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# A cross-sectional study on knowledge, attitude and practices related to owls in central Punjab, Pakistan

Ghulam Mustafa Rashid[1*], Mirza Habib Ali[3], Abida Butt[2] & Abdul Qadir[3]

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**Abstract** Owls are considered as dominant predators for control of rats and mice population in agricultural fields and presently their populations are continuously declining in Punjab, Pakistan. The present study was aimed to assess the knowledge and attitude of people of rural and urban areas about the declining trend of owls. During this survey, more than 1600 people were asked to collect information regarding the owl populations from six localities including Faisalabad, Sialkot, Jhang, Lahore and Bahawalnagar. Four parameters were the major part of the questionnaire: familiarity, misconceptions, awareness about owls and their acceptance as a biological controlling agent. The results revealed that about 95% of people were familiar with owls in the agro-ecosystem. Only 15.6% of people thought that owls should be eliminated; 23.0% were of the opinion that owl's presence in a locality leads to ruination; 33.3% agreed that the owls presence was a sign of bad omen; 41.8% considered them as signs of foolishness; 47.0% believed that owl's body parts were used for black magic purposes. In contrast, 50% of people acknowledged that owls are beneficial to humans; 60.3% knew that owls are the enemies of rodents, 67.7% agreed that they are suppressors of rats and mice and 63.8% agreed that artificial nest boxes can serve as their nests and roosts. It was encouraging to know that 74.8% showed their willingness to enhance the owl's population on their farms, and 74.0% were willing to permit the installation of nest boxes in or near the villages. The study of attitudes of respondents towards owl will help to develop an effective conservation strategy and to boost owl's population in croplands for biological control of rats and mice.

Keywords: awareness, biological control, familiarity, misconceptions, owls, survey

**Összefoglalás** A baglyokat a mezőgazdasági területek domináns ragadozóiként tartják számon, mint a patkányok és egerek populációjának szabályozói. Állományuk folyamatosan csökken a pakisztáni Pandzsábban. Jelen tanulmány célja a vidéki és városi térségekben élők tudásának és hozzáállásának értékelése volt a baglyok számának csökkenésével kapcsolatosan. A felmérés során több mint 1600 embert kértek fel, hogy gyűjtsenek információkat a bagolypopulációkról hat helységből, beleértve Faisalabad, Sialkot, Jhang, Lahore és Bahawalnagar településeket. A kérdőív fő részét négy paraméter adta: az ismertség, a tévhitek, a baglyokkal kapcsolatos tudatosság, valamint a baglyok biológiai szabályozó szervezetként történő elfogadása. Az eredményekből kiderült, hogy az emberek körülbelül 95%-a ismerte a baglyok szerepét az agro-ökoszisztémában. Az emberek csupán 15,6%-a gondolta úgy, hogy a baglyokat el kell távolítani a területről; 23,0%-uk véleménye szerint a baglyok jelenléte egy településen annak tönkremeneteléhez vezet; 33,3% egyetértett abban, hogy a baglyok jelenléte rossz előjel; 41,8% az ostobaság jeleinek tartotta őket; 47,0% úgy vélte, hogy a baglyok testrészeit fekete mágia céljára használták. Ezzel szemben az emberek 50%-a elismerte, hogy a baglyok hasznosak az ember számára; 60,3% tudta, hogy azok a rágcsálók ellenségei, 67,7%-uk egyetértett abban, hogy a baglyok szabályozzák a patkányok és egerek populációit, 63,8%-uk pedig abban, hogy a mesterséges költőládák fészkelőhelyként szolgálhatnak a madarak számára. Biztató eredmény, hogy a megkérdezettek 74,8%-a hajlandóságot mutatott a baglyok számának növelésére a gazdasága területén, 74,0%-uk pedig beleegyezett a költőládák kihelyezésébe a falvakban vagy azok közelében. A válaszadók baglyokkal kapcsolatos ismereteinek és hozzáállásának vizsgálata segít a hatékony védelmi stratégia kidolgozásában, továbbá a baglyok populációjá-

nak növelésében a mezőgazdasági termelés alá vont területeken, ahol ezáltal a patkányok és egerek állományának biológiai kontrollja is megvalósulhat.

Kulcsszavak: tudatosság, biológiai kontroll, ismertség, tévhitek, baglyok, felmérés

[1] *Department of Zoology and Fisheries, University of Agriculture, Faisalabad, Pakistan*
[2] *Department of Zoology, University of Punjab, Quaid-e Azam campus, Lahore, Pakistan*
[3] *Pakistan Science Foundation, G-5/2, Constitution Avenue, Islamabad, Pakistan*
[4] *College of Earth and environmental Sciences, University of the Punjab, Lahore, Pakistan*
** corresponding author, e-mail: gmrashid786@yahoo.com*

## Introduction

Biological control involves the suppression of pest population by a natural predator (Tooker *et al.* 2020) and can be effectively used for control of invasive species as well as local pest species. The common biological control agents are used against insects and vertebrate pests (Rondoni *et al.* 2020). These should be indigenous predator species since this will reduce the risk of any ecological disasters and control the pest species in an effective manner (Weeden *et al.* 2002).

Owls are the most effective biological controlling agents against insect as well as vertebrate pests. Among owls, the Barn Owl *(Tyto alba)* is considered a key factor in reducing the incidence of Hantavirus, largely transmitted by rodents to humans and livestock. The feeding habits of Barn Owls are highly influenced by population fluctuations of the common and water voles, which appeared to be more specialists in the selection of food items. This shows a highly complex correlation among common and water voles with forest rodents that favored the permanent establishment of roosts of the Barn Owl in woodland (Bernard *et al.* 2010). In South Australia, Barn Owls intermittently predated on a variety of rodents in the plague-affected area and played a significant role in lowering the rodent populations and ultimately decreased the incidence of the disease (Janžekovič & Klenovšek 2020). A large extent of rats and mice population in oil palm plantation in Malaysia was controlled by Barn Owls. The pellet analysis of this area showed that the diet of Barn Owl composed of 75% of the House Rat, 15% of insects, and 10% of the unidentified remnants (Puan *et al.* 2011). The Barn Owl is a generalist predator and significant variations were recorded in its dietary habits ranging from small to large rodents, with a high proportion of insects among the cultivated areas in Madagascar (Rasoma & Goodman 2007). Magrini and Facure (2008) reported House Rats, shrews, House Mouse and Cotton Rats from the regurgitated pellets of the Barn Owl. This valuable predator is facing threats to its survival in Pakistan because the local population considers it as the symbol of foolishness and misfortune associated with witchcraft, magic, birth, death, and weather calamities (Lambert 2008). Santhanakrishnan *et al.* (2012) surveyed that respondents from the nomadic tribe "Kuravas" uses owl flesh, liver, eyes to cure lung and eye-related diseases.

