

Resilience at the wall: ecological lessons from *Pilea microphylla* through the FIKR (facet, insight, knowledge and resilience) lens

Abstract

Backyard photographs from Selangor (Malaysia) document the artillery plant *Pilea microphylla* forming low mats along the wall and concrete seam. The species is identified by soft succulent shoots, opposite tiny leaves two to five millimetres long, and minute axillary flowers lining the stems like beaded spikes. Across wet and dry pulses the mats remain green, rooting at nodes and spreading linearly in narrow cracks. This short case study asks what this hardy wall flora can teach about human resilience and adaptation when viewed through the FIKR (Facet, Insight, Knowledge, and Resilience) frame. Our objectives are to record reliable field characters, relate persistence to simple habitat filters at wall bases, and translate plant strategies into portable lessons for personal and team practice. Observations show three enabling rules. Sample edges where moisture and fines accumulate. Advance by small, low cost steps that can re root quickly. Hold shade and drainage together to buffer stress. Read through FIKR, these rules map to decisive execution, sensitive scanning, cumulative learning, and steady recovery. The plant succeeds because structure and behaviour fit the microhabitat. People and teams do the same when they design small moves that can be repeated under constraint. The backyard seam becomes a clear teaching tool for ecology, urban biodiversity, and everyday method. It is small, clear, transferable, and grounded in daily observation.

Keywords: *Pilea microphylla*, urban ecology, resilience, fikr framework, wall vegetation

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Introduction

Pilea microphylla L. (Family: Urticaceae) is a tiny herb in the nettle family that forms low, succulent mats with opposite leaves only a few millimetres long and many minute axillary flowers that line the stems like beaded spikes. Male flowers eject pollen with a characteristic “artillery” snap, a feature that helps identification in the field.¹ The species is recorded for Malaysia and is widely naturalised in urban settings across the region, where it often occurs on moist shaded substrates.^{2,3}

Beyond its diagnostic morphology, *P. microphylla* shows a suite of ecological traits that allow it to persist in hardscapes. It grows and flowers throughout the year, tolerates extended flooding, and once established exhibits moderate drought tolerance, which together explain its ability to survive in the wet–dry cycles typical of backyard drains and wall seams.⁴ Urban vegetation studies show that cracks at the base of masonry walls function as narrow but dependable niches shaped by shade, seepage, and very shallow rooting volume, and that small ruderal herbs often dominate these sites and contribute to street-level biodiversity.^{5,6} For comparison with superficially similar taxa sometimes seen in the same microhabitats, lycophytes such as *Selaginella* bear scale-like microphylls in ranks and reproduce with cone-like strobili rather than flowers, which separates them clearly from *Pilea*.⁷

This paper documents the occurrence of *P. microphylla* in a residential backyard in Selangor, Malaysia, illustrates the morphological characters used for reliable field identification, and describes its linear colonisation of wall–floor seams under alternating waterlogged and dry conditions. We relate these observations to published accounts of the species’ flooding and drought tolerance and

to urban wall-vegetation ecology, and we outline brief implications for management and for using this readily available plant as a teaching specimen in ecology and plant identification.^{1,4–8}

The FIKR conceptual framework

The FIKR framework is an integrative behavioural model consisting of four complementary dimensions: Facet, Insight, Knowledge, and Resilience (FIKR). Facet represents effective execution and practical implementation of actions.^{9–18} Insight reflects environmental awareness, pattern recognition, and anticipatory thinking. Knowledge represents accumulated understanding gained through repeated experience and learning. Resilience describes the capacity to absorb disturbance, reorganize, recover, and continue functioning under changing environmental conditions. Rather than functioning independently, these four dimensions interact continuously during adaptive processes. In the present study, the ecological behaviour of *Pilea microphylla* is interpreted through these four dimensions to demonstrate how simple observations from urban vegetation can provide accessible examples of adaptive biological systems.

