USING BARN OWLS (Tyto alba erlangeri) FOR BIOLOGICAL PEST CONTROL IN ISRAEL

by

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Introduction

Agricultural pests come in all forms, but worldwide it is small mammals, mostly rodents, that are responsible for the destruction of about 35% of the total world agriculture. To combat rodents, farmers use rodenticides. However, these pesticides are relatively ineffective as they are short-lived and have to be re-applied frequently. Moreover, rodents become bait shy after their use. In addition to being ineffective, rodenticides destroy ecosystems, poison the soil and water systems and have secondary health effects on humans and wildlife. An environmentally friendly approach to agricultural management practices will help to alleviate these problems and create a sustainable environment for both humans and wildlife. As an alternative to rodenticides, Barn Owls have been used as pest control agents of rodents since 1982, and even earlier in Malaysia. Predation upon rodents by these natural nocturnal predators substantially decreases rodent numbers, thus lowering crop damage and eliminating the need for less benign methods.

During the late 1960’s, hundreds of birds of prey (some of them threatened and endangered species) were killed throughout Israel from secondary poisoning after eating rodents that had been poisoned with rodenticides. Israel is an important migration route for these birds, with 500 million individuals passing through the country twice yearly.

In the 1980’s a conservation plan was devised to try and reduce the use of rodenticides and instead, use birds of prey as part of biological pest control. Barn Owl nesting boxes were erected in 1982 at Kibbutz Neot Mordechai in the Hula Valley, in the hope of creating a Barn Owl population that could control the rodent populations. Unfortunately, after a short time, rodenticides were reintroduced to the fields, killing the Barn Owls and causing the project to be abandoned.

A year later, Kibbutz Sde-Eliyahu, located in the Great Rift Valley, 7 km. from the city of Beit Shean, 30 km. south of the Lake of Galilee, was chosen as the replacement for Neot Mordechai, due to its better environmental awareness and support of nature conservation. 14 Barn Owl nesting boxes and hunting perches were erected in strategic locations in and around the fields and plantations in order to establish stable Barn Owl populations. During the first couple of years there were many ups and downs. The first nest box design came from Europe and did not supply enough ventilation for the 40 deg.C. summers of the Beit Shean Valley. However, within a couple of years and after a few improvements to the nest box designs, a population of Barn Owls was formed which is still thriving to this day. The project is based on the erection of large numbers of nest boxes in farmland (typically spaced at 200 – 400 metre intervals), a decrease in the use of pesticides, and creating a friendly environment for raptors in general. After integrating this project into first organic, then non-organic farming practices, other farmers started placing nest boxes within the Valley, and
later in other parts of Israel. In Israel it is mostly Barn Owl boxes which are erected in agricultural areas as we do not wish to create artificially high predator populations which might alter the ecology of natural habitats. However, to date, after switching from rodenticides to Barn Owls as a control measure, other wildlife species (e.g. Kestrels), some of which also prey upon agricultural pest species, have also reaped the benefits of the reduced rodenticide use and population numbers have increased to their normal levels.

**ISRAEL NATIONAL POLICY**

Currently there are an estimated 1,000 Barn Owl nest boxes placed in 7 main regions of Israel, with plans to increase the size of the project to other locations in the future. In the past, the majority of the project was carried out by the farmers themselves with little scientific influence, little analyzing of the breeding data, and little scientific publication of data. Of those nest boxes almost 90% were erected by the farmers for the purpose of biological pest control of rodents in their fields, with only c.10% being erected by conservationists and researchers. By monitoring the boxes using standardized methods, information will now be gathered in order to increase the efficiency (nest box placement, etc.) of the applied pest control project.

In order to expand this project throughout the whole of Israel and increase the success of and coordination of existing nest boxes, a pilot national biological pest control scheme was started during the 2007 breeding season, and hopefully a larger scale project will be established and implemented during the 2008 breeding season.

This project will be funded by the Baracha Foundation with (hopefully!) matching funding from the Israeli Ministry of Agriculture and Ministry of Environment Protection – all of which will be needed in order to carry out the necessary large scale national monitoring of the scheme.

The project will involve national coordinators to monitor the farming activities and carry out scientific research, rodent population monitoring, and educational activities. The country has been split into multiple regions to facilitate this and each will have its own regional coordinators. Monitoring methods include standardized nest box monitoring, ringing of owlets and adults, rodent monitoring and pellet analyses. Unlike similar monitoring programmes in Europe, volunteers are hard to find in Israel, and only people holding special permits from the Nature & Parks Authority are allowed to monitor nest boxes (mainly ringers). The project therefore relies on paid ringers for monitoring. Without paying the ringers, only a small proportion of the boxes would be checked each year.

**DIFFERENCES BETWEEN BARN OWLS LIVING IN ISRAEL & THE UK**

In the UK and Europe, Barn Owl populations normally rely on just a few rodent species, mainly voles, as prey. Their numbers therefore tend to fluctuate annually, depending upon the current state of the vole cycles in their area. However, when voles become largely unavailable, they can become opportunistic hunters if necessary. This is not the case in Israel where three species of rodent are commonly found in agricultural areas all the year round and are frequently hunted by Barn Owls. These are the **Levant Vole** (*Microtus socialis guentheri*), **House Mouse** (*Mus musculus*) and **Tristram’s Jird** (*Meriones tristrami tristrami*). In regions where Levant Voles are common, they are the main prey, but where they are absent (as they are in certain crops) the other two species become the main prey.
This means that during every year and every season the Barn Owls have at least one rodent species available in high numbers, and in addition have a lot of alternative prey such as shrew species (comprising c.5% of the diet), Black Rats (*Rattus rattus rattus*) (c.3%) and birds. Most studies of Barn Owl diets in Israel found that rodents, mostly pest species, make up more than 90% of the prey. That said, in some areas with extremely high densities of Barn Owls, birds comprised c.30% of the diet for some pairs breeding in villages less than 300 metres from agricultural fields. It is thought that this might be due to intense competition with Barn Owls breeding in the fields themselves, plus the high densities of song birds and doves roosting close to their nests, thus becoming easily available.