It is estimated that 30% of the crops are globally destroyed by rodents in pre and post-harvest times (Feldhamer *et al.* 2007). While in East Africa, Tanzania, the loss of cereal crops caused by rodents is 15%; to maize at cultivation and seedling is about 40–80%, while

in western Kenya, the loss of maize (20%), wheat (34–100%) and barley (34%) is reported (Makundi *et al.* 1999). In central Ethiopia, the loss caused by rodents to cereal crops is 26% (Bekele & Leirs 1997).

Pakistan is an agricultural country where the majority of the rural populations possess small landholdings. A considerable part of their agricultural produce is lost annually to vertebrate pests (Beg *et al.* 2010). Natural control agents viz., the owls have never been used to minimize the loss caused by rats and mice populations in the country. The main conviction of using these predators as a natural control agent of rats and mice population is the belief of people associated with death and demolition. This resulted in the rejection of owls (Santhanakrishnan *et al.* 2012). The objective of this research paper is to know the attitude of people, conservation problems of owls and finally to educate farmers and students about owls.

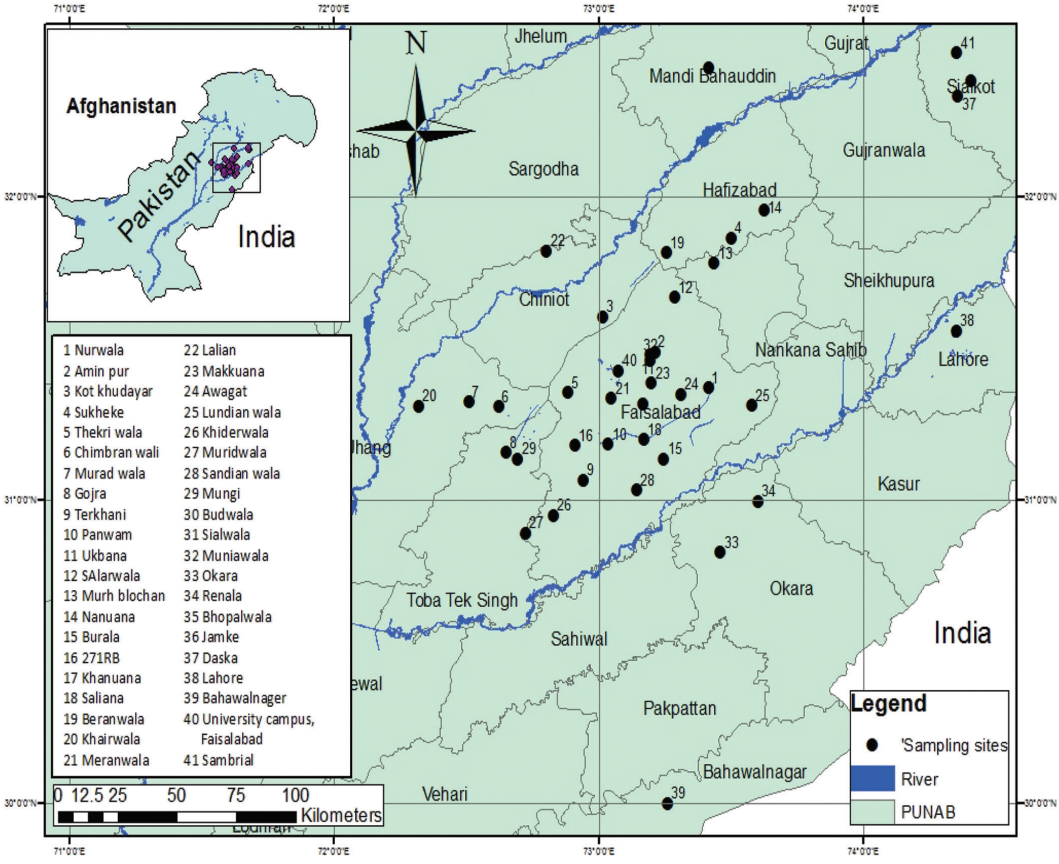


*Figure 1.* Map of study area showing location of sampling sites in central Punjab, Pakistan

*1. ábra* A vizsgálati terület térképe a mintavételi helyek elhelyezkedéséről Pandzsáb központi régiójában (Pakisztán)

## Materials and Methods

### Study sites and survey

The study was conducted in six localities of the Punjab (Pakistan) including Faisalabad (31°41'80''N, 73°07'90''E), Sialkot (32°29'50''N, 74°32'10''E), Jhang (30°58'33''N, 71°65'00''E), Lahore (31°54'97''N, 74°34'36''E) and Bahawalnagar (29°39'56''N, 71°68'36''E) *(Figure 1)*. A total of 41 sampling sites were selected for the surveys. The 90% of the sampling sites were in rural areas. Most of these areas reside along extensive canal systems in central Punjab. The province of Punjab comprises of nearly 50% of the country's population. Study areas had three major seasons: a hot season usually during the months of April-June, when the mercury rises as high as 44 °C, a rainy season usually during the months of July-September, with an average annual rainfall of 46 cm in the plains, and a mild season during the rest of the year when the temperature decreases as low as 5 °C (Khan *et al.* 2013).

A questionnaire was developed by following Frary's guidelines (Frary 1998). The age distribution of respondents is 19 or below; 20–35; 36 or above in years and education segregation was below matric; matric; intermediate and above. The following parameters were the part of questionnaire and asked from target human population in Punjab, Pakistan viz., familiarity with owls (owl sighting, types of owls, benefits of owls, medicinal value and enchantments), misconceptions about owls (sign of bad omen, killing of owl, sign of foolishness, causes of ruination), awareness about owls (rat population control, annual consumption of rats, biological controlling agent, knowledge about rodent control), management of owls as biological control agent (installation of nest boxes, location of nest boxes).

All these parameters were analyzed statistically using Chi-square test to calculate deviation between expected (E) and observed (O) data by using Minitab 16 statistical software. Calculated deviation was further used to know the probability (Lancaster & Seneta 2005).

