

Thesis title	Comparison of Tropane Alkaloid Production by <i>Datura innoxia</i> Miller and <i>D. metel</i> Linn. varieties of, white, black, and fastuosa in Various Cultivation Conditions, Soil, Hydroponics, <i>In Vitro</i> Plant Culture, and Transformed Root Cultures.
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Abstract

The tropane alkaloids ; hyoscyne (scopolamine) and hyoscyamine (atropine), are important secondary plant products because of their operation on the human nervous system. Moreover, they are listed as one of the ten substances of plant origin most used in pharmaceutical products in USA. They occur naturally in certain species of the Solanaceae including *Datura innoxia* Miller and *D. metel* Linn. In order to compare the production of tropane alkaloid, *Datura innoxia* Miller and *D. metel* Linn. varieties of white, black and fastuosa were simultaneously cultivated in four conditions : (1) soil ; (2) hydroponics ; (3) *in vitro* plant cultures ; (4) and transformed root cultures. The content of tropane alkaloid in certain *Datura* cultures were subsequently assayed by using ion-pair HPLC. As a result, the different cultivated conditions used for growth and tropane alkaloid production in certain *Datura* cultures affected directly on the contents and patterns of synthesizing alkaloidal compounds. The appropriate conditions were soil cultivation and various

transformed root cultures. All of the tested plant specimens, the appropriate plant for producing tropane alkaloidal compounds was *D. metel* Linn., black variety, either grown in soil or transformed root cultures. Simultaneously, the most appropriate part for producing atropine was the seeds of *D. innoxia* Miller (1.03% DW) from the field grown plant, followed by young root of *D. metel* Linn., black variety (0.97% DW) plant grown in soil. In the case of scopolamine, the most appropriate part was the transformed root of *D. metel* Linn., black variety induced by *Agrobacterium rhizogenes* strain 9402(1) (1.00% DW). Additionally, the highest content of atropine plus scopolamine was obtained from young root of *D. metel* Linn., black variety plant grown in soil (1.63% DW), followed by the transformed roots of this plant induced by *A. rhizogenes* strain A4(1.40% DW). Moreover, the transformed root of these four *Datura* species, either induced by *Agrobacterium* strain 9402(1), 8196, A4, or R1000::121, were able to produce almost the same amounts and the same constituents of alkaloidal compounds as young root of the original plant grown in soil. Thus, the application of the transformed roots as the feasibility of industrial exploitation was invaluable. Profitableness of these transformed roots beside from high ability to produce tropane alkaloidal compounds, there were the ease and facility in cultivation, maintenance, harvest, and extraction. These prominent points promoted the cultures of transformed root, especially the transformed root of *Datura metel* Linn. black variety, to be the appropriate source for large scale production of tropane alkaloid.