Not surprisingly, even Israel’s worst winters involve just rain, and would simply be regarded as fair autumn weather in Europe! This means that Israel’s Barn Owls and rodents do not have to face the problems of harsh winter weather and snow cover as they do in Europe.

Unlike UK and other European nest box schemes where boxes are usually erected at widely spaced intervals, in Israel they are placed at high density levels, sometimes as close as 30 metres from each other. In some fields there can be as many as 20 boxes spread 150 metres apart – of which around 50% are occupied by Barn Owls each year! For example, the region with most nest boxes, Beit Shean Valley, has 300 nest boxes in 90 km.sq. During 2002 – 2007, 48%-74% of these were occupied (144 – 222 pairs yearly). In addition to nest boxes, another 30 – 40 pairs breed in empty man-made structures and date palms within villages, meaning that there may be as many as 260 breeding pairs breeding in 90 km.sq. at times. Since it is intended to erect even more nest boxes in the future, it is possible that the number of breeding pairs might eventually increase even beyond this figure.

An added advantage of this density is that Israeli researchers are able to monitor around 30 – 60 boxes daily – a figure which would be almost impossible for UK workers where the distances between nest boxes are much greater. The actual number of boxes checked each day of course depends a great deal on how many are occupied (time taken to ring owlets and adults captured at the nest, etc.), rather than the actual distance between boxes, which is almost never more than 1 km.

**COOPERATION**

Birds of course “know no boundaries” and Israel’s raptors, including Barn Owls, move regularly into Jordan and Palestine where they are at risk of secondary poisoning and hunting. Even in Israel which has extensive laws concerning the use of pesticides, meaningful enforcement and regulation is sorely lacking, but unfortunately the situation in Palestine and Jordan is much worse. In these countries law enforcement and regulations are totally inadequate. Hunting and poisoning are of course significant causes of raptor population declines throughout the world, but are especially apparent in the Middle East. Illegal hunting of birds of prey is widespread in this region, especially in Jordan and some areas of Palestine because owls are considered ‘bad omens’ by many Muslim people. In addition to hunting, secondary poisoning from pesticides and rodenticides is also an important factor within all countries. Thus, an important goal of our Barn Owl Project is to raise public awareness about the usefulness of raptors and the benefits of environmentally friendly agricultural practices.

Since 2002 the Jewish Community Federation of Cleveland has funded a project involving both Jordan and Israel, and as part of this nest boxes were erected for the first time in Jordan.
in 2005. Of the 22 boxes erected, a total of 5 breeding attempts were recorded during the 2006 and 2007 breeding seasons. Preliminary studies of the diet of Barn Owls in Irbid showed that Jordanian Barn Owls (the same subspecies as Israel, i.e. *erlangeri*) preyed on 91% rodents. Unfortunately, due to their long held superstitions and beliefs, Jordanian farmers were initially worried about having Barn Owls on their farms. However, after the success of the first two years those farmers who had erected nest boxes were soon asking for more, and new farmers were also requesting boxes! The project will therefore be expanded during the 2008 breeding season in both Jordan and the Palestine Authority as part of the US-AID MERC research project in collaboration with Israel. This work will aim to demonstrate how owls, rather than bringing bad luck and even death to communities, can actually benefit farmers. Educational campaigns will be run in conjunction with the fieldwork to target local communities and show them the benefits of owls and Kestrels. The basic hypothesis being that naturally occurring wildlife can be managed in such a way as to control agricultural pests, limit the use of pesticides and benefit farmers economically.

**EDUCATION**

Posters and leaflets written in Arabic and Hebrew have already been produced in Israel and distributed to local farmers, decision makers and the broader public. As part of the Cleveland project, a poster produced in Israel has been translated into Arabic for distribution in Jordan, but the text makes no reference to Israel in order to decrease possible friction with the local residents.

**SUMMARY**

Once farmers grasp the concept that their ‘winged’ neighbours can help to solve rodent damage if they stop using poisons, Barn Owls and Kestrels will be able to rise to the occasion and control rodents. By living in harmony, both farmers and these birds will be able to benefit from living in co-existence. As we are just beginning to understand the power of nature we realise its many economic benefits, even in modern times. As Barn Owls and Kestrels truly know no boundaries, they not only solve economic problems, but are also bringing peoples together. Something that is very much needed in the Middle East.

**ACKNOWLEDGEMENTS**

This project is a joint venture led by the International Centre for the Study of Bird Migration at Latrun, Tel Aviv University, the Israel Ornithology Center, Israel Society for the Protection of Nature, and the Ministry of Agriculture and Ministry of Environmental Protection. The project is run on a very small budget and is always searching for additional funds. Any donations are always helpful and will help to keep the project alive. Anyone interested in donating to the project can contact the author via the World Owl Trust office.