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Review article

Evaluation of Selected Vegetable Crops with Ornamental Value in Sustainable Landscape Design: A Review

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ABSTRACT

As cities expand so rapidly and private garden space is shrinking, edible landscaping is on the rise. Edible landscaping is a design concept that combines food-producing plants with ornamental landscape design. The upshot is that a planted area can be both pleasing to the eye and nutritious. An increasing number of vegetable crops are treated as dual-purpose plants (edible and ornamental). However, the scientific documentation of their ornamental potential is scattered across different sources, such as plant breeding textbooks, plant physiology references and landscape design manuals, often dealing with individual species separately. This article attempts to assemble published evidence on the ornamental qualities of selected vegetable crops that collectively exemplify three different approaches to producing ornamental value in home gardens: (1) colourful fruits, exemplified by dwarf tomatoes and ornamental peppers; (2) coloured foliage, exemplified by flowering kale (ornamental cabbage); and (3) overall plant form, flowers or fragrance, exemplified by basil and okra. The article also seeks to identify research gaps and propose an integrated evaluation framework to balance aesthetic and productive values for guiding sustainable landscape design in the future.

1. Introduction

Edible landscaping or foodscaping is the integration of food-producing plants in ornamental landscape designs with planted beds, containers, and pots that are aesthetically pleasing and provide edible harvests (Fetouh, 2018; Thakur et al., 2025). This has been a popular reaction to the intensification of urban life and the diminishing of private outdoor spaces, where many households cannot sustain a 'traditional' vegetable garden apart from their ornamental garden (Fetouh, 2018). A growing body of research in edible landscaping confirms that interest in this field has increased markedly in recent years. This heightened attention is linked to the multiple environmental, economic, and social benefits offered by dual-purpose plantings in urban environments (Mok et al., 2014; Specht et al., 2014).

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Vegetable crops occupy a central position in this approach because many species that were originally bred for yield or flavor also exhibit fruit colors, foliage patterns, or growth habits that satisfy conventional ornamental criteria. The colorful leaf stalks of Swiss chard, the purple leaves of basil, and the glossy foliage of ornamental peppers are already marketed as bedding or container plants in the horticultural trade, independent of their culinary uses (Missouri Botanical Garden Plant Finder, n.d.; Gilman et al., 2023).

The university of Florida has issued a practical, principle-based extension guide for edible landscaping that addresses site selection, drip irrigation practices, container cultivation, seasonal planting calendars, and soil and pest management to facilitate the attractive integration of food-producing plants into home gardens (Saracino et al., 2020). This applied guide demonstrates that extension level and industry ready recommendations for edible-ornamental design already exist in considerable practical detail. However, as this review highlights, scientific evidence at the plant for the recommended species remains fragmented and is rarely compared across taxa.

This review examines a selected group of ornamental vegetable crops that collectively illustrate three distinct pathways through which a food crop can acquire ornamental value: (1) persistent display of colorful fruits, exemplified by dwarf tomato ('Micro-Tom') and ornamental pepper; (2) colored foliage, represented by flowering kale (ornamental cabbage) and Swiss chard; and (3) overall plant form, flowers, or fragrance, illustrated by basil and okra. This three-dimensional review aims to synthesize the morphological, physiological and genetic evidence that supports the ornamental value of each species, to identify gaps where current sources fall short of providing a true multi-species comparative assessment and to propose a structured framework that future experimental work can utilize to address this gap.

2 .Review of Studies on Vegetable Crops with Ornamental Value

Recent scientific research has shown that vegetable crops of ornamental value are not a botanically homogeneous group in terms of traits used in landscape design. Attractiveness is not a binary concept. Different parts of the plant attract different insects, and the attractive part could be the foliage, fruits, flowers, or the plant's overall shape (Holding, 2026; NC State Extension, 2026). In this context, the concept of edimentals has arisen – a portmanteau of edible and ornamental – to describe plants that have a dual function simultaneously: aesthetic beauty and food production (Schuster, 2026; Tracy W., 2026).

