

## **Growth Characteristics and Production of Physalins from *Physalis minima* Hairy Roots in Shake Flasks**

### **Abstract**

This report described the growth characteristics and production of physalins from *Physalis minima* hairy roots in shake flask culture. The presence of lateral branches in the inoculum had a negligible effect on the final root biomass dry weight (DW), specific growth rate ( $\mu$ ), doubling time ( $t_d$ ) and production of physalins. However, excising the primary and lateral root tips reduced  $\mu$  and the total root length but not the final biomass. Mature root tissues were observed to accumulate more physalin B and F (1.55 and 3.74 mg.g<sup>-1</sup> DW, respectively) compared to the root tips (0.65 and 1.47 mg.g<sup>-1</sup> DW, respectively). Increasing the number of root tips from 2 to 12 and the medium volume significantly reduced  $\mu$  and extended  $t_d$ . Decreasing the medium volume with a small number of inocula reduced  $t_d$ , improved the biomass and production of physalins and  $\mu$ . Using a 100 mL flask, four root tips cultured in 25 mL medium provided the optimum conditions for biomass (0.24 g DW) and production of physalins (1.68–3.5 mg.g<sup>-1</sup> DW).