Review article

Adventitious rooting of conifers: influence of biological factors

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Abstract

Vegetative propagation of superior conifer trees can be achieved through rooted cuttings or rooted microshoots, the latter predominantly through *in vitro* tissue culture. Both techniques are used to achieve rapid multiplication of favorable genetic combinations and the capture of large proportion of the genetic diversity in a single generation cycle. However, adventitious rooting of shoots is often not efficient due to various problems such as scarcity of roots and cessation of their growth, both limiting the application of VP in conifers. Many factors are implicated in the adventitious rooting of conifers including physical and chemical ones such as plant growth regulators, carbohydrates, light quality, temperature and rooting substrates or media (reviewed by Ragonezi et al. 2010). In this review, we cover the biological factors, such as *Agrobacterium rhizogenes*, Plant Growth Promoting Rhizobacteria and other endophytes, and mycorrhizal fungi, which were found to stimulate adventitious rooting. These microorganisms could contribute not only to the adventitious root development but also help in protecting conifer plants against pathogenic microorganisms, facilitate acclimation and transplanting, and contribute to more sustainable, chemical-free forests.

Keywords: Biotization, Mycorrhization, Plant-Growth-Promoting Bacteria, Gymnosperms.