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A Mini-review of *Culicoides* (Diptera: Ceratopogonidae) Fauna and its Vectorial Role in Tunisia

Ahmed Tabbabi*

Department of Hygiene and Environmental Protection, Ministry of Public Health, Tunis, Tunisia

Abstract

Following the bluetongue outbreaks in Tunisia from 1999 to 2006, bluetongue virus serotype 2 was isolated and several entomological investigations were performed. The present study reviewed the current status of *Culicoides* fauna in Tunisia and their role as proven and potential vectors of bluetongue virus based on the available and scattered reports. In total, about 35 species of *Culicoides* are known to occur in the country. *Culicoides imicola* is considered as the main and the proven vector of bluetongue virus. Other species of the genus *Culicoides* were suggested as potential vectors bluetongue virus. We cited mainly *Culicoides obsoletus*, *Culicoides scoticus*, *Culicoides dewulfi* and *Culicoides pulicaris*. Priority recommendations to prepare the country for future veterinary health challenges were suggested.

Keywords: *Culicoides imicola;* Bluetongue virus; Veterinary health; Tunisia

Introduction

Biting midges of the genus *Culicoides* (Diptera: Ceratopogonidae) are hematophagous insects found in tropical and temperate countries. These insects have an importance veterinary health importance by transmitting several pathogens [1,2]. Actually, about 1316 biting midges species have been identified and 50 arboviruses have been found inside species of *Culicoides* considered later as vectors [3,4]. Recently, *Schmallenberg bunyavirus* (genus Orthobunyavirus; Bunyaviridae) have been isolated in *Culicoides* species in Europe [5,6]. The aim of the present study was to review the species composition of *Culicoides* fauna in Tunisia and their role as proven and potential vectors of bluetongue virus.

Current Species Composition of *Culicoides* Fauna in Tunisia

Entomological investigations carried out in Tunisia have reported an increasing number of species during the last decades. In total, about 35 species of *Culicoides* are actually present in the country [7-11]: *Culicoides imicola* kieffer, 1913; *Culicoides obsoletus* Meigen, 1818; *Culicoides circumscriptus* Kieffer, 1918; *Culicoides newsteadi* Austen, 1921; *Culicoides punctatus* Meigen, 1804; *Culicoides parroti* Kieffer, 1922; *Culicoides puncticollis* Becker, 1903; *Culicoides riethi* Kieffer, 1914; *Culicoides cataneii* Clastrier, 1957; *Culicoides corsicus* Kremer, 1971; *Culicoides gejgelensis* Dzhafarov, 1964; *Culicoides griseidorsum* Kieffer, 1918; *Culicoides heteroclitus* Kremer and Callot,1965; *Culicoides jumineri* Callot and Kremer, 1969; *Culicoides longipennis* Khalaf, 1957b; *Culicoides maritimus* Kieffer, 1924; *Culicoides pseudopallidus* Khalaf, 1961; *Culicoides santonicus* Callot, Kremer, Rault and Bach, 1966; *Culicoides semimaculatus* Clastrier 1958a; *Culicoides sergenti* Kieffer, 1921h; *Culicoides submaritimus=C. maritimus* Borkent 2008; *Culicoides univittatus* Vimmer, 1932; *Culicoides saevus* Kieffer, 1922g; *Culicoides kingi* Austen, 1912; *Culicoides fascipennis* Staeger, 1839; *Culicoides subfasciipennis* Kieffer, 1919a; *Culicoides sahariensis* Kieffer, 1923a; *Culicoides kurensis* Dzhafarov, 1960; *Culicoides langeroni* Kieffer, 1921; *Culicoides lailae A; Culicoides lailae B=C. odiatus* Borkent 2008; *Culicoides marcleti* Callot, Kremer and Basset, 1968; *Culicoides odiatus* Austen 1921; *Culicoides indistinctus=C. odiatus* Borkent, 2008; *Culicoides paolae* Boorman, 1996.

Vectorial Role of *Culicoides* as Proven and Potential Vectors in Tunisia

Culicoides imicola is considered as the main and the proven vector of bluetongue virus and African horse sickness virus viruses Africa, Middle East, southern Asia and southern Europe [12,13]. The two pathogens are responsible of devastating diseases in ovine and equidae, respectively. It is important to note that other species including *Culicoides obsoletus*, *Culicoides scoticus*, *Culicoides dewulfi* and *Culicoides pulicaris* are considered as known or potential bluetongue virus vectors [14-20]. In Tunisia, the first outbreaks of bluetongue virus (BTV) were identified in 1999 causing a dramatic sanitary and economical crisis in the country [21]. Later, two serotypes including BTV-2 and BTV-1 have arisen in 2000 and 2006, respectively [8]. In 1999, the first outbreak appeared in eastern Tunisia along the coast. An important rate of morbidity and mortality rates were recorded reaching 8.35% and 5.5% respectively [22]. One year later, 72 outbreaks affecting 6,120 sheep were recorded in eastern and central Tunisia. Vaccination campaigns were undertaken in sheep flocks by veterinary health authorities in order to control the propagation of the disease.

Priority Recommendations to Prepare the Country for Future Veterinary Health Challenges

Control against bluetongue disease consists to ameliorate our knowledge of the epidemiology of blue tongue and to better understand the vectors ecology. The dominance of *Culicoides imicola* compared to other collected species highlights the risk of emergence of new diseases. Further entomological investigations are essential to continue the surveillance of other potential and to limit the propagation of the disease in the country. Understanding what a vector is to evaluate and predict vector transmission risks, improve current control methods and develop new approaches and Coordinating multidisciplinary research efforts are the main and priority recommendations to prepare the country for future veterinary health challenges.

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***Corresponding author:** Ahmed Tabbabi, Department of Hygiene and Environmental Protection, Ministry of Public Health, Tunis, Tunisia, Tel: +0021697085424; E-mail: tabbabiahmed@gmail.com

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