



Honey Bee Colony Losses in Turkey: Winter 2022/23 and 2023/24 Findings from the COLOSS Monitoring Questionnaire

Ayğün Schiesser¹, Ziya Şahin², Robert Brodschneider³, Alison Gray⁴

¹Department of Biology, Hacettepe University, Ankara, Turkey; ²Association of Turkish Beekeepers, Ankara, Turkey; ³Department of Biology, University of Graz, Graz, Austria; ⁴Department of Mathematics and Statistics, University of Strathclyde, Glasgow, UK

INTRODUCTION

Honey bee colony health is essential for pollination services, agricultural sustainability, and the overall resilience of the beekeeping sector. Globally, honey bee malnutrition and starvation represent major challenges, as shortages of pollen and nectar dramatically impact bee health and productivity, often requiring repeated and prolonged emergency feeding interventions. While poor nutrition negatively affects honey bee development and colony performance, there is limited understanding of the role and impact of feeding practices and beekeepers' perceptions. In Turkey, high colony loss rates continue to raise concerns.

To address these issues, the 2023 and 2024 COLOSS Honey Bee Colony Loss Surveys aimed to assess losses and identify contributing factors, providing critical insights to improve colony management strategies. Continuous monitoring through standardized surveys is crucial to understanding loss trends and their underlying factors, while the global COLOSS Bee Nutrition Task Force survey complements this by offering an overview of current feeding practices and nutritional challenges faced by honey bee colonies.

Keywords: Honey bee colony losses, beekeeping, colony health, COLOSS Questionnaire, queen problems, natural disasters, Turkey

MATERIALS AND METHODS

The surveys were conducted online using Google Forms, based on the COLOSS standardized questionnaire. Beekeepers were invited to participate voluntarily through official newsletters, social media, phone communication with local beekeeping centers, and in-person contacts. The 2023 survey included 50 beekeepers managing 4,371 colonies, while the 2024 survey expanded to 131 beekeepers with 11,505 colonies.

Survey data recorded colony losses due to dead or empty colonies, unresolvable queen problems, and natural disasters (e.g., wildfires, floods, earthquakes). For each beekeeper, the loss rate was calculated as the sum of lost colonies (due to queen problems, natural disasters, and worker bee deaths) divided by the colonies present before winter. This approach aligns with the COLOSS methodology used internationally to enable standardized comparisons and provide robust insights into colony health and management practices.



Figure 1. Turkish version of Coloss Monitoring Questionnaire

RESULTS

In 2023, the overall colony loss rate was 34.1%, comprising 25.1% dead or empty colonies, 7.4% queen problems, and 1.6% natural disasters. In 2024, the overall loss rate slightly increased to 35.8%, with 19.8% dead or empty colonies, 7.8% queen problems, and 8.1% natural disasters.

Dead or empty colonies remained the most common cause of losses, while natural disaster-related losses showed a considerable increase in 2024. Queen problems consistently contributed a moderate proportion of losses. These findings highlight the importance of monitoring colony health and implementing effective management practices.

DISCUSSION

The high overall loss rates observed in 2023 and 2024 emphasize the need for improved colony management strategies in Turkey. Dead or empty colonies remain the primary cause of losses, indicating potential issues with colony health or wintering conditions. The moderate but consistent contribution of queen problems suggests that systematic queen management, including regular replacement, could help reduce losses.

Natural disasters had a substantial impact on Turkish beekeeping during this period. Wildfires, especially in the Mediterranean and Aegean regions, destroyed forage sources and damaged hives. The February 2023 Kahramanmaraş earthquake disrupted beekeeping infrastructure, displacing many hives and affecting honey production. Flood events in 2024 further damaged apiaries and reduced harvests.

Governmental and local interventions, including financial support, temporary hive relocation, and direct aid to affected beekeepers, partially mitigated these impacts. These events underline the vulnerability of apiculture to environmental hazards and highlight the need for climate-resilient management strategies.

Adaptive management practices, including enhanced queen care, monitoring of colony health, diversified forage sources, and mitigation of predictable environmental stresses, are essential for promoting sustainable beekeeping in Turkey. While some natural disasters, such as earthquakes or floods, cannot be prevented, certain risks—such as extreme heat, drought, or wildfire—can be anticipated and addressed through preventive measures, hive relocation, or supplementary feeding. Increased participation in surveys will improve data accuracy, aid loss prevention, and support the long-term resilience of honey bee colonies.

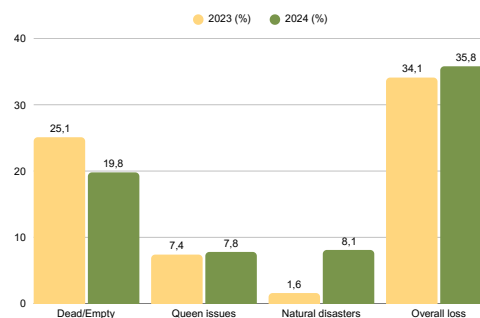


Figure 2. Overview of Honey Bee Colony Losses and Contributing Factors in Turkey (2023-2024)



Aygün Schiesser¹, Ziya Şahin², Robert Brodschneider³, Alison Gray⁴

¹Department of Biology, Hacettepe University, Ankara, Turkey

²Assosiation of Turkish Beekeepers', Ankara, Turkey

³Department of Biology, University of Graz, Graz, Austria

⁴Department of Mathematics and Statistics, University of Strathclyde, Glasgow, UK

Honey bee colony health is essential for pollination services and agricultural sustainability. In Turkey, high colony loss rates continue to raise concerns. The 2023 and 2024 COLOSS Honey Bee Colony Loss Surveys aimed to assess these losses and identify contributing factors to improve colony management strategies. Despite previous research, limited data exist on the causes of colony losses in Turkey, hindering effective interventions. Continuous monitoring through standardized surveys is crucial to understanding loss trends and their underlying factors. The 2023 survey included 50 beekeepers with 4,371 colonies before winter, while the 2024 survey expanded to 131 beekeepers with 11,505 colonies. Both surveys used the COLOSS standardized questionnaire to record losses due to dead/empty colonies, colonies alive after winter but with unresolvable queen issues, and natural disasters. In 2023, the overall loss rate was 34.1 percent, with 25.1 percent attributed to dead/empty colonies, 7.4 percent to queen problems, and 1.6 percent to natural disasters. In 2024, the overall loss rate increased slightly to 35.8 percent, with 19.8 percent due to dead/empty colonies, 7.8 percent to queen problems, and 8.1 percent to natural disasters. While overall losses remained high, natural disaster-related losses increased, whereas dead/empty colony losses declined. These findings highlight the need for better queen management, colony health strategies, and climate resilience. Greater beekeeper participation in surveys will improve data accuracy, aiding effective loss prevention. Adaptive management is crucial for sustainable beekeeping in Turkey.