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Article

Dermanyssus gallinae (Acari, Mesostigmata) in the Barn Swallow (*Hirundo rustica*) nests in Urmia suburb, North West of Iran

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ABSTRACT

Migratory birds are most often responsible for the distribution of avian diseases in different areas and serve as hosts for most parasites, including ectoparasites. The aim of the present study was to record the distribution range of a mesostigmatic mite species, *Dermanyssus gallinae*, in barn swallow nests in Urmia suburb, North West of Iran. The samples were collected from 161 bird nests in 44 villages during 2013–2014. From a total of 161 swallow nests, 61 samples were infested by at least one mite. According to the result, *D. gallinae* was present in the majority of sampled nests. Since it can be transmitted to the other industrial birds and humans habit through swallows. It is recommended to spray acaricide two times per year before and after nesting in order to reduce mite population with minimum harmful effects of acaricide on the exposed birds.

KEY WORDS: Bird; distribution; ectoparasite; mite; *Hirundo rustica*.

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INTRODUCTION

Birds are the freest animal in terms of movements, and their ability to fly makes them one of the most movable animals, whereas some species being migratory (Forshaw 2000). The barn swallow [*Hirundo rustica* (Linnaeus, 1758)] is a widespread species in Eurasia and North America with an estimated global population of 190,000,000 pairs; although it is recognized that the species underwent a moderate population decline at least in Europe in the last few decades. This species undertakes one of the longest migratory journeys among migrants (Cramp 1988; Alerstam 1990). Migratory birds are most often responsible for the distribution of avian diseases over long distances (Gilbert *et al.* 2006). Birds serve as hosts for most parasites, including ectoparasites (Schmäsckke *et al.* 2003). *Dermanyssus gallinae* (De Geer, 1778) currently is the most important ectoparasite, known to poultry farmers as “red mite”, has a negative impact on animal health and is a vector of viruses and bacteria, also affecting egg layers in several countries (Hamidi *et al.* 2011; Bartley 2015). However, *D. gallinae* is most important direct pest because it is an obligatory blood-sucking parasite and reproduces very rapidly. This mite may feed on the blood of a lot of birds (poultry, game aviary and wild birds). Meanwhile, itching dermatitis occasionally has been reported from mammals associated with the poultry mite, *D. gallinae*, in many parts of the world including Iran (Mignon and Losson 2008; Akdemir *et al.* 2009; Haag-Wackernagel and Bircher 2010; Collgros *et*

al. 2013; Abdigoudarzi *et al.* 2014; Gavrilović *et al.* 2015).

The aim of the present study is to record the distribution range of a mesostigmatic mite species, *D. gallinae*, in the nests of barn swallow in Urmia suburb, North West of Iran.

MATERIALS AND METHODS

The samples were collected from 161 bird nests in 44 villages in Urmia, Northwest of Iran during 2013–2014. In order not to interfere with breeding, sampling was not conducted during presence of swallows in the nests and samples were obtained before and after nestling (Fig. 1). One hundred nests were sampled once, 33 were sampled twice and 18 and 10 nests were sampled 3 and 4 times, respectively. The sampling intervals were approximately two months.



Figure 1. One of the nests which was sampled for collecting *Dermanyssus gallinae*.

