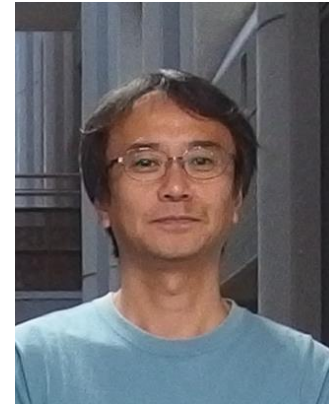


Breakthrough technologies to accelerate breeding and strain improvement in biological production for a sustainable society

New genomic breeding using cybrid plants between the three most important crops

Project Leader : Takashi Okamoto
Professor, Department of Biological Sciences, Tokyo Metropolitan University

R&D Team : Tottori University, Meiji University, Takasaki University of Health and Welfare



Summary :

The three major cereal crops, rice, wheat, and maize, account for about 90% of the world's cereal production, because the agricultural genetic characteristics of these crops are superior to those of other crops (plants). However, these three crops belong to different subfamilies, and mutual utilization of their superior genetic resources through cross-breeding has been impossible. This project aims to overcome the difficulties in hybridization among the three major cereals by producing various cytoplasmic hybrid plants (cybrid plants) using an in vitro fertilization system that can freely fuse gametes of different species (Fig. 1). In addition, the optimal heterologous genomic DNA that contributes to the various novel traits acquired in the cybrid plants will be identified to establish heterologous genome breeding technology.

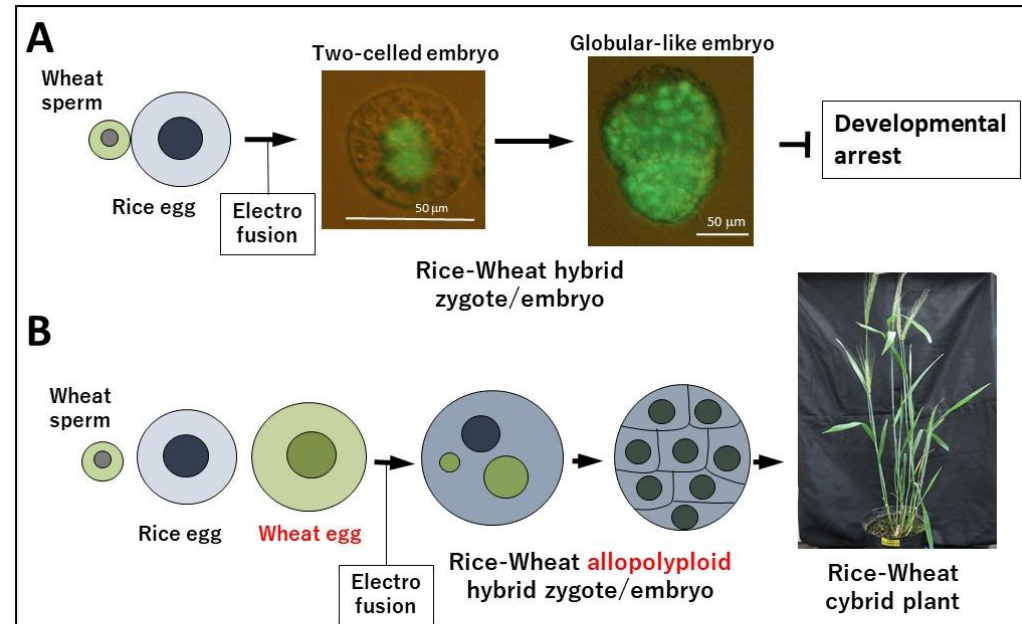


Fig. 1. Production of rice-wheat cybrid plants by in vitro fertilization system
Although hybrid zygote between wheat sperm cell and rice egg cell shows developmental arrest at the globular-like embryo stage (A), rice-wheat allopolyploid hybrid zygote (B) bypasses the developmental arrest and develops into mature plant, which possesses both characteristics.