# Nutrients interaction investigation to improve Monascus purpureus FTC5391 growth rate using response surface methodology and artificial neural network

## ABSTRACT

Aims: Two vital factors, certain environmental conditions and nutrients as a source of energy are entailed for successful growth and reproduction of microorganisms. Manipulation of nutritional requirement is the simplest and most effectual strategy to stimulate and enhance the activity of microorganisms. Methodology and Results: In this study, response surface methodology (RSM) and artificial neural network (ANN) were employed to optimize the carbon and nitrogen sources in order to improve growth rate of Monascus purpureus FTC5391, a new local isolate. The best models for optimization of growth rate were a multilayer full feed-forward incremental back propagation network, and a modified response surface model using backward elimination. The optimum condition for cell mass production was: sucrose 2.5%, yeast extract 0.045%, casamino acid 0.275%, sodium nitrate 0.48%, potato starch 0.045%, dextrose 1%, potassium nitrate 0.57%. The experimental cell mass production using this optimal condition was 21 mg/plate/12days, which was 2.2-fold higher than the standard condition (sucrose 5%, yeast extract 0.15%, casamino acid 0.25%, sodium nitrate 0.3%, potato starch 0.2%, dextrose 1%, potassium nitrate 0.3%). Conclusion, significance and impact of study: The results of RSM and ANN showed that all carbon and nitrogen sources tested had significant effect on growth rate (P-value < 0.05). In addition the use of RSM and ANN alongside each other provided a proper growth prediction model.