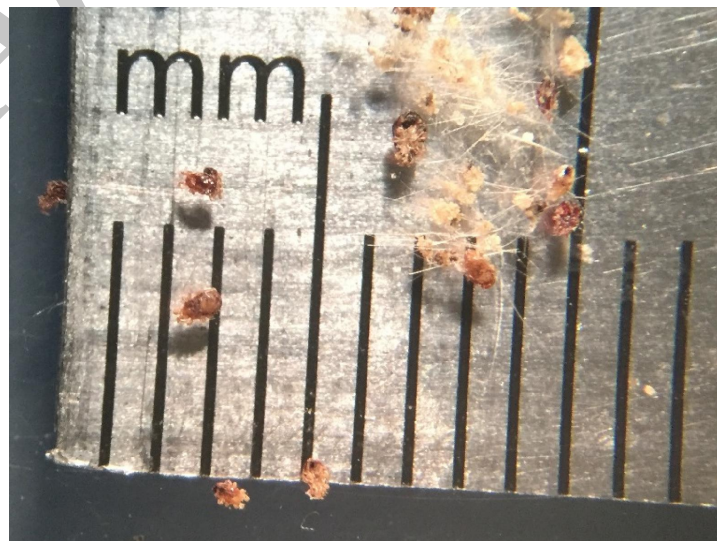


Figure 2. The mites that obtained from barn swallow's nest.

The nest's material were transferred into plastic bags and transported to the laboratory of parasitology, Faculty of Veterinary Medicine, Urmia University, Iran for future works. The collected samples were rinsed into a Petri dish and examined under a dissecting microscope for mite specimens (Fig. 2).

The ectoparasites were preserved in 70% ethanol, cleared in lactophenol, and mounted in Canada balsam on a microscope slide (Mirzaei *et al.* 2016). They were identified according to their morphological characteristics using key identification as described by Soulsby (1982) and Wall and Shearer (1997) (Fig. 3).



Figure 3. *Dermanyssus gallinae* after clearing in lactophenol, anus (black arrow) is located on posterior part of anal plate (magnification: 100×).

RESULTS

Of 161 analyzed samples, 61 cases were infested by at least one mite specimen, giving an overall prevalence of 35.29%. Figure 3 shows *D. gallinae* obtained from an infested nest, cleared by lactophenol. The results indicated that of one hundred nests which sampled once, 35 nests were infested by the parasite. Within 33 nests sampled twice, 8 were infested and among nests which sampled three and four times, 13 and 5 nests were infested, respectively. All of the nests which were infested at first time sampling were also showed infestation in repeated samplings and none of the infested nests were become cleaned in repeated samplings. In 61 of village houses where infested nests were found, the villagers were also keeping fowls. No difference was found in infestation of nests which were sampled before and after the breeding time. Additionally, the seasonal changes did not affect infestation of nests by *D. gallinae*. No other ectoparasite was also obtained from the examined nests.

DISCUSSION

The poultry red mite, *D. gallinae*, is a nocturnal haematophagous parasitic mite and has been described to cause an important debilitation by exsanguination, involving high mortality rate in newborns, and sometimes in hens (Wojcik *et al.* 2000). *Dermanyssus gallinae* has also been proven to transmit zoonotic pathogen agents (Chirico *et al.* 2003; Valiente Moro *et al.* 2005, 2007a, b, c, 2009; Brännström *et al.* 2010; Circella *et al.* 2011). It is a serious ectoparasitic pest of poultry and potential pathogen vector (Bartley 2015). The prevalence of *D. gallinae* and the prevalence of *Salmonella* spp. within host mites on infested laying poultry farms were investigated in Kosovo (Hamidi *et al.* 2011). The first case of dermatitis associated with *D. gallinae* in a horse was reported by Mignon and Losson (2008). It occurred in a 16-year-old horse that was in contact with domestic hens. Moreover, evidence of transmission to humans has been described, with subsequent apparition of skin lesions and a dermatological pruritic syndrome (Bellanger *et al.* 2008; Cafiero *et al.* 2008, 2009, 2011; Akdemir *et al.* 2009; Dogramaci *et al.* 2010; Haag-Wackernagel *et al.* 2010). *Dermanyssus gallinae* spend most of its life in the bird's environment rather than on the host itself, especially in narrow interstices like perches, feeding bowls; it acts more like a mosquito or a bed bug than like other parasites, since it only occasionally bites its hosts to take a blood meal (Akdemir *et al.* 2009; Roy *et al.* 2009; Haag-Wackernagel and Bircher 2010; Collgros *et al.* 2013; Gavrilović *et al.* 2015).

