



Herbaria: a valuable resource of the time treasured historic plant specimens with boundless research potential for environmental sustainability

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Abstract

The research studies on herbarium specimens have unraveled the mysteries hidden in historical treasured specimens, which could not have been possible with the living plants. A plethora of research studies have been carried out on herbarium specimens. The specimens have been instrumental in advancing our comprehension of diverse scientific phenomena, including but not limited to climate change, the impact of the ozone hole, phenological variations, indicators of effective pollination, interactions in pollination processes, antibiotic activity, biodiversity assessments, and the development of evolving conservation strategies. Additionally, they have facilitated investigations into coevolution within plant–insect relationships, allowed for noninvasive anatomical studies, led to the discovery of phytochemicals with commercial significance, provided insights into the migration patterns of plant pathogens, aided our current understanding of the origin of invasive herbivores, and supported research in molecular systematics and evolution. Furthermore, herbarium specimens have been instrumental in addressing issues related to patent claims, among other scientific inquiries. The observations on the trend of research studies on herbarium specimens indicate that several new understandings are likely to emerge in times to come since the specimens are dynamically contributing to the enhancement of the knowledge base. The current review comprehensively covers the fascinating research studies on herbarium specimens, as evidenced by appropriate examples.

Keywords Climate change · Phenology · Patent revocation · Biodiversity conservation · Coevolution · Invasive species · Bioindicators · Pollination

1 Introduction

Herbarium specimens formed about 500 years ago (Arber, 1938; Nesbitt, 2014; Sprague & Nemes, 1931; Stefanaki et al., 2019). However, the collection of plant species continues to be inadequate, particularly in the tropical regions. Identifying the collected specimens is a huge, time-consuming, and arduous task (Bebber et al., 2010). Still, huge collections with authentic

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