## Results

### Familiarity with owls

Out of the total 1606 people who responded to the questionnaire, 95.0% were familiar with owls. The overall response of the respondents from the different localities varied significantly ($X^2$=17.15, D.F.=5, P=0.001). Out of these respondents, the highest percentage was familiar with Little Spotted Owlet *(Athene brama)*. The species-related variations in awareness significantly varied from respondents of various regions in the study area ($X^2$=55.37, D.F.=10, P=0.001). More than 50% of respondents of five cities viz., Faisalabad, Sialkot, Jhang, Lahore and Bahawalnagar gave a positive response regarding the beneficial role of owls. However, a small percentage showed ignorance. The response of the respondents varied significantly among different regions of the study area ($X^2$= 4.11, D.F.=10, P=0.001). There was no clear-cut difference in their perception regarding the beneficial role of

owls among the respondents of survey. It was found that 47.4% of respondents believed that bones, blood, etc. of owls have medicinal. The response of the respondents varied significantly ($X^2$=160.11, D.F.=10, P=0.001). The respondents from Sialkot and Jhang were in the greater proportion who believed that owls had medicinal value. More than 50% of respondents considered that owls were used in black magic. However, a small percentage of respondents who filled the questionnaire were not in favor of this response. The locality related variations in response varied significantly ($X^2$=131.40, D.F.=10, P=0.001). There was little difference in the attitude of the respondents towards the owl's use in black magic between localities *(Figure 2)*.

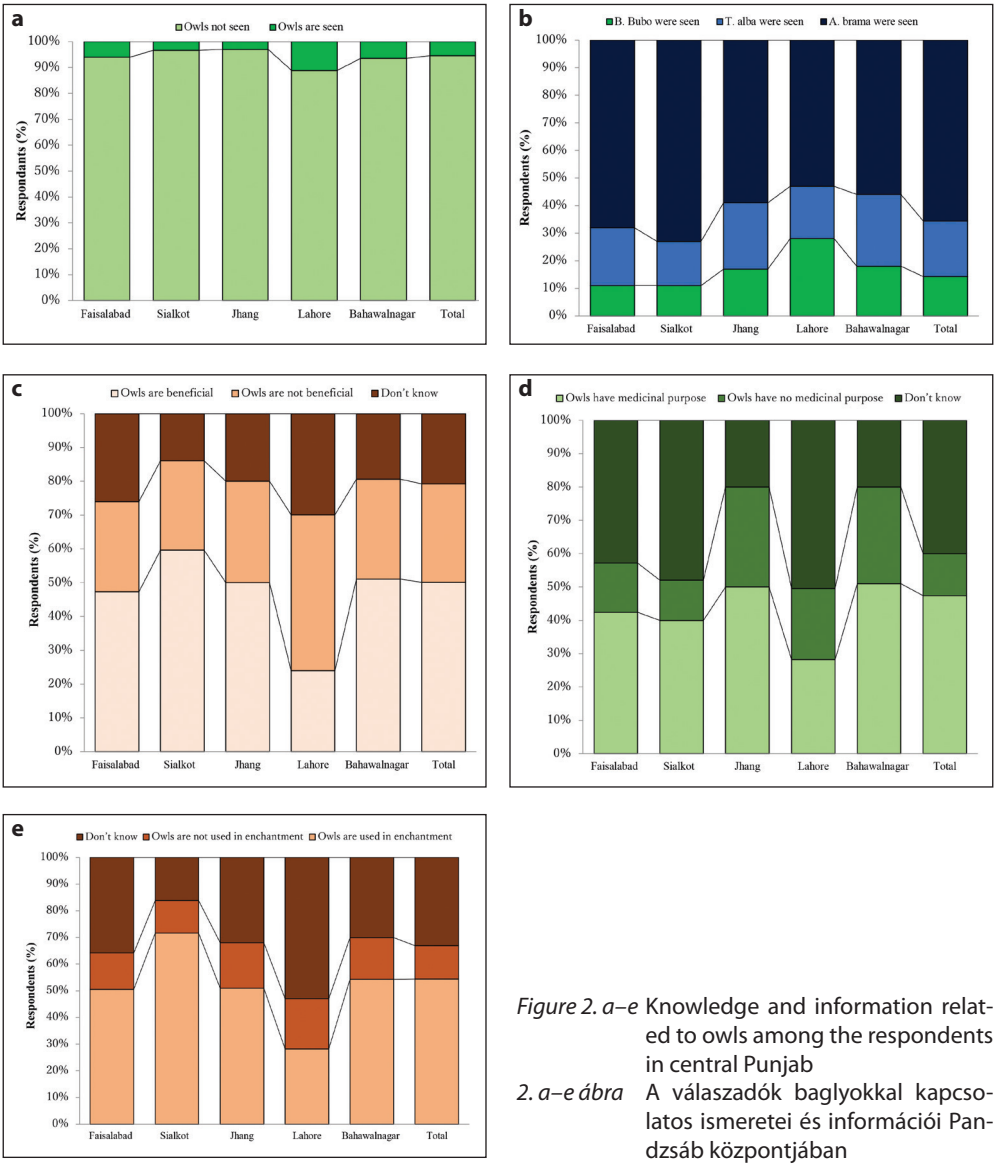


*Figure 2. a–e* Knowledge and information related to owls among the respondents in central Punjab

*2. a–e ábra* A válaszadók baglyokkal kapcsolatos ismeretei és információi Pandzsáb központjában

## Misconceptions about owls

More than 45% of the people who responded did not consider as a sign of a bad omen. However, more than 35% of the respondents were agreed with the opinion that owls are sign of a bad omen and a very small number of the respondent was ignorant. A significant variation in response was observed from different localities of the study area ($X^2$=104.33, D.F.=10, P=0.001). The respondents from these localities indicated no clear-cut difference in the perception that the owls were not a sign of bad omen. Only 15.0% of the respondents thought that the owls should be destroyed because they are ominous and bring bad luck. The response in different localities was significantly different ($X^2$=45.8.3, D.F.=5, P=0.001). More than 50% of respondents gave a positive response regarding the presence of owls as a cause of ruination. However, more than 20% of people were in favor of this argument. The locality related variations in the opinion of the people varied significantly from area to area ($X^2$=44.14, D.F.=10, P=0.001). Owls are a sign of foolishness; this argument was supported by more than 40% of people. However, the same percentage was against this notion. The locality related variations in the people's response varied significantly from area to area ($X^2$=53.29, D.F.=10, P=0.001) *(Figure 3)*.

