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Synthesis and preliminary evaluation of brassinosteroid derivatives for plant growth regulators

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Brassinosteroid (BRs) are unusual steroids with a lactone B-ring structure and a dihydroxylate side chain. These steroids have been isolated from many plant species and have been recognized as hormones potentially affecting a wide range of physiological responses in plants, including stem elongation, pollen tube growth, leaf bending and epinasty, root growth inhibition, induced synthesis of ethylene, activation of proton pump, xylem differentiation, synthesis of nucleic acids and proteins, activation of enzymes, and photosynthesis. The brassinolide a C28 brassinosteroid has been reported to be the most biologically active of the BRs and widely studied for applications due to their potential agricultural utility. 28-Homobrassinolide and 28-homocastasterone, the most active C29 BRs have also been intensively investigated for their potential agricultural uses. As BRs are present in plants only in very small quantities, chemical synthesis of BRs is the source for scientific and practical use. This results in numerous synthetic efforts and development of non-natural analogues of BRs that are easier to prepare and which have similar or even greater activity than the natural BRs. In this article, the 28-homocastasterone (3), and analogues including their dimeric compounds were prepared from stigmasterol via a key intermediate olefin. Evaluation of the rice lamina inclination bioassay of the synthesized compounds showed they have lower bioactivity than 28-homocastasterone. However, the novel molecules can be further investigated for other properties, such as persistence, and the results give design considerations for molecules with structures recognized by brassinosteroid receptors.

Biography

Weerachai Phutdhawong is an Associate Professor of Organic Chem. at Kasetsart University at Kamphaengsaen, Thailand. He obtained BS from Prince of Songkla University, Thailand and MS and PhD from Chiang Mai University in Thailand and Post-doc (Natural Products Chemistry) at NIES in Japan. His research interest has two main intersecting themes. The first involves the development of methods for the synthesis of novel bioactive compounds and the study of their spectroscopic, chemical and pharmacological properties. Mechanistic aspects of these and associated syntheses are also of interest. New synthetic methods for antibiotic compounds are also being investigated.

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