

A Pattern Language for Weaving Relationships Between Everyday Life and Nature

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This paper presents patterns that support a lifestyle that weaves relationships between everyday life and nature through growing food in familiar places such as gardens and fields. Currently, with urbanization and technological advancements, people have shifted from a way of life where farming activities were integral to survival and naturally connected to nature, to living in a world that is sensorially disconnected from the soil and animals. This increasing physical and mental distance from nature not only impacts the natural environment but also affects various aspects of human health and creativity. This paper introduces six patterns from a pattern language that focuses on practices of weaving relationships between everyday life and nature through growing plants. These patterns are drawn from the gardening and farming activities of individuals who nurture environments where diverse organisms can thrive within their reach, by growing plants. As a result, 36 patterns were identified and categorized into three categories: NURTURING A RELATIONSHIP WITH THE PLANTS YOU GROW, NURTURING A RELATIONSHIP WITH THE UNSEEN WORLD OF THE SOIL, and NURTURING AN ECOSYSTEM. This paper focuses on six patterns: *Diverse Micro Planting*, *Unexpected Edible Parts*, *Nurturing Soil*, *Edible Weeds*, *Symbolic Tree*, and *Shared Garden*, each from their respective category.

Categories and Subject Descriptors: **[Human-centered computing]:** Interaction design—*Empirical studies in interaction design*; **[Applied computing]:** Computers in other domains—*Agriculture*

Additional Key Words and Phrases: pattern language, human-nature interaction, ecological relationship

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1. INTRODUCTION

Urbanization is progressing rapidly worldwide, and currently, more than half of the global population resides in urban areas. Along with this urbanization, people's connection with nature has been diminishing both physically and mentally. It is believed that humans have an innate desire to connect with nature and living beings (Wilson 1984), yet in urban environments, this desire often remains unfulfilled. Furthermore, by 2050, the proportion of the urban population is projected to exceed 70% (Heilig 2012), raising concerns about the further decline in opportunities for direct interaction with nature.

Under these social conditions, the reassessment of human-nature relationships has been gaining attention across various fields. One background factor is the suggested link between urbanization and the global increase in mental disorders (Patel et al. 2007, Whiteford et al. 2013). Recent studies indicate that reduced exposure to nature in urban environments may influence psychological functions, highlighting the role of nature in stress reduction and cognitive enhancement (Lederbogen et al. 2011, Hartig et al. 2003, Kaplan 1995).

Against this backdrop, growing plants has been attracting attention as one way to reconnect with nature. Horticultural activities have been reported to contribute to stress relief and mental health improvement (Kaplan 1995, Clatworthy et al. 2013), and horticultural therapy is actively practiced in welfare and healthcare settings. Additionally, social initiatives utilizing agriculture, such as farming programs designed to support the independence of homeless individuals and socially withdrawn individuals, have been developed (Ojima 2014), suggesting that the act of growing plants can promote individual well-being and social integration.

The author, Hayashi having grown up in an urban setting and currently residing in a city, also became interested in vegetable cultivation through interactions with their research supervisor and individuals engaged in home gardening and farming. Through these experiences, it became evident that many practitioners do not merely aim for crop production but rather seek to deepen their relationship with nature and appreciate the richness derived from it.

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Practitioners have expressed sentiments such as, “I find richness in the act of growing itself,” “Blending into nature creates a sense of security,” and “The presence of an ecosystem expands my own sense of agency.” These insights reveal that growing plants is not merely an agricultural activity but an engagement embedded within a broader ecological context. However, there has been little research on the worldview that underpins such practices and how these experiences of connectedness emerge.

This paper therefore focuses on the act of growing plants. It presents a framework that goes beyond treating vegetable cultivation as mere agricultural work, and aims to articulate practices that weave together daily life and the broader natural environment. The following sections explain how the pattern language used in this study was developed, outline the overall structure of the pattern language, and introduce six specific patterns. It is hoped that the findings of this study will serve as a guide for fostering a deeper relationship with nature when growing plants in everyday life.

2. CREATION PROCESS

The pattern language for nurturing a lifestyle that weaves relationships between everyday life and nature in gardens and fields follows the creation process of human activity pattern languages (Iba 2016). This section describes the three phases undertaken to create this pattern language: Pattern Mining, Pattern Writing, and Pattern Symbolizing.

2.1 Pattern Mining

In the Pattern Mining phase, seeds of patterns are discovered and created from interviews and practice-oriented literature, and the structure of the overall pattern language is built.

First, we conducted Pattern Mining to uncover good practices for weaving relationships between everyday life and nature when growing plants. The subjects were seven practitioners who grow food with the aim of creating environments where diverse organisms can thrive within their immediate surroundings, such as gardens or fields, along with 13 literature sources that summarize the methods and practices of these practitioners. The purpose of this research is to identify patterns of interaction with nature through food growing, across diverse environments and professions. Therefore, we selected a diverse group of practitioners, including those whose primary livelihood is farming, as well as university faculty and engineers who practice farming alongside other occupations, all of whom are engaged in different climates and land environments (Figure 1).



Fig. 1. The state of the practitioners' fields. The top left shows the garden of a practitioner who is captivated by vitality, productivity, and beauty, growing 50 varieties of fruits and vegetables annually in a residential area. The top right shows the field of a practitioner who has created a biotope, including a water environment, as a habitat for various living creatures, while also growing food within it. The bottom left is the garden of a practitioner who grows enough food for their own consumption in *Satoyama* environments (traditional rural landscapes in Japan), aiming to preserve the local landscape and ensure access to safe, healthy food. The bottom right shows a vineyard where the practitioner engages in agriculture as a way to foster a culture that values life, incorporating strategies to attract and support diverse living organisms.

