



Opinion

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Securing the Future of Beekeeping in West Africa: A Call for Robust Research and Sanitary Surveillance to Safeguard Bee Health and Sustainability



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Abstract

In this opinion, we emphasize the critical importance of protecting bee populations. We discuss the factors contributing to Colony Collapse Disorder (CCD) and provide an overview of the current research on bee health and disease surveillance, specifically focusing on the context of West Africa. By understanding the complex interactions among these factors, effective mitigation strategies can be developed. The abstract highlights the need for researchers, government entities, and other stakeholders to actively engage in bee health research. Safeguarding bees is crucial not only for ecosystem health but also for sustaining agriculture and promoting sustainable development.

Keywords: Bee health; Colony collapse disorder; Sustainability; West Africa

Background

Beekeeping plays a vital role in the socioeconomic fabric of rural areas, significantly contributing to the livelihoods of local populations. In addition to their direct contributions to the livelihoods of beekeepers, bees play a crucial role in ecosystems and agricultural systems worldwide. They are essential pollinators, facilitating the reproduction of numerous plant species, including those that produce fruits, vegetables, nuts, and seeds. Pollination by bees enhances food production and quality, contributing to the diversity and abundance of crops. Beyond agriculture, wild plant communities and natural habitats also rely on bees for successful reproduction and ecosystem stability. Furthermore, bees contribute to the maintenance of biodiversity by promoting the reproduction of various plant species. Their foraging activities and movement between flowers facilitate genetic diversity within plant populations, which is vital for long-term species survival and resilience. Bees also serve as a food source for other organisms, creating interconnected ecological relationships and supporting overall ecosystem health. In addition to their ecological signif-

icance, bees hold cultural and aesthetic importance. They have long been admired and celebrated for their intricate hive structures, social organization, and industrious nature. Bees and their products, such as honey, beeswax, and propolis, have cultural and traditional value in many societies, being used in culinary practices, medicines, and cosmetic products. However, over the past few decades, a global phenomenon known as Colony Collapse Disorder (CCD) has emerged, posing a significant threat to bee colonies [1]. CCD's multifactorial nature has raised concerns about the availability of bee products and has led to substantial economic losses for beekeepers.

Protecting Bees: Unraveling Colony Collapse Disorder, Sustainable Practices, and Climate Resilience for Beekeeping and Ecosystem Health

Given the multiple dimensions of their importance, it is imperative to address the threats facing bee populations and take proactive measures to protect and conserve them. By safeguarding bees and their habitats, we can ensure the continuity

of their essential contributions to ecosystems, agriculture, cultural heritage, and sustainable development. Extensive scientific research has shed light on various factors contributing to CCD. Pathogens such as viruses, bacteria, and fungi have been identified as significant culprits behind colony collapse. Additionally, the widespread use of pesticides in agriculture has raised concerns about their detrimental effects on bee health and colony survival. Furthermore, the impacts of global climate change, including shifts in temperature patterns, precipitation, and the availability of floral resources, have also been implicated as stressors affecting bee colonies. Understanding the intricate interactions between these factors and their combined effects is crucial for developing effective mitigation strategies. Ongoing scientific investigations aim to unravel the underlying mechanisms of CCD, improve disease management practices, promote sustainable agricultural approaches with reduced pesticide usage, and develop resilient beekeeping practices that can adapt to the challenges posed by global climate change. By advancing our knowledge and implementing evidence-based solutions, we can strive to safeguard bee populations, preserve their valuable contributions to ecosystems, and ensure the continuity of beekeeping as a vital economic activity.

To mitigate the detrimental impacts of these threats on the sustainable development of beekeeping, a plethora of scientific studies have been conducted to comprehensively address their root causes and devise effective control measures. Developed countries have made significant investments in research funding to support these efforts and have implemented specialized monitoring systems. Notably, the monitoring of bee diseases has been integrated into standard animal disease surveillance systems, underscoring the importance of ensuring the health and well-being of bees within the broader context of animal health. The World Organization for Animal Health has dedicated some chapters to the diagnosis of bee diseases and defined guidelines for the official health control of bee diseases in its Terrestrial Animal Health Code. The comprehensive list of bee diseases includes infestations like American and European foulbrood, as well as infestations caused by *Aethina tumida* and *Varroa* sp. These diseases are considered significant and must be promptly reported. Such efforts are crucial in mitigating Colony Collapse Disorder (CCD) and ensuring the survival of the beekeeping industry, thereby preserving biodiversity and the critical role bees play in ecosystems.

However, like various other sectors in Africa, the well-being of bees has received relatively less attention when it comes to addressing the threats they face. While African bees have demonstrated some resilience to bee diseases, it is crucial not to underestimate the importance of actively safeguarding their

health. Unfortunately, most research efforts have primarily focused on the socio-economic and technical aspects of beekeeping Kanazoe et al. [2], melliferous potentials Nombre et al. [3], as well as the sensory and physicochemical qualities of honey, often neglecting comprehensive studies of bee diseases. Limited in-depth research has been conducted, primarily examining the presence or absence of specific pests [4,5]. It is imperative to prioritize and expand research endeavors to thoroughly map and characterize pathogens and investigate the risk factors associated with bee diseases and ensure the sustainable protection of these vital pollinators.

Addressing the Challenges: Mobilizing Researchers, Developers, and Government for Meaningful Impact

While past research and achievements have undoubtedly played a pivotal role in advancing efforts against various threats, it is increasingly evident that insufficient attention is being given to the protection of bees in West Africa, particularly in Burkina Faso. The scarcity of researchers, research centers, and dedicated funding for this crucial cause is a pressing concern. Recognizing the critical role bees play in ecosystem health and food security, it is imperative to prioritize and strengthen efforts to safeguard bee populations in the region. This requires active involvement and support from the government, including the allocation of resources and the establishment of policies that promote bee conservation. Additionally, developers and stakeholders should collaborate to implement sustainable practices and technologies that minimize the impact the threats. By working together, we can ensure the long-term survival and well-being of bees in West Africa.

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