

# Production of Glucobrassicin, a Phytochemical of Major Interest, through Jasmonic Acid Treatment of Woad (*Isatis tinctoria* L.) Leaves

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Species of cultivated *Brassicaceae* are particularly important in providing vegetables and oil-seeds. Studies relating fruit and vegetable intake to cancer risk reduction have suggested that the consumption of Brassicaceae can help improving human health. Beneficial effects have been attributed to specific phytochemicals, belonging to the glucosinolate (GLs) family, which occur in all economically important varieties of *Brassicaceae*. In particular, glucobrassicin (GBS) is an indole-type GL contained in all the *Brassica* vegetables that are usually consumed as part of the human diet. GBS is a precursor to a complex mixture of compounds derived from enzymatic hydrolysis, which exhibit uncertain or questionable anti-cancer properties (1). Until now, the biological effects of pure GBS have not been studied because of difficulties in purifying the molecule from vegetable extracts, since those usually contain complex GLs mixtures. On the other hand, the chemical synthesis of GBS is difficult and rather costly (2).

It was reported in a previous work (3) that treatment with jasmonic acid enhanced GBS (by about five times) in leaves of an Italian accession of woad (*Isatis tinctoria* L. - *Brassicaceae* family) that exclusively contains this GL. Here we report the production in 80% yield of pure GBS starting from freeze-dried, treated leaves with a GBS content of about 40 mg.g<sup>-1</sup> (d.w.). After purity assessment by reversed HPLC following the ISO 9167-1 method, the compound was characterised by <sup>1</sup>H and <sup>13</sup>C NMR. The method that we set up allowed us to obtain GBS with a high grade of purity and a high yield. GBS availability at low cost should allow further studies to be performed with a view to determining pharmacokinetic and antioxidant properties, and to remove any doubts about the possible risks versus benefits of GBS-derived indolyl degradation products, using actually ingested GBS as part of the human diet.

(1) R. H. Dashwood (1998) *Chemico-Biological Interactions* 110: 1-5.

(2) S. Cassel, B. Casenave, G. Déléris, L. Latxague and P. Rollin (1998) *Tetrahedron* 54: 8515–8524 and references cited.

(3) S. Galletti, O. Leoni, R. Iori, S. Palmieri (1999) *Sixth Symposium on Renewable Resources and 4<sup>th</sup> European Symposium on Industrial Crops and Products*, Bonn (Germany), 23-25 March 1999, pp 481-485.