During the interviews, we focused on “what is important” and “how these important things are practiced or creatively implemented,” exploring how practitioners successfully navigate challenges that ordinary people find difficult (Iba 2021). We dug deeper into the differences between “what is typically done” and “what the practitioners

are doing,” looking at the innovative ways they bridge this gap. As a result, we identified 224 elements of how-what from the interviews and literature mining.

Then, we conducted Clustering to group these elements and delve into the essence of the practices. Each element was written on a piece of paper, prepared so that each piece represented one element and could be freely moved around. The clustering was done collaboratively, discussing and confirming the essence of each practice while moving the pieces of paper. When talking about the proximity of elements, we sometimes referred back to transcripts to understand the intent and purpose of the practices, considering what meaning was behind the words used, even when the practices seemed similar at first glance. This process led to the creation of 100 groups, each containing one or more how-what elements. For each group, we described what is important (*what*) and how to achieve it (*how*) in a single sentence, which we termed Seeds of Patterns.

After broadly understanding the overall structure by spreading out the 100 pattern seeds formed in clustering, we took a top-down approach to discuss and identify the three most important elements for weaving relationships between everyday life and nature. Each member brought their perspectives, and we identified three categories. We placed the corresponding pattern seeds under these categories as patterns to achieve them. Next, we examined each category, considering the three most critical elements needed to achieve each category. We grouped these elements and allocated three pattern seeds to each group. This process was guided by a 3-3-3 structure, where each of the three categories contained three groups, and each group had three patterns. The restriction of the number 3 was set to reduce complexity when providing support, while also functioning as a creative constraint. As Finke et al. (1992) stated, constraints on output can enhance creative performance. By first creating a framework of three and thinking within that framework, it becomes possible to focus on the most essential components.

Through this top-down and bottom-up interchange, we constructed the overall structure. During the pattern writing discussions and the review stages with practitioners, additional important patterns not identified during the initial mining dialogues emerged, relaxing the 3-3-3 constraint. Ultimately, the structure settled into 36 patterns and three categories, each with four groups. Building upon this framework, we created a single illustration to represent the world of weaving relationships between everyday life and nature (Figure 2). The overall structure was then constructed by layering elements onto this illustration.



Fig. 2. An illustration representing the world of weaving relationships between everyday life and nature, derived from the structured framework.

2.2 Pattern Writing

In pattern writing, the essence of each pattern was captured while also considering its placement within the overall framework—specifically, which category or group it belonged to. When composing the text, the situation in which the pattern applies, the problem that tends to arise, and the solution essential for addressing it were described step by step.

Once the situation, problem, and solution were clearly defined and the core of each pattern became solidified, the forces contributing to the problem were explored, and concrete examples illustrating how the solution can be implemented were included. Additionally, the positive outcomes resulting from the solution’s application were described.

Through this process, texts were crafted that not only captured the fundamental essence of each pattern but also positioned them clearly within the broader system.

2.3 Pattern Symbolizing

The pattern language developed in this study is designed for others to use, making it essential that the patterns are both accessible and inspiring—something that encourages others to try them out. Therefore, rather than merely describing the practices in text, they need to be expressed symbolically and in a way that is immediately understandable at a glance.

To achieve this, the study incorporates three key elements: pattern names that function as usable terms, introductory statements that draw readers into the pattern, and relationship diagrams that visually convey the structure of the connections presented in the pattern.

First, each pattern name was carefully chosen to reflect the core action that defines the solution, derived from the *How* component of the solution statement. These names were expressed as nouns, making them usable as concepts or vocabulary. The naming process prioritized not only conveying meaning but also ensuring that the names were engaging and inspiring for practice. Initially, the pattern name was assigned when drafting the core CPS (Context-Problem-Solution) structure. As the pattern text was refined, the name was continuously evaluated and polished to ensure it captured the essence of the practice.

The introductory statement was crafted to be both precise and engaging, encouraging the reader to explore the full pattern. This statement typically expressed either the *How* or *What* of the solution, a combination of both, or the forces that contribute to the problem. Since the introductory statement serves to complement the pattern name, they were developed in tandem.

Finally, to represent the ways in which relationships between everyday life and nature are woven together, this pattern language incorporates visual diagrams alongside textual elements such as names and descriptions. Specifically, inspired by the social anthropologist Tim Ingold's concept of life's trajectories as "lines" that fluidly take shape through interactions with the environment (Ingold 2007), we created *Relationship Diagrams* to illustrate the interconnectedness between human daily life and nature (Figure 3). In this diagram, the flow of human life and the flow of plants and ecosystems are each represented by lines, with their interwoven relationship depicted at the center. The arrows in the center indicate the passage of time, visually representing how the relationship between daily life and nature evolves over time.

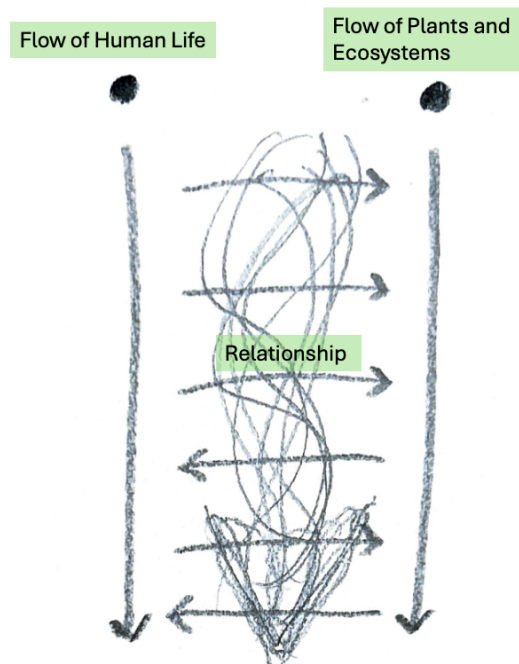


Fig. 3. Relationship Diagram between everyday life and nature.

