

Bioactive secondary metabolites from comfrey (*Symphytum officinale*)

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Comfrey (*Symphytum officinale*) is a long known medical plant with analgetic and antiinflammatory effects that enhances tissue regeneration. Allantoin and rosmarinic acid are regarded as main active compounds. They are accompanied by other phenole carboxylic acids, tanning agents, triterpenes and polysaccharides working as adjuvants. Beside these useful substances, toxic pyrrolizidine alkaloids are found in comfrey. After ingestion, they are metabolized and form toxic derivatives which can harm human liver, capillaries and lung. Mutagenous and probably carcinogenous effects have also been shown. This limits the use of comfrey to the application on intact skin. Hairy roots, induced by *Agrobacterium rhizogenes*, can be used as tissue culture system for the production of plant metabolites. They do not need light or phytohormones for growth and often produce more complex metabolite patterns than callus cultures. This project aims at generating Hairy roots of *Symphytum officinale* with downregulated alkaloid biosynthesis to exclude the toxic components from the otherwise beneficial metabolite pattern.