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THE IMPORTANCE OF BIRDS IN BIOLOGICAL CONTROL AND INSECTIVOROUS BIRD SPECIES DETERMINED IN BARTIN[1]

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Abstract

This study has been carried out between 2009–2011 in order to figure out insectivorous bird spieces in Bartın. During the study, over 100 bird observations have been done in 27 different locations. In consequence of observations, 50 insectivorous bird spieces from 16 families belonging to 6 orders have been observed. The insectivorous bird spieces that have been observed are species belong to Apodidae (2), Meropidae (1), Upupidae (1), Cuculidae (1), Aegithalidae (1), Laniidae (2), Motacillidae (6), Muscicapidae (3), Hirundinidae (4), Paridae (4), Sittidae (1), Sturnidae (1), Sylvidae (8), Turdidae (10), Troglodytidae (1), Picidae (4) families. It has been observed that among these insectivorous bird spieces found in Bartın, 27 of them are summer migrant, 10 of them are winter migrant and 13 of them are resident indigenous birds. Among all, 5 species (*Motacilla alba* L., *Hirundo rustica* L., *Parus major* L., *Erithacus rubecula* (L.), *Turdus merula* L.) are observed in all locations.

Key words: Bartın, insectivorous birds, pest insect, biological control

BİYOLOJİK MÜCADELEDE KUŞLARIN ÖNEMİ VE BARTIN İLİNDE TESPİT EDİLEN BÖCEKÇİL KUŞ TÜRLERİ

Özet

Bu çalışma 2009–2011 yılları arasında Bartın ilindeki böcekçil kuş türlerini tespit etmek amacı ile yapılmıştır. Çalışmada 27 farklı lokalitede 100'ün üzerinde kuş gözlemi yapılmıştır. Yapılan kuş gözlemleri sonucunda 6 takıma bağlı 16 familyadan toplam 50 böcekçil kuş türü tespit edilmiştir. Tespit edilen böcekçil kuşlar Apodidae (2), Meropidae (1), Upupidae (1), Cuculidae (1), Aegithalidae (1), Laniidae (2), Motacillidae (6), Muscicapidae (3), Hirundinidae (4), Paridae (4), Sittidae (1), Sturnidae (1), Sylvidae (8), Turdidae (10), Troglodytidae (1), Picidae (4) familyalarına dahil türlerdir. Bartın ilinde tespit edilen böcekçil kuş türlerinden 27 adedi yaz göçmeni, 10 adedi kış göçmeni, 13 adedi ise sürekli görülen yerli kuş türü olarak belirlenmiştir. Tespit edilen böcekçil kuş türlerinde 5 tür (ak kuyruksallayan (*Motacilla alba* L., 1758), ev kırlangıcı (*Hirundo rustica* L., 1758), büyük baştankara (*Parus major* L., 1758), kızılgerdan (*Erithacus rubecula* (L., 1758)), karatavuk (*Turdus merula* L., 1758)) tüm lokalitelerde gözlenmiştir.

Anahtar sözcükler: Bartın, böcekçil kuş, zararlı böcek, biyolojik mücadele

Introduction

Turkey has an ecosystem unity which is biogeographically the richest and the most diverse in the Palearctic region. This different structure and richness reflect upon all living habitat (Kiziroğlu, 2009). Turkey has more species than all bird species in Europe with a number 468 species with this biological richness. The most important reason of this stems from the fact that Turkey is located on two main bird migration ways.

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Birds are very gluttonous and appetitive animals. Their daily nutrient consumptions are generally much more than their weights. The most important reason of this stems from the fact that the birds are very active and they use a quite amount of energy. The daily nutrient consumption in some species can reach twofold of their self-weight. The ratios between their specific weights and daily nutrient consumptions are given in Table 1 (Anonymous, 1975; Malazgirt, 1988; Gill, 2007) .

