Studying the Brassinosteroids Signaling Pathway Using Forward and Reverse Genetics

Abstract:
Brassinosteroid (BR) regulates plant growth and development in many different levels, including the seedling hypocotyl elongation. BRs are perceived by the trans-membrane receptor kinase BRI1, and then through several phosphatases and kinases to activate the BES1/BZR1 family transcription factors. BES1 gain-of-function mutant bes1-D showed constitutive BR responsive phenotypes, like longer hypocotyl, curly leaf and elongated leaf petiole. We firstly treat the bes1-D seeds with mutagen Ethyl methanesulfonate (EMS), and then screened for the suppressors of bes1-D phenotype, to identify the signaling components downstream of BES1. Several interesting mutants (EMS suppressor of bes1-D, esb) were identified, and they all showed increased sensitivity to BR biosynthesis inhibitor BRZ in hypocotyl elongation assay under dark condition. They are also more sensitive to another BR biosynthesis inhibitor Propiconazole (PCZ) when grown in soil. The suppressors were back-crossed to bes1-D, and then F1 plants self-crossed to get the F2 population. The F2 suppressor population will be pooled for the next generation sequencing to determine the causal mutation for the bes1-D suppressor phenotype.

Besides the genetic screening, we also identified a drought responsive transcription factor, RD26, that is involved in the BR-regulated drought responses. The signaling cascades regulating RD26 in drought response will also be discussed.

Biography:
Hao received his BS in Biotechnology from Peking University. Hao is currently a fourth year graduate student in IPB.