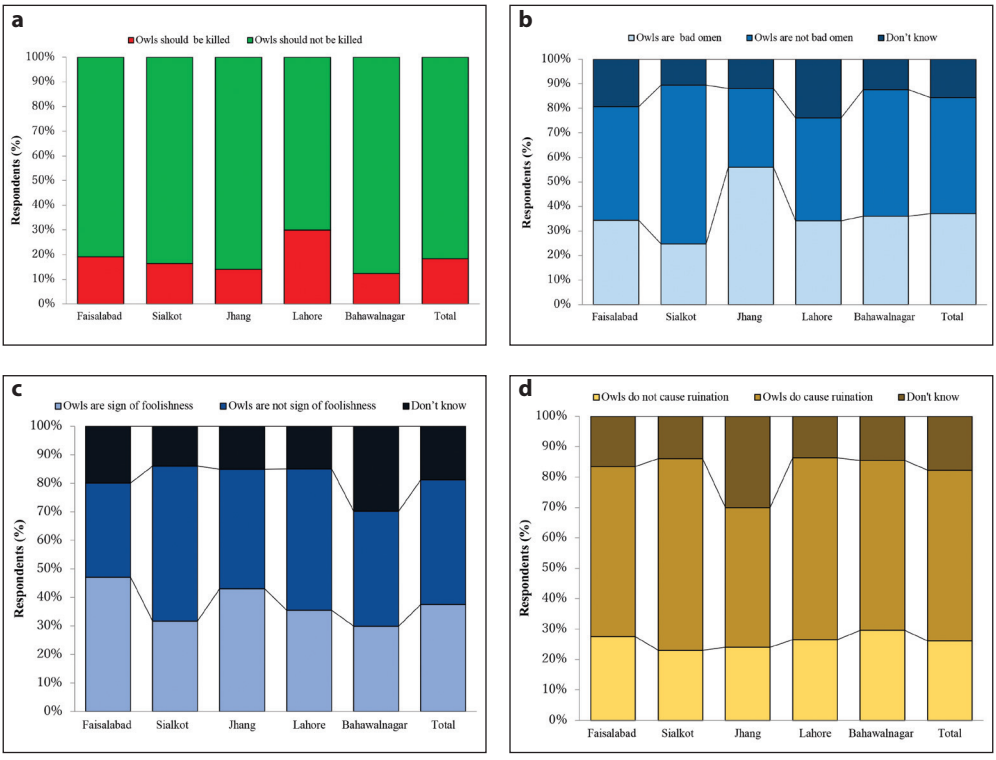


*Figure 3. a–d* Misconceptions related to owls among the respondents in central Punjab
*3. a–d ábra* A baglyokkal kapcsolatos tévhitek a válaszadók körében Pandzsáb központjában

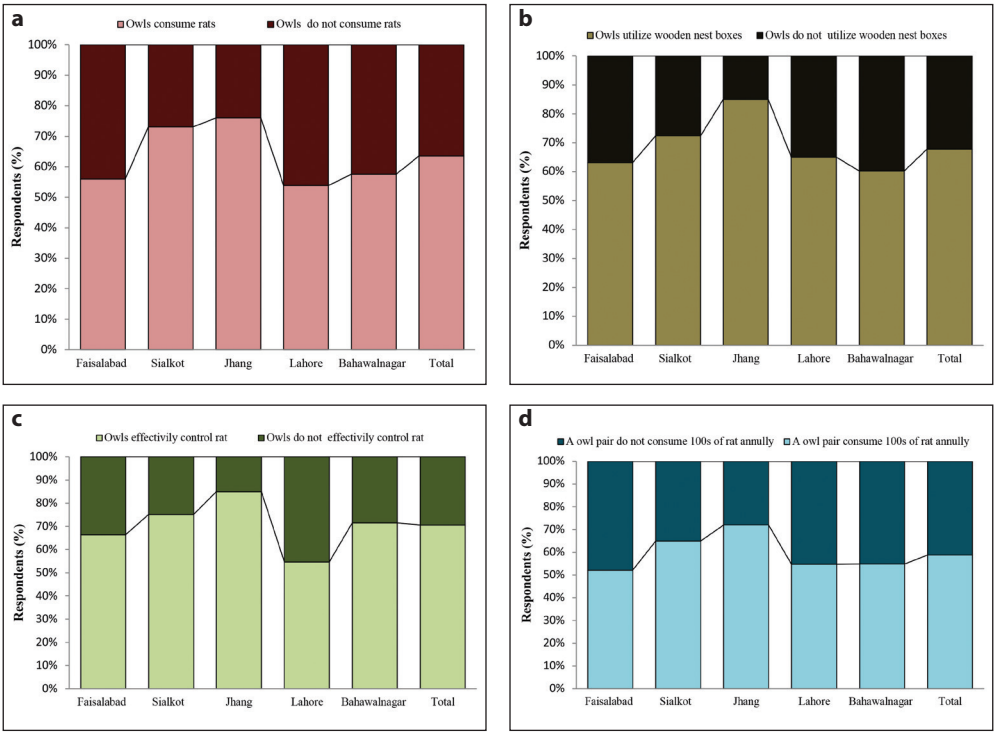


*Figure 4. a–d* Awareness level of respondents about role of owls in agro-ecosystem of central Punjab
*4. a–d ábra* A válaszadók ismerete a baglyok agro-ökoszisztémákban betöltött szerepéről Pandzsáb központjában

## Awareness level of owls

A high percentage of respondents gave a positive response regarding the consumption of rats by owls while the rest responded negatively. The locality-related variations in the response of the people were highly significant ($X^2$= 61.69, D.F.=4, p=0.001). More than 60% of all the people who responded gave a positive response regarding the role of the owls as suppressors of rats and mice populations. The locality related response with respect to this point varied significantly ($X^2$=52.71, D.F.=5, P=0.001). The respondents from Jhang, Sialkot, and Bahawalnagar were better informed than those of the other localities. More than 50% of respondents gave a positive response regarding the potential of owls to control rats. The locality-related variations in the responses varied significantly ($X^2$=81.56, D.F.=5, P=0.001). Respondents from Jhang and Sialkot were more knowledgeable in this respect as compared to others *(Figure 4)*.

## Willingness of respondents to keep owls in cropland

More than 70% of respondents was willing to install boxes in cropland and near to the villages. The variations in the response were found to be non-significant from area to area *(Figure 5)*.

