

## EXPLORING THE FEATURES OF PLANTS THREATENING MALAYSIA'S HERITAGE BUILDINGS

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### ABSTRACT

Plants contribute to various functions in landscape design such as shade, ornamentation, food sources and etc. For heritage buildings, the functions of plants are identified as elements that can enhance the heritage value of a building. The presence of plants also harms the stability of heritage buildings. Certain plants are identified to cause damage such as roof damage, wall cracks, plaster layer damage, stains on the paint layer, paint peeling, gutter and drain blockage, and wooden component damage. Therefore, the objective of this study is to identify the features of plants that threaten heritage buildings. This study uses a qualitative approach through observation and interviews. Observation methods were carried out on 112 masonry heritage buildings listed by the National Heritage Department (JWN). In-depth interviews were conducted with eight (8) registered conservators who are experienced and actively involved in heritage building conservation. The collected data were analyzed using thematic methods to produce a list of characteristics of plants that damage heritage buildings. The study found a total of eight (8) plant characteristics, namely compact canopy, shedding leaves excessively, bearing fruit, dense flowering, lateral roots, adventitious roots, easy decay, and wide-crowned tree. This study will assist conservators, building occupants, maintenance contractors, and landscape architects in selecting suitable plants for landscaping and environmental design surrounding heritage buildings in Malaysia.

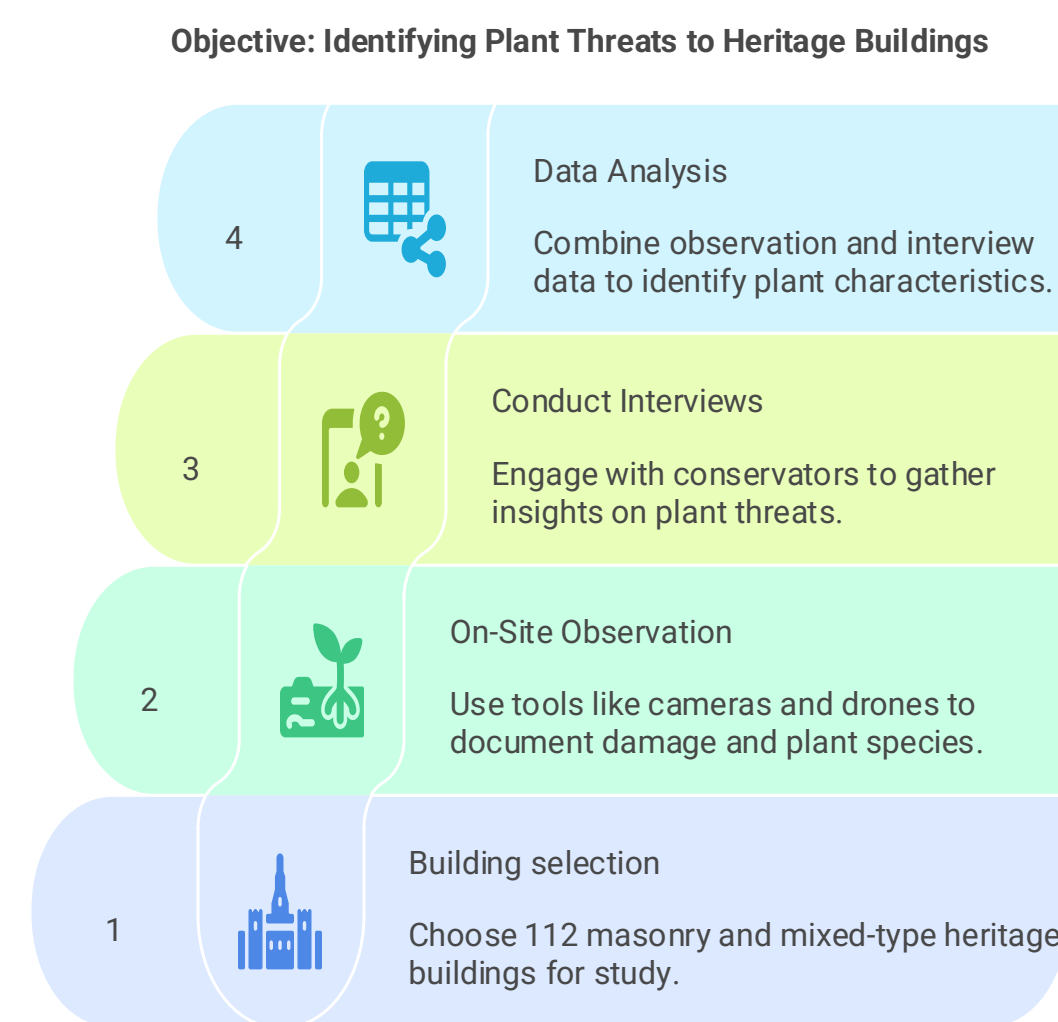
### KEYWORDS

Plant characteristics, landscape plants, threatening plants, building conservation, heritage building

