Research Notes

DOES CONTINUOUS REMOVAL OF INDIVIDUALS SEPARATE HIGH- AND LOW-QUALITY RICEFIELD RATS?

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In many open populations of small rodents such as multimammate rats (*Mastomys natalensis*; Mwanjabe and Leirs 1997) and voles (*Microtus* spp.; Krebs et al. 1976, Sullivan 1979), conspecifics rapidly reinvade an area after the removal of residents. Rapid recolonization may act through 2 processes: (1) True dispersers immigrate into the area (Halle 1993). In some small mammal species predominantly juveniles and subadults disperse (Andreassen and Ims 2001, Sullivan et al. 2001), and dispersing red-backed voles (*Clethrionomys gapperi*) can be reproductively inferior to residents (Schieck and Millar 1987). (2) Conspecifics living adjacent to removal areas may occupy the area by expanding their territories (Boutin et al. 1985, Schieck and Millar 1987).

Rapid recolonization can be a major problem for the management of overabundant populations if the removal techniques are short term (Stenseth 1977). Continuous removal of individuals may minimize rapid recolonization, but it could profoundly alter the population's composition and may in fact separate individuals of high quality (breeding adults of good body condition) from individuals of low quality. If residents were removed and immigration occurred quickly, immigrants would be present in the population and create a bias towards individuals of low quality, assuming that immigrants are of low quality (e.g., reproductively inferior or of low body mass). In addition, one would expect a male bias because dispersal in mammals is often biased towards young males (e.g., Bollinger et al. 1993, Clout and Efford 1984, Bollinger et al. 1993).

Trap barrier systems (TBS) were introduced to some Southeast Asian countries for rodent management (Lam 1988, Singleton et al. 1999*a*). A TBS consists of traps associated with a plastic fence, which encloses an early planted lure crop. TBS allow continuous removal of rodents from rice fields from the time the farmers' crop is transplanted to the time it is ripening (Singleton et al. 1999*b*). As with many trapping systems, it is unclear whether residents or dispersers enter the TBS traps and whether the composition of the surrounding populations changes because of the continuous removal of individuals.

If a TBS removed mainly dispersers of low quality and left the resident population intact, the quality of residents near a TBS would be similar to rats in areas without a TBS. If a TBS removed resident rats also, replacement by immigrants may occur and result in the presence of individuals of lower quality in areas near the TBS compared to areas with no TBS.

We used TBS to remove individuals from populations of ricefield rats (*Rattus argentiventer*). Ricefield rats occur throughout Southeast Asia. They are the most common species of rodent in lowland irrigated rice agro-ecosystems in West Java, Indonesia. There, they cause 10–20% pre-harvest damage to rice crops (Geddes 1992). The breeding season of ricefield rats is closely linked to the crop stage (Lam 1983). It starts spatially synchronized about 1–2 weeks before the maximum tillering stage of the rice crop, lasts 7–9 weeks per cropping season, and finishes soon after harvest (Leung et al. 1999). Female ricefield rats are territorial with home ranges of 1–2 ha (Tristiani et al. 2000).

We compared the demographic characteristics of ricefield rats removed with TBS and of residents sampled in areas with and without a TBS to determine whether TBS remove mainly residents or dispersers and whether continuous removal separates high- and low-quality individuals.

Study Area

We conducted our study in lowland irrigated rice crops in Cilamaya, West Java, Indonesia, (6°14′S,

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