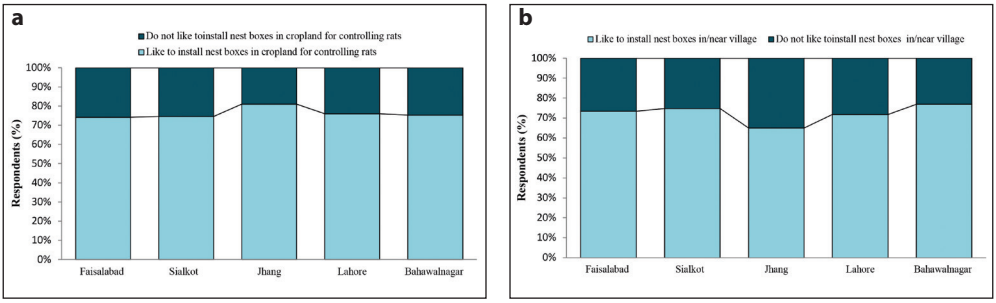


*Figure 5. a–b* Willingness of respondents to conserve owls in cropland of central Punjab
*5. a–b ábra* A válaszadók hajlandósága a baglyok megóvására Pandzsáb középső részén

**Age and education-related knowledge of respondents with owls**

Age-related variations among the respondents regarding the familiarity with owls were not statistically significant. The education-related variations regarding the familiarity with owls were also non-significant. Familiarity with the owls among the respondents was highest for Little Spotted Owlet. Variations in the level of awareness were non-significant for various age groups. Variations in awareness related to the education of the respondents were highly significant ($X^2$=17.82, D.F.=4, P=0.001). The respondents with the lowest education level were best familiar with Eurasian Eagle Owl *(Bubo bubo)* and Little Spotted Owlet, whereas those with the highest education level were best familiar with Barn Owl. Age-related variations regarding the beneficial role of owls were highly significant ($X^2$=12.54, D.F.=4, P=0.001). The proportion of the respondents of 35 years in age or above was somewhat greater than the younger respondents regarding their belief about the beneficial role of the owl. Responses of the respondents of different education levels varied significantly ($X^2$=17.67, D.F.=4, P=0.001). The respondents having the lowest educational qualification were in greater proportions than the others who believe that owls were beneficial to humans. The age-related variations varied significantly ($X^2$=30.06, D.F.=4, P=0.001). The proportion of the respondents of older age was greater than those of the younger people. The response regarding the medicinal importance of the owls among the people of different educational levels varied significantly ($X^2$=8.71, D.F.=4, P=0.001). The proportion of respondents having Intermediate or better qualifications who believed that owls had medicinal value was relatively smaller. More than 50% of the respondents considered owl's use in black magic. The age-related variations varied significantly ($X^2$=19.73, D.F.=4, P=0.001). The proportion of older respondents than younger ones who believed that owls were used in black magic was greater. Education had a significant impact on the attitude of the people towards the owls. The opinion of the people of different education level varied significantly ($X^2$=16.97, D.F.=4, P=0.001). The proportion of respondents of below matric qualification was greater than the other educational levels who believed that owls were used in black magic *(Figure 6)*.

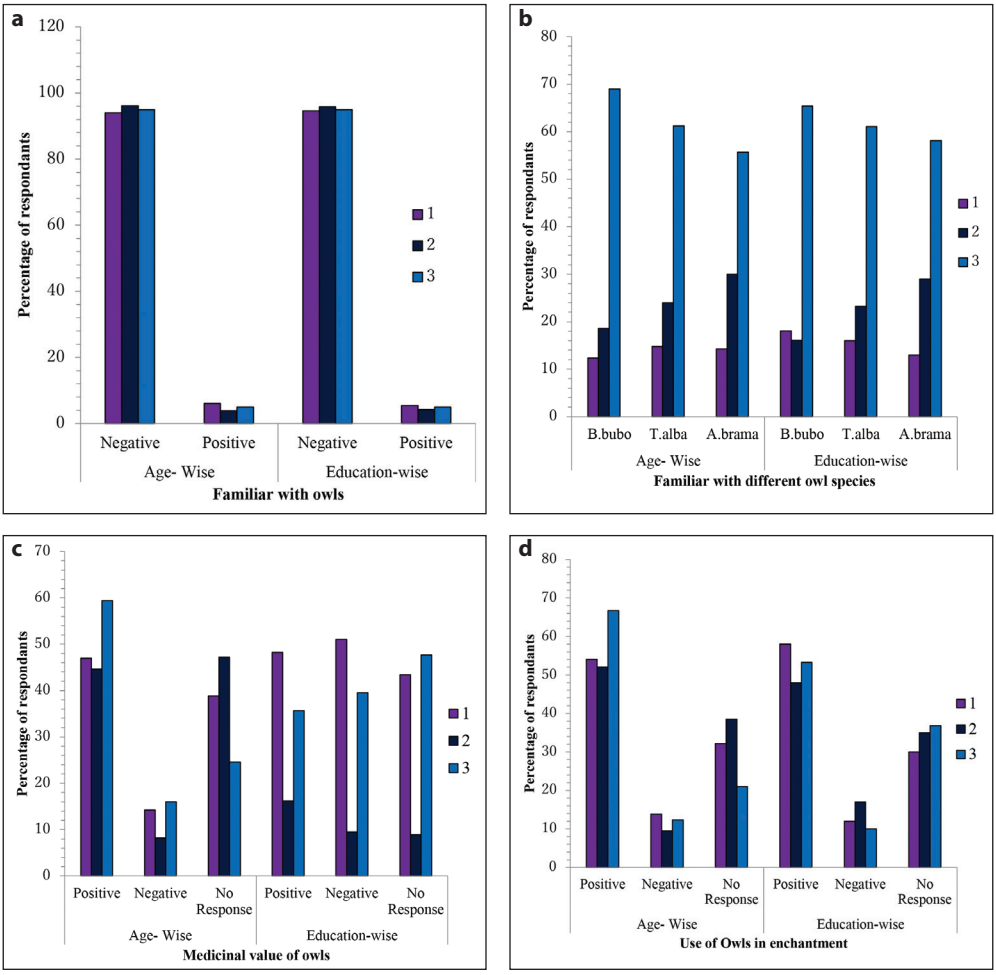


*Figure 6. a–d* Age and education related knowledge of respondents with owls. 1=19 or below: below metric; 2= 20–35: Matric; 3= 36 or above: intermediate or above

*6. a–d ábra* A baglyokkal kapcsolatban kérdezett válaszadók kor és iskolázottság szerinti százalékos megoszlása tudásuk tekintetében

