Decreasing Pest Activities of Rice Field Crab in the Paddy Field Ecosystem

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Using pesticide to kill rice field crabs (Somanniathelphusa germaini) leaves chemical residue in the paddy field, causing biological magnification, which is harmful to top consumers like humans. This study aimed to reduce pesticide usage by decreasing pest behavior of crabs in the paddy field ecosystem. We first investigated the effect of rain throughout the rice cultivation period for 4 months. We found that rain significantly affected the crabs' population and their rice-destroying behavior (foraging behavior). As we simulated rainfall by giving 5 hours of water to the crabs in the experimental field, the change from foraging to reproductive behavior was observed. However, this was a stimulated-reproductive behavior. The crabs paired with each other for 2-3 days but they did not get pregnant after 30 days. During that time, the rice grew to the stage that the crabs couldn't destroy it. In mating crabs, we found the increase in the gene expression of farnesoic acid O-methyltransferase (FAMT), the enzyme involved in the production of the hormone methyl farnesoate which controls the reproduction of insects and crustaceans. In the paddy field, when water was given at the rice sprout transplanting phase for 4 days, the crabs decreased their foraging behavior with only 7.9% of the rice was destroyed. Through this behavior control, reducing rice-destroying behavior of the crabs by giving water to the rice field at the right growth phase results in the balance and sustainable paddy field ecosystem with no contaminants in the environment.

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