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**Article**

## More than a microcosm: Ecology and ecolinguistics in the garden

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### Abstract

Traditional gardening in the United Kingdom has a rich background of cultural and stylistic influences with a well-embedded terminology. All serve to reinforce the annual cycle of garden tasks in which the ground is dug, seeds are sown, plants planted, weeds and pests eliminated, crops harvested, and over-luxuriant growth cut back. The outcome over time has been to reduce structural complexity in gardens with negative consequences for niche availability and thence biodiversity. In short, much gardening today has become, in fundamental ecological terms, low-diversity, high-disturbance, and short-term. Ecology, meanwhile, continues to revolutionise our understanding of habitats. Self-organisation is now thought to play an important role in both community structure and function through the emergent property of resilience, which is usually defined as the ability of a community to recover if disturbed. High diversity promotes resilience and is therefore good, but it can only develop in a relatively low-disturbance environment, and only if it is given time. The modern paradigm in ecology thus suggests an approach to gardening that is the antithesis of gardening tradition; one that is high-diversity, low-disturbance and long-term. The apparent incompatibility of conventional and “ecological” gardening has led to suggestions that gardens should undergo rewilding as practised on a larger landscape scale. This ignores the high conservation value that can be achieved in gardens; most are already small-scale mosaics of habitats where simple emendations can have large positive effects for wildlife. What is lacking is a suite of metaphors, frames, and triggers that encourages gardeners to cultivate their wildlife as well as their plants.

**Keywords:** gardens; history; ecology; complexity; biodiversity; decomposition

## 1. Introduction and definitions

A garden can be defined as *enclosed ground, usually adjoining a house or other building, in which plants are cultivated*, although the term is often applied to public areas laid out for pleasure or education and can be applied more generally to any pleasant place or fertile area. *Gardening* describes the act of cultivation and is separated from agriculture in that it is usually based on digging, turning the land with the spade rather than turning the land with the plough. Also, gardens are usually far smaller than farms, and plants are often cared for individually, something that is not common in agriculture.

The annual cycle of gardening tasks is directed towards encouraging plants that are considered to be useful in some way. Other components of the garden habitat such as non-useful producers (other plants), primary consumers (animals that eat plants; herbivores), secondary consumers (animals that eat other animals; carnivores, insectivores, etc.) and members of the decomposition community (detritivores, fungi, and bacteria) are mostly ignored unless they are perceived as weeds, pests, or diseases in which case attempts are made to discourage or even to eradicate them. There are thus two aspects to gardening; on the one hand, plants are encouraged to grow (plant cultivation), and on the other, they are defended from attack (plant protection). Human agency is central to both, and a gardener makes many value-judgements concerning the desirability of one species over another, and how best to grow the plants of choice. In managing the garden habitat towards a desired end, the gardener can easily be reframed as an applied ecologist but is also, in ecological terms, a member of the within-garden community of species. The human species acts intentionally or otherwise on all aspects of community structure; as a biotic filter to influence the number of species within the garden (often termed its biodiversity, diversity or species richness), and as a keystone species to shape the physiognomy of the habitat through altering species abundances (the numbers of individuals of species).

Gardening is said to be the most popular leisure activity in Britain, and gardens make up about a quarter of the area of a typical British city (Loram et al., 2007). Overall, they occupy some 4,300 square kilometres (Davies et al., 2009), an area rather larger than that of all Britain's National Nature Reserves combined (2,900 km<sup>2</sup>), although these figures vary according to source and criteria (Dobersky, 2024). Even so, gardens have been, historically, mostly ignored by ecologists because they were generally considered to be highly-managed, "artificial" environments (Vickery, 1995). Revision began with the epic, thirty-year study carried out by ecologist Jennnifer Owen (Owen, 2005, 2010) in her own garden in the city of Leicester. A second study, the Biodiversity in Urban Gardens Sheffield project, or BUGS (Smith et al., 2006), corroborated much of her work, and together, these two studies now form the basis of our understanding of what lives in smaller gardens. More recently, Philips (2020) found particularly high levels of biodiversity in the formal gardens of the renowned, large, and historic estate of Great Dixter and concluded that it "highlights how gardening and horticulture can play ... a crucial role in reversing the loss of pollinators within the UK". Gardens do not have to be large and historic to achieve high biodiversity;