## Age and education-related misconceptions about owls

The proportion of the respondents of 19 years in age or less were greater than the older respondents regarding their belief that owls were a sign of bad omen. The age-related variations in the perception of the people for the owls were significantly different ($X^2$=14.36, D.F.=4, P=0.001). The respondents having educational qualification up to intermediate or above were in greater proportion than the others who considered the owls as not a sign of bad omen. More than 76% of respondents of various age-related categories were against killing of owls. The variations in their belief that owls should be destroyed because they brought misfortune were highly significant ($X^2$=10.72, D.F.=2, P=0.001). More than 80% of the people

with different educational background was not agreed to destroy owls on misfortune ground. Age-related variations in the belief of the people that owls should be destroyed because they brought misfortune were highly significant ($X^2$=21.49, D.F. =4, P=0.001). Some of the respondents were of opinion that the presence of owls can cause ruination. However, more than 50% of people responded negatively and the rest expressed no opinion. The age-related variations in the opinion of the people concerning this point were not significant. Education had a significant impact on the attitude of the people towards the owls. The variations in the opinion of the people of different educational backgrounds varied significantly ($X^2$=11.77, D.F.=4, P=0.001). The age-related variations were found to be statistically non-significant. The proportion of respondents having intermediate or better educational qualifications who believed that owls were the cause of ruination was relatively smaller. More than 40% of the respondents considered owls as a sign of foolishness. The variations in the Education-related perceptions were not statistically significant *(Figure 7)*.

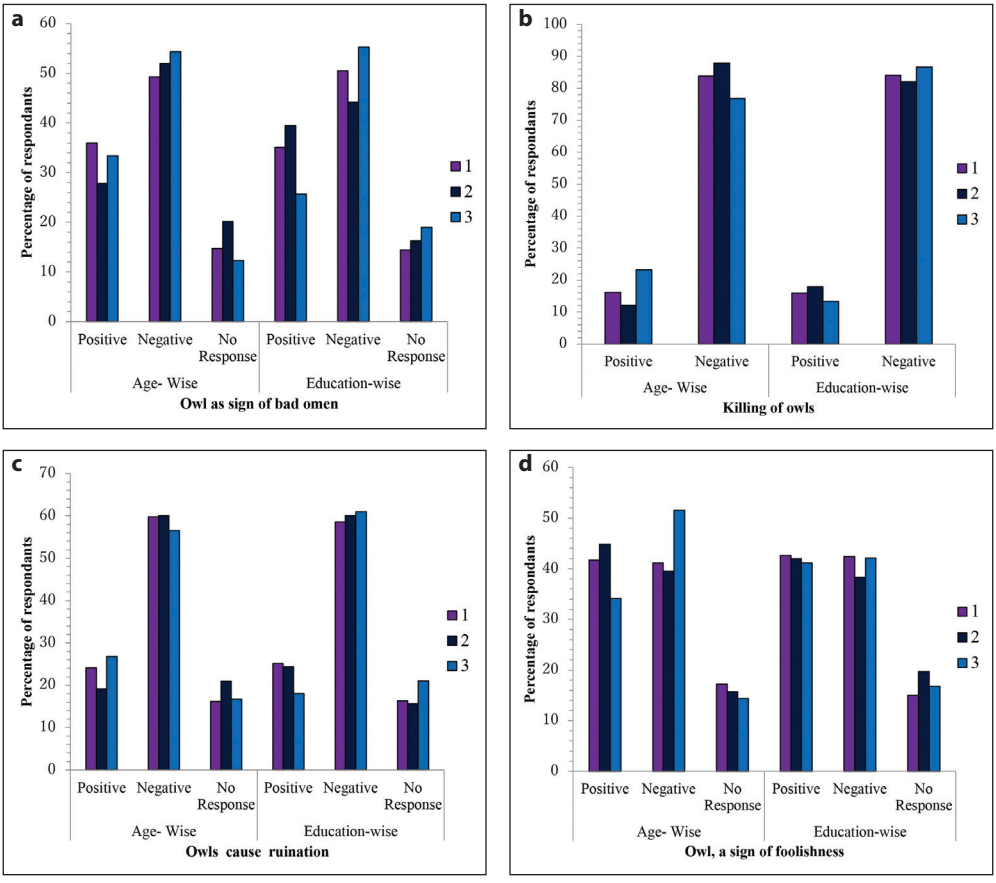


*Figure 7. a–d* Misconceptions about the owls among the respondents in central Punjab. 1=19 or below: below metric; 2= 20–35: Matric; 3= 36 or above: intermediate or above

*7. a–d ábra* A baglyokkal kapcsolatos tévhitek a válaszadók körében Pandzsáb központi részén (kor és iskolázottság szerinti megoszlás)

**Age and education-related awareness level of owls**

More than 60% of the respondents had the opinion that the owls consumed rats, while the rest denied this idea. The respondents of younger ages were better informed than older people. This variation was found to be highly significant ($X^2$=30.07, D.F.=2, P=0.001). The awareness regarding the consumption of rats by the owls among the people of different education levels varied significantly ($X^2$=41.4, D.F.=2, P=0.001). People with the lowest level of education exhibited better awareness than those having better education backgrounds. Age-related responses varied significantly ($X^2$=6.03, D.F.=2, P=0.001). The respondents of 19 years or below gave the best positive response. The response levels regarding the use of nest boxes for nesting and roosting purposes varied significantly among the people with different levels of education ($X^2$=38.07, D.F.=2, P=0.001). People with lower educational backgrounds gave better positive responses. The younger respondents outnumbered the older people regarding their knowledge about the suppressing role of the owls for the rodent's

