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FOOD PREFERENCE AND THE EFFECT OF PREDATOR CUES ON THE FORAGING BEHAVIOUR OF HOUSE RAT (*Rattus tanezumi*)

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ABSTRACT

The House Rat (*Rattus tanezumi*) is a major pest in the agriculture and food industry, a carrier of zoonotic diseases, and a source of nuisance to society. Poisoning is not an ecologically desirable method to control the rat population due to its effect on non-target animals. This article reported on the use of predator cues to control the rat's foraging behavior. Food preference for sugarcane, corn, oil palm fruit, and young coconut flesh was determined first using a modified "cafeteria method" with a central cage connected to four feeding stations by PVC tubes. Then the effect of predator cues (3-D model and call of an owl, a combination of model and call and no predator cue as control) on foraging behavior was tested by manipulating these cues near the feeding station. Giving up density (GUD), which is the amount of food remaining at the feeding stations, was measured in both experimental phases. Treatment means were analyzed using ANOVA and compared using the Tukey test. The finding showed that House Rats preferred young coconut flesh over other test foods. All predator cues increased GUD significantly ($p<0.01$) but the 3-D model was the most effective. This study suggests a potential use of predator cues to control rat pest.

Key words: House rat (*Rattus tanezumi)*, visual cue, auditory cue, giving-up density (GUD), foraging behavior

INTRODUCTION

Rodent, with 2,552 species worldwide (Burgin *et al.,* 2018), is the most diverse and successful mammalian group in the world. They play various ecological roles such as seed dispersal, assisting in nutrient cycling through faecal deposition (Pimsai *et al.,* 2014) as well as being an important prey base for many predator species (Witmer, 2004). Rats are also a major pest of crops by competing for food with humans and livestock leading to significant economic loss (Singleton, 2003; Stenseth *et al.,* 2003; Rehman *et al.,* 2019). A study in Indonesia estimated that every 1% increase in tiller damage by rats translates to 58 kg/ha loss in rice yield (Singleton *et al.,* 2005). *Rattus tiomanicus* attacked oil palm at all stages of growth, causing 5 – 30% damage to fruits and 7 – 10% of the palms (Wood & Chung, 2003). Wood and Chung, (2003) estimated damage due to rats ranged from USD48-288/ha, depending on the price of palm oil. Meanwhile, the close association of some murids with a human has brought health concern of zoonotic diseases (Himsworth *et al.,* 2013; Kosoy *et al.,* 2015; Strand & Lundkvist, 2019; Modlinska & Pisula, 2020).

Methods of managing the rat population have included trapping, poisoning, and biological control. Poisons such as anticoagulant rodenticides have been used successfully to control the rat population in agricultural areas (Wood & Chung, 2003; Atta *et al.,* 2018) but there is evidence that rats are developing some resistance to them (Lam, 1982; Quy *et al.,* 1995; Andru *et al.,* 2013; Strand & Lundkvist, 2019). The use of poison is ecologically inappropriate and undesirable due to its secondary effect on non-target animals (Howald *et al.,* 1999; Serieys *et al.,* 2019). The barn owl has been used to control the rat population in rice fields and oil palm plantations in Malaysia (Hafidzi &

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