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Plant-pollinator interactions are essential for plant productivity and ecosystem stability, as the majority of flowering plants depend on animal-mediated pollination, predominantly by bees. However, climate change poses increasing threats to these interactions, leading to vegetation loss and phenological mismatches. Despite these concerns, large-scale data on how such changes impact bee foraging resources remain limited. In this study, we leveraged a citizen-science network established within the framework of the European project "INSIGNIA-EU - Preparatory action for monitoring of environmental pollution using honey bees" to conduct an unprecedented Europe-wide study of pollen collected by honey bees (*Apis mellifera*). We used the ITS2 metabarcoding method to identify at the species level over 2,500 pollen samples collected fortnightly between May and August of 2023 from traps deployed in 310 apiaries located across all 27 EU countries. Using the relative abundances estimated from ITS2 sequence reads, we examined geographic and temporal distributions of floral resources and assessed risks of interaction losses under varying climate change scenarios. Additionally, we estimated the temperature and precipitation niche distributions of the plant resources identified to assess their risk towards environmental change. Our findings indicate that increasing temperatures and declining precipitation significantly reduce the diversity of foraging resources throughout Europe, by pushing many plant species beyond their climatic tolerance thresholds. This is a major concern, even when considering resilience through geographic and temporal shifts in resources, because the changes in plant diversity pose serious risks to bee nutrition, ecosystem health, and food security. Moreover, Southern Europe is projected to experience the most severe impacts, with some already observable. This study highlights the urgent need for measures to mitigate climate change effects on plant-pollinator systems, emphasizing their critical role in both ecological balance and agricultural productivity.