3. PATTERNS

The pattern language for weaving relationships between everyday life and nature consists of 36 patterns, and they are systemized into three categories: NURTURING A RELATIONSHIP WITH THE PLANTS YOU GROW, NURTURING A RELATIONSHIP WITH THE UNSEEN WORLD OF THE SOIL, and NURTURING AN ECOSYSTEM. As shown in Figure 4, each categories contains four groups and 12 patterns. Each pattern is not entirely independent of the others but is interrelated across categories. In the following, we introduce short descriptions for each category of groups.

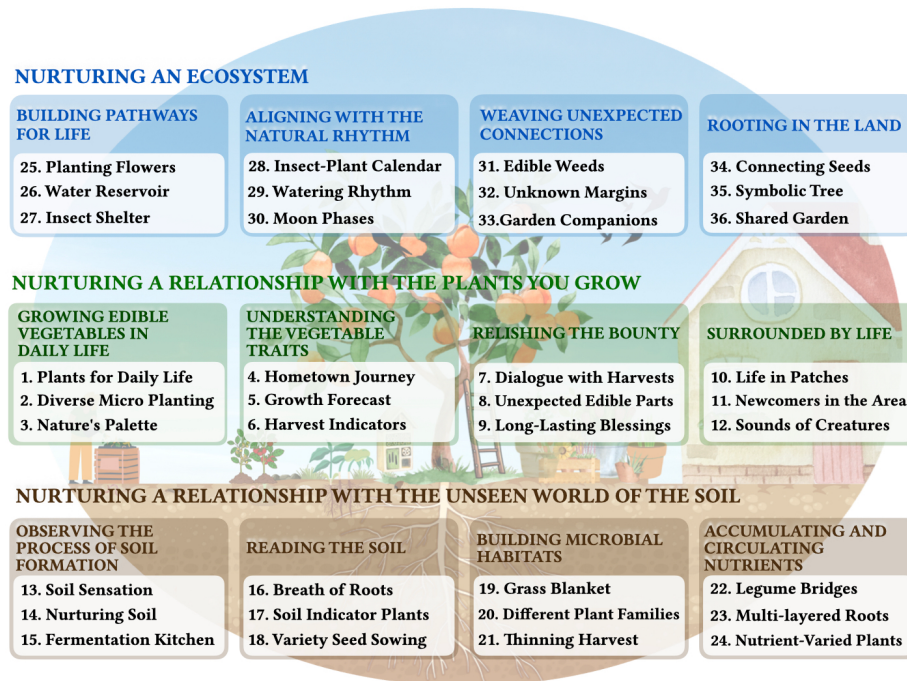


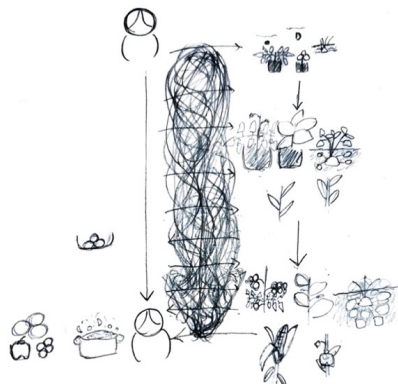
Fig. 4. The overview of a pattern language for weaving relationships between everyday life and nature.

This section presents six patterns from three categories: *Diverse Micro Planting* and *Unexpected Edible Parts* from NURTURING A RELATIONSHIP WITH THE PLANTS YOU GROW, *Nurturing Soil* from NURTURING A RELATIONSHIP WITH THE UNSEEN WORLD OF THE SOIL, *Edible Weeds*, *Symbolic Tree*, and *Shared Garden* from NURTURING AN ECOSYSTEM.

3.1 Diverse Micro Planting

Diverse Micro Planting

Design a space where something changes every day.



You are considering what kinds of plants to grow and how many.

▼ In this context

Growing only plants of the same type and at the same stage might be enjoyable when changes occur, but can soon become monotonous. Any plant brings joy when it sprouts, bears fruit, or changes color. However, growing just one kind of plant means that germination times, growth patterns, and color changes will be identical, limiting opportunities for new discoveries and surprises during observation and care.

▼ Therefore

Simultaneously nurture plants with differing growth rhythms, such as varying germination periods, harvest timings, and frequencies, to continually experience plant developments. Begin with about five varieties. For instance, when growing summer vegetables, you might combine plants harvested just once, like carrots or pumpkins, with continuously harvestable plants such as tomatoes, eggplants, or bell peppers. Some gardeners apply this method to grow as many as fifty types of vegetables and fruits in their garden throughout the year.

▼ Consequently

Because various plants grow at their own unique pace, you'll find new discoveries every day, making your time spent observing and engaging with them more enjoyable. Also, even if weather conditions vary, you'll experience the joy of successfully harvesting something each season. Additionally, by growing multiple types of plants simultaneously, you'll increase the diversity of your harvest, bringing more variety and creativity to your cooking.

[Examples]

As a concrete example of a practitioner's approach, the author, Iba, provides his own experience. Initially, he started by growing around three types of plants. However, whenever he encountered new seedlings or seeds, he had never cultivated before, he found himself intrigued and gradually discovered joy in growing them. Over time, this passion led him to cultivate approximately 50 different varieties of vegetables and trees. Figure 5 shows a photograph of his garden as of November 2023. The planters in the image contain a diverse selection of plants, including cabbage, garland chrysanthemum, cilantro, Korean lettuce, garlic, and shallots, among others.



Fig. 5. The state of the author, Iba's garden in November 2023.

