The effects of alternate water-saving irrigation technique on biodiversity of paddy field-epigeal and aquatic functional diversity change with the process of impoundment[1]

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Abstract

Alternate wetting and drying irrigation methods with appropriate fertilizer usage is considered to use for numerous profits, such as: water saving, strengthening root system of rice, reducing greenhouse gas emissions from anaerobic impoundment etc., but few studies focus on the effects of irrigation manipulation on farmland biodiversity. The invertebrates can be divided into the epigeal and aquatic assemblage that sorted by the vertical structure of rice shoot. This study aims to compare the ecological impacts on epigeal and aquatic invertebrates alternation of taxonomic and functional diversity that relate to the process of impounding between different irrigation pattern. Results revealed no significant difference in the similarity analysis between irrigation treatment, but the aquatic organisms might be more susceptible to potential threats than terrestrial species; the functional diversity (feeding type as trait) of epigeal assemblage was significantly and negatively correlated with increasing days of desiccation ($r = -0.704$, $p = 0.011$). The functional diversity of aquatic assemblage was significant negative correlated with days of flooding ((feeding type: $r = -0.805$, $p = 0.002$; oxygen obtained: $r = -0.805$, $p = 0.002$; habitat use: $r = -0.801$, $p = 0.002$). Furthermore, more empirical evidences will be need for constructing clear mechanisms into functional contribution. The impacts of biodiversity and ecosystem integrity should be considered as first priority before taking action to address climate change in nowadays. This study suggests ecological engineering and habitat maintaining for endangered species conservation could take into account while saving water irrigation being adopted to avoid the lost of ecological function and its service values form impacts.

Keywords: greenhouse gas, functional traits, paddy fields, water-saving irrigation, functional dispersion

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