Survival in the dry wall side

The patches in Figure 1 are the artillery plant *Pilea microphylla*, a Neotropical herb that is now naturalised in Southeast Asia, including Malaysia. On hard edges and cracks the species spreads quickly by brittle, rooting stems and by many tiny fruits produced after frequent axillary flowering. Male flowers can eject pollen explosively, which helps dispersal at very short range. The species tolerates intermittent dryness once established, especially where shade reduces evaporative stress, and it rebounds after wet periods that recharge thin substrates. These traits explain why it persists along the base of exterior walls even when the surface dries between rains.^{1–4,8}

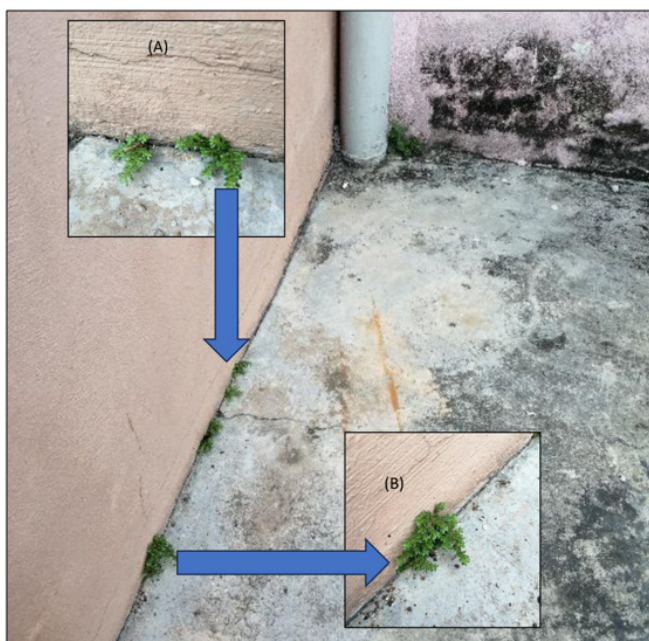


Figure 1 *Pilea microphylla* L. (artillery plant) in a damp shaded corner of a residential backyard in Selangor, Malaysia. The main panel shows patches along the junction between the wall and concrete floor where water pools after rain. Inset A shows small clumps emerging from narrow cracks at the wall base. Inset B shows a larger mat of prostrate shoots with opposite tiny leaves and many axillary flower clusters. Photograph taken on 25 August 2025.

Urban wall bases behave ecologically like miniature cliffs and pavements, with very shallow rooting space, rapid drainage, and short moisture pulses. Studies of wall vegetation show that plant assemblages on masonry are shaped by microhabitats at the wall surface, crest, and foot, and by factors such as material, sunlight, and seepage. Small disturbance-tolerant herbs often dominate these sites and also occur along streets and pavements, where spontaneous flora can be rich and functionally important. Field floras from tropical Asia list *P. microphylla* specifically from stone walls and rock crevices, which matches the wall–ground seam in Figure 1 during dry spells.^{5,6,19}

Waterlogging tolerance and why it still thrives here

In Figure 2 the wall–floor seam holds shallow standing water, yet the patches of *Pilea microphylla* remain fresh and green. This makes sense because the species tolerates episodes of waterlogging. Extension fact sheets report “soil tolerances: extended flooding,” and nursery trials note that plants “can tolerate extended flooding,” even though they also do fine once the surface dries again.^{4,20} Descriptive floras add that it copes with short periods of soil inundation, especially in humid shade, which matches the shaded, splash-wet gutter in the photo.^{1,21}

The same traits explain its linear spread along cracks and edges. *Pilea microphylla* commonly occupies moist, disturbed hardscape niches such as crevices in driveways, paths and planting-bed borders, then persists through the wet–dry cycle typical of backyard drains.⁴ Regional field guides repeatedly list it from concrete gaps, damp corners and similar sites, and floras in tropical Asia record it on stone walls and rock crevices, all of which echo the habitat,^{19,22} as seen in Figure 2.

