



ZHEJIANG UNIVERSITY

Statement of support for the Shanghai Declaration

Zhejiang University fully supports the Shanghai Declaration in particular the strategic priority B *“Integrate aquaculture with the natural environment, with agriculture, capture fisheries, forestry, tourism, renewable energy and other sectors, and within agri-food systems for increased resilience”*, concerning the integration of fish (or other aquatic animals like shrimp and crabs) culture with rice culture (Rice-fish co-culture), the development of novel co-culture technology to support rice-fish co-culture system and the development of diverse types of rice-fish co-cultures for different rice planting regions.

Rice culture and freshwater aquaculture are important because they provide staple food aquatic protein for the world. Both rice culture and freshwater aquaculture, however, currently faces the great challenge because of the scarce land and freshwater. Rice production requires substantial water. Like rice production, freshwater aquaculture requires significant quantities of freshwater and competes for this limited resource with other uses including crop irrigation, drinking water supply, and industrial needs. Further expansion of freshwater aquaculture in response to growing needs is becoming difficult.

Rice fields offer a suitable environment for fish (in this paper, the term ‘fish’ refers to a wide range of aquatic animals including fish, prawn, shrimp, crabs, soft shell turtles, etc.). Rice-fish system can optimize the benefits of scarce land and water resources through complementary and synergistic interactions between fish and rice plants. On the one hand, Rice-fish system can reduce the use of pesticides and fertilizers for rice. On the other hand, rice-fish system can help produce fish and solve some problems generated from freshwater aquaculture. Thus, rice co-culture with fish in a paddy field system could contribute to food security and poverty alleviation, which helps to increase the contribution of aquaculture to the Sustainable Development Goals.

During the last 20 years, professors and researchers at Zhejiang University has been working in the field of rice-fish system (including rice-carp, rice-crab, rice-crayfish, rice turtle), focusing on ecological principles, technologies and models. Now and in the future, we will continue to work in the field of rice co-culture with fish, focusing on developing a novel co-culture technology package for sustainable rice-fish system. This technology package includes (i) installation of temporary physical field structures to protect the fish during field operations and to prevent fish escape; (ii) machinery suitable for transplanting rice, applying fertilizers, feeding fish, and harvesting rice and fish in large-scale RFS operations; (iii) rice and fish varieties adapted to RFS, including rice varieties that are adapted to water

that is deeper than in rice monoculture and fish varieties that are adapted to water that is shallower than in fish monoculture; and (iv) daily field management procedures including the coordination of irrigation, fertilization, pest control, and the feeding of fish. The development of this novel technology package would help the sustainable rice-fish system.

In cooperation with Shanghai Ocean University, China National Fisheries Technology Extension Center, and the Provincial Fisheries Technology Extension Centers in China, the technology package including several innovative technologies for rice-fish co-culture will apply to rice-fish rice-carp, rice-crab, rice-crayfish, rice turtle and other types of rice-fish co-cultures.

XIN Chen

A handwritten signature in black ink that reads "Xin Chen". The signature is written in a cursive, slightly slanted style.

Professor

Zhejiang University