even in her “typical suburban garden” of 741 m<sup>2</sup>, Jennifer Owen found “an astonishingly large proportion” of some taxonomic families — 37%, 26% and 54% respectively of Britain’s hoverflies (Diptera: Syrphidae), ichneumons (Hymenoptera: Ichneumonidae), and ladybirds (Coleoptera: Coccinellidae), for example — and in all identified 2,627 species, several of which were new to science. Within the wider environment, where species generally are in decline, “substantial proportions of the populations of some previously widespread and common species now occur in urban environments” (Davies et al., 2009) and gardens provide important refuges for declining, rare, or threatened species (Cameron et al., 2012) such as the Jersey toad *Bufo spinosus* (Maguire, n.d.). There are, however, few or no direct comparisons of diversity in gardens and the wild (Dobersky, 2024).

In recognition of the role that gardens can play, conservation and gardening organisations now encourage gardeners to reframe their gardens — both conceptually and physically — as small nature reserves and promote the adoption of techniques that allow more wildlife to co-exist alongside productive and ornamental plants (*The RHS Sustainability Strategy: Net Positive for Nature and People by 2030*, 2021). Although many gardeners follow recommended practices such as the incorporation of ponds, bird feeders, bug hotels and log piles in the garden, these assumedly eco-friendly additions are usually set within a matrix of conventional gardening in which traditional practices that are typically inimical to wildlife — digging, hoeing, weed and pest control, and pruning — continue. Thus, there appears to be a disconnect between being eco-friendly in the garden and gardening itself, and many conservationists, yet to be convinced of the role gardens can play, still use the term “gardening” pejoratively and instead promote the idea of rewilding as is practised on a larger, landscape scale. For them, the human animal has created an “unnatural” habitat which should be returned to a more “natural” condition, in a modern iteration of the old Cartesian duality of humankind’s separateness from nature.

In the words of Botkin (1992), cited by Verhagen (2008), we view our environment from an “unspoken, often unrecognized perspective” which “ironically in the scientific age, depends on myth and deeply buried beliefs”. Although the fundamental, unchanging needs of plants lends it a certain constancy, gardening is an ancient pursuit that has been subject to many cultural and historical influences. In this sense, the incorporation of ecology and environmentalism into gardening is simply the latest manifestation of a continuing process, and these new ideas must compete with long-established traditions that may be underpinned by old, hidden worldviews about how both nature and human society function. Whilst the language used historically by those writing about gardens can reveal the metaphors and frames employed and how they have changed with time, gardening is, above all, a practical, hands-on pursuit, and so what gardeners *do* can tell us much, too.

## 2. Early gardening and the establishment of basic concepts

The origins of gardening are now lost to us, but probably lie in either early forms of agriculture or perhaps agroforestry (also termed “forest gardening”, in which mixtures of

crop-bearing trees and shrubs are grown, or at least encouraged, and amongst which small areas are given over to annual or biennial crops). The earliest known gardens date to the Old Kingdom of ancient Egypt (approx. 2,600 BCE), and in the texts of the time *garden* is represented by a hieroglyph which includes lattice-like elements considered conventionally to mean sectioned or irrigated land (N23 or N24 in Gardiner; Dickson, 2006). Also, our modern words *garden*, *yard*, *paradise*, and even *horticulture* have their etymological roots in terms meaning *enclosure*. Physical enclosure is thus a key early concept that acts to separate the space within from the world outside, to yield a place where the gardener might be more able firstly to provide for the needs of cultivated plants and secondly to protect them from attack. Here already, five millennia ago, are the two footings upon which modern gardening is built: plant cultivation and plant protection.