Table 1. The ratios between some bird species specific weights and their daily nutrient consumptions

Bird species	Weight (g)	Daily nutrient consumption (g)	Bird weight ratio (%)
Song thrush (*Turdus philomelos* Chr. L. Brehm)	51	49	96
Pied wagtail (*Motacilla alba* L.)	17	21	126
Goldcrest (*Regulus regulus* (L.))	9,5	17	180
Willow warbler (*Phylloscopus trochilus* (L.)	9	17	190

A goldcrest (*Regulus regulus* (L.)), can eat 8-10 millions small insects in a year. Swallows hunt millions of insects during summer. There are always more than 150 bark beetles (Scolytidae) in a great spotted woodpecker's (*Dendrocopos major* (L.) craw. These insects and that more than 70 nare traces are found in decimeter square in damaged trees show the effect of woodpecker upon bark beetles. Similarly, it has been ascertained that a starling (*Sturnus vulgaris* L.) consumes 7800 Cockchafers (*Melolontha melolontha* (L.)) worms and adults in brood feeding period (Anonymous, 1975).

Birds can be examined in different categories according to their nutrient regimes. Insects, plants, mammals, reptiles and other birds make up different bird species' nutrients. Among these birds, birds which take nourishment from insects are called insectivorous birds and these species build nests in hollow, burrow and hole parts of trees, and former woodpeckers's nests. The birds which build nests under forest flora and on the ground are quite important because they feed their nestlings with insects although they usually take herbal nutrients.

Birds have great importance in nature, they particularly play an important role in permanency of natural balance. Most of the birds feed on insects. The birds, which eat seeds and fruits, feed their nestlings with insects, butterfly caterpillars and insect larvae during their breeding periods. Birds prevent insects' breeding and thus insect harm by eating insects, insects' larvae, pupae and eggs. While looking for these nutrients, birds find insects under tree barks, among wood texture, in the land and from mud and eat them (Turan, 1990). Some insectivorous birds, on the other hand, hunt insects which move freely or fly.

The bill is generally in short and wide form in insectivorous birds. However, it has differentiated in insectivorous birds that fly or take nourishment in different ways, so as to catch, carry and eat their preys. Birds with as such bill forms can easily catch and crumble insects flying in the air. But the bill is longer and as much stronger as to endure impacts in birds such as woodpecker which hunt inner-wood insects (Lederer, 1975; Ensminger, 2006).
Because insectivorous birds have an active pressure on insect population, the use of these species in biological control widely continues nowadays. Such a process of biological control in nature remains constant.

It has been declared in a study carried out in Italy that the ratio of insectivorous birds has reached 46,6 % in the country's bird fauna and the annual insect consumption has exceeded 275 millions kilograms. Considering birds, which are not insectivorous, feed their nestlings with insects and when it is compared to country's avifauna, it has been calculated that this birds' insect consumption is 25 million tons. This shows that all birds in Italy consume 300 million tons of insects annually. This case indicates how birds are important in struggle against insects in agricultural and forest lands (Malazgirt, 1988).

Raiss (1976), in his work "Nutrient Ecology of *Turdus philomelos* Chr. L. Brehm, 1831'es in Autumn in Helgoland Peninsula", has analyzed guts of 244 song thrushes and has stated that during autumn these species take solely animal nutrients 46% of which are made up of insects. He has ascertained that daily climate conditions and land case play a significant role in determination of animal nutrients from alimentation menu.
Dornbusch (1981), in his work issued "Alimentation of Small Bird Species in Juvenile Pine Forests" carried out in Steckby Nature Conservation Area in Germany between the years 1964–1968; has banded 230 nestling individuals' throats belonging to 8 different bird species and has attained 779 animal nutrients consisting of forest pest insects from these nestlings' throats.

Pfeifer ve Keil (1962), in their work issued "The Frequency of Alimentation in some Songster Species" around Frankfurt of Germany, have stated that 6 bird species have carried animal nutrients to their nestlings for 18 hours and 50–90% of these nutrients are composed of forest pest insects.

Mooney et al. (2010), have examined more than 100 birds, bats and lizards which are effective upon insects on 4 continents during their study and have identified that they are very different predators from each other. They have seen that these species have collectively reduced the loss of insects on the plants up to 40%.

Nightjar (*Caprimulgus europaeus* L.), masked shrike (*Lanius nubicus* Liech.), grey wagtail (*Motacilla cinerea* Tunstall), tit species (*Parus* spp.), woodpecker species (*Dendrocopus* spp. *Picus* spp.), nuthatch (*Sitta europaea* L.), eagle-owl (*Bubo bubo* (L.)), starlings (*Sturnus vulgaris* L.), warbler species (*Sylvia* sp.), redstart (*Phoenicurus phoenicurus* (L.)), blackbird (*Turdus merula* L.), thrushes (*Turdus* spp.) and the hoopoe (*Upupa epops* (L.) are among the important bird species which live in our country's forested areas and feed on insects. Especially coal tit (*Parus ater* L.), pine processionary (*Thaumetopoea pityocampa* Schiff.) are very important in biological control against this insect by means of eating its caterpillars (Oğurlu, 2000).

