external Glu on transmitting electrical signals locally. For this, intracellular glass electrodes were impaled in each internodal cell, and the two-electrode current-clamp technique was applied in each cell. The membrane potential in each cell was recorded, and three APs were elicited by increasing the current until the excitation threshold was reached, the process repeated every 5 minutes. This was iterated bidirectionally, signifying the initiation of APs in the apical cell and their transmission to the basal cell, and vice versa. This bidirectional process yields crucial insights into dynamic cellular communication within plants. Results indicate tendancy that in standard conditions AP propagates to the apical direction at a higher velocity than the basal one. Exposing the tandem to 1 mM Glu after control measurements did not reveal a clear Glu effect: transmission between neighbouring cells was inconsistent, occurring at times and absent at others, although it appears that glutamate slows the transmission of action potentials to the neighbouring cells. More research is needed to fully explore Glu's impact on tandem cell AP transmission and its effects on electrophysiological parameters.