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Spatial organization of tobacco cell plasma membrane: characterization, and modulation upon elicitation

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The ability of lipids to form liquid-ordered sterol-rich phases in complex mixtures, and the associability of specific proteins with sterol-enriched biochemical fractions extracted from biological membranes, have given rise to the "lipid raft" hypothesis. This hypothesis posits the presence of small-sized ordered domains of particular lipid and protein composition within biological membranes, which could act as signal transduction platforms, particularly during plant- microorganism interactions. However, the precise organization of the living cell plasma membrane remains poorly described. For example, the spatial distribution of segregating liquid-disordered and liquid-ordered phases has not been analyzed in plant cells at a resolution compatible with the estimated size of such assemblies.
We developed a multispectral confocal microscopy approach to generate ratiometric images of a large surface of tobacco cell plasma membrane, suggesting the membrane exhibits a mosaic organization into areas of various levels of order. Moreover, we demonstrate that modification of the plasma membrane fluidity, together with an increase in the proportion and organization of ordered domains, transiently occurred in the early steps of signaling triggered by cryptogein, an elicitor of defense reaction.