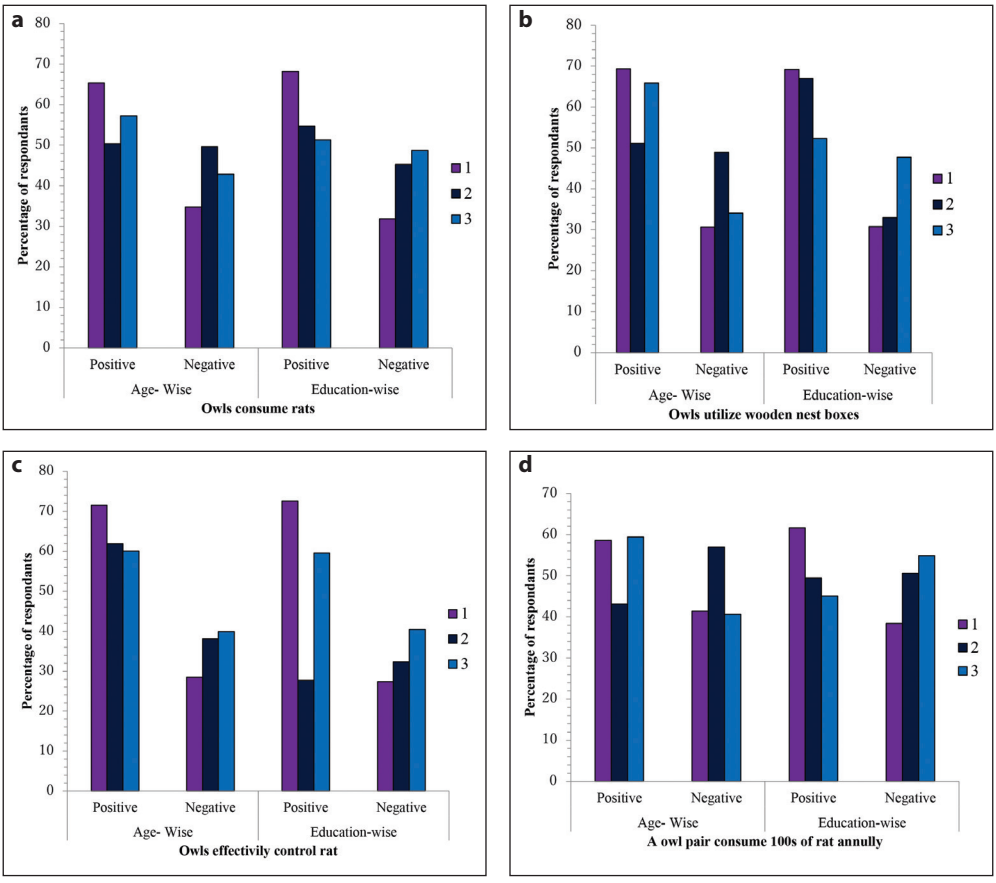


*Figure 8. a–d* Awareness level of respondents about the owls in central Punjab. 1=19 or below: below metric; 2= 20–35: Matric; 3= 36 or above: intermediate or above

*8. a–d ábra* A válaszadók baglyokkal kapcsolatos ismerete Pandzsáb középső részén

population. The age-related variations were highly significant ($X^2$=17.55, D.F.=2, P=0.001). Respondents with the least education were better informed about the anti-rodent role of the owls *(Figure 7)*. The education-related variations were found to be highly significant ($X^2$=22.91, D.F.=2, P=0.001). The respondents those belonging to the younger and older age categories were better aware than the intermediate age category. The age-related variations in the awareness about the intensity of owl predation on rodents were significant ($X^2$=32.2.4, D.F.=2, P=0.001). The respondents having the lowest educational background were better informed about the degree of intensity of the owl predation on rats and mice. The age-related variations in this respect were significant ($X^2$=36.37, D.F.=2, P=0.001) *(Figure 8)*.

**Age and education-based willingness of respondents to keep owls in cropland**

Variations in the age-related positive responses regarding keeping the owls in the croplands among the respondents varied from 74.0% to 79.0%. These variations were found to be non-significant. Education had a significant impact on the attitude of the people towards the owls. The variations were found to be significantly different at a statistically significant level ($X^2$=6.39, D.F.=2, p=0.001). The level of positive response was the best among the best-educated respondents. The variations in willingness to install boxes in or near villages were not significant concerning the age of the respondents. Education level related variations were found to be non-significant among people having different educational backgrounds *(Figure 9)*.

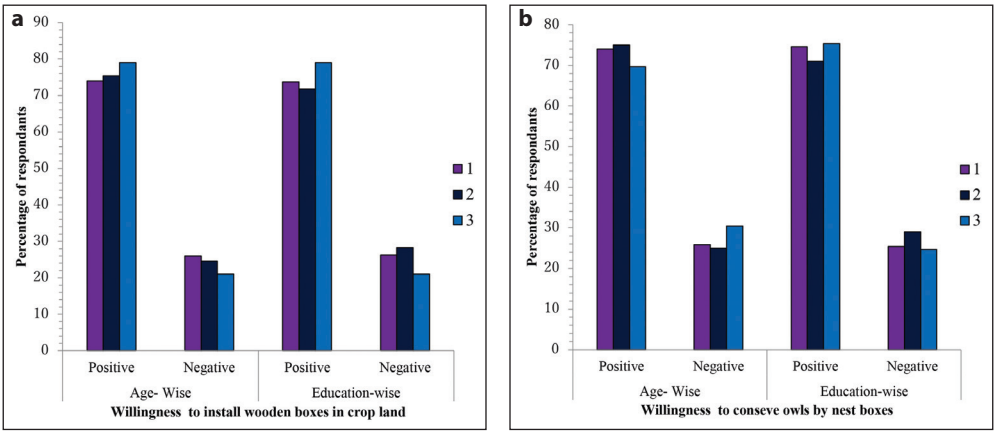


*Figure 9. a–b* Willingness of respondents to keep owls in cultivations of central Punjab. 1=19 or below: below metric; 2= 20-35: Matric; 3= 36 or above: intermediate or above

*9. a–b ábra* A válaszadók bagolytartási hajlandósága Punjab központjában

## Discussion

The survey was conducted to know about the attitude of the people vis-a-vis owls presented interesting information. The questionnaire was divided into four major parameters viz., familiarity, misconceptions, awareness about owls, and their acceptance as a biological control agent. The familiarity of respondents with Eurasian Eagle Owl, Barn Owl and Little

Spotted Owlet was 12.6%, 20.1%, and 62.3%, respectively. Only 47.0% of participants responded that owls have medicinal importance, 2.6% responded in negative and 40% were unaware. About 54.4% of respondents consider owls were used in enchantment. However, 12.5% do not know about such use. About 33.3% agreed that the owls presence was a sign of a bad omen, whereas, 50.6% were not agreed. Only 15.6% of the people in the sample thought that owls should be destroyed, whereas, 84.4% responded negatively. Of the respondents, 23.0% believed that owl's presence in a locality leads to ruination, whereas 59.5% were of the view that the presence of owls is not causing ruination. About 41.8% considered them as signs of foolishness but an almost equal number of people (46.6%) did not agree. Of the respondents, 47.0% believed that owl's body parts were used for black magic purposes, whereas 33.1% were unaware about the notion but 12.5% responded negatively. The brighter side of the picture is that 50% of the people acknowledged that the owls are beneficial to mankind; 60.3% knew that the owls were predators of rodents, and 67.7% agreed that they were suppressors of rats and mice populations. 63.8% of the people agreed that nest boxes could serve as nests and roosts. It was very encouraging to know that 74.8% showed their willingness to allow the installation of nest boxes for the owls on their farms and were willing to permit the installation of the nest boxes in or near the villages.

