Entomologia Generalis, Vol. 42 (2022), Issue 4, 655–658
Published online 24 February 2022

The rising threat of the invasive bumblebee *Bombus terrestris* highlights the need for sales restrictions and domestication of unique local biodiversity in Asia

Michael C. Orr[1,2], Zong-Xin Ren[3], Jin Ge[4], Li Tian[5], Jiandong An[6], Jiaxing Huang[6], Chao-Dong Zhu[1,2,4,7,*], and Paul H. Williams[8,*]

[1] Key Laboratory of Zoological Systematics and Evolution, Institute of Zoology, Chinese Academy of Sciences, Beijing, China
[2] International College, University of Chinese Academy of Sciences, Beijing, China
[3] Key Laboratory for Plant Diversity and Biogeography of East Asia, Kunming Institute of Botany, Chinese Academy of Sciences, Kunming, China
[4] State Key Laboratory of Integrated Pest Management, Institute of Zoology, Chinese Academy of Sciences, Beijing, China
[5] College of Plant Protection, China Agricultural University, Beijing, China
[6] Key Laboratory for Insect-Pollinator Biology of the Ministry of Agriculture and Rural Affairs, Institute of Apicultural Research, Chinese Academy of Agricultural Sciences, Beijing, China
[7] College of Life Sciences, University of Chinese Academy of Sciences, Beijing, China
[8] The Natural History Museum, London, United Kingdom
* Corresponding authors: zhucd@ioz.ac.cn, p.williams@nhm.ac.uk

With 2 figures

Abstract: The managed bumblebee *Bombus terrestris* L. (Hymenoptera: Apidae) has become established on multiple continents and various islands globally, potentially impacting fauna and flora alike. Its introduction could prove especially problematic in Asia, where bumblebee biodiversity is the highest worldwide. Here, we report the active, unregulated commercial management and sale of non-native *Bombus terrestris* in China, also including its use in open environments, which has resulted in at least two introductions into the wild that we newly report here (Beijing and Kunming, China), although whether they are established is unknown. National and international regulations on the trade and use of this species are needed, and some of the many native species should instead be targeted for domestication.

Keywords: Apoidea, Apidae, *Bombus*, pollination, exotic species, invasive species, biodiversity decline

Bees are valued for their crucial ecosystem services, but when invasive they can prove exceedingly detrimental, causing species declines and potentially disrupting ecosystem functions (Russo 2016). *Bombus terrestris* is known from Europe into western China and Mongolia, where it occurs in the mountains to the far west and north, long barred in its advance by adjacent deserts. Within its native range, it is often highly abundant and easily studied, and it is also amenable for easy captive rearing. This and its membership in a group of difficult species complexes (Williams et al. 2012; Williams 2021) made it a model organism for behavioral, genomic, and other research, and efforts to refine its rearing have made it one of the most popular commercially-available pollinators worldwide (Dafni et al. 2010).

The global success of *B. terrestris* as both a commercial pollinator and an invasive species has had unfortunate impacts. Established in Chile/Argentina, Japan, New Zealand, and Tasmania, this species has negatively impacted other bumblebees, even leading to local extirpations of native competitors as it continues to spread, including the large "flying mouse" bumblebee, *B. dahlbomii* (Morales et al. 2013; Schmid-Hempel et al. 2014; Montalva et al. 2017; Rendoll-Carcamo et al. 2017). In addition to direct competition, this can also be mediated through pathogen introductions and effects on local flora (Arbetman et al. 2013; Aizen et al. 2014; Arismendi et al. 2020). In some of these areas, such as South America, *B. terrestris* may now be the most common bee species (MCO, pers. obs.).

DOI: 10.1127/entomologia/2022/1409
www.schweizerbart.de
0171-8177/2022/1409 $ 1.80