



OVERPRODUCTION STRATEGIES FOR MICROBIAL SECONDARY METABOLITES: A REVIEW

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ABSTRACT

The formation of secondary metabolites is regulated by nutrients, growth rate, feedback control, enzyme inactivation, and enzyme induction. Regulation is influenced by unique low molecular mass compounds, transfer RNA, sigma factors and gene products formed during post-exponential development. The syntheses of secondary metabolism are often coded by clustered genes on chromosomal DNA and infrequently on plasmid DNA. Strategies for overproduction of microbial products can be based on microbial response (Elicitors, quorum sensing), genetic engineering, metabolic engineering and ribosome engineering. Also molecular genetic improvement methods include amplification of SM biosynthetic genes, inactivation of competing pathways, disruption or amplification of regulatory genes, manipulation of secretory mechanisms, expression of a convenient heterologous protein, combinatorial biosynthesis.

Key words: Secondary metabolites, Overproduction, Microbial, Strategies, Genetic.

INTRODUCTION

Secondary metabolites are organic compounds that are not directly involved in the normal growth, development or reproduction of an organism (Anon, 2008). Secondary metabolites often play an important role in defense systems of different organisms (Stamp N, 2003). Humans use secondary metabolites as medicines, flavorings, and recreational drugs. Microbial secondary metabolites include antibiotics, pigments, toxins, effectors of ecological competition and symbiosis, pheromones, enzyme inhibitors, immunomodulating agents, receptor antagonists and agonists, pesticides, antitumor agents and growth promoters of animals and plants. They have a major effect on the health, nutrition and economics of our society. This paper discusses in detail the

regulation of secondary metabolites, strategies for overproduction of such metabolites with the aim of highlighting strategies based on genetically modification methods.

Regulation of secondary metabolites production

The formation of secondary metabolites is regulated by nutrients, growth rate, feedback control, enzyme inactivation, and enzyme induction. Regulation is influenced by unique low molecular mass compounds, transfer RNA, sigma factors and gene products formed during post-exponential development. The synthesis of secondary metabolites are often coded by clustered genes on chromosomal DNA and infrequently on plasmid DNA. Unlike primary metabolism, the pathways of

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