In addition to the fundamental property of enclosure, other basic elements of modern gardens were also present in the gardens of the Old Kingdom. Funerary art and archaeological excavation have revealed symmetry and geometric design, the use of water not just to sustain plants but as an architectural feature, and subdivision into sections including relatively small areas planted with a restricted number of species (Wilkinson, 1994). For the ancient Egyptians, though, a garden was not simply the outcome of interplay between form and function, but spiritual. Gardens were not sited for practical reasons such as soil quality or water availability but where gods were believed to live, and were designed to resemble an imagined mythical world. A building in a garden was not primarily an architectural feature, as today, but the home of a god. The souls of the dead could find rest and refreshment in a garden with trees and water, and water itself was where the god Nun lived. Papyrus (*Cyperus papyrus*) was the home of Hathor, and waterlilies (*Nymphaea* spp.) were reminders of Ra. Date palms (*Phoenix dactylifera*), figs (*Ficus sycomorus*), and even the lettuce (*Lactuca sativa*) were associated with other deities. The food produced was used ceremonially, and the garden itself provided space for ritual. There can be no doubt that gardens were important to the ancient Egyptians; the commitment and labour needed to build and maintain these physical manifestations of a mythical world, often situated in arid environments where water and even soil were rare commodities, and in which high levels of geometric order were imposed upon a few chosen plant species of religious significance, was vast.

Gardens also had a strongly theistic imprint in the early Judaeo-Christian tradition. God was thought to have resided in the Garden of Eden along with the first humans, creatures, and plants, and all lived in harmony. However, God had somehow seen the need to give humans the mandate as agential beings to take control of the Earth, while subduing and passivating all else that lives (Genesis 1:26, 1:28). Such inconsistencies in the biblical narrative combined with the realities of life led mediaeval theologians to argue (Minnis, 2016) that dangerous or noxious creatures, unfruitful plants, and weeds came into being as a result of original sin, dooming humankind to a life of toil (Genesis 3:17–18). Even so, belief in man's dominion over nature was ubiquitous during the period, and the garden became a place where the perfection of early Eden could once again be realised. Ever since,

conflation of the garden with religious imagery — paradise on earth — has helped to give the idea of the garden potency that has permeated all three Abrahamic traditions. For believers, the heavenly garden of Eden is a divine metaphor that precedes and influences its earthly counterpart. For the secular, the metaphor of the heavenly garden ultimately derives from the ancient use of a garden as a place of earthly pleasure, rest, or contemplation (*Paradise on Earth* | *Encyclopedia.com*, n.d.). Either way, within its enclosing boundary, the garden becomes more than a microcosm of the anthropocentric world outside, it becomes a place where nature can and ought to be improved upon, a place where prelapsarian Eden could be recreated if only all the noxious creatures and weeds were removed.

Circumstantial evidence suggests that the religious significance of gardens in ancient Egypt declined over time to the point where both their design and planting became merely traditional (Daines, 2008). With or without the theistic element, the highly-structured, high maintenance, low-diversity style of Egyptian gardens went on to heavily influence Roman garden design (Evyasaf, 2010) which then spread with the expansion of the Roman empire throughout Europe, north Africa and western Asia (Bowe, 2004).

Roman gardening came to Britain following the conquest of 43 CE (Ryley, 1998), and some aspects have proved to be extraordinarily persistent here. For example, today's gardeners easily recognise almost all the tools employed by Roman gardeners (Farrar, 2011) and they also frequently bemoan the high labour and time costs of traditional gardening, unaware that their workload has evolved out of a social system in which labour was not a significant factor for most garden owners because the great majority of gardeners were slaves (Burks, 2008). Following the end of Roman occupation in 410 CE and the decline of Roman influence, many aspects of Roman gardens such as the narrow, rectangular bed described by the first century CE writer Columella (Henderson, 2004), the forerunner of today's ubiquitous raised bed, were re-introduced with the monastic tradition of the Mediaeval period (Landsberg, 2004) and then reinforced with the publication of the first practical book on gardening in the UK in 1577, Thomas Hill's *The Gardeners Labyrinth* (Hill & Mabey, 1988), which itself borrowed heavily from classical authors. Finally, the Italianate garden style reintroduced geometric designs that not only emphasised the idea of control over nature but also became a statement of the wider power and wealth of the garden owner (Uglow, 2005).