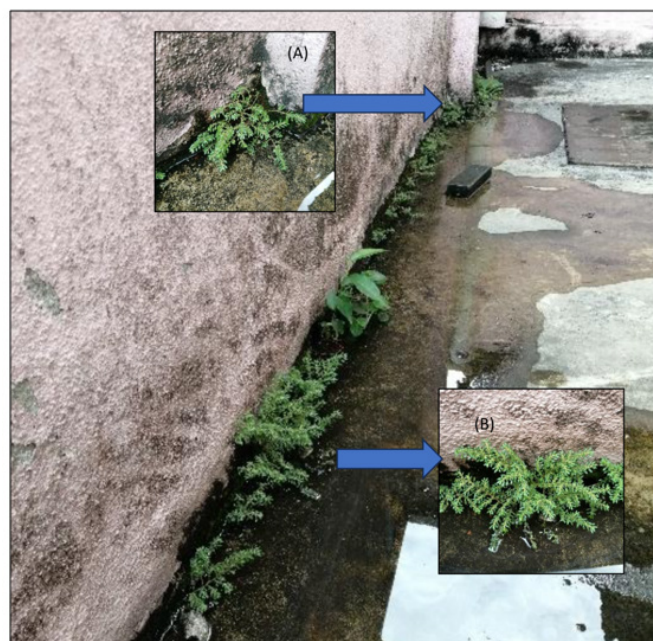


Figure 2 *Pilea microphylla* L. (artillery plant) at the opposite corner of the same backyard in Selangor, Malaysia. The main panel shows linear colonization along the wall and floor junction where water accumulates after rain. Inset A shows a young clump emerging from a crack at the wall base. Inset B shows a denser mat with prostrate shoots bearing tiny opposite leaves and axillary flower clusters. Photograph taken on 25 August 2025.

Surviving dry hardscape seams

In Figure 3 the wall base is mostly dry between short wet pulses, yet the mats of *Pilea microphylla* remain green and dense. This matches published tolerances: artillery weed “occurs primarily in moist, disturbed areas but can tolerate dry conditions once established,” and it is rated as having moderate drought tolerance.^{4,23} These traits, together with its small leaves and fleshy stems, explain why the species can persist through repeated drying on thin substrates such as the concrete seam shown here.²³

The same sources report that *P. microphylla* commonly colonizes cracks and hardscapes including driveways and pavements, habitats that drain quickly and heat up in sun, yet still support the plant once it is rooted.⁴ Field observations from urban horticulture likewise note the species growing “in cracks in walls and sidewalks,” which mirrors the linear spread along the corroded wall–floor junction²⁴ as seen in Figure 3. Partial shade along the wall probably reduces water stress and helps the mats stay healthy across dry spells.¹

Root system and survival

The plants in Figure 4 show why this species is so persistent along walls and paving. *Pilea microphylla* develops a fibrous root system and sometimes a short taproot, and even small pieces of root or stem can regenerate new plants. That ability to re-sprout makes hand pulling unreliable unless every fragment is removed.⁴ Stems and cuttings also root readily, so fragments caught in cracks or carried by runoff establish quickly, including in the thin substrates of hardscapes where the plant is often reported as a “rockweed” in masonry and concrete joints.^{8,25}

These rooting traits pair with broad environmental tolerance. Artillery plant grows best in humid shade but accepts brighter sites if moisture is available, and it tolerates extended flooding as well

as moderate drought, which lets newly rooted fragments survive through alternating wet and dry spells typical of built environments.^{1,8} Together, a fast-rooting, fragment-regenerating habit and tolerance of site conditions explain its healthy, continuous mats along the wall base,^{4,25} as seen in Figure 4.

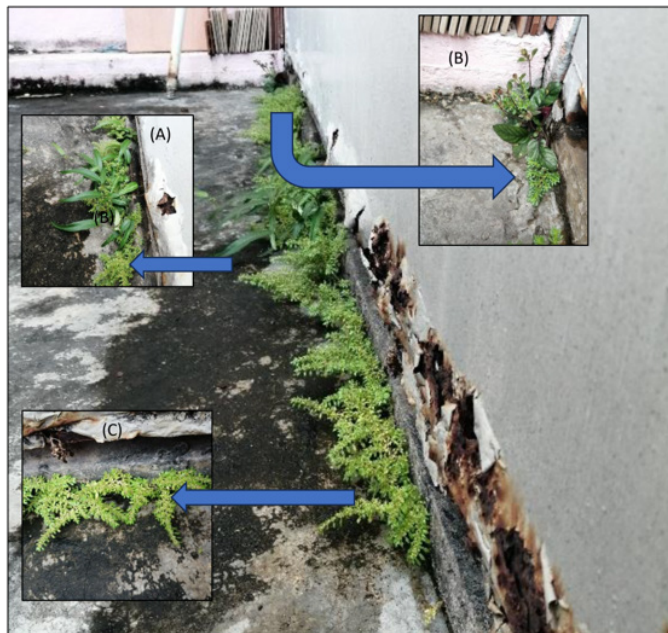


Figure 3 *Pilea microphylla* L. (artillery plant) along the wall–floor junction at the opposite right corner of the same backyard in Selangor, Malaysia. The main panel shows a continuous, low mat tracking the seam beneath the corroded wall skirting where water seeps after rain. Inset A highlights young shoots emerging from a narrow crack beside a pipe. Inset B shows co-occurrence with other ruderal herbs at a wetter drain edge. Inset C shows the prostrate, rooting branches forming dense “fans” of tiny opposite leaves that hug the concrete surface. Photograph taken on 25 August 2025.



