49b Modulating Ajmalicine Production from Cell Cultures of *Catharanthus Roseus* with the Application of Signal Transduction Molecules

Carolyn WT Lee-Parsons, Seda Erturk, and Amber Royce

In this paper, parts of the signaling cascade involved in defense against pathogens and elicitors were activated as a means of enhancing secondary metabolite accumulation in plant cell cultures. Instead of adding pathogens to activate the entire signaling cascade, we focused on the role of two specific signaling molecules in this signal transduction pathway, methyl jasmonate (MJ) and Ca^{2+}, and their effect on the accumulation of terpenoid indole alkaloids (TIAs) from *Catharanthus roseus* cell cultures.

The effectiveness of jasmonates on enhancing TIA production depended on the timing of induction. In our *C. roseus* suspensions, the optimum culture stage and the corresponding optimum dosage for enhancing the production of a marker TIA, ajmalicine, with jasmonate was during rapid growth (i.e. day 6) with 10-100 μM methyl jasmonate (MJ). The interaction between Ca^{2+} and MJ in modulating TIA production was also explored by culturing cells in nine combinations of $CaCl_2$ (3, 23, and 43 mM) and MJ (0, 10, and 100 μM) or by treating cells with Ca^{2+} chelator EGTA or Ca^{2+} channel blocker verapamil. Although gene expression was reported to increase with Ca^{2+} and MJ in the literature, ajmalicine production in our MJ-induced *C. roseus* was not amplified. However, Ca^{2+} was necessary for MJ-induced ajmalicine production in *C. roseus* cultures. To further increase production, the enzymatic bottlenecks to TIA production from these MJ-induced *C. roseus* cultures were investigated through precursor feeding, pointing to specific bottlenecks to be explored further.