

Population dynamics and breeding patterns of *Mastomys natalensis* Smith 1932 in irrigated rice in eastern Tanzania

Mulungu, L.S.¹, Ngowo, V.², Mdangi, M.³, Katakweba, A.S.¹, Tesha, P.², Mrosso, F.P.⁴, Mchomvu, M.²

¹Pest Management Centre, Sokoine University of Agriculture, P.O. Box 3110, Morogoro, Tanzania, lothmulungu@yahoo.co.uk

²Rodent Control Centre, Ministry of Agriculture, Food Security and Cooperatives, Morogoro, Tanzania

³MATI-Ilonga, Box 66, Kilosa-Morogoro-Tanzania,

⁴Ilonga Agricultural Research Institute P.O. Box 33 Kilosa, Tanzania

DOI: 10.5073/jka.2011.432.096

Abstract

The population dynamics and breeding patterns of the Multimammate rat, *Mastomys natalensis*, were investigated in irrigated rice cropping systems in eastern Tanzania in 2010/ 2011. Population abundance varied with habitat and crop growth stages. In both rice fields and fallow land, the highest population peak was observed during the dry season from July to October. The results show that *M. natalensis* is sexually active throughout rice cropping season in the study area, although it reaches the highest level at maturity stage of crop growth. Breeding occurred in the dry and wet seasons, and suggests that it was highly influenced by the presence of a rice crop in both seasons. More juvenile individuals were recorded at transplanting stage in each season and few in the subsequent crop growth stages in all habitats. Breeding, therefore, was not seasonal and seemed not to be associated with rainfall patterns. The sex ratio of *M. natalensis* was not skewed to either males or females.

Keywords: breeding, fallow land, population, rice fields

Introduction

In Tanzania, crop production of cereals is increasing. In these cropping systems, rodent pest cause serious losses and widespread food shortage. In 2004, there was an outbreak of *Mastomys natalensis* populations in lowland irrigated rice in Mvomero district, Morogoro region. Also, over the past 5 years, extension agents in rice-growing districts have reported significant rodent problems (pers. comm. Victoria Ngowo, Rodent Control Centre, Morogoro). There is little known about the rodent species, and their population dynamics in irrigated areas where rice is a major crop. The occurrence of rodent outbreaks in Tanzania in mosaic habitats is influenced by the rainfall pattern (Leirs, 1995; Linn, 1991). Rodents breed during the long rains and usually starts one month after the usual peak rainfall, lasting until dry season (Leirs, 1995). Neonates grow slowly and normally do not mature before the next rainy period. Unless abundant rains appear before March and April the following year, they will be at least six months old before they begin to breed (Leirs, 1995). However, if the short rains are abundant, sub-adults mature and may breed as early as January. Neonates in such early breeding seasons grow fast and mature in their third month, starting to breed during the main breeding period. This additional generation allows the development of high densities later in the year (Leirs et al., 1996). This situation, however, could be different in irrigated rice agro-ecosystems.

Material and Methods

Four (70 m x 70 m each) permanent trapping grids in rice field and fallow mosaics were laid out in Hembeti village, Mvomero District at 06°16'S, 37° 31'E. Trapping was conducted from June 2010 to May 2011. Sherman live traps (H.B. Sherman Traps Inc., Tallahassee, FL, USA) were used and were set for three consecutive nights at intervals of four weeks. A single trap was placed at each trapping station making it 49 traps per grid. Traps were baited with peanut butter mixed with maize bran/maize flour and placed afternoon and were inspected in the morning. Captured animals were taken to the field laboratory for processing. Animals were identified to genus or species level, toe clipped for new animals, weighed and reproductive status recorded. They were later released at the station of capture. The data were recorded and entered into a CMR data input program for analysis. Population size was estimated for each 3-day trapping session using the M(h) estimator of the program CAPTURE for a closed population, which allows for individual heterogeneity in trapping probability (White et al., 1982).

Results

Species composition and Discussion: A total of 1520 individual animals belonging to 5 species of rodents and one shrew (*Crocidura sp.*) were captured in a total of 5292 trap nights (28.7% trap success). The rodent species comprised of *M. natalensis*, *Rattus rattus*, *Dasmys sp.*, *Acomys spinnosissimus*, and *Gramomys sp.* *M. natalensis* comprised more than 92% of the total capture.

Rodent population abundance: Temporal variations in population density changes were observed between habitat and crop growth stages. In both rice fields and fallow land, the highest population peak was observed during the dry season from July to October, when >200 animals per ha were captured.

Breeding patterns: Breeding occurred in both the dry and wet seasons, and suggests that it was highly influenced by the presence of a rice crop in both seasons. More juvenile individuals were recorded at transplanting stage in each season and few in the subsequent crop growth stages in all habitats. Breeding, therefore, was not seasonal and seemed not to be associated with rainfall patterns as suggested by Leirs (1995) and Linn (1991) in maize-based cropping systems. The sex ratio of *M. natalensis* was not skewed to either males or females.

Reference

- Leirs H 1995 Population ecology of *Mastomys natalensis* (Smith 1834). Implication for rodent control in East Africa. Agricultural Edition, Belgian Administration for Development Cooperation, Brussels, 35: 1-268.
- Leirs H, Verhagen R, Verheyen W, Mwanjabe P, Mbise T 1996 Forecasting rodent outbreaks in Africa: an ecological basis for *Mastomys* control in Tanzania. *Journal of Applied Ecology* 33: 937-943
- Linn IJ 1991 Influence of 6-methoxybenzoxazolinone and green vegetation on reproduction of *Mastomys coucha*. *South African Journal of Wildlife Research* 21: 33-37
- White GC, Anderson DR, Burnham KP, Otis DL 1982 Capture-recapture and removal methods for sampling closed populations. Los Alamos National Laboratory, Los Alamos, New Mexico