### **3. Plant cultivation: Plants as machines — or partners?**

Verhagen (2008) identified an important component of the anthropocentric worldview in the metaphor NATURE AS A MACHINE. He argued that its origins lay in the twin developments of Newtonian determinism (the clockwork universe) and scientific reductionism (the whole can be understood as the sum of the parts) during the early years of the Age of Enlightenment, which in the UK is usually said to date from the founding of the Royal Society in 1660 CE. However, during this period when educated landowners first

began to apply the new principles of science to their lands and estates, the ancient principles of gardening were already deeply embedded. Gardeners were well aware of how domesticated plants would respond to the provision of basic needs such as soil type, soil enrichment, water and heat (although they had only a hazy appreciation of other needs, such as light). This highly mechanistic, deterministic view of plants — that plants respond in particular, predictable ways to particular environmental conditions — thus pre-dates determinism and reductionism by millennia, and so could only have been reinforced rather than initiated by them. Other variants of the mechanistic metaphor that were identified by Verhagen, such as NATURE AS A FACTORY and NATURE AS A STOREHOUSE, also apply to the garden; it is both a photosynthetic factory and a repository of the products of photosynthesis.

As the nineteenth century progressed, the mechanistic metaphor came to underpin almost every aspect of plant cultivation. In the Victorian age (1837–1901 CE), advances in inorganic chemistry and plant physiology revealed the importance of individual nutrients to plant growth, and for the first time commercial interests made available many products that were said to meet particular needs of the plant, further enhancing the mechanistic perspective. Here, then, are the early stirrings of plant autecology, the deterministic and reductionist study of the physicochemical needs and dynamics of individual species, a refinement of the mechanistic metaphor that came to dominate the study of plants as organisms, and in many ways still does today. There is no denying that the mechanistic approach of Victorian gardeners was hugely successful; the period is referred to today as the “Golden Age of Horticulture”. The reasoning throughout was a commonsensical one of simplicity and directness; plants have needs, humans supply them, and thereby gain benefits.

Humans work hard to cultivate domesticated plants for the benefits they provide, and useful crops are now grown in large numbers, in a diversity of forms, well outside their native ranges. For example, the origins of the apple (*Malus pumila*) lie in the fruit forests of the Tien Shan, the cabbage (*Brassica oleracea*) is an uncommon species of coastal habitats in temperate regions, and the onion (*Allium cepa*) may have evolved in Baluchistan but is thought now to be extinct in the wild. To conduct a little thought experiment, a disinterested, non-human, sentient observer might look at a field of onions and those tending them, and wonder exactly who is working for whom? Both *Homo sapiens* and, to take another example, wheat *Triticum aestivum* gain clear benefits from their relationship; both can extend their geographic range, increase population numbers and enhance reproductive or genetic fitness. The interaction is not antagonistic nor even unidirectional, but mutualistic. Biologically speaking, domesticated plants (and animals) have a cooperative partnership with humans (Zeder, 2015).

#### 4. Plant protection

Humans may have entered into a successful mutualistic relationship with domesticated

plants and animals, but few gardeners would argue that they have such a relationship with the rest of nature in the garden. Weeds, pests and diseases are not seen as passive, or cooperative, but as persistent active threats to desirable plants, and a large part of the gardener's time is taken up in preventative and corrective action. For most gardeners, growing crops and ornamentals is an eternal “war against nature” (Carson, 1962).