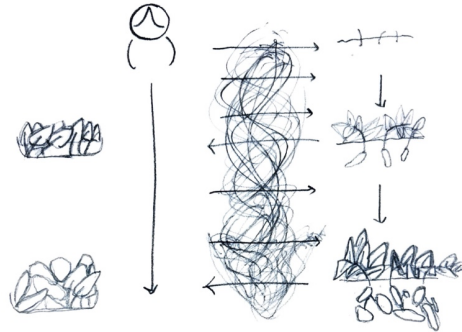
"Try growing multiple varieties at the same time. It's interesting to grow them, and since I go to the garden every day anyway to water the plants, I figured—why not have different kinds? That way, I can enjoy seeing various changes. ... I've arranged planters in front of my living room so that, rather than just having them there, I actually get to enjoy looking at the greenery."—Excerpt from an interview with the author, Iba on November 25, 2023.

In this way, even when space for cultivation is limited, planting a small quantity of diverse plant varieties creates an environment where there is always some form of change to observe. This approach allows for a more engaging and enjoyable experience, fostering a deeper appreciation for the growth and development of plants.

3.2 Unexpected Edible Plants

Unexpected Edible Plants

It's not something you can buy, but there are parts you can savor only because you've grown it yourself.



The same crops have been harvested in abundance.

▼ In this context

If you uniformly consider parts of vegetables and fruits that are not commonly found in stores as “inedible,” you might be missing opportunities to fully appreciate what you’re carefully grown. Most commercially distributed produce emphasizes visual appeal and ease of preparation, leading to the frequent removal of slightly more demanding parts like leaves, stems, seeds, and skins. As a result, these parts become unfamiliar in our daily lives, and you often discard them because you don’t know how to prepare them. However, categorizing plant parts into “edible” and “inedible” based solely on existing knowledge not only prevents us from accessing valuable nutrients, but also limits our opportunity to deepen our understanding of the plants themselves.

▼ Therefore

By incorporating every part of the plant—leaves, stems, flowers, and even nutrient-rich seeds and peels—into your cooking, fully absorb the energy the plant has stored. For instance, carrots offer not just their roots but also aromatic leaves that can add flavor to dishes. Similarly, sweet potatoes and broccoli have delicious leaves in addition to their more familiar tubers or florets. Even onion skins, which are often discarded, can gently release hidden nutrients when cooked together with rice, enriching our meals in unexpected ways.

▼ Consequently

By discovering culinary value in parts of plants previously overlooked, you can enjoy your harvest in broader and more creative ways. Everyday cooking will become more imaginative, transforming your relationship with the plants you nurture and enriching the time spent in your garden.

[Examples]

As an example of a practitioner who enjoys ingredients that are not commonly available in markets but can be experienced through cultivation, the practice of the author, Iba serves as a notable case. He appreciates the edible flower buds of green onions, by preparing them as tempura or frying them. Similarly, through growing plants, the

author, Hayashi has come to cherish every part of them, feeling a natural curiosity to explore their flavors and making an effort to try as many as possible.

For instance, when growing broccoli, the author, Hayashi harvest its abundant leaves—leaving enough for photosynthesis—both before and after the formation of flower buds. Figure 6 shows a dish made with these harvested broccoli leaves and a homegrown pumpkin, prepared as a simmered dish.



Fig. 6. Simmered pumpkin with broccoli leaves, growing with large, expanding foliage.

There is also a practice of enjoying fully ripened ingredients—something only possible when growing your own produce. For example, bell peppers commonly found in stores are harvested while still green, which is actually an unripe stage for the plant. When allowed to fully ripen, they turn red. Some practitioners intentionally wait until full ripeness before harvesting (Figure 7). Similarly, bitter melon changes from green to yellow when fully mature. While the green variety commonly sold in stores contains strong bitter compounds, a fully ripened bitter melon loses most of its bitterness, and its white pith disappears, though this also reduces some of its nutrients and beneficial compounds.

In the author, Iba's garden, bitter melon vines intertwine among the trees, sometimes hiding fruits until they are unexpectedly discovered. While he has occasionally thought, "I didn't even notice this one....," he has enjoyed the red seeds as a sweet snack and used the peel as an ingredient in curry (Figure 8).



Fig. 7. The sight of bell peppers turning red in a practitioner's field, a testament to their full ripeness and natural growth process.



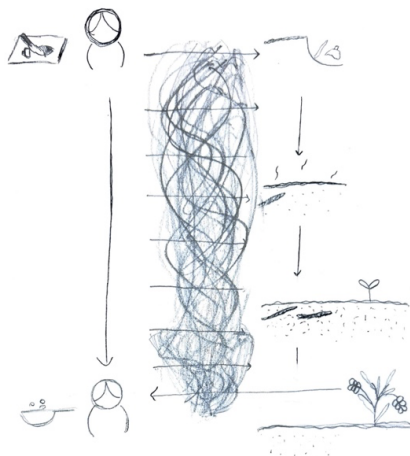
Fig. 8. The fully ripened Bitter Melon grown in the author, Iba's garden, turning vibrant yellow as it reaches its natural maturity.

In this way, discovering new possibilities in typically discarded parts and utilizing the entire plant allows for maximizing its potential and fully appreciating its value.

3.3 Nurturing Soil

Nurturing Soil

Nurture soil that's rich with beneficial microorganisms by kitchen compost.



You are about to dispose of the unused parts of your ingredients, such as peels and cores.

▼ In this context

If you simply discard food scraps as kitchen waste, you miss out on the opportunity to return valuable nutrients to the soil. Cooking inevitably leaves behind challenging-to-prepare parts, such as tough peels and cores. Yet, by throwing these away, you lose the rich nutrients originally absorbed from the earth, interrupting nature's essential cycle.

▼ Therefore

Return non-edible plant parts to the soil, transforming household waste into nutrients beneficial to soil health. First, set up a compost space using cardboard boxes, wooden crates, or specialized compost bags. Then, finely chop food scraps before adding them to the compost to help microorganisms break them down more efficiently. Mix the compost regularly to keep it well-aerated. Adding ingredients such as rice bran or oil cake can further accelerate the decomposition process. Observing how the scent and temperature change as food scraps break down provides an enjoyable way to experience firsthand the activity of microorganisms and the transformation of waste into fertile soil.

