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**MIST DRAINAGE CHARACTERISTICS OF SPHERICAL HAIRY ROOT BED IN  
NUTRIENT MIST REACTOR**

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**ABSTRACT**

Nutrient Mist Reactor is the best bioreactor system to grow hairy roots in which gas phase nutrient is a continuous phase. The mist captured by the growing root bed forms a layer over a root which eventually grows with culture time and resists oxygen transfer through it. Drainage of excess mist from the root bed characterized using linear model and logarithmic model. The intermittent operation of NMR with linear drainage and logarithmic drainage is discussed extensively. The mist-ON cycle duration is controlled by the liquid film thickness over roots which can be altered by feed flow rates and drainage rates. The mist-OFF cycle duration is controlled by the nutrient concentration of the held liquid. Low flow rates and high drainage rates promotes oxygen mass transfer rates with careful monitoring of liquid nutrients availability in the film.

**Keywords: Mist deposition, drainage, hairy root, mass transfer**

**INTRODUCTION**

A disease characterized by enormous branching rate due to soil dwelling gram negative bacterium *Agrobacterium rhizogenes* is popularly known as hairy root. Hairy root cultures have gained lot of attention over other cell culture methods to produce plant based secondary metabolites in

recent years due to their high genetic stability, ability to grow in hormone free medium, high levels of phytochemicals production and faster growth rate than untransformed plant roots. Recovering valuable secondary metabolites which are used for drugs, flavors and poisons