

Short-step Synthesis of (+)-Sesamin via Direct Construction of 1,4-Dicarbonyl Moiety

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(+)-Sesamin is the major lignan found in sesame seed and has well-established antioxidant and health protecting properties. During the past decades, various pharmacological activities were found out empirically and stimulated significant interest due to their wide range of intriguing biological activities. Despite of these fascinating efficacies, biokinetic or pharmacological analysis of this lignan has not been clarified enough because their resources are derived from natural product. Furthermore, reported synthetic approaches are not favorable because of their excessive toxic chemicals usage. Herein we report a short-step synthesis of the enantiomerically pure (+)-Sesamin by employing a novel asymmetric construction of 1,4-dicarbonyl moieties with chiral ammonium reagents.

In connection with our synthetic studies for this compound, a biosynthetic intermediate provides an opportunity to develop great ideas for synthetic approaches. We envisaged that the direct convergent synthesis of 2,3-disubstituted-1,4-dicarbonyl moiety is efficient to provide a target. We focused on the alkyl-alkyl cross coupling between two carbonyl derivatives with organocatalyst reagent to construct short-step (+)-Sesamin synthesis with simply and no toxicity.

We found the alkyl cross coupling with α -bromoketone and silyl enol ether can provided means of forging a carbon-carbon bond directly. Surprisingly, it proceeds under mild conditions and this account was not reported until this research program was initiated. The reaction, however, was still limited in asymmetric construction and substrate utilities. Our future studies will be develop that the direct functionalization of α -bromoester and silyl enol ether with enantioselectively. It is anticipated that our continuous research will explore concise (+)-Sesamin synthesis and will find wide applications in the synthetic community.