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## How to make a recombinant microbial strain of bio-safety for agricultural and industrial engineering?

Microbes have been widely applied to agricultural and industrial processes including food, forage or fertilizer fermentation, or industrial production of enzymes or fermentation products. These microbial strains usually should be improved by genetic mutagenesis to meet the requirement of their application. DNA recombinant techniques offer a fast, convenient and accurate approach for genetic modification of microbe strains. In a genetic modification system, a selection marker (SM) is essential for the functions of allowing transformants to be selected from non-transformed cells and maintaining recombinant properties by adapting to the selective stress of a culture medium. Drug-resistant genes are the most commonly used SMs in bacterial systems, however, they have a potential to spread antibiotic resistance to pathogenic microbes. Many currently available auxotrophy markers have been developed for yeast and fungus systems; however, these SMs require certain conditions to create selective stress which can be achieved in a laboratory, but not in environments such as biomass, forage, pulp, animal guts, wastewater, or soil. Therefore, bio safe and effective SM is required for the construction of recombinant strains used in agricultural and industrial engineering. Glutamine:fructose-6-phosphate aminotransferase (GFAT) catalyzes the formation of glucosamine-6-phosphate, and its gene are essential for microbes. The GFAT-deficient strains of bacteria, a fission yeast and an aspergillus have been constructed, and GFAT vectors can be selected and maintained stably in these cells. Using the GFAT-encoding gene can prevent the use of a drug-resistant gene as an effective SM in bacteria, yeasts and fungi. Another unique property of the GFAT-SM is that no particular compound is prohibited or required for creating a selective stress, i.e. a selection stress is naturally occurred in media or environments lacking exogenous glucosamine. Therefore, GFAT-SM will allow the release of genetically modified microbes from laboratory for practical applications in agricultural and industrial engineering.

## Biography

Weilan Shao holds a PhD Degree in Microbiology from the University of Georgia, USA (1993). She has been working as a Distinguished Professor in Jiangnan University, Nanjing normal University and Jiangsu University in China since 2000. Her research mission is to develop feasible and economic effective approaches for enzyme production and renewable bioenergy processing by using molecular biotechnology. She has published more than 100 papers and obtained 2 US patents and more than 15 Chinese patents.

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