Insectivorous birds such as tits (*Parus* spp.), nuthatch (*Sitta europaea* L.), starling (*Sturnus vulgaris* L.), and many song birds consume a large amount of insects particularly in their nesting period, and put pressure on insect populations (Avcı et al., 2005).

Main forest birds -the tit species- great tit (*Parus major* L.), coal tit (*Parus ater* L.), blue tit (*Parus caeruleus* L.) and sombre tit (*Parus lugubris* Temminck) feed on insects which do harm on the forest in the ratio of 48.6 to 70.2% (Kiziroğlu et al., 1990).

Kaçar et al. (2004), in a study they have carried out between the years 1999–2003, have tried to identify insectivorous birds using the bird nests, and have ultimately identified 48 insectivorous bird species 26 of which is resident, 17 of summer migrants, and 5 of winter migrants belonging to 24 families.

Arslangündoğdu and Hızal (2011) have identified 65 insectivotous bird species in they study which about insectivorous bird living in Belgrad Forest. *Parus major, P. caerulens, P. palustris, Turdus merula, Erichacus rubecula* and *Troglodytes troglodytes* have been observed to the most common insectivorous bird species.

Toper (1998) lists the benefits of birds against harmful insects in biological control as follows:

1. Unlike other polyphagian predators, birds can reproduce economically easier.
2. There are large living areas of the birds and that is why they are provided to grow in forests of economically important.
3. Birds also contribute to the spread of diseases and affect indirectly to the termination of insect pests. Related to this issue, it has been observed that two viruses which cause diseases in wood bees have been carried in the United Kingdom and Germany by birds.
4. When pest population comes to critical period or there is reduction in their number, there happens no loss in birds.

It is seen how important that birds are in limiting the reproduction of insects, thus preventing their damage, keeping agricultural and forest areas' health and their existing natural balance, and providing its sustainability.

Both because its geographical location and because its ecological characteristics, Bartın is a territory where insect attacks in agricultural and forest areas are almost always seen. Log importation, especially done by sea and by land, is seen as a major source of insect threat against forests. In addition, Bartın province is very rich in terms of biological diversity. Over 250 bird species have been identified in the province. The insectivorous birds constitute an important place among these birds. Lack of divided habitats with a very high mountain ranges in the province causes spread of insectivorous birds to the large areas.

Insect damage are rather widespread in Bartın Forest Management Directorate. Because of this reason, this study was carried out to purpose of detecting for insectivorous birds a very important factor biological control in Bartın.

Materials and Methods

Insectivorous bird species distribution in Bartin forms the main material of the study. In the field studies for the detection of insectivorous birds, Soligor Zoomfernglas 8-24×50 mm binoculars, Nikon D70 and Nikon D300S digital cameras with VR Zoom-Nikkor 80-400mm f/4,5–5.6D and Nikon AF ED tele-zoom lenses were used.

In this study, 27 different localities were selected and over 100 bird observations have been carried out in these localities. Observed bird species diagnoses have been picked out from birdwatching books and with bird experts'

reviews on the website of Turkey's Anonymous Birds. Observations have been made as camouflage at certain points or on standby in tents (Point counts), or in the form of brisk walk starting from a point and stop (Transect counts). Bibby et al. (2000), Buckland (2006,), Hamel et al. (1992) and Ralph et al. (1997) have been utilized for this porpose. GPS records of the localities have been done by considering the points where first observations have begun. Localities where observations have been made and the data from these localities are given in Table 2. Observation records have been kept separately from each observation and bird species, as well as the number of birds have been noted in the observations. After the observations, those of insectivorous bird nature from obtained birds have been determined and this publication has been prepared.

