

Hairy root structure: Evaluation by image analysis

Katiba Mezreb, Yoann Huet, Jean Pierre Ele Ekouna, Eric Gontier, Michèle Boitel- Conti

Laboratoire Biologie des Plantes et contrôle des Insectes Ravageurs (EA 3900), UPJV, 80000 Amiens
Katiba.mezreb@u-picardie.fr

Summary

Due to their stable and high productivity, hairy root cultures have been investigated for several decades for their potential to produce valuable metabolites that are present in wild type roots [1, 2]. Transformed roots are obtained by infection of susceptible plant species with soil bacterium *Agrobacterium rhizogenes* [3]. This soil bacterium transfers a DNA segment (T-DNA) from its large root-inducing (Ri) plasmid into the genome of the infected plant [4]. This carries a set of genes that encode enzymes, modifying hormonal balance of the plant cells. As a consequence the formation of proliferating roots (called “hairy roots”) is induced at the wounding sites.

Hairy root cultures represent an alternative to the culture in fields for the production of secondary metabolites. Characterizing the structure (e.g., root thickness and surface area) of the tangled hairy root and how they evolve is essential to understand growth phenomenon.

Image analysis offers then the possibility to follow and understand the kinetic of hairy root growth and especially morphological changes. This method allows biomass quantification by a non destructive manner at any desired moment of growth in batch culture [5].

The aim of the work presented herein was to monitor the growth kinetic and the morphological structure of hairy root.

References

- [1] Giri, A., dhingra, V., Giri, C.C., Singh, A., Ward, O.P and Narasu, M.L. Biotransformations using plant cells organ cultures and enzyme systems: current trends and furor prospects. *Biotechnology advances*. 19, 175-199. (2001)
- [2] Sevon, N and Oksman-caldentey, K.M. *agrobacterium rhizogenes* mediated transformation: root cultures as a source of alkaloids. *Plante Medecina*. 68, 859-868. (2002)
- [3] Shin, W.S and Hjortsa, M.A., A tissue embedding technique for measuring the structure of hairy root mats of *tagetes erecta*. *Korean journal of chemical Engineering*. 15 (2), 150-156. (1998)
- [4] Guillon, S., Trémouillaux-guiller, J., Pati, P.K., Rideau, M and Gantet, P. Hairy root research : recent scenario and exciting prospects. *Current Opinion in Plant Biology*. 9, 341-346. (2006)
- [5] Berzin, I., Mills, D and Merchuk, J.C., Morphologically structured model for hairy root cultures. Flores HE, Lynch JP, editors. *Radical biology: advances and perspectives on the function of plant roots*. MD: American society of Plant Physiologists, 438-443. (1997)