The assumption underlying plant protection — the art and science of keeping the damage caused by weeds, pests and diseases down to acceptable levels — seems to be that non-domesticated nature does little or nothing that is useful and much that is bad. This is another old and persistent belief. In the major Roman gardening texts, all the non-domesticated nature described is harmful; Columella, for example, discusses trouble with weeds and Palladius covers trouble with everything else (Henderson, 2004). These beliefs were then reiterated and expanded upon in *The Gardener's Labyrinth* (Chapters 31–34). With such a view, human agency becomes not only an essential part of plant protection, but the only agency available. In a world without taxonomy or ecology, all animals in the garden were considered to be potential pests. Nobody (in the Western world, at least) had any idea that as well as pests — primary consumers of plants — there existed such a thing as a community of secondary consumers that might include pests within their diet and could, therefore, act as a natural brake on pest populations. The only available methods of plant protection had, in common with the techniques of plant cultivation, the characteristics of simplicity and directness; perceive a weed, pest, or disease, then try to kill it. At no time was human intervention a conscious substitute or replacement for natural controls, for there was little or no idea in the Western world that natural controls existed.

## 5. The rise and rise of human agency in plant protection

During the Enlightenment, several authors such as René-Antoine Ferchault de Réaumur in France (Carton, 2005) had noted the potential usefulness of some secondary consumers, but simple direct action against pests continued to become both increasingly popular and more extreme. William Cobbett (1829) introduced the concept of “the garden constantly clean” which was furthered by highly influential head gardeners such as James Barnes (1806–1877). In common with other head gardeners, Barnes of Bicton was famously hard-working — the importance of human agency meant he could be little else — and for him, cleanliness was an essential element of good gardening (Musgrave, 2009). Surfaces were washed and cleansed, and even soil was doused with boiling water in an effort to control pests and disease, and the hoe was essential for keeping at bay both weeds and pests amongst growing plants. Under such head gardeners, those in junior posts would spend long hours performing repetitive (and doubtless very tedious) tasks such as washing used pots and seed trays and clearing away fallen leaves, which were all thought to be sources of disease.

Furthermore, the ongoing industrial revolution made available many novel (and highly toxic) products for disease control. Commercial interests promoted their wares heavily in

the horticultural media of the time, and quick cure-alls became popular, as evidenced by the worryingly high levels of copper, lead and arsenic found today in the soils of some old gardens, such as at the RHS Garden Bridgewater where 35,000 cubic metres of contaminated soil had to be removed and replaced during its renovation (*Autumn 2018 at RHS Garden Bridgewater / RHS Gardening*, n.d.).

Victorian products began to fall into disuse with the dawn of the agro-industrial revolution at the end of the 1939–45 conflict. The Victorian enthusiasm for the mechanistic principle of simple, direct action in both plant cultivation and protection continued, but now included powerful additions to the gardener's armoury in the form of artificial fertilisers and synthetic pesticides. For the government of the time, the shift to agrochemicals was in the national interest; disrupted supply lines meant that starvation had become a real possibility in the immediate post-war years (Harvey, 1997). It was made aware of possible environmental issues, but concluded early on that some environmental damage was a price worth paying for food security. The government/industrial nexus promoted the new chemicals heavily, and growers were conditioned to believe in a new reality; one gardening friend recalls that during this period “you were made to feel that you had to garden with chemicals”, and nearly everyone did. By 1983, no fewer than 47 pesticides were recommended for use in the garden (Thrower, 1978).

## 6. Modernism

With a new armoury of chemicals, the ancient ideal of a garden free from noxious creatures and weeds now seemed easily achievable, and the introduction of modernism into the garden made it even more desirable. This twentieth-century movement in art, architecture and wider society sought to use “new imagery, materials and techniques to create artworks that better reflect the realities and hopes of modern societies” (Tate, n.d.). In the garden, it meant the use of strong geometry, new (to gardening) materials such as concrete and steel, and architectural features that were formerly known as plants.