Figure 4 *Pilea microphylla* L. (artillery plant) from a backyard in Selangor, Malaysia. (A) Mat-forming habit along the wall–concrete seam after rain. (B) Close view of shoots with opposite tiny leaves (≈2–5 mm), interpetiolar stipules at the nodes, and numerous minute axillary inflorescences arranged like beaded “spikes.” (C) Whole shoot with size reference, showing fan-like branching from a creeping stem and the linear sequence of flower clusters. (D) Succulent prostrate stems; nodes bear roots and root scars, explaining rapid spread and re-establishment from fragments. Photograph taken on 25 August 2025.

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Resilience, opportunism, and adaptation: a FIKR lens on *Pilea microphylla*

Seen through the FIKR (facet, Insight, Knowledge and Resilience).^{9–18} Frame, the backyard mats of *Pilea microphylla* display textbook Resilience. This species survives alternating wet and dry spells, tolerating extended flooding yet also persisting through moderate drought once established; in practice it rides out the pulse of rain in concrete seams and stays green when the surface dries.^{1,4} In FIKR terms, that capacity to absorb shocks and recover maps cleanly to the Resilience component that underpins sustained performance under stress.^{9–18}

Ecological resilience extends beyond simple tolerance to environmental stress. Contemporary resilience theory describes resilience as the capacity of biological systems to absorb disturbance, reorganize internal processes, and maintain essential ecological functions despite environmental variability. The persistence of *Pilea microphylla* exemplifies this dynamic process. Rather than avoiding disturbance, the species exploits recurring fluctuations in moisture availability through rapid regeneration from rooted stem fragments and repeated establishment within protected microsites. Similar adaptive strategies have been documented among spontaneous urban vegetation, where repeated disturbance favours species possessing flexible life-history strategies rather than competitive dominance. Consequently, the resilience of *P. microphylla* reflects continual ecological adjustment rather than passive resistance to environmental change.

Careful examination of the backyard observations reveals three simple ecological rules underlying the successful persistence of *Pilea microphylla*. First, establishment consistently occurs where moisture, accumulated fine sediments, and partial shade interact to create favourable microsites. Second, the species expands gradually through repeated clonal growth and regeneration from rooted stem fragments, allowing colonisation to proceed through many small, low-cost steps rather than through rapid large-scale expansion. Third, the combined effects of shade, intermittent water availability, and efficient drainage buffer environmental stress and permit long-term persistence despite repeated wet and dry cycles. These observations demonstrate that successful colonisation depends on the close matching between plant traits and local environmental conditions. Viewed through the FIKR framework, this ecological strategy represents environmental sensing (Insight), accumulation of adaptive experience (Knowledge), efficient implementation of growth (Facet), and continued recovery following disturbance (Resilience).

Its success also reflects a strongly opportunistic strategy. *Pilea microphylla* flowers year-round and disperses pollen by a rapid stamen “explosion,” while tiny fruits and brittle, rooting shoots help it colonize cracks and disturbed edges quickly, a classic ruderal tactic in Grime’s CSR scheme^{1,4,26} In the FIKR analogy, this is the Facet of fast execution and the Insight to seize brief openings, much like people who act decisively when windows of opportunity appear.^{9–18} At the wall–floor junction the species shows clear adaptive placement. Urban wall-vegetation studies demonstrate that plant assemblages are filtered by microhabitats along the wall face and foot, where seepage, shade, and thin substrate interact; spontaneous street flora similarly thrives in pavement cracks when permeability and management allow it.^{5,6} *P. microphylla* fits this pattern by rooting at nodes, probing for moisture,

and then spreading linearly along the seam. In FIKR language, that is practical Insight and Knowledge in action: continual sensing of micro-gradients followed by a low-cost rule set for expansion.