Table 2. Data from observed localities

Locality No	Location	GPS	
		Latitude	Longitude
1	Boğaz	41°40'25.09"K	32°14'54.80"E
2	Boğaz	41°40'40.20"K	32°14'20.45"E
3	Yılanlı drump	41°40'45.10"K	32°14'1.87"E
4	İnkumu	41°40'13.01"K	32°13'40.35"E
5	Mugada	41°36'31.75"K	32° 9'22.64"E
6	Gazhane	41°38'19.40"K	32°19'55.33"E
7	Ağadacı	41°36'3.34"K	32°20'47.94"E
8	Göl	41°35'48.51"K	32°19'30.10"E
9	İhsanoğlu	41°35'11.61"K	32°20'3.48"E
10	Çaydüzü	41°37'33.66"K	32°22'22.21"E
11	Kozcağız	41°28'4.32"K	32°20'31.91"E
12	Kozacağız drump	41°29'39.91"K	32°20'34.96"E
13	Topal Ali	41°32'2.41"K	32°20'25.29"E
14	Hasankadı	41°20'45.76"K	32°23'8.76"E
15	Küre dağları	41°41'54.50"K	32°40'19.71"E
16	Kumluca	41°27'12.42"K	32°28'40.80"E
17	Gezen plateau	41°22'11.67"K	32°34'15.21"E
18	Ulus	41°34'51.97"K	32°39'13.28"E
19	Ulukaya	41°40'14.59"K	32°45'50.57"E
20	Uluyayla	41°32'38.54"K	32°47'15.69"E
21	Amasra	41°45'7.70"K	32°22'59.10"E
22	Gömü village	41°43'50.49"K	32°21'33.84"E
23	Tarla ağzı village	41°43'19.51"K	32°20'27.86"E
24	Bozköy	41°46'28.07"K	32°28'5.57"E
25	Çakraz	41°46'50.25"K	32°29'3.86"E
26	Kurucaşile	41°49'50.65"K	32°40'7.11"E
27	Kızılkum	41°35'45.24"K	32° 7'43.13"E

Result and suggestion

Over 100 bird observations in 27 different localities have been carried out with this study. As a result of the observations, 50 insectivorous bird species from 16 famileas of 6 orders have been identified. Insectivorous bird species identified in the study are given in table 3 (Figure 1).

As a result of the study, 50 insectivorous bird species from 16 families of 6 orders have been identified. As a result of bird observations, 27 of insectivorous bird species identified in Bartın are summer migrants, 10 of them are winter migrants and 13 of them are indigenous bird species which are seen resident. White wagtail (*Motacilla alba* L.), house martin (*Hirundo rustica* L.), great tit (*Parus major* L.), robin (*Erithacus rubecula* (L.)), blackbird (*Turdus merula* L.), chiffchaff (*Phylloscopus collybita* (Vieillot) are the most common species identified in each observation point of research field. Swift (*Apus apus* (L.), alpine swift (*Apus melba* (L.)), willow warbler (*Phylloscopus trochilus* (L.)), goldcrest (*Regulus regulus* (L.)), firecrest *(Regulus ignicapillus* (Temminck)), whitethroat (*Sylvia communis* Latham), song thrush (*Turdus philomelos* Chr. L. Brehm), mistle thrush (*Turdus viscivorus* L.) are among the least common insectivorous bird species for the duration of the study. Turdidae family-with 10 different insectivorous bird species- is identified as having the most species among others. Coal tit (*Parus ater* L.) and great tit (*Parus major* L.), which are the most important to insectivorous birds for forests, are among the bird species indigenous to study area. However, great tit (*Parus major* L.) has been observed in all of the study area though coal tit (*Parus ater* L.), has seen in 15th and 19th localities.