The style was popularised in the early 1960s by garden designer John Brookes (1933–2018). In particular, he coined the term *the room outside* to describe his view of the garden as an extension of the home (Brookes, 1985). His design technique relied heavily on strong horizontals and verticals (“the grid”), emphasising the connectedness of house and garden. With such a framing, extra areas for “outdoor living” — for example, for dining or relaxation — were created. Plants played a secondary role, simply contributing an architectural backdrop of form and mass. Brookes is even quoted as saying that for him “the plants came last” (*John Brookes MBE 1933–2018 — Great British Gardens*, n.d.). Brookes is widely regarded as both “the most influential garden designer of the twentieth century” and “the man who made the modern garden”. His emphasis on the structural aspects of the garden, employing principles such as simplicity of form and the appeal of geometric shapes, remains the norm amongst garden designers (denmansgarden-gwendolyn, 2022).

In subdividing the garden, Brookes' concept followed a long tradition, but uniquely, his



term *the room outside* planted the idea that the garden was not just an extension to the house, but could be part of it. By framing the garden in such a way, it became a place where orderly domesticity could not only be achieved, but was desirable. Paradoxically, Brookes made no reference to neatness or tidiness and was never overly concerned with either in his own garden at Denmans, which he developed in a naturalistic style.

Commercial interests seized upon the idea of the garden room, for there was now another house-space that could be filled with products. The opinions and expectations of the garden owner — often someone with little experience of gardening and still less of ecology, and in search of help — became something to be carefully managed, and the horticultural industry began to use the framing of desirable, orderly domesticity in marketing material, and still does. Those with gardens are advised to act upon trigger-phrases such as *keeping your garden neat and tidy* (531 million hits on Google), *keep the garden clean* (416 million hits) and *put the garden to bed for winter* (100 million hits).

*Put the garden to bed for winter* refers to the autumnal task of removing spent vegetation and leaf litter, thereby preparing the garden for spring regrowth. Winter is also said to be the time for garden maintenance. For example, commercial websites frequently contain messages such as:

Winter strips the garden back to its bare bones and allows you to access its structure for essential maintenance. It's the outdoor equivalent of emptying a room and stripping off the wallpaper so that you can decorate it. (*Putting Your Garden to Bed for Winter*, 2021)

Such exhortations are essentially a continuation of the Victorian ideal of the *garden constantly clean*, but in a more extreme form. Behind them all lies the notion that disorder, weeds, and detritus harbour pests and disease, and so the commonsensical thing to do is to tidy up and remove everything except chosen plants. All probably have roots in the pre-Victorian mindset that produced the aphorism *Cleanliness is next to Godliness* (Tréguer, 2021). Such beliefs pre-date the work of Pasteur, Lister and Koch on germ theory by about a century and have their origins in the ancient concept of miasmas, in which disease was thought to arise spontaneously from foul air emanating from rotten matter in damp places (Pannell, 2016). Gardeners knew full well that both dead plant matter and animal waste were important sources of nutrients, but the risk of miasmas meant that such waste had to be treated before use. Excreta was usually consigned to the dung heap, and rotting plant matter was buried immediately, if at all possible, or removed to the compost heap or leaf bin until it became more wholesome and could be applied to the garden. In spite of the work of the early microbiologists, miasma theory outlived the nineteenth century in gardening. In one popular guide (Sutton & Sons, 1902), “the accumulation of rubbish anywhere ... is to be deplored as an evil altogether ... the accumulation of dead leaves and other vegetable detritus is productive of miasma. It is therefore above all things necessary to keep the garden clean from end to end ... all decaying refuse should be got out of sight

as soon as possible, to rot harmlessly instead of infecting the air”.

