

THE EFFECT OF YEAST GLUCAN ELICITATION ON ALKALOID PRODUCTION DURING THE GROWTH CYCLE OF *AILANTHUS ALTISSIMA* CELL SUSPENSIONS

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Cell suspension cultures of *Ailanthus altissima* produce high levels of the biologically active canthin-6-one alkaloids. These are known to have antibacterial, antifungal, antileukaemic and CNS depressant properties. Canthin-6-one alkaloids are tryptophan derived via tryptamine and the major alkaloids produced are canthin-6-one, 1-methoxycanthin-6-one and 1-hydroxycanthin-6-one. Alkaloid production can be increased when plant cell cultures are treated with fungal elicitors, e.g. glucan from yeast cell walls. We have investigated the effect of an elicitor on alkaloid production and enzyme activity, namely tryptophan decarboxylase in *A. altissima* over the growth cycle of the cell cultures. Elicitation involves the addition of a commercial yeast glucan to the cultures 24 hours prior to harvesting. Tryptophan decarboxylase activity was determined following modifications of Pennings et al (1987) and Búki et al (1985) using ^{14}C methylene tryptophan. The results show that elicitation of canthin-6-one occurs early on in the growth cycle with a 2 fold increase in the alkaloid, whereas no effect was observed on 1-methoxycanthin-6-one production. However glucan elicitation in the latter part of the growth cycle appears to have a deleterious effect on alkaloid production (Fig. 1). The glucan elicitor increased tryptophan decarboxylase activity, although this increase at days 13-19 does not improve alkaloid production (Fig. 2). It is likely that the increased alkaloid production after elicitation early on in the growth cycle was due to a stimulation of enzymes of the biosynthetic pathway subsequent to tryptophan decarboxylase (Roberts et al, 1989).

Figure 1. Time course of the % increase in wet weight and the canthin-6-one and 1-methoxycanthin-6-one accumulation in *A. altissima* cell suspension cultures.

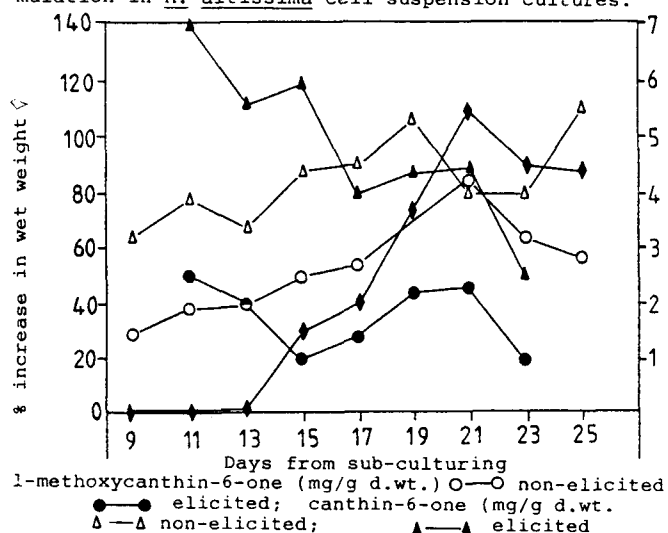
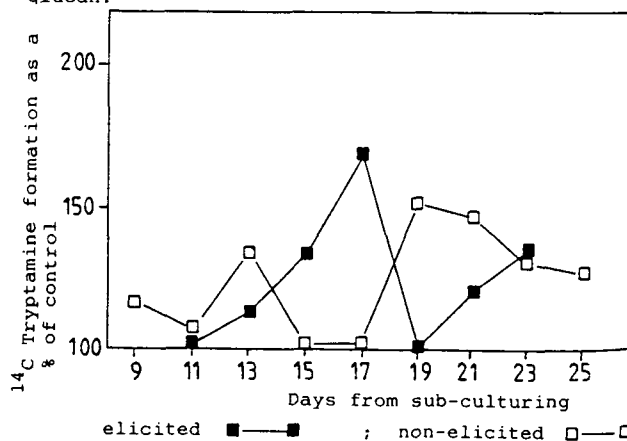


Figure 2. Time course of elicitation of the tryptophan decarboxylase in *A. altissima* by yeast glucan.



These experiments suggest that elicitation for an increase in alkaloid production is only valuable early on in the growth cycle of a fast growing culture and these results are consistent with those obtained by Krauss et al (1989). The lack of effect of elicited tryptophan decarboxylase on alkaloid production is consistent with the results obtained by Eilert et al (1987) for indole alkaloid production in *Catharanthus roseus*.

Búki, K.G. et al (1985) Acta Microbiologica Hungarica 32(1): 65-73

Eilert, U. et al (1987) Arch. Biochem. Biophys. 354(2): 491-497

Krauss, G. et al (1989) Z. Naturforsch. 44C: 712-714

Pennings, E.J.M. (1987) Analytical Biochemistry 165: 133-136

Roberts, M.F. et al (1989) in Proceedings of 11th Int. Symposium on Primary and Secondary Metabolism of Plant Cell Cultures, Springer-Verlag