Dermanyssus gallinae is present in poultry premises worldwide and in all kinds of housing systems but the prevalence seems to be higher in back-yard flocks and free-range systems all over the world (Sparaganao *et al.* 2009). The mites gather in the hen nests, in cervices of the perches and in the litter where the birds have close access to these places. In studies of the distribution patterns of *D. gallinae*, it has been shown that mites seem to spread throughout the house from one or few original places (Nordenfors 2000).

Dermanyssus gallinae could be considered as an invasive species presenting a wide host range, with more than 40 bird families (Roy *et al.* 2009). Wild birds which build nests on a house could also be a source of infestation, as well as rodents moving in/out of the house (Mul and Koenraadt 2009).

The hypothesis has been formulated that these ectoparasites could be easily transmitted horizontally, from one infested bird nest to another close one (Clayton and Tompkins 1994), in the case of mixed colonies (Valera *et al.* 2003) or from wild birds feeding in open air together with domestic species (Roy *et al.* 2009). This could also represent a way of transmission to humans. Indeed it has been shown that birds do nest in the vicinity of humans such as city buildings (Haag-Wackernagel and Geigenfeind 2008) and several case studies have presented the evidence of *D. gallinae* populations close to abandoned bird nests, near windows or aeration circuitry (Forshaw 2000; Bellanger *et al.* 2008). Such infestations are in direct relationship with dermatologic clinical syndromes in humans, associated with pruritic syndrome (Cafiero *et al.* 2008, 2009, 2011; Bellanger *et al.* 2008; Akdemir *et al.* 2009; Dogramaci *et al.* 2010; Haag-Wackernagel *et al.* 2010). Since *D. gallinae* has been proven to transmit zoonotic pathogen agents, perching birds, like swallow, alongside house walls could be an eventual risks in terms of transmitting disease agent by *D. gallinae* to human or causing pruritus and skin lesions (Valiente Moro *et al.* 2007b; Dogramaci *et al.* 2010).

In current study, *D. gallinae* collected from 61 out of 161 swallow nest. Mite specimens were found in every sampling from the infested nests showing long time persistent of parasitic mites. Poultry were kept in every building having infested nest. These results showed that *D. gallinae* can transmitted between poultry population and barn swallows.

Due to the result that *D. gallinae* was present in the majority of sampled nests, and since it can be transmitted to the other industrial birds and humans through swallows and their nests, acaricide

can reduce mite population. It is recommended to use spraying before and after nestling to decrease the harmful effect of acaricide to these wonderful birds.


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Dermanyssus gallinae (Acari, Mesostigmata) در لانه‌های پرستوهای خانگی در شهرستان

ارومیه، شمال غرب ایران

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چکیده

پرنندگان مهاجر اغلب مسئول پخش بیماری در مناطق مختلف هستند و میزبان گونه‌های مختلف انگلی از جمله انگل‌های خارجی‌اند. هدف مطالعه حاضر بررسی وجود کنه‌ای میان استیگما، *Dermanyssus gallinae*، در لانه‌های پرستوهای خانگی مناطق اطراف شهرستان ارومیه، شمال غرب ایران بود. نمونه‌ها از ۱۶۱ لانه در ۴۴ روستا در سال‌های ۱۳۹۱-۱۳۹۲ جمع‌آوری شد. از ۱۶۱ لانه، آلودگی در ۶۱ لانه دیده شد. این لانه‌ها دارای دست‌کم یک کنه آلوده بودند. با توجه به نتایج، آلودگی *D. gallinae* در تعداد زیادی از لانه‌ها وجود داشت و از این طریق این کنه می‌تواند به سالن‌های پرورش طیور و منازل منتقل شود. به منظور کاهش جمعیت این کنه‌ها اسپری لانه‌ها با استفاده از کنه‌کش‌ها دو بار در سال توصیه می‌شود. این اقدام باید پیش و پس از استقرار پرستوها انجام شود تا کنه‌کش‌ها تأثیری بر این پرنندگان شگفت‌انگیز نداشته باشند.

واژگان کلیدی: پرنده؛ پراکنندگی؛ انگل خارجی؛ کنه؛ *Hirundo rustica*.

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