▼ Consequently

Kitchen scraps, once considered mere “waste,” become valuable sources of nutrients for the soil. And by continuously cycling these nutrients back into the very place you nurture, you can grow plants in soil that’s consistently rich and fertile. In this way, your everyday life gives rise to small yet meaningful cycles of renewal.

[Examples]

This practice is carried out in various settings, including farms, gardens, and planters. One practitioner, guided by the belief that “what we take is borrowed from nature,” has designated a space within a community farm for returning food scraps, harvested stems, and cut flowers back to the soil.

Iba, who deeply values soil and is profoundly inspired by its life-giving power, integrates this practice into his daily life by composting directly in his garden. He utilizes a former flowerbed, which has become shaded due to the growth of trees, as a composting area, where he incorporates food scraps from daily life to create nutrient-rich compost. During winter, he produces compost in this area, which is then transferred to planters in the spring, providing fertile soil for summer vegetables.

This process also creates a natural cycle involving earthworms, which play a key role in decomposition. As the compost is moved to the planters, the worms travel with it, and after the growing season, they return to the composting area, sustaining the cycle. Iba humorously refers to this process as “the earthworms’ bento box” (Figure 9).



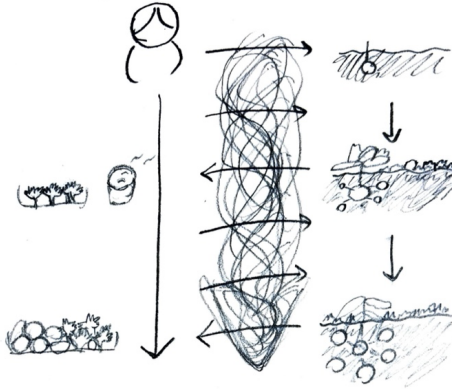
Fig. 9. This scene captures a moment in the process of burying kitchen scraps from daily life into an empty space in the flower bed in Iba’s garden. Once the soil is enriched, it is divided into several pots, where vegetables are grown. Afterward, the soil is returned to the flower bed, sustaining the cycle of soil nourishment.

In this way, engaging with soil through the practice of *Nurturing soil* and understanding the processes and mechanisms by which it forms is essential for fostering a deeper connection with the world of soil.

3.4 Edible Weeds

Edible Weeds

Even wild grasses growing naturally can become part of your daily meals.



There are many naturally growing plants in the garden and field.

▼ In this context

If you regard all plants other than the ones you're intentionally nurturing as weeds or assume they aren't edible, you might be overlooking an opportunity to enjoy nature's bounty. Beyond your intended vegetables, many plants naturally appear, sprouting from seeds carried by insects, birds, or the wind. If you automatically remove these as obstacles that compete for nutrients or block sunlight, you miss the chance to discover their hidden potential.

▼ Therefore

By carefully observing plants that grow naturally and identifying those that are edible, incorporate them into your cooking, deepening your familiarity with a wider variety of plants. For example, in spring, mugwort or daisy fleabane can be enjoyed, and in summer, herbs like houttuynia and purslane can be delicious in salads, stir-fries, or brewed into tea. However, since some wild plants can be harmful to humans, it's important to carefully observe their colors and shapes and ensure they're safe to eat before harvesting.

▼ Consequently

Once you start wondering, "Could this be edible?" you'll begin noticing plants growing all around you and appreciating each one individually. Plants you previously couldn't name may gradually become special to you. You'll also start noticing how seasonal shifts occur, as the plants that naturally appear change throughout the year.

[Examples]

Plants that grow besides cultivated ones are often regarded simply as weeds, seen as bothersome or worthless, disrupting the landscape. This perception is deeply ingrained. According to the definition of a weed, it is "a plant that grows on land used by humans and directly or indirectly causes harm based on human value judgments." However, many of these plants can actually be utilized as food.

For example, purslane, which grows from spring to summer. Figure 10 shows purslane that naturally grew next to the cucumber planter the author, Hayashi was tending. Purslane has the characteristic of becoming sticky when boiled, and she eagerly looked forward to enjoying it as a topping for rice. Eventually, she found themselves growing purslane instead of cucumbers. This plant is highly nutritious; for example, it contains significantly more ALA than other

vegetables, with 5 to 7 times the amount found in spinach. Additionally, purslane contains EPA, a compound typically found in marine organisms but not commonly present in most plants.



Fig. 10. Purslane that naturally grew in a pot where cucumbers are being grown (left), and a dish using the mucilaginous texture of boiled purslane served over rice (right).

Another practitioner values the resilience and low-maintenance nature of wild plants that naturally grow in the area, embracing the principle of “making the most of what grows where it is meant to.” For example, lamb’s quarters (Figure 11), which grew next to the eggplant he was cultivating, is typically considered an annoying weed when it spreads. However, he uses it as a substitute for spinach. The window for consuming it is brief, as the plant becomes highly toxic outside of the young shoot stage. Additionally, in the spring, when dandelions begin to sprout, he makes “dandelion coffee” from the roots, and once he started making it, he began searching for larger dandelions.



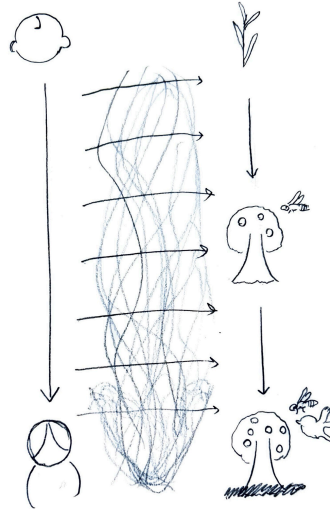
Fig. 11. Lamb’s quarters growing next to the eggplant in the practitioner’s garden.