Miasma theory may have been replaced by germ theory, but the miasma-preventative techniques of zoning and burial of organic matter in order to provide, eventually, nutrient enrichment in the garden have continued unchanged. Municipal authorities have gone on to adopt zoning enthusiastically in the form of the green waste bin, in which “bad” waste is taken away, processed by human agency, and made available in the form of “good” potting compost or soil amendments. Today’s cultural norms about dirt and matter being out of place may seem rational (Mooney, 2021) but they are rooted in the theory of miasmas.

## 7. The modern ecological paradigm

The development of synecology — the study of interactions between species — from the early twentieth century on, continues to revolutionise our understanding of habitat structure and community function. The study of how species fit together, and of the interactions between them, has inevitably added a layer of intricacy to what we have learnt from autecology.

As with any new discipline, the establishment of concepts was not without controversy. A fundamental dichotomy emerged early on as a result of the work of plant ecologists Henry Gleason and Frederic Clements (deLaplante & Picasso, 2011). For Gleason, a plant community was made up of many individual species that acted separately and only grew together simply because they had physicochemical requirements in common. Consequently, a community could be understood at a mechanistic, reductionist level. For Clements, the members of a plant community interacted in some way to take on the properties of a quasi-organism. The holistic nature of Clements’ concept was popularly decried throughout much of the twentieth century by those in reductionist biological disciplines such as biochemistry or physiology, for the claims made by some ecologists, that there was something extra in communities, that the sum of the parts was somehow greater than the whole, was unsupported by rigorous evidence even though experience suggested it to be true. That evidence began to accrue in the 1980s with the discovery of mycorrhizal links between the different species in a plant community (Francis & Read, 1984) which allowed physiological connectedness and some level of inter-specific communication. Complexity theory, which began to be formulated at about the same time (Lewin, 1992), offered at last a working conceptual framework for such views, although it too had its own durable controversies, such as the diversity/stability debate (Landi et al., 2018).

Complexity theory has gone on to become commonplace in ecology. In particular, the discovery of the emergent property of resilience, usually defined as the ability of a community to recover once disturbed, has been pivotal. Resilience, acquired through the interactions between species, is now thought to be an important reason why diversity, its loss, and its restoration, matters. More diversity equals more interactions equals higher resilience.

Here, then, is the central paradox of gardening. Conventional gardening relies on a low-diversity, high-disturbance model based on short-term growing cycles in which human agency is the only component of crop protection, whereas the current ecological paradigm suggests a model of high diversity and low disturbance over the long term in which other biotic elements play an enhanced role in crop protection. The challenge is to develop a gardening style that embraces high diversity and low disturbance, without rewilding.

## 8. Discussion

The fundamentals of gardening are rooted in the ages before ecology existed as a subject. The twin principles of plant culture and plant protection emerged with enclosure, and theistic visions of a paradise on earth gave rise to design features such as symmetry and subdivision that were created and maintained using the now discredited social system of slavery, but which are still in use today and just as reliant on high labour input. Domesticated plants were of course cultivated, but every other plant and animal in the garden was thought bad, and it was assumed that human agency was the only means of keeping the bad things away. Simplistic, commonsensical solutions to problems of cultivation and protection were sought using early expressions of the mechanistic metaphor.

This metaphor and its variants have dominated horticulture (and agriculture, for that matter) ever since. Its expression, though, became more extreme through time as the degree of control that could be exerted on the growing environment increased with technical advances, particularly during the Victorian Golden Age of Horticulture and the agro-industrial revolution. As it became possible to have a garden without weeds, pests or disease, modernism introduced the unconsciously destructive frame of the outdoor room, in which cleanliness and other forms of orderly domesticity, such as neatness and tidiness, could not only be imposed but were promoted as desirable.

Traditional gardening is now about 5,000 years old, and during that time many of its principles and practices have taken on the properties of memes, passing through generations little changed. In part, that is due to the unchanging needs of plants and their natural enemies, but also springs from deeply embedded theistic, deterministic and reductionist worldviews within which the mechanistic metaphor engendered simplistic, commonsensical beliefs about how the natural world functions.