Table 3. Insectivorous bird species identified in Bartın

Ordo	Family	Code	Scientific Name	Cammon Name	Status	First Record	Locality
Apodiformes	Apodidae	7950	*Apus apus* (L., 1758)	Swift	S	23.06.2010	8
		7980	*Apus melba* (L., 1758)	Alpine swift	S	13.08.2010	8
Coraciiformes	Meropidae	8400	*Merops apiaster* L., 1758	Bee-eater	S	15.07.2009	18
Coraciiformes	Upupidae	8460	*Upupa epops* (L., 1758)	Hoopoe	S	16.03.2010	1, 5
Cuculiformes	Cuculidae	7240	*Cuculus canorus* L., 1758	Cuckoo	S	20.10.2009	15, 17, 18, 20, 26
Passeriformes	Aegithalidae	14370	*Aegithalos caudatus* (L., 1758)	Long-tailed tit	R	06.09.2010	6, 7, 19
	Laniidae	15150	*Lanius collurio* L., 1758	Red-backed shrike	S	21.06.2010	1, 4, 5, 7, 11, 14, 15,
		15190	*Lanius minor* Gmelin, 1788	Lesser grey shrike	S	18.07.2009	7, 9
	Motacillidae	10110	*Anthus pratensis* (L., 1758)	Meadow pipit	S	04.12.2011	27
		10140	*Anthus spinoletta* (L., 1758)	Water pipit	S	11.12.2009	1
		10090	*Anthus trivialis* (L., 1758)	Tree pipit	S	17.04.2011	7
		10200	*Motacilla alba* L., 1758	Pied wagtail	S	09.07.2009	All
		10190	*Motacilla cinerea* Tunstall, 1771	Grey wagtail	S	18.12.2009	2, 3, 7, 11, 12, 13
		10170	*Motacilla flava* L.,1758	Yellow wagtail	S	15.06.2010	3, 8, 10, 24, 25
	Muscicapidae	13480	*Ficedula albicollis* (Temminck, 1815)	Collared flycatcher	W	23.04.2011	7
		13350	*Muscicapa striata* (Pallas, 1764)	Spotted flycatcher	S	23.09.2010	1, 6, 7
		11440	*Oenanthe isabellina* (Temminck, 1829)	Isabellina wheatear	S	06.09.2010	1

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Passeriformes	Hirundinidae	10010	*Delichon urbica* (L., 1758)	House martin	S	23.072009	All
		9920	*Hirundo rustica* L., 1758	Swallow	S	20.03.2010	4, 5, 7, 8, 9, 11, 16, 21
		9910	*Hirundo daurica* (L, 1771)	Red-rumped awallow	S	18.06.2009	18, 20
		9810	*Riparia riparia* (L., 1758)	Red-rumped awallow	S	30.04.2010	11, 12, 13
	Paridae	14610	*Parus ater* L., 1758	Coal tit	R	11.11.2010	15, 19
		14610	*Parus caeruleus* L., 1758	Blue tit	W	18.11.2009	1, 2, 7, 10, 22, 23
		14640	*Parus major* L., 1758	Great tit	R	10.06.2009	All
		14400	*Parus palustris* L., 1758	Marsh tit	W	07.11.2010	19
	Sittidae	14790	*Sitta europaea* L., 1758	Nuthatch	R	08.11.2010	7, 8, 9
	Sturnidae	15820	*Sturnus vulgaris* L., 1758	Starling	R	20.03.2010	1, 3, 6, 7, 21, 22, 23
	Sylvidae	13110	*Phylloscopus collybita* (Vieillot, 1817)	Chiffchaff	W	16.10.2010	All
		13120	*Phylloscopus trochilus* (L., 1758)	Willow warbler	S	19.09.2010	6
		13150	*Regulus ignicapillus* (Temminck, 1820)	Firecrest	W	20.11.2010	7
		13140	*Regulus regulus* (L., 1758)	Goldcrest	R	12.12.2010	7
	Sylvidae	12770	*Sylvia atricapilla* (L., 1758)	Blackcap	S	12.06.2009	7, 14
		12750	*Sylvia communis* Latham, 1787	Whitethroat	S	07.05.2010	7
		12740	*Sylvia curruca* (L., 1758)	Lesser whitethroat	S	13.08.2010	1, 2
		12670	*Sylvia melanocephala* (Gmelin, 1789)	Sardinian warbler	R	14.10.2011	1

Passeriformes	Turdidae	10990	*Erithacus rubecula* (L., 1758)	Robin	W	18.12.2009	All
		11040	*Luscinia megarhynchos* (Brehm, 1831)	Nightingale	S	07.05.2010	7
		11210	*Phoenicurus ochruros* (Gmelin, 1774)	Black redstart	R	03.08.2009	1, 4, 6, 7, 11, 14, 15, 20, 21
		11220	*Phoenicurus phoenicurus* (L., 1758)	Redstart	S	18.06.2009	1, 7, 10, 15, 17, 20
		11370	*Saxicola rubetra* (L., 1758)	Whinchat	S	13.08.2010	1, 2
		11390	*Saxicola torquata* (L., 1766)	Stonechat	S	24.01.2010	1, 2, 5, 7, 9
		11870	*Turdus merula* L., 1758	Blackbird	R	11.12.2009	All
		11980	*Turdus pilaris* L., 1758	Fieldfare	W	13.03.2011	7
		12000	*Turdus philomelos* Chr. L. Brehm, 1831	Song thrush	W	30.04.2010	16
		12020	*Turdus viscivorus* L., 1758	Mistle thursh	W	27.03.2010	16
	Troglodytidae	10660	*Troglodytes troglodytes* (L., 1758)	Wren	W	24.12.2010	6, 23
Piciformes	Picidae	8870	*Dendrocopos minor* (L., 1758)	Lesser spotted woodpecker	R	03.03.2010	9, 19, 20
		8780	*Dendrocopos syriacus* (Hemprich a. Ehrenberg, 1833)	Syrian woodpecker	R	11.11.2010	15, 19, 20
		8630	*Dryocopos martius* (L., 1758)	Black woodpecker	R	10.10.2010	15, 17, 19, 20
		8560	*Picus viridis* L., 1758	Green woodpecker	R	08.08.2010	6, 15, 17, 19, 20