In this way, what initially grew naturally rather than being intentionally cultivated gradually becomes something to be carefully nurtured once it’s recognized as edible.

3.5 Symbolic Tree

Symbolic Tree

Planting a tree to grow alongside you, creating a garden where both your time and the life around you expand together.



You spent time alongside the plants, watching over their changes from seed to fruit.

▼ In this context

Growing only plants with short life cycles, such as annuals, can make it easier to lose touch with your garden or field after the plants have finished their growth. It's natural, at times, for your attention to drift away when there's a clear end point. However, nurturing only annuals makes it easy to overlook the subtle transitions between seasons, making it difficult to experience your garden's long-term growth and changes alongside your own.

▼ Therefore

By planting trees as special beings that will continue to grow alongside you into the future, create gardens and fields that encourage sustained engagement over the long term. Starting with trees like lemon or blackberry, which bear fruit from their first year, can make it easier to begin this journey. Consider planting your tree on a memorable occasion—such as a birthday or wedding anniversary—to deepen its personal significance. If your space is limited, cultivating the tree in a pot is also a great option.

▼ Consequently

As time passes, your garden's scenery will gradually change, offering ongoing enjoyment that unfolds over the years. Planting trees provides food and shelter for birds, insects, and small animals, whose droppings enrich the soil, creating natural cycles within your garden. This increases the number and diversity of living creatures around you. Over time, you'll feel increasingly connected to these trees, growing alongside them as cherished life companions.

[Examples]

In the author, Iba's garden, many trees are grown—not just as plants, but as symbolic trees that hold special connections with particular people. For example, the kumquat tree is considered the "eldest daughter's tree," the yuzu tree represents the "second daughter's tree," and the mandarin orange tree is the "third daughter's tree." Each of these trees was planted in the birth year of his daughters. The children, aware that these are their trees, often express concern, asking, "Is my tree okay? Is it healthy?" Seeing this, he feels a deep responsibility to care for them, saying, "I can't let their feelings go to waste." Similarly, a persimmon tree in the garden holds special meaning as "my father's tree," grown from a seedling his late father had purchased. Since his passing, he has cared for it with the thought, "I can't let this tree wither."

Other practitioners also view trees as seasonal markers that help track the natural rhythm of the year beyond the calendar. In Yamagata Prefecture, a region famous for cherry farming, many farmers use cherry blossom trees as indicator trees to predict when their cherries will ripen.

As trees grow taller and wider over the years, their cultivation can be limited by space constraints. To adapt, some practitioners choose to grow trees in pots. One individual has been cultivating a ginkgo tree in a pot for over 40 years,

misc



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mindset, making it difficult to develop a harmonious connection and truly integrate yourself as part of the broader natural community.

▼ Therefore

By reframing the plants and spaces grown and nurtured as part of the broader natural environment, and sharing them among portions for human consumption, use by other organisms, and seeds for future growth, an environment is created in which diverse forms of life can flourish together. This allows us to nurture an environment where diverse forms of life thrive together. You might divide the fruits from a single vegetable or fruit tree, or more broadly share the abundance of an entire garden or vegetable plot. Some people, for instance, practice allocating their harvest according to a thoughtful ratio: about 30% for humans, 30% for other living creatures, and the remaining 40% preserved as seeds to sustain future growth.

▼ Consequently

Even if a garden begins as a place intended primarily for yourself, it will gradually become essential and meaningful to many other plants and living creatures. By recognizing your garden not simply as “a space for humans,” but as “a shared place belonging to other life forms as well,” you’ll find it less painful when insects nibble at leaves or birds peck at fruits. With this mindset, you lay the groundwork for a lasting relationship of mutual nurturing and sharing with the natural world around you.

[Examples]

Practitioners value positioning their harvests not as something solely for themselves but as part of nature’s ongoing cycles. For example, one practitioner emphasizes the importance of not calculating harvest yields based on the assumption that they will remain undisturbed. Instead, he considers it essential to assume that insects and animals will consume a portion of the crops and to determine how much can be taken within the natural ecosystem. For instance, when growing grapes, which are often eaten by golden beetles, he adapts his approach accordingly. Typically, grapevines are pruned to leave 13 leaves per bunch to ensure proper growth. However, knowing that golden beetles will feed on some of the leaves, he chooses to leave more than the standard number, taking into account the natural interactions occurring within the environment.

Other practitioners also engage in their activities with an awareness of ecological balance, identifying specific proportions and incorporating them as guiding principles. One such practitioner, who values the perspective of “not focusing solely on plants (vegetables)”, places great emphasis on coexistence and interaction with other living beings. He has discovered what he considers a golden ratio in the relationship between humans, insects, and plants. In this approach, humans harvest only 30% of the crops, while 30% is left for insects and birds to consume. The remaining 40% is dedicated to the plants’ natural role—allowing them to fulfill their life cycle by producing and dispersing seeds for future generations.

In this way, the nurturing space is not solely for humans but also serves as a vital habitat for a diverse range of life, including plants, animals, insects, and microorganisms. Embracing this perspective and fostering a *Shared Garden* is essential for creating a sustainable environment in harmony with nature.

4. CONCLUSION

In this paper, we introduced six patterns from the pattern language for weaving relationships between everyday life and nature in familiar places such as gardens and farms. The proponent of the research methodology used in this study, Christopher Alexander, states in his book *A Pattern Language*, specifically in pattern No.177 *VEGETABLE GARDEN*:

“In a healthy town, every household should grow vegetables at home. The era in which this is seen as a hobby for enthusiasts is over; it must be considered a fundamental element of human life” (Alexander 1977, p.819).