In contrast, environmentally-aware gardening has been around for perhaps 80 years. Throughout, its practitioners have championed a whole-of-community, holistic style of gardening which has often placed it at odds with ecology, where the mechanistic metaphor, reductionism and determinism continue to dominate. Complexity theory has at long last offered a working conceptual framework for holism, but there is no denying that decentralised processing among many individuals, which results in the emergence of new, unexpected properties, is conceptually difficult for humans, who have a central processing unit called the brain and have designed computers in their image. Many, too, find it difficult

to accept that something so useful can spring from nothing. The outcome is that many growers cling to the old certainties of what they think they know. However, at the heart of every complex system is a small set of simple rules. In the case of natural plant protection, and in the absence of little or no direct research on the topic, I suggest that these would seem to be *increase diversity*, *reduce disturbance*, and *give it time*. These ideas are easily incorporated into gardens using very simple techniques that gardeners are already familiar with — more diverse and denser plantings alongside a combination of the non-removal and wider addition of organic matter.

Gardeners now have to contend with demands to rewild their gardens, or incorporate more native species, or let weeds grow, and have come to look with suspicion upon the ecologists and environmentalists who make them. In reply, all a gardener needs to do is point to the high levels of biodiversity that can be achieved in gardens, and to the benefits brought by increased levels of resilience when species richness is enhanced. The physiognomy of a garden does not need to change radically, but the incorporation of extra plantings and organic matter might be interpreted by some to mean unacceptable levels of untidiness. So, how might we persuade gardeners to look beyond a little untidiness and see structural complexity? Here, it may be best to work within the long-established existing framings rather than against them. The framing of orderly domesticity in the garden may encourage gardeners to strip away diversity, but it might be possible to use that same framing in some way to promote microhabitat provision — something along the lines of *make homes for helpers*, perhaps.

A few trigger-phrases have begun to gain traction. Some success has already been had with the term *no-dig*, equivalent to the term *no-till* in agriculture, in which soil disturbance is minimised thus saving labour and allowing soil diversity to increase. Other terms include *feeding the soil* and *low-impact gardening*, and agriculture has the broadly equivalent *repair the soil* and *restorative farming*. In a recent work on the diversity of natural enemies in vineyards (Rocher et al., 2024), weeds are referred to throughout as *spontaneous vegetation*, a term that lacks negative associations. Generally, though, there are very few words and phrases in the English language that transmit the idea of biodiversity as good. *Species richness* was originally a technical definition of diversity, being the number of species found within a given area, and as such is well suited to both the garden and the farm. *Species rich* has a useful antonym in *species poor*, and both avoid the now value-laden *biodiversity*, and also avoid the conflation of diversity with abundance in diversity indices, concepts which are probably best considered separately in discussions of natural pest control (Aldebron et al., 2020). Finally, I can find very few terms in English to describe vegetation which is both diverse and attractive; *bosky* may be the sole example.

Modern pest control continues to use the ancient commonsensical principle of simple and direct action in which a single chemical (or biocontrol agent) is used as a “magic bullet” against a particular pest. However, the discovery of resilience, and the importance of interspecific interactions in its development, has suggested another approach based on the community, or at least upon functional groups within it. This idea, which is closely related

if not identical to the holistic ideal, is in its formative stages (Bohan et al., 2013; De Heij & Willenborg, 2020) but it has already led to the re-evaluation of biological controls in citrus orchards (Niu et al., 2014) and is even being applied in epidemiology, to human zoonoses and their transmission (Sokolow et al., 2017), an approach which places the human animal firmly within the wider environment. In their wide-ranging analysis, Isobel Jones and colleagues (2022) point out that “the war against citrus pests in ancient Chinese orchards was not won by eliminating insect life, but by cultivating it”. The idea that garden wildlife can be cultivated alongside desirable plants could turn out to be important. The “living jigsaw” (Bourne, 2017) may no longer need passivisation but *partnership*.

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