

Synthesis and biological activity of new brassinosteroid analogs of type 24-nor-5 β -cholane and 23-benzoate function in the side chain

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Abstract

Brassinosteroids are polyhydroxysteroids that are involved in different plants' biological functions, such as growth, development and resistance to biotic and external stresses. Because of its low abundance in plants, much effort has been dedicated to the synthesis and characterization of brassinosteroids analogs. Herein, we report the synthesis of brassinosteroid 24-nor-5 β -cholane type analogs with 23-benzoate function and 22,23-benzoate groups. The synthesis was accomplished with high reaction yields in a four-step synthesis route and using hydoxycholeic acid as starting material. All synthesized analogs were tested using the rice lamina inclination test to assess their growth-promoting activity and compare it with those obtained for brassinolide, which was used as a positive control. The results indicate that the diastereoisomeric mixture of monobenzoylated derivatives exhibit the highest activity at the lowest tested concentrations (1×10^{-8} and 1×10^{-7} M), being even more active than brassinolide. Therefore, a simple synthetic procedure with high reaction yields that use a very accessible starting material provides brassinosteroid synthetic analogs with promising effects on plant growth. This exploratory study suggests that brassinosteroid analogs with similar chemical structures could be a good alternative to natural brassinosteroids.

Author keywords

23-benzoates
24-nor-5 β -cholane
Brassinosteroids analogs
Synthesis