In the field of pattern languages, the study of human relationships with nature has also been evolving. For example, there are pattern languages that focus on achieving a lifestyle that maintains a connection with the natural environment while enabling people to live and work more naturally, such as the *Natural Living Pattern* (Kamada, 2016)

and *Natural & Creative Living Pattern* (Yamakage 2022). Other examples include a pattern language focusing on rural landscapes (Iwata 2016) and a pattern language based on the practices of those who have promoted collaborative management of *Satoyama* biodiversity (Kamada et al. 2023, Kamada et al. 2024). Additionally, in the context of food, the *Cooking Pattern* (Akado 2016) focuses on the practice of cooking. However, within these applications of pattern languages, there has yet to be a language that explicitly focuses on the act of growing plants and the relationship with nature in everyday life. Therefore, this research is expected to contribute to the development of pattern languages in this domain.

In future work, we plan to utilize the proposed pattern language as a tool for supporting practical applications and to examine its versatility. First, the pattern language will be used to support individuals living in urban areas where opportunities to engage with nature have been decreasing. However, even in regions considered rich in natural environments, there are concerns about the diminishing connection between people and nature. Therefore, beyond urban settings, we will implement the pattern language in various regions, including nature-rich environments with abundant natural resources, to explore how it holds meaning for different individuals.

Moreover, the issue of decreasing interaction with nature is a common concern in many countries. Therefore, we plan to implement the pattern language in various countries to analyze its applicability across different climates and cultural contexts, as well as to observe how it is utilized in each region. Furthermore, although this pattern language was originally designed for adult use, we aim to develop it into a tool that enables adults to involve children in its practices. Given the increasing concern over the decline of children's nature experiences, we seek to adapt this research into a format that fosters relationships with nature through growing plants within various intergenerational settings—such as between parents and children at home, between teachers and students in schools, and between adults and children in local communities. This adaptation will allow children to understand the content and enable adults to effectively engage them in these practices. Through these efforts, we aim to academically advance the study of practical engagement with nature in daily life.

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APPENDIX

To give an idea of the overall pattern language, the short descriptions of all 36 patterns, including the patterns not presented in this paper, are listed below.

A.1 PATTERNS FOR NURTURING A RELATIONSHIP WITH THE PLANTS

The category for NURTURING A RELATIONSHIP WITH THE PLANTS consists of three groups. The first group, GROWING EDIBLE VEGETABLES IN DAILY LIFE, contains the following three patterns, which are shown in Table 1: *Plants for Daily Life*, *Diverse Micro Planting*, and *Nature’s Palette*. The second group UNDERSTANDING THE VEGETABLE TRAITS, contains the following three patterns, which are shown in Table 2: *Hometown Journey*, *Growth Forecast*, and *Harvest Indicators*. The third group RELISHING THE BOUNTY, contains the following three patterns, which are shown in Table 3: *Dialogue with Harvests*, *Unexpected Edible Parts*, and *Long-Lasting Blessings*. The fourth group SURROUNDED BY LIFE, contains the following three patterns, which are shown in Table 4: *Life in Patches*, *Newcomers in the Area*, and *Sounds of Creatures*.

Table 1 The short descriptions of the patterns in GROWING EDIBLE VEGETABLES IN DAILY LIFE

No.	Pattern Name	Short Description
1	Plants for Daily Life	By selecting plants that are familiar as food and well-suited to the local climate and soil conditions, enjoy nurturing them as they grow to fruition.
2	Diverse Micro Planting	Simultaneously nurture plants with differing growth rhythms, such as varying germination periods, harvest timings, and frequencies, to continually experience plant developments.
3	Nature’s Palette	Select different varieties or seeds and seedlings of the same species with varying colors to enrich the visual diversity of fruits and flowers.

Table 2 The short descriptions of the patterns in UNDERSTANDING THE VEGETABLE TRAITS

No.	Pattern Name	Short Description
4	Hometown Journey	By tracing plants back to their original habitats, you can understand the climatic and soil conditions to which they are naturally adapted.
5	Growth Forecast	By envisioning the weather conditions needed during key stages like germination and harvest, and working backwards from there to determine the timing for sowing seeds or planting seedlings, ensure that plants are grown at the most suitable time.

6	Harvest Indicators	Instead of focusing only on the size of the produce, closely observe the plants and become sensitive to their changes to harvest them at the right moment.
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Table 3 The short descriptions of the patterns in RELISHING THE BOUNTY

No.	Pattern Name	Short Description
7	Dialogue with Harvests	By planning meals based on the shape, color, ripeness, and condition of the ingredients in front of you, as well as your mood that day, incorporate seasonal ingredients into your daily meals in a way that maximizes their freshness and flavor.
8	Unexpected Edible Parts	Utilize all plant parts, including leaves, stems, flowers, seeds, and peels, in cooking to fully absorb the energy stored within plants.
9	Long-Lasting Blessings	By preserving the produce in ways that allow for long-term storage, such as freezing, drying, or fermenting, gradually incorporate it into a variety of dishes.

Table 4 The short descriptions of the patterns in SURROUNDED BY LIFE

No.	Pattern Name	Short Description
10	Life in Patches	Incorporate nurtured plants into various daily life contexts beyond cooking, fostering deeper everyday connections with nature.
11	Newcomers in the Area	Actively seek first encounters with new plants or insects each year, noting arrivals and departures, to sensitize oneself to seasonal and yearly environmental changes.
12	Sounds of Creatures	Attune oneself to the sounds of insects and birds, observing where and how they occur, enhancing awareness of the presence of life through auditory signals and fostering emotional connections with nature.