R: Resident, S: Summer migrant, W: Winter migrant


Apus apus


Apus melba


Upupa epops


Cuculus canorus


Aegithalos caudatus


Lanius collurio


Lanius minor


Anthus pratensis


Anthus spinoletta


Anthus trivialis


Motacilla alba


Motacilla cinerea


Motacilla flava


Ficedula albicollis


Muscicapa striata


Oenanthe isabellina


Delichon urbica


Hirundo rustica


Hirundo daurica


Riparia riparia


Parus caeruleus


Parus major


Sitta europaea


Sturnus vulgaris


Phylloscopus collybita


Phylloscopus trochilus


Regulus ignicapillus


Sylvia atricapilla


Sylvia communis


Sylvia curruca


Sylvia melanocephala


Erithacus rubecula

Figure 1. Some insectivorous birds of determined in Bartın (Photos by Özkazanç).

Woodpeckers (Picidae family), an important species of insectivorous birds, have continuously been in the area and made a broad range of spread. Nevertheless, an important one of insect-eating birds, starling (*Sturnus vulgaris* L.), is among the indigenous bird species for Bartın and has made a wide range of spread. Cuckoo (*Cuculus canorus* L.), which is a very important insectivorous bird for forest areas, locates in the area as summer immigrant and is usually seen around highland areas in the inner-forest.

Bartın province has a rich diversity in terms of bird species. With 50 different species identified, insectivorous birds are seen to have a highly important place within this diversity. As well as being a part of the biological richness, insectivorous birds stand out as a quite important biological agent in control of the pests. The effective use of these bird species especially in agricultural and forest areas against insects pests will help decreasing in production costs and preventing environmental pollution in ecological scale. Insecticides used in agricultural and forest areas lead to serious environmental pollutions and ecological problems.

The damages to the ecosystems caused by chemical compounds used against insects has been presented by many researches. Therefore, by a biological control method using birds against insects, the environment and ecosystem will be protected (Ünal, 2008). However, both natural and of human origin -unnatural- many factors threaten the natural habitat of birds and therefore the lives of birds. We may line up the main factors that threaten the lives of birds as following:

1. Humans (excessive and illegal hunting, habitat destruction)
2. Natural enemies
3. Climate conditions
4. Natural disasters

The most accurate way to protect birds from these threats is to protect them in their natural habitats. For this purpose, factors threatening the habitats of birds should be minimized and artificial bird nests should be hung in their habitats where they can build nests. The removal of hollow, decayed and old trees especially in forest areas from forests restricts the possibilities of insectivorous birds' nesting (Ünal, 2008). Artificial bird nests play an important role in the increase insectivorous birds' populations.

In a study, Kaçar et al. (2004) stated that 30-50% of artificial bird nests have been used successfully and that krüper's nuthatch (*Sitta krueperi* Pelzeln), coal tit (*Parus ater* L), scops owl (*Otus scops* (L.)) and short-toed treecreeper (*Certhia brachydactyla* Brehm) but in particular great tit (*Parus major* L.) and redstart (*Phoenicurus phoenicurus* (L.)) species have nested and completed their incubation activities successfully.

The importance of insectivorous bird species will be highlighted by the implementation of this study, which is carried out for detection of insectivorous bird species in the province of Bartın, on different regions as well. As

second phase of the study, it will be provided to use these bird species in biological control studies while supporting their reproduction with artificial bird nests in the natural environments and thus to prevent up ecological deterioration arising from chemical control to a point.

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