

Asymmetric Reduction of Ketones Using *Pisum Sativum* Sprouts

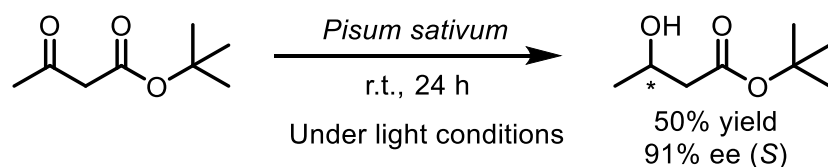
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Optically active alcohols are important chiral starting materials for preparing pharmaceuticals and agrochemicals. Asymmetric reduction is one of useful methods of obtaining optically active alcohols. We have been studying the asymmetric reduction of prochiral ketones using plant cells of species such as *Nicotiana tabacum*¹ and *Arabidopsis thaliana*² as biocatalysts. Germinated plants have also been used as biocatalysts for asymmetric reduction of ketones.³ *Pisum sativum* is an annual plant in the family Fabaceae which is grown worldwide and its sprouts are utilized as foods. Previously, it was reported that the reduction of ketones using sprouted *Pisum sativum* proceeded enantioselectively under dark conditions.⁴ In this study, we have investigated asymmetric reduction of ketones using *Pisum sativum* sprouts under illumination of light.

Sprouted plant, *Pisum sativum*, (200 mg) was added to the solution (5 mL) of ketone (0.65 mg/mL) in H₂O. The reaction was carried out at room temperature under dark or illumination (fluorescent light, 4500 lux) conditions for 24 hours. After extraction with diethyl ether, the resulting solution was analyzed by GC.

For example, *tert*-butyl 3-oxobutanotate was converted into *tert*-butyl (3*S*)-3-hydroxybutanoate in 17% yield and 85% ee under dark conditions. Under light conditions, we found that both of the yield and ee increased in 50% and 91%, respectively. In this lecture, we will present the experimental details.



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