



琉球大学学術リポジトリ

University of the Ryukyus Repository

| | |
|------------|---|
| Title | Effect of fiddler crabs (<i>Ucca</i> spp.) on soil nutrients and mangrove productivity |
| Author(s) | Mchenga, Islam S.S.; Tsuchiya, Makoto |
| Citation | 琉球大学21世紀プログラム「サンゴ礁島嶼系の生物多様性の総合解析」平成18年度成果発表会 |
| Issue Date | 2007-03-10 |
| URL | http://hdl.handle.net/20.500.12000/669 |
| Rights | |

PE-5 Effect of fiddler crabs (*Ucca* spp.) on soil nutrients and mangrove productivity

Islam S.S. Mchenga and Makoto Tsuchiya

Laboratory of Ecology and Systematics, Faculty of Science, University of the Ryukyus,
Okinawa, Japan

Bioturbation by burrowing macrofauna has a major impact on sediment properties and nutrient cycling. By reworking the soil and facilitating the establishment and growth of seedlings, crabs contributing to mangrove forest growth and production. Despite growing evidence of macrofauna impacts on ecosystem function, there are few replicated and controlled experimental investigations on the impacts of crabs on tree growth and productivity, in particular, in subtropical mangrove forest. A field experiment was conducted to investigate the effects of burrowing crabs (*Uca* spp.) on soil nutrients, growth and productivity of *Kandelia obovata* seedlings at Sashiki bay, southern Japan. Two replicates of 1 m² cages for experimental, control and disturbance treatments, as well as ambient control plots on open flat area and under mangrove canopy were established. Prior to propagule plantation, all crabs and gastropods were removed from the experimental cages, while crabs were maintained in the control cages and ambient plots. A total of nine propagules were planted in each cage, and the conditions of cages were maintained every month. Propagule height increase, number of leaves produced, total organic carbon and nitrogen, inorganic nitrogen (NH₄-N, NO₂-N and NO₃-N) and phosphate (PO₄-P) were measured for a period of six months (June – December 2006) in relation to higher crab activities. We addressed the following questions: (1) Does crab activity affect the nutrient status of mangrove sediments? (2) Does increased nutrient availability by crab activity affect mangrove growth and productivity?

The results show that the presence of crabs reduces toxic ammonia to a more useful nitrogen form (NO₃-N). There were significant effects of control treatments on leaf production, while propagule elongation was considerably higher under the mangrove canopy. The impacts of crabs were also demonstrated by higher above and below-ground biomass and total nitrogen content in propagules grown in ambient control at open flat areas. Increased leaf production could be associated with higher nitrogen detected in the sediments of control treatments during the course of experiment.

To summarize, we found that fiddler crabs significantly influence the nutrient status of mangrove sediments and affect mangrove leaf production more than shoot elongation. The degree of crab impacts on mangrove tree growth might also depend on their density, species behaviour and other area specific sedimentary characteristics. This study elucidates the impacts of fiddler crab on tree growth and productivity and broadens our understanding of the natural regeneration of subtropical mangrove forest.