### 1. INTRODUCTION

Landscape plants enhance comfort and aesthetics around buildings but can also pose risks to structural integrity (Mattheck et al., 2003). In heritage conservation, tree removal is often a preventive measure to avoid future damage (Catt, 1994). In urban areas, thoughtful landscape design helps preserve the identity of heritage sites (Shamsuddin et al., 2012). Research shows that certain plant species contribute to moisture retention, blocked gutters, structural cracks, and termite infestations (Ahmad, 2004, 2018; Awang et al., 2020–2024; Jim, 2013, 2018). These impacts are mostly linked to specific plant traits and growth behaviours. Malaysia's hot, humid climate promotes rapid plant growth, increasing the risk of colonisation on heritage structures. However, vegetation-related risks are often overlooked in planning, leading to long-term structural threats (Sim, 2015). As a result, restored buildings may be surrounded by unsuitable vegetation. Identifying problematic plant characteristics can support better plant selection, reducing damage while maintaining the visual and ecological value of heritage landscapes.

### 2. MATERIALS AND METHODS



### 3. RESULT AND DISCUSSION

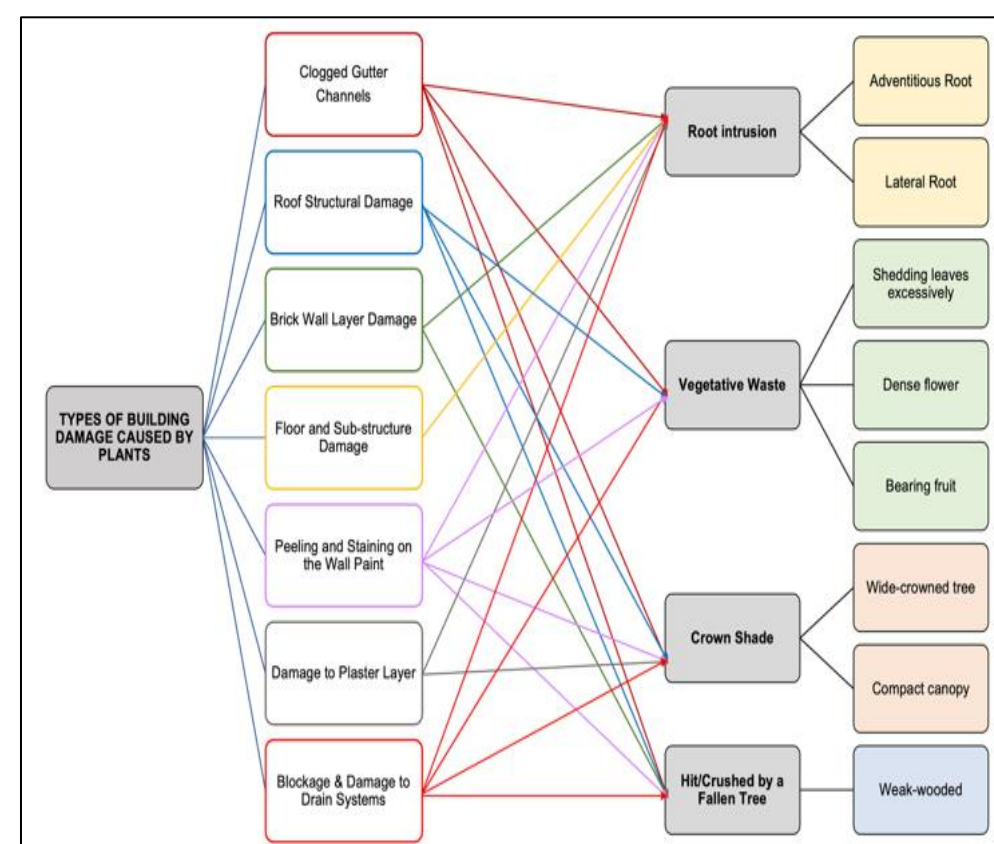


Figure 1: The relationship between building damage and the characteristics of plants that pose a threat to heritage buildings in Malaysia

