

A built-in strategy for transgene containment

A method of creating selective terminable transgenic rice was reported by the scientists of Zhejiang University in this week's PLoS ONE. Unintended spreading of transgenic rice by pollen and seed dispersal is a major concern for planting transgenic rice, especially transgenic rice expressing pharmaceutical or industrial proteins.

The transgenic rice plants created in the past usually can only be detected by sophisticated molecular detection methods and it is prohibitively difficult to identify and selectively kill the transgenic rice plants once they escape into environments and contaminate conventional rice.

However, with the technology reported by Dr. Zhicheng Shen's group, the transgenic rice plants mixed in the conventional rice could be selectively eliminated by a spray of Bentazon, an herbicide commonly used for rice weed control.

This technology appears to be quite simple, reliable and inexpensive for implementation. "If you use Bentazon for weed control in your rice field, you do not need to worry about any possible contamination caused by transgenic rice created by our method. The herbicide will take care of it" said Dr. Shen, the corresponding author of the article. "Containment of transgenic crops only by physical isolation is not sufficient in our view, as human errors, animal activities and nature accidents will lead to the spreading of transgenic rice plants sooner or later" added Chaoyang Lin, graduate student in Dr. Shen's laboratory and one of the leading contributors of the article. Indeed, several major accidents of unintended spreading of the transgenic crops did happen in the past several years in USA.

This technology may be best for use to contain transgenic rice as bioreactors. "While all biotech products today are safe and nutritious, this technology could allow certain crops targeted for industrial, energy or health uses to be grown under controlled conditions and kept separate from other channels" said Nick Duck Vice President of Research for Athenix Corp. in the USA.

The principle beneath this strategy is elegant and simple according to the article. The genes of interest in these transgenic rice plants will be linked with an RNAi cassette which suppresses the expression of the rice detoxification enzyme of Bentazon, rendering the transgenic rice to be sensitive to the herbicide. Conventional rice is highly tolerant to Bentazon.

Dr. Shen's lab is currently using the technology for developing transgenic rice as well as corn for expression of industrial enzymes and pharmaceutical proteins. "We believe that transgenic crops are the future, and we feel much better knowing that we may release selectively terminable transgenic plants in the future to address the concern of transgene spreading", said Dr. Shen.

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