Sustainable Technologies to Overcome Pest Rodents in Africa through Science

StopRats

Does biological control work for pest rodents?

Policy Discussion Paper

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Statement of proposition

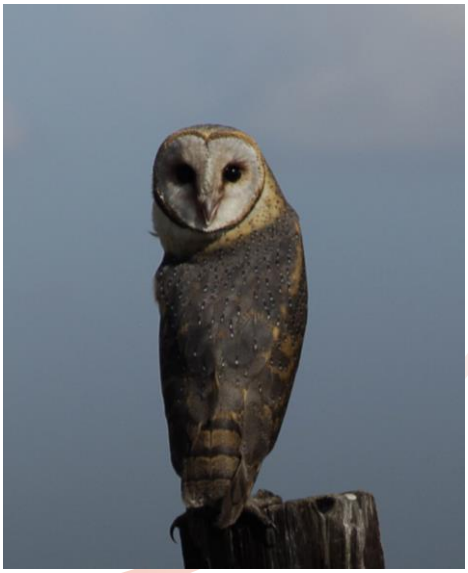
Biological control is a desirable and sustainable method for controlling pest rodents, but has to take into account the ecology of the rodents, the difference between domestic and native predators, and the spatial scale at which control is needed. Biological control on its own is not a solution, but as part of an integrated pest management strategy, it can be effective in contributing to reduced rodent damages.

Explanation

There is a widespread popular acceptance of the view that predators can be effectively used to control pest rodents. This is scale dependent. For example a cat at a home can be visibly observed to feed on rats. However, this process needs to be scaled up to have an effect across a larger area, such as a village. From a theoretical ecology perspective, predators can be expected to maintain pest rodents that do not exhibit large population fluctuations. However, rodents with population irruptions (outbreaks) are not expected to be controlled by predators. It is important to distinguish between domestic predators (such as cats and dogs), and native predators (such as owls, mongooses and snakes) which will be distributed differently in the landscape. From an ecological perspective, it can be expected that a diverse community of predators will have a better impact on pest rodent control.

Evidence

There is published evidence that predators alter the landscape of fear of pest rodents. The presence of predators alters the behaviour of pest rodents at a local scale.[1–3] However, evidence of the effect of predators on controlling population dynamics of pest rodents is less well documented. A study on the impact of Barn Owls in oil palm plantations in Malaysia demonstrated that at a local scale there was a measurable impact on pest prey populations. However, when the owl control was extended to cover multiple oil palm plantations, the effect disappeared. This is most likely due to a decline in prey populations and the subsequent starvation of owls that had no place to disperse.[4–6]



The Barn Owl, *Tytus alba*

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Assumptions and their implications

It is assumed that local communities will work together to ensure the successful use of biological control programmes for managing rodent pest issues. However, many cultures do not tolerate the presence of certain predatory species, most obviously snakes, but even many predatory bird species such as owls are associated with beliefs in witchcraft or bad omens and are often not tolerated.

Counterviews and their implications

- Early adoption of native predators of rodents may be hindered by cultural beliefs
- Domestic cats can impact on disease transmission, e.g. toxoplasmosis, a disease which can adversely affect foetal development during pregnancy and individuals who are immuno-compromised.
- Snakes should not be persecuted, they will contribute to rodent management
- Small wild carnivores such as genets and mongooses can have negative impacts on native local fauna when introduced to new areas, particularly islands and forest blocks
- General public education to raise awareness can be complicated across cultures, particularly associated with owls and snakes. Policy and education programmes need to be moulded to fit local cultural norms

References

1. Vibe-Petersen et al. Effects of predation and dispersal on M*astomys natalensis* population dynamics in Tanzanian maize fields. *J. Anim. Ecol.* **75,** 213–220 (2006).
2. Labuschagne et al. Are avian predators effective biological control agents for rodent pest management in agricultural systems? *Biol. Control* **101,** 94–102 (2016).
3. Mohr et al. Foraging of multimammate mice, *Mastomys natalensis*, under different predation pressure: cover, patch-dependent decisions and density-dependent GUDs. *Oikos* **100,** 459–468 (2003).
4. Wood et al. A critical review of the development of rat control in Malaysian agriculture since the 1960s. *Crop Prot.* **22,** 445–461 (2003).
5. Kross et al. Agricultural land use, barn owl diet, and vertebrate pest control implications. *Agric. Ecosyst. Environ.* **223,** 167–174 (2016).
6. Puan et al. Absence of Differential Predation on Rats by Malaysian Barn Owls in Oil Palm Plantations. *J. Raptor Res.* **45,** 71–78 (2011).

The common genet *Genetta genetta*

The yellow mongoose *Cynictis penicillata*

StopRats is a project funded by the European Union through the African, Caribbean and Pacific Science and Technology Programme. The project is about rodent pests and the damage they cause in crop production, the loss and contamination of stored food after harvest and the many health problems inflicted on people and domestic animals through the transmission of rodent-borne diseases. StopRats is officially led and managed by Professor Steven Belmain from the Natural Resources Institute of the University of Greenwich, United Kingdom and involves the following partner organisations: Sokoine University of Agriculture, Tanzania; University of Swaziland; University of Namibia; University of Venda, South Africa; Agricultural Research Council – Plant Protection Research Institute, South Africa; the Vahatra Association, Madagascar and Concern Worldwide, Sierra Leone. More about the project can be obtained by contacting the project leader, Prof Steven Belmain via Email: s.r.belmain@gre.ac.uk and through the project website http://projects.nri.org/stoprats More about the ACP S&T programme can be found at http://www.acp-hestr.eu

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