

Oil palm is an important commodity crop in Malaysia, providing numerous opportunities and societal benefits to rural communities while contributing significantly to the country's economic growth (Parveez *et al.*, 2023). In 2022 Malaysia's total oil palm planted area was estimated at 5.67 million hectares, accounting for more than 60% of the country's agricultural area (Parveez *et al.*, 2023).

However, oil palm plantations are susceptible to a variety of vertebrate and invertebrate pests, including bagworm, nettle caterpillar, rhinoceros beetle, bunch moth, rodents, and termites (Tuck *et al.*, 2011; Wahid *et al.*, 2003). It is estimated that rodents alone account for 5% of crude oil losses (Wahid *et al.*, 2003; Wood and Fee, 2003). If not effectively managed, the number of rats in an oil palm plantation could reach 1500 per hectare (Salim *et al.*, 2021).

To control rodent infestation, some plantations employ a combination of chemical pesticides and biological agents, most notably barn owls (*Tyto alba*) as the biological control (Zainal-Abidin *et al.*, 2022). Chemical pesticides generally have a toxic effect on natural rodent predators via secondary or tertiary poisoning caused by long-term bioaccumulation (Serieys *et al.*, 2019). Thus, a nature-based alternative is recommended to reduce the use of synthetic agents. In this regard, increasing the presence of other predatory birds as biological control for rodent infestations is critical for the oil palm industry's long-term sustainable endeavour.

THE TECHNOLOGY

This service provides consultation on pest control techniques in agricultural areas, with a special focus on rodent pest control, utilising a biological control method. The process starts with the

identification of potential species of birds on the plantation, followed by the installation of suitable artificial hunting perches. The purpose for these artificial hunting perches in agricultural areas is to establish permanent structures that serve as perching spots for predatory birds engaged in hunting for prey (Figure 1). The presence of this structure has proven to successfully increase the number of native (*i.e.*, diurnal and nocturnal) predatory bird species in the oil palm ecosystem which also contributes to rodent pest control.

In most oil palm ecosystems, predatory birds typically perch on dead oil palm trunks, stacked fronds, and oil palm fronds while hunting for prey. However, these natural structures present some challenges, such as their limitation in numbers (*e.g.*, dead oil palm trunk), proximity to prey (*e.g.*, stacking frond), and obstruction of view and movement (*e.g.*, oil palm frond). The presence of artificial hunting perches in the oil palm ecosystem can mitigate these issues.

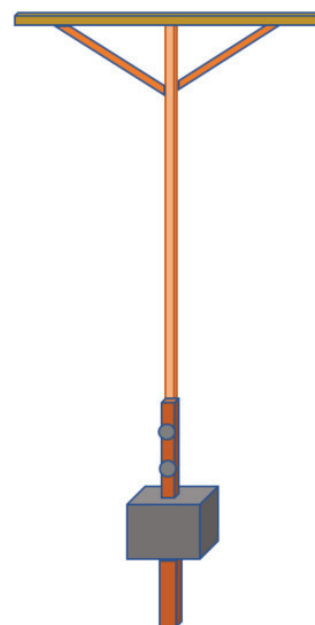


Figure 1. Schematic diagram of an artificial hunting perch.