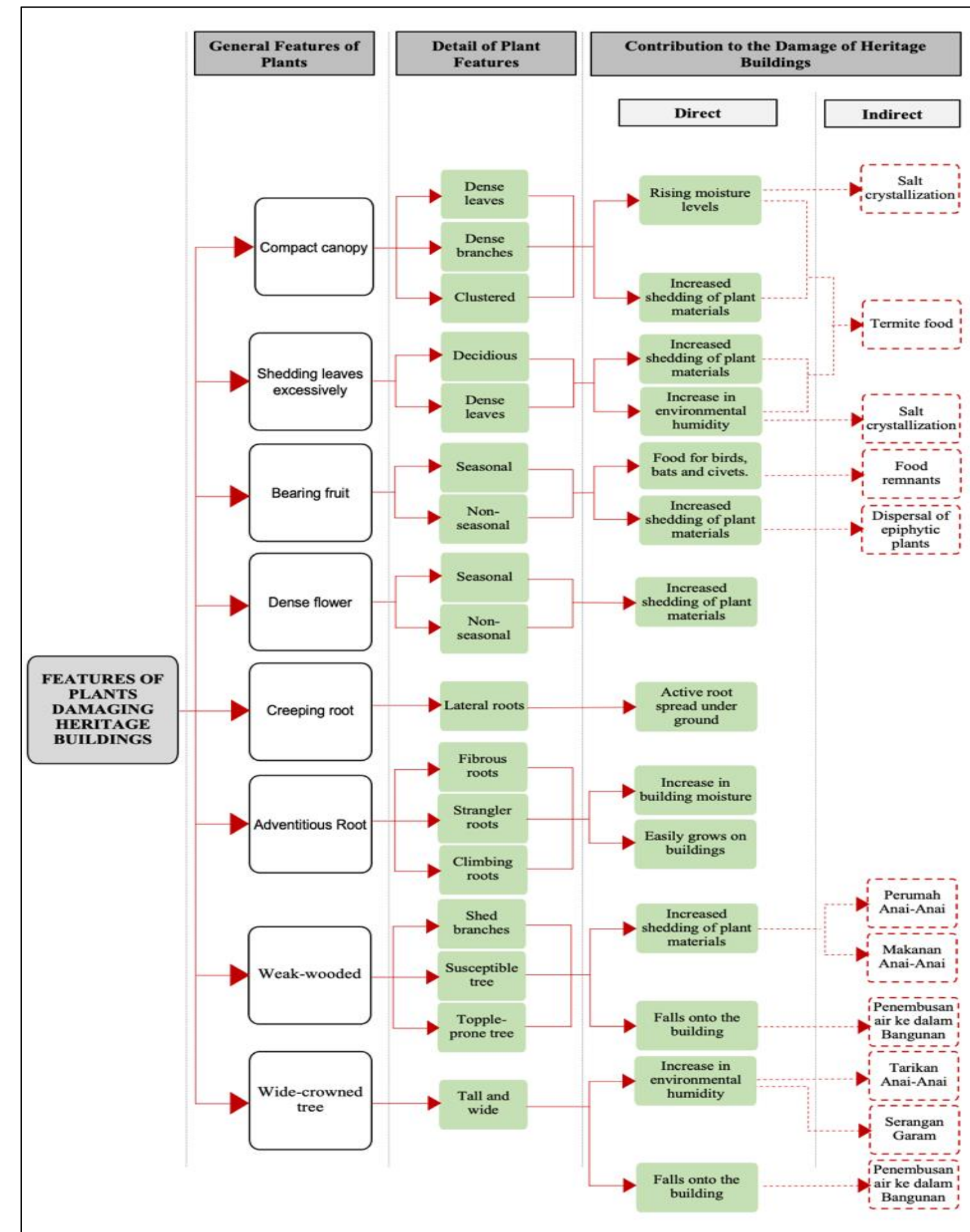


Figure 2: Comprehensive Chart of Plant Traits that Threaten and Damage Heritage Buildings

### 4. CONCLUSION

While the diversity of plant species around heritage buildings enhances aesthetic and historical value, it also introduces a range of impacts due to differing plant traits. Each plant has unique characteristics that influence its environmental impact. A wide variety of plant species allowed the study to observe a broad spectrum of effects on buildings. These characteristics contribute both directly and indirectly to building deterioration. For example, termites are attracted by dead wood, fallen leaves, and moisture, while mineral salts can be absorbed into bricks due to water movement. Plants that create cool, moist, and shaded environments typically have dense canopies and shed leaves that cover the ground. Malaysia's tropical climate, with abundant rainfall and sunlight, encourages plants to develop thick canopies and lush foliage. When trees are planted too close together, their overlapping canopies form a "roof" effect, resulting in damp, waterlogged soil below. This creates ideal conditions for epiphytes such as Ficus species to grow on brick buildings. Tropical plants differ from those in non-tropical regions by producing more moisture and debris, while non-tropical species are more commonly associated with root intrusion. Research focused only on root invasion may not be suitable for tropical climates. Therefore, planning must begin at planting, with correct spacing to avoid future damage. Identifying the Critical Root Zone (CRZ) is crucial to preventing root intrusion. Arbitrary planting distances, like the 10 to 15 metres suggested by K2, are less reliable since each tree species behaves differently. The CRZ concept specifically applies to trees and helps ensure safe planting distances near heritage buildings.

Table 1: Detailed characteristics of plants that threaten and damage heritage buildings according to conservators

NO.	CONSERVATOR	CHARACTERISTICS OF PLANTS THAT DAMAGE HERITAGE BUILDINGS							
		Compact canopy	Shedding leaves excessively	Bearing fruit	Dense flower	Lateral Root	Adventitious Root	Weak-wooded	Wide-crowned tree
1.	K1	/	/	/	/	/	/	/	/
2.	K2	/	/	/	/	/	/	/	/
3.	K3	/	/	/	/	/	/	/	/
4.	K4	/	/	/	/	/	/	/	/
5.	K5	/	/	/	/	/	/	/	/
6.	K6	/	/	/	/	/	/	/	/
7.	K7	/	/	/	/	/	/	/	/
8.	K8	/	/	/	/	/	/	/	/

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