The persistence of *Pilea microphylla* illustrates a broader ecological principle commonly observed among spontaneous urban vegetation. Species that successfully colonise disturbed urban environments generally combine rapid establishment, flexible reproduction, environmental tolerance, and efficient resource utilisation. Rather than competing directly with larger perennial vegetation, these species exploit overlooked microsites where physical disturbance is relatively low but sufficient resources remain available for growth. Consequently, the success of *P. microphylla* reflects ecological specialization through habitat filtering rather than simple opportunistic invasion. This interpretation places the present observations within established theories of urban ecology and disturbance ecology.

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Finally, its clonal, fragment-rooting habit means that even small pieces left behind can regenerate whole mats, which complicates control but guarantees persistence in human-disturbed places.⁴ Put together, the plant's structural Facet traits, situational Insight, accumulated Knowledge of workable niches, and robust Resilience create a living analogue of the FIKR profile that helps teams and individuals perform under uncertainty.⁹⁻¹⁸ This can be summarized in Figure 5.

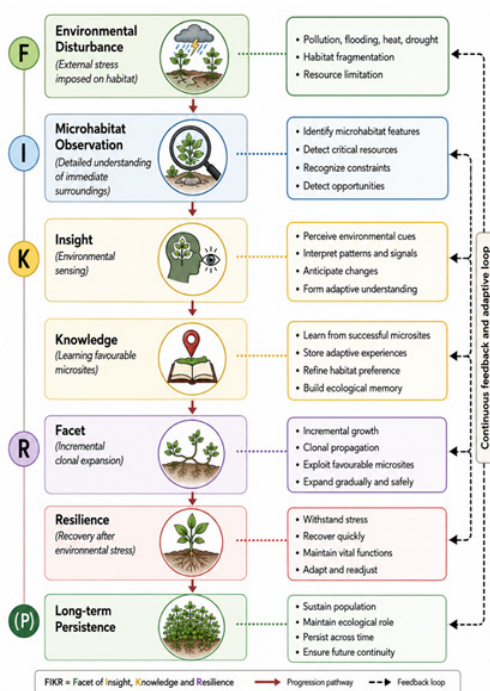


Figure 5 Conceptual framework illustrating the application of the FIKR methodology to the ecological adaptation of *Pilea microphylla*.

Viewed through the FIKR lens, *P. microphylla* exemplifies Facet through efficient clonal expansion, Insight through continuous environmental sensing, Knowledge through repeated occupation of favourable microsites, and Resilience through sustained recovery following alternating wet and dry conditions. Collectively, these four dimensions illustrate how successful persistence emerges from the interaction between organismal characteristics and environmental conditions rather than from any single adaptive trait.

Although *P. microphylla* is frequently regarded as a nuisance weed, it provides several ecological benefits within urban ecosystems. Dense mats help stabilize fine sediments along wall edges, reduce localized erosion caused by rainfall, and improve moisture retention within shallow substrates. The vegetation also contributes to spontaneous urban biodiversity by providing habitat for small arthropods and microorganisms while increasing vegetative cover on otherwise impervious surfaces. Such spontaneous vegetation represents an often-overlooked component of urban ecological infrastructure that contributes to ecosystem functioning and biodiversity conservation. Recognizing these ecological roles may encourage more balanced management approaches that distinguish between harmful invasive species and beneficial spontaneous vegetation capable of enhancing urban ecosystem resilience.

Conclusion

Urban ecological studies indicate that wall bases function as specialized microhabitats where intermittent moisture, accumulated fine particles, reduced solar exposure, and protected rooting spaces collectively favour stress-tolerant ruderal species. The linear distribution of *P. microphylla* observed in this study therefore reflects ecological habitat filtering rather than random colonisation, with the species consistently occupying narrow environmental corridors that provide favourable conditions for long-term persistence.

Declaration on the use of artificial intelligence

The author declares that generative artificial intelligence tools were used in a supportive capacity during the preparation of this manuscript. These tools assisted with language refinement, structural organisation, and stylistic clarity of the text. All ideas, interpretations, reflections, and conclusions presented in this paper are the author's own and are grounded in personal experience and scholarly judgment. The author retains full responsibility for the content, accuracy, originality, and integrity of the manuscript.

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None.

Conflicts of interest

The authors declare that there are not conflicts of interest.

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