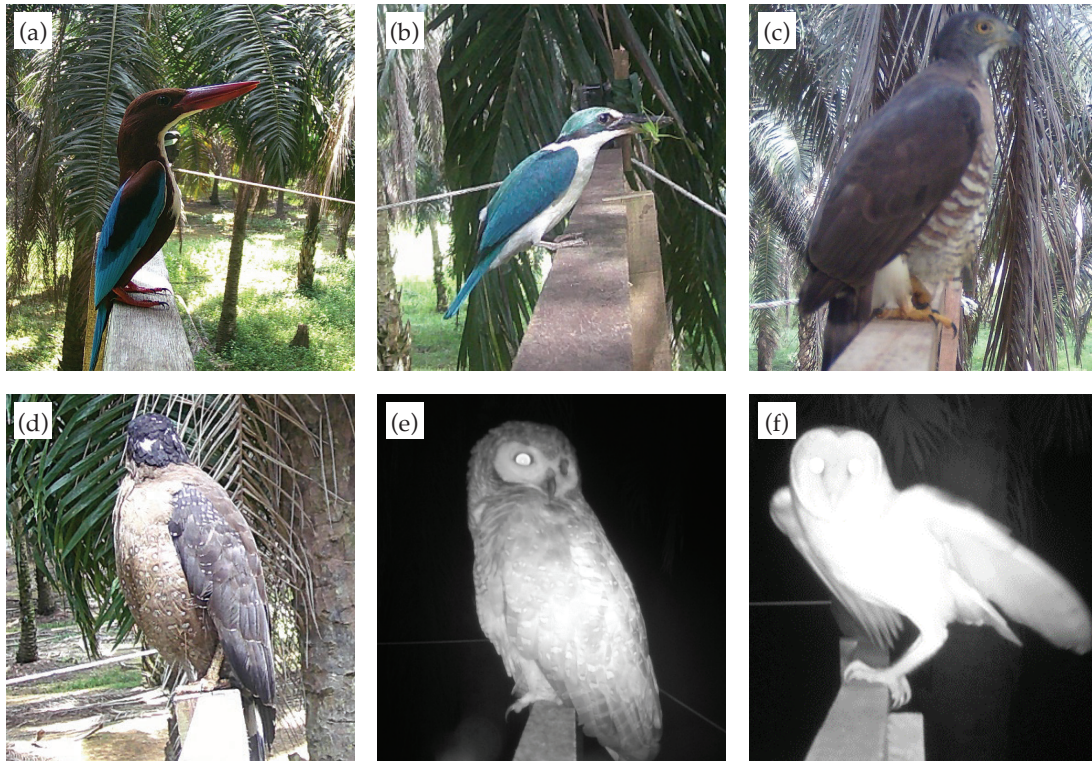


Figure 2. (a) White-throated Kingfisher; (b) Collared Kingfisher; (c) Crested Goshawk; (d) Crested Serpent-Eagle; (e) Spotted Wood-Owl and (f) barn owl.

The native diurnal and nocturnal predatory birds include the White-throated Kingfisher, Collared Kingfisher, Crested Serpent-Eagle, Crested Goshawk, Spotted Wood-Owl, and barn owl (Figure 2) were seen to have used this structure.

NOVELTIES

- Installation of artificial hunting perches can effectively encourage the presence of diurnal and nocturnal predatory birds, offering biodiversity-friendly alternative to chemical pesticides for rodent pest control.
- Oil palm growers need not rely solely on chemical pesticides to control rodent pests. Aside from cost saving, long-term use of chemical pesticides should be avoided as it causes pesticide resistance and loss of non-targeted fauna (e.g., predatory birds).

BENEFITS AND ADVANTAGES

- Increased hunting success by local farmland birds against oil palm pests (e.g., barn owl = 1000-3000 rats per year), especially rodent pests, particularly during the day;
- Using other species of birds of prey, such as the White-throated Kingfisher, which has the ability to control rodent pest populations as early as the juvenile stage by hunting directly at the pest nest;

- Reduce dependency on chemical pesticides that have adverse effects on biodiversity;
- Less use of chemical pesticides reduces GHG emissions along the supply chain; and
- The technology can also be applied at the nursery, for cash crops and oil palm plantation boundaries.

SERVICE CHARGE

The service charge for this consultation is RM 80 per hectare plantation.

IMPACT

The agriculture sector in this country, particularly oil palm cultivation, will become more sustainable with less use of chemical pesticides. The harmful effects of long-term use of chemical pesticide on workers and the environment can be reduced.

CONCLUSION

In line with our efforts to introduce nature-based solutions, the installation of artificial hunting perches can improve the ecosystem services for biological rodent pest control in oil palm plantations. It is technically and economically viable to be implemented.

REFERENCES

- Parveez, G K A; Rasid, O A; Ahmad, M N; Taib, H M; Bakri, M A M; Hafid, S. A; Tuan Ismail, T N M; Loh, S K; Abdullah, M O; Zakaria, K and Idris, Z (2023). Oil palm economic performance in Malaysia and R&D progress in 2022. *J. Oil Palm Res.*, 35(2): 193-216.
- Salim, H; Zainal-Abidin, C M R and Hamid, N H (2021). Tikus perosak di ladang sawit. *Musuh Perosak Tanaman Kelapa Sawit* (Salim, H; Hamid, N H and Ahmad, A H eds.). FGV R&D Sdn. Bhd., Malaysia. p 75-98.
- Serieys, L E K; Bishop, J; Okes, N; Broadfield, J; Winterton, D J; Poppenga, R H; Viljoen, S; Wayne, R K and O'Riain, M J (2019). Widespread anticoagulant poison exposure in predators in a rapidly growing South African city. *Sci. Total Environ.*, 666: 581-590.
- Tuck, H C; Ibrahim, Y and Chong, K K (2011). Infestations by the bagworms *Metisa plana* and *Pteroma pendula* for the period 1986-2000 in major oil palm estates managed by Golden Hope Plantation Berhad in Peninsular Malaysia. *J. Oil Palm Res.*, 23: 1040-1050.
- Wahid, M B; Kamarudin, N; Abu Seman, I; Darus, A; Sundram, S; Moslim, R and Ahmad Ali, S R (2003). *Handbook of Pests and Diseases of Oil Palm*. MPOB, Bangi. 113 pp.
- Wood, B J and Fee, C G (2003). A critical review of the development of rat control in Malaysian agriculture since the 1960s. *J. Crop Prot.*, 22(3): 445-461.
- Zainal-Abidin, C M R; Mohd-Noor, H; Hamid, N H; Raqvindran, S; Puan, C L; Kasim, A and Salim, H (2022). Comparison of effectiveness of introduced barn owls, *Tyto alba javanica*, and rodenticide treatments on rat control in oil palm plantations. *J. Pest Sci.*, 95: 1009-1022.

For more information, kindly contact:

Head of Innovation Commercialisation Center, MPOB
6 Persiaran Institusi, Bandar Baru Bangi,
43000 Kajang, Selangor, Malaysia
Tel: 03-8769 4574
Fax: 03-8926 1337
E-mail: tot@mpob.gov.my
www.mpob.gov.my