

THE BARN OWL

Secret weapon in the fight against rodents



A recent study by **Lushka Labuschagne** of the Centre for Wildlife Management at the University of Pretoria suggests that barn owls can provide effective control of gerbils on cropland in North West.

Rodents are recognised worldwide for the damage they cause to agricultural crops. This can be direct (feeding on crops) or indirect (spoilage, contamination and hoarding during on-farm and post-harvest phases).

Although rodent pest control methods are diverse, management tends to rely on the use of rodenticides. The misuse of such substances can result in environmental damage, however. This has led to **ecologically-based rodent management (EBRM)**, a balanced approach to optimise crop production based on the ecology of pest species.

Natural predation forms an integral part of the EBRM approach, with predator attraction probably being one of the oldest methods in

biological pest control. One of the better-known and more successful ecologically based rodent management programmes was launched in Israel in the 1980s.

THE BARN OWL: PROVEN RODENT PREDATOR

In numerous studies worldwide, the barn owl (*Tyto alba*) has been confirmed as a highly versatile avian predator in biological rodent pest management schemes. Barn owls are amongst the most widely distributed bird species in the world and are found in a variety of habitats, many of which are associated with human settlements and agricultural practices.

Barn owls are known as resident species; they do not abandon

ABOVE: A number of studies conducted worldwide suggest that the barn owl can assist in eliminating rodent pests. PHOTOS BY LUSHKA LABUSCHAGNE



COURTESY OF LUSHKA LABUSCHAGNE

LUSHKA LABUSCHAGNE

a specific area unless presented with highly unfavourable conditions such as lack of food resources. They display minimal territoriality, with home ranges generally overlapping. They are also versatile in selecting nesting sites and have been recorded as preferring man-made structures for breeding.

Unlike most avian predators, these owls display the so-called r-selected breeding strategy, with larger brood sizes more than once per year and early maturation.

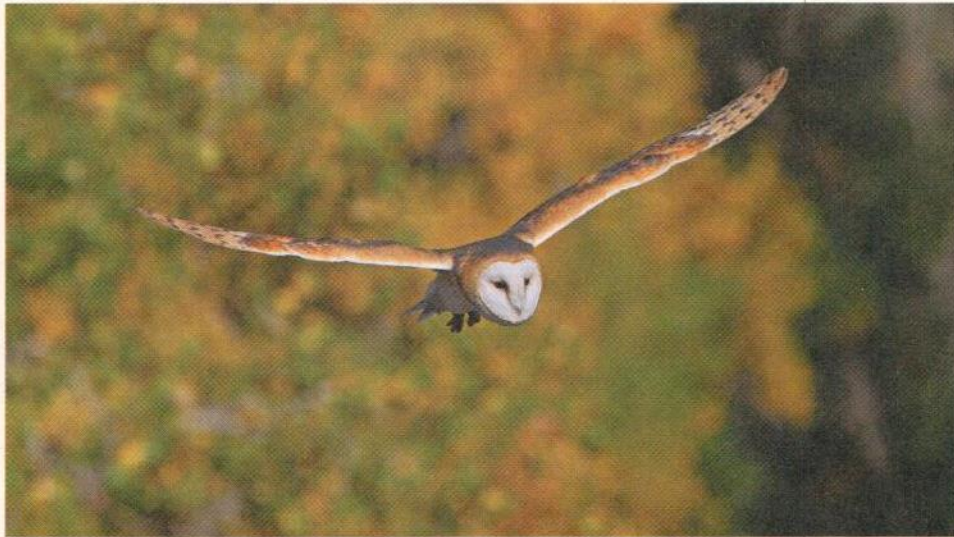
(K-selection involves the opposite: smaller broods and late maturation.)

Rodents are the barn owl's main prey source. Due to their high metabolic weight, these owls are able to consume up to a quarter of their body weight each night. In natural environments, the weight of an adult male barn owl ranges from about 250g to 350g and of an adult female from 320g and 480g. This amounts to prey weight averages of between 60g and 120g daily.

OTTOSDAL OWL STUDY

A recent study conducted over nine months in the Ottosdal district in North West assessed the effectiveness of barn owls in the control of agricultural rodent pests. Rodents of the genus *Gerbilliscus* (*springhaasrotte*) are regarded as the primary pest of maize crops in the region.

The reproductive success (breeding rate and chick survival rate) of 10 breeding pairs of barn



owls was monitored to determine whether the birds were successful breeders within the agricultural matrix.

An occupancy modelling framework was used to determine the rate at which barn owls occupied the area (900km²), and which factors might influence these occupancy rates.

The rodent species most fed upon by the owls was determined in order to confirm that the birds were feeding on the primary rodent pests.

FINDINGS

The 10 breeding pairs constantly occupied the nests during the nine months of monitoring. All had a high reproduction rate and the majority bred twice within the study period. Breeding followed a seasonal trend, with most hatchlings being recorded one or two months after the highest rainfall occurrence (March and April). This is thought to correlate with the seasonal breeding of rodent prey populations. Occupancy rate was consistent within the region, suggesting that no owls abandoned



the area at any time. However, there were more owl sightings in the wet season than in the dry season. This is thought to be related to the owls' and the rodent prey reproduction patterns.

