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**Micro-Plate Colourimetric Assay for Endo-Acting Amylase,
Chitinase and 1.3- β -Glucanase Activities in *Chromolaena odorata*
Roots Colonized with (V)A Mycorrhizal Fungi**

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Abstract

Some hypotheses and possibilities are discussed in the literature concerning the mechanisms of improved phosphorus uptake by roots of plants when infected with (V)A mycorrhizal fungi compared with uninfected plants. One of the hypotheses includes the role of enzymes in the symbiosis between plants and mycorrhizal fungi. In this investigation the activities of amylase, chitinase and 1.3- β -glucanase in roots of *Chromolaena odorata* inoculated with the fungus *Glomus manihotis* or *Acaulospora longula* were compared with those of non-inoculated plants. An extraction with sodium acetate-acetic acid buffer (pH 5.0; 0.01 M; 10 ml g⁻¹ roots) and an assay procedure adapted to microtiter plates for measuring the activities of the mentioned enzymes were used. Enzymatic fissionable water-soluble polysaccharide derivatives covalently labelled on a pigment type of the Remazols (RBB = Remazol Brilliant Blue R and RBV = Remazol Brilliant Violet 5R) were applied as substrates for the enzymatic assays. An increased amylase activity could be determined in the extract of 12 weeks old roots infected with *G. manihotis* compared with 6 weeks old roots and uninfected roots with this (V)A mycorrhizal fungus. No amylase activity could be found in the extracts of roots infected with *A. longula* or of non-mycorrhizal roots.

Considerable chitinase and glucanase activities could be determined in extracts of the 6 weeks old roots colonized with *G. manihotis* and *A. longula* compared with relative low activities of both enzymes in the extracts of the uninfected roots. These activities decreased in the root extracts of both (V)A mycorrhizal fungi to the same level of non-mycorrhizal root extracts when the roots became 12 weeks old.

The results showed furthermore that the enzyme activities were correlated with increased P uptake and thereby improved plant growth, demonstrating that enzymes seem to play a role in the mechanisms of P uptake by mycorrhizal roots. However, further investigations are still needed.

Keywords: Enzymes, mycorrhiza, P uptake