A.3 PATTERNS FOR NURTURING A RELATIONSHIP WITH THE UNSEEN WORLD OF THE SOIL

The category for NURTURING A RELATIONSHIP WITH THE UNSEEN WORLD OF THE SOIL consists of three groups. The first group, OBSERVING THE PROCESS OF SOIL FORMATION, contains the following three patterns, which are shown in Table 5: *Soil Sensation*, *Nurturing Soil*, and *Fermentation Kitchen*. The second group READING THE SOIL, contains the following three patterns, which are shown in Table 6: *Breath of Roots*, *Soil Indicator Plants*, and *Variety Seed Sowing*. The third group BUILDING MICROBIAL HABITATS, contains the following three patterns, which are shown in Table 7: *Grass Blanket*, *Different Plant Families*, and *Thinning Harvest*. The fourth group ACCUMULATING AND CIRCULATING NUTRIENTS, contains the following three patterns, which are shown in Table 8: *Legume Bridges*, *Multi-layered Roots*, and *Nutrient-Varied Plants*.

Table 5 The short descriptions of the patterns in OBSERVING THE PROCESS OF SOIL FORMATION

No.	Pattern Name	Short Description
13	Soil Sensation	By actually touching the soil, you can feel its warmth and texture.
14	Nurturing Soil	Return non-edible plant parts to the soil, transforming household waste into nutrients beneficial to soil health.
15	Fermentation Kitchen	By making fermented foods, whose transformations are easily noticeable, and closely observing the phenomena occurring throughout the process, experience something similar to the processes happening within the soil.

Table 6 The short descriptions of the patterns in READING THE SOIL

No.	Pattern Name	Short Description
16	Breath of Roots	By directing our awareness not only to what's happening above ground but also beneath the soil, trust in the potential of plants to thrive, continuing to watch over them carefully.
17	Soil Indicator Plants	By observing the variety and quantity of common plants growing naturally in an area, use their preferred habitats as indicators to better understand the underlying soil conditions.
18	Variety Seed Sowing	By experimentally planting various types of seeds in a small area, discover which plants are best suited to that land on your own.

Table 7 The short descriptions of the patterns in BUILDING MICROBIAL HABITATS

No.	Pattern Name	Short Description
19	Grass Blanket	Spread cut or uprooted vegetation across the soil surface to protect it from direct ultraviolet exposure.
20	Different Plant Families	Combine plants from diverse taxonomic groups and ecological characteristics to maintain a balanced soil biotic community.
21	Thinning Harvest	By thinning and gradually harvesting the plants, allow them to grow healthily while maintaining the connections between their roots, which communicate with each other.

Table 8 The short descriptions of the patterns in ACCUMULATING AND CIRCULATING NUTRIENTS

No.	Pattern Name	Short Description
22	Legume Bridges	Plant legumes to harness atmospheric nitrogen, replenishing essential nutrients within the soil ecosystem.
23	Multi-layered Roots	Integrate plants with vertically penetrating and horizontally spreading root systems to optimize nutrient extraction from various soil depths.
24	Nutrient-Variied Plants	Combine nutrient-demanding plants with those requiring fewer nutrients to maintain balanced soil fertility.

A.4 PATTERNS FOR NURTURING AN ECOSYSTEM

The category for NURTURING AN ECOSYSTEM consists of three groups. The first group, BUILDING PATHWAYS FOR LIFE, contains the following three patterns, which are shown in Table 9: *Planting Flowers*, *Water Reservoir* and *Insect Shelter*. The second group ALIGNING WITH THE NATURAL RHYTHM, contains the following three patterns, which are shown in Table 10: *Insect-Plant Calendar*, *Watering Rhythm*, and *Moon Phases*. The third group UTILIZING WHAT IS THERE, contains the following three patterns, which are shown in Table 11: *Edible Weeds*, *Unknown Margins*, and *Garden Companions*. The fourth group ROOTING IN THE LAND, contains the following three patterns, which are shown in Table 12: *Connecting Seeds*, *Symbolic Tree*, and *Shared Garden*.

Table 9 The short descriptions of the patterns in BUILDING PATHWAYS FOR LIFE

No.	Pattern Name	Short Description
25	Planting Flowers	By planting flowering plants alongside others, create an inviting environment for diverse creatures drawn in by the colors and fragrances of the blossoms.
26	Water Reservoir	Establish water-accumulating habitats such as ponds or wetlands to attract aquatic plants, insects, and birds.
27	Insect Shelter	Create habitats using varied natural materials to provide safe environments for insects.

Table 10 The short descriptions of the patterns in ALIGNING WITH THE NATURAL RHYTHM

No.	Pattern Name	Short Description
28	Insect-Plant Calendar	By observing the types and conditions of existing plants and animals and carefully intervening with consideration for their activities, create an environment that respects other living creatures while ensuring that the plants you wish to grow can thrive.
29	Watering Rhythm	By watering according to the plants' natural rhythms, ensure that moisture reaches them precisely when they need it.
30	Moon Phases	Align planting and harvesting schedules with lunar cycles, acknowledging subtle environmental influences and enhancing holistic agricultural awareness.

Table 11 The short descriptions of the patterns in UTILIZING WHAT IS THERE

No.	Pattern Name	Short Description
31	Edible Weeds	By carefully observing plants that grow naturally and identifying those that are edible, incorporate them into your cooking, deepening your familiarity with a wider variety of plants.
32	Unknown Margins	Valuing the state of "not knowing" and taking diverse factors and perspectives into consideration enables an attitude responsive to various possibilities.
33	Garden Companions	Through plants, joy and wisdom are shared, creating companions who nurture and grow together.

Table 12 The short descriptions of the patterns in ROOTING IN THE LAND

No.	Pattern Name	Short Description
34	Connecting Seeds	By collecting seeds from fruits and flowers after they've matured, and continuing to grow plants from these seeds in the following seasons, the plants can inherit environmental information, developing forms and resilience uniquely suited to their specific location.
35	Symbolic Tree	By planting trees as special beings that will continue to grow alongside you into the future, create gardens and fields that encourage sustained engagement over the long term.
36	Shared Garden	By reframing the plants and spaces grown and nurtured as part of the broader natural environment, and sharing them among portions for human consumption, use by other organisms, and seeds for future growth, an environment is created in which diverse forms of life can flourish together.