In Madurai, Tamil Nadu, India Santhanakrishnan *et al.* (2012) reported that 54.2% of the respondents knew about two owl species Barn Owl and Little Spotted Owlet, 28.3% of the respondents told rodents are the staple food item while 30.1% thought about insects. More than 60% of respondents believed that owls are being hunted for food; 23.7% believed in medical use. Of the respondents 69% showed strong beliefs about superstitions about owls; 86% linked owls with sudden death while 72.3% responded that they have not seen such death directly but have heard of it; 19.4% mentioned it as a sign of evil and misfortune. Nearly 56% of respondents were of the view that artificial nest boxes attract owls towards agriculture fields and 65% confirmed the use of nest boxes as perching sites. Majorities of people were classified as bad omen (53.2%) while 2.5%% were considered owls as beneficial; 14.5% emphasized that owls are birds; 6.2% considered them harmful while 3.5% as fearing birds.

A total of 12142 pairs of Barn Owl were estimated in England and Wales (Blaker 1934). In a similar survey conducted after 50 years (1982–85) in the same area, the estimation was 3778 pairs of the Barn Owl. This estimated result revealed a 69% decline in the Barn Owl population (Shawyer 1987). In Britain approx. 70% decline in farmland birds is caused by changes in agricultural practices a reduction in the reproductive output is caused by loss of breeding habitats due to the result of the development of drainage and agriculture extension. Overgrazing and increased use of pesticides are the severe causes of food scarcity and reduces nesting success for ground-dwelling birds (Vickery *et al.* 2001, Newton 2004). Arthropods are highly affected by the use of herbicides, which represents staple food items in the avian diet, increasing the mortality rate of avian fauna through the food chain in North America (Sibly & Hone 2002).

Rodents are nocturnal mammals that are the strong pest of agricultural cash crops. Destructive habits of rodents possess heavy economic loss to the agriculturists. In the agro-ecosystems, rodents caused significant damage to cereal crops (Jacob & Tkadlec 2010). Loss caused by the rodents to cereal crops such as rice, wheat, and maize is between 5–10% at the pre-harvest level in India and China. Post-harvest damage of these cereal crops is

higher than pre-harvest loss (Abass *et al.* 2014). The average damage caused by rodents to cereal crops in Sichuan, province of China was studied as 320 kg/hectare (Singleton & Brown 2003). The damage caused by the rodents in Philippines is 13.2% in the wet season while 8.1% in dry seasons (Stuart *et al.* 2011). In Indonesia and Malaysia, damage caused by the rodents to rice fields at the pre-harvest stage is 5% and 17% respectively (Singleton & Petch 1994). In Tanzania, damage caused by rodents to maize stored in traditional stored structure is 40.4% (Mdangi *et al.* 2013) while in Lao village damage to stored rice is 11.7% (Brown *et al.* 2013). In small crop fields, the damage caused by the 13 species of wildlife species in three communities viz*., Doumno*, *Malen*, and *Mimplala* was 100%, 94%, and 100% respectively at Dja Faunal Reserve, in Cameroon. A total of 96.7% of damage is caused by small mammals to different crops. Of the total 96.7% damage, 73% is caused by cane rats (Arlet & Molleman 2007). The average damage caused by rodents to cereal crops such as wheat (10%), rice (19%), sugar cane (7.5%), groundnuts (5.3%) (Beg *et al.* 2010). Owls are considered effective biological control agents for rats and mice populations in cultivations. (Mahmood-ul-Hassan *et al.* 2007a) found during the pellet analysis of Barn Owl that consumption of rats and mice population at central Punjab (28%), at southern Punjab (14%) and southern Balochistan (93%). Variation in the dietary composition depends upon time cultivation, harvest, and crop pattern. The regurgitated pellets of Barn Owl in lower Sindh Pakistan revealed remnants of small mammals (84%) and birds (25%) while from six districts of central Punjab (Pakistan), 75% of the diet of Barn Owl is comprised of *Suncus murinus* (Mushtaq-ul-Hassan *et al*. 1990). Insects were the main staple items of Little Spotted Owlet but the rodents stood at secondary importance (Beg *et al.* 1990).

It requires time to acknowledge owls as a biological control agent in the cultivations and different methods should be conducted to conserve Barn Owls. The installation of nest boxes within a 500 m radius in agricultural fields play a significant role in the cultivations in Beit Se'an valley, Israel. During five years, 86.7% of the nest boxes were occupied by Barn Owls. Erection of nest boxes is a very effective method for increasing Barn Owl's population in agriculture fields (Meyrom *et al.* 2009).

Most of the superstitions are related to stories of old times, when people were more fearful and tried to get the answer about their lives and the environment. Now the attitude of people, on the whole, was in favor of the owls. Their willingness to allow the raptor to live and breed in their villages and croplands is a very encouraging thing that has emerged from the present surveys. Decidedly more people had a soft corner for the owl because of their role in inhibiting the populations of rats and mice. This sort of attitude will make things easier for workers desiring to bring owl closer to cropland for biological control of rats and mice populations.

## Conclusion

Owls are considered one of the best predators of vertebrate pests in the agro-ecosystem. Human interference viz., agricultural pattern, use of pesticides, lack of knowledge, and awareness has changed its habitat, which has reduced its fecundity and declined populations in their natural habitats. Many attributes of his body structure such as starring eyes give the

wise appearance, tuft of the feather on head give horned devil appearance, turning of the head and piercing cries make them mysterious birds. Over the period, these features created many misconceptions about the bird, which implicated bad impressions in the mind of people. People start believing in such old myths and superstitions, which played a negative role against owls. By providing a true picture of misconception and highlighting its beneficial aspects of owls will help in reducing pressure on the owl populations. The natural habitat of owls is disturbed and it is the need of time to develop an alternative method for conservation of owls such as the installation of nest boxes in agricultural habitats. As a biological control agent of rats and mice populations in cultivations deserve support and encouragement for the development of a conservation strategy by wildlife departments. The conservation of owl is mainly affected by anthropogenic interference. The study will provide baseline data for making conservation policy for owls by wildlife managers.

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