THE BARN OWL CAN CONSUME UP TO 25% OF ITS BODYWEIGHT EACH NIGHT, WITH RODENTS BEING THE MAIN PREY SOURCE

The owls' diet consisted mainly of two rodent species: *Mastomys* spp. (the multimammate mouse) and *Gerbilliscus leucogaster* (the Bushveld gerbil). The latter, which primarily inhabits cropland, is recognised as the main rodent pest species in the area

and was preyed upon primarily in the wet season. *Mastomys* was preyed upon during the dry season, when *Gerbilliscus* numbers are known to decline. These results point to opportunistic feeding

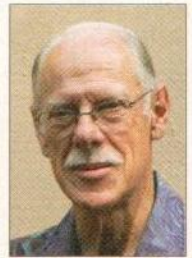
patterns that may enable the birds to reside and probably breed in the given area.

The average weight for the primary rodent pest species *G. leucogaster* was 65g, suggesting that an owl in the Ottosdal district might consume one

BIO MONITOR

Caterpillars bypass maize defence

Some 400 000 plant-eating insect species feed on 300 000 plant species. The interaction between insects and plants involves chemical signals from both parties, and deposited material from insects may affect plant response.



WYNAND VAN DER WALT

Recent US research into the chemical interaction between maize plants and the fall armyworm (*Spodoptera frugiperda*) has produced interesting results.

Maize defence systems are largely ineffective against this pest. Now scientists have found the reason for this: chemicals in caterpillar excreta dropped into leaf whorls. Researchers at Pennsylvania State University investigated the chemical composition of caterpillar faeces, which is a mix of chewed leaf material, insect material and associated microbial material, and debris. This so-called frass falls into leaf whorls and where the leaf attaches to the stalk, presenting a base for microbes to flourish.

Investigation showed that leaf wounds caused by feeding caterpillars trigger a plant's defence chemical synthesis, but the defence then moves to counteracting pathogens growing in the frass. The host maize plant now has to counter both feeding insects and fungal infection, where the latter defence requires different plant protein production. This conclusion was reinforced by results from a study where leaf blight fungal spores were used to infect leaves, resulting in uninterrupted caterpillar feeding.

Plans are underway to isolate and test specific protein components of frass as potential bio-pesticide sprays or boost maize inherent resistance by incorporating the genes for these proteins into maize genetics.

- Sources: Pennsylvania State University News; J. Chem. Ecol., Sept 2015.
- Email Wynand van der Walt at farmersweekly@caxton.co.za with 'Biomonitor' in the subject line. ■FW

TOP:

The barn owl, of which there are about 30 subspecies, occurs worldwide. Its diet varies somewhat depending on prey availability, but rodents generally predominate, making them allies of farmers everywhere. FOTOLIO

ABOVE:

Barn owl chicks in a breeding nest box in the Ottosdal district in North West.

to two rodents per night. Collectively, the 10 owl nests (20 individuals) are thus able to consume 14 600 rodents per year. This excludes rodents preyed upon by the chicks.

Preliminary results show that barn owls may be useful in controlling agricultural pests in the Ottosdal district, because the population:

- is able to rapidly respond to increasing prey abundance;
- displays constant occupancy rates;
- feeds largely on the main agricultural pests species.

However, as nesting sites are limited in the area, the supplementation of properly constructed nest boxes, placed appropriately, may increase barn owl densities.

SIMILAR STUDIES ELSEWHERE

Numerous studies have indicated that nest box provisioning is a successful tool in enhancing barn owl population numbers. This is evident in Malaysia, where erected nest boxes, for the purposes of biological control were 80% occupied within a year. Results from a similar study on barn owl nest box occupancy in wheat



ABOVE: The gerbil is the primary rodent pest in the Ottosdal district in North West.

occupied nests has been recorded as close as 20m and as far as several kilometres, depending on prey availability.

HOW TO AVOID A POPULATION 'CRASH'

The Ottosdal study was unable to establish definitive guidelines for the placing of nest boxes. Environment or habitat type, in other words, made little difference to occupancy rates.

RIGHT: A barn owl with its gerbil prey.



STUDIES INDICATE THAT NEST BOXES COULD ENHANCE BARN OWL POPULATION NUMBERS

crop areas in the Western Cape concluded that one box/25ha would be a sufficient density, taking into consideration fluctuations in owl population numbers according to changes in prey abundance. However, this nest box density is by no means a hard and fast figure; different rodent densities require different nest box densities. The distance between

The only factor that seemed to have a strong influence on occupancy rates and breeding was food availability.

Croplands have been recorded as acting as potential 'ecological traps', with nest occupancy and breeding commencing pre-harvest (when ample prey resources are available), but extending until after crop harvest (when prey population

numbers tend to decline due to lack of food). Often, this leads to an owl population 'crash'.

In such a case, where rodent abundances are known to drastically decline in croplands after harvesting, ensuring that there are patches of indigenous vegetation on the farm may be the solution. These patches will contain other rodent

communities that may provide an alternative and stable prey source to barn owls until the gerbil population swells once more.

• For a detailed description on how to construct proper wooden nest boxes, visit www.scvas.org/pdf/cbrp/BuildingBarnOwlBoxes.pdf.
• Email Lushka Labuschagne at lushka.labuschagne@gmail.com. ■FW

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ISSN 0041846X

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