In this article, the reviewed studies are categorized into functional groups, which allow a comparison of crops and to understand their roles in sustainable landscape design. The groups are determined by the plant part which provides the primary ornamental value. This may be coloured foliage, showy fruits, attractive flowers, or distinctive architectural form. This classification corresponds to the framework given by Holding (2026) in *Eat Your Garden*, which categorizes dual-purpose plants according to their structural layers (low, medium, tall) and their design function (edging, backgrounds, focal points, etc.

This method is also consistent with NC state Extension (2026) guidelines which highlight that edible plants can serve many ornamental functions in the landscape, in addition to producing food, such as providing shade, creating visual screens, or adding seasonal colour. The division of vegetable crops into

functional groups facilitates comparison between the crops and also assists designers and gardeners in choosing the correct plant for the correct function within the overall garden design.

2.1 Crops Valued Primarily for Foliage in Landscape Design

These include flowering kale (*Brassica oleracea* var. *acephala*) and ornamental cabbage (*Brassica oleracea*, Capitata Group). Both are members of the family Brassicaceae. The foliage forms rosettes with a gradient of colours from light green to deep purple and creamy white. The rosette shapes are regular and can be used for edging, beds, containers, mass plantings in public landscapes and mixed borders especially in autumn and winter (Graves et al., n.d.). The flowering kale has gained increasing popularity as a horticultural plant owing to the diversity of its leaf shapes and colours, strong tolerance to low temperatures and dual value as an ornamental and an edible plant, according to recent molecular study (Zhou et al., 2022). This is also true for other colored-leaf species that use other mechanisms. For example, the ornamental value of Swiss chard (*Beta vulgaris* subsp. *vulgaris*) is due to the pigmentation of leaf stalks, which is caused by betalain pigments, rather than the rosette form (Park et al., 2026). The ornamental value of coloured lettuce is also mostly described in commercial cultivar catalogues and is not subjected to quantitative ornamental studies.

2.2 Crops Valued Primarily for Their Fruits in Landscape Design

The group includes the ornamental pepper (*Capsicum annuum*), dwarf tomato (*Solanum lycopersicum* 'Micro-Tom'), aubergine (*Solanum melongena*) and the ornamental-fruited cucurbits. The species feature brightly coloured fruits in shades of red, yellow, orange and purple. The extension documentation states that ornamental pepper usually grows to be 25-50 cm tall and produces coloured fruit from May until the first frost. Suitable for front edging, mixed floral borders and containers, tolerant of hot weather conditions, performs well during the warm season. However, ornamental cultivars are often grown for visual display and their fruit may be inedible because of extreme pungency (Gilman et al., 2023).

Eggplant (*Solanum melongena*) The purple hues of the flowers and the glossy fruit in different colours and shapes make eggplant a plant that is great for container and mixed border planting. Recent genetic studies emphasise the importance of young leaf colour in eggplant as an important agronomic trait related to its ornamental value. In addition to its correlation with photosynthetic efficiency, stress tolerance and fruit quality. This provides opportunities for the selection of cultivars with high yield and the colour variation suitable for landscape design (HU et al., 2026).

2.3 Crops Valued for Their Overall Form, Flowers, or Fragrance

Basil (*Ocimum basilicum*) combines fragrance, diverse foliage colors (ranging from green to deep purple, as in the 'Dark Opal' cultivar) and a range of growth forms from tall and open to compact and globe-shaped characteristics that have been documented in scientific literature for an extended period. A study specifically dedicated to ornamental potential compared the basil cultivars 'Grecco a Palla', 'Alfavaca Basilicão Vermelho', and 'Thai Basil' under protected cultivation. The study recorded canopy diameter, leaf length, inflorescence length, plant height, and fresh/dry leaf biomass, and complemented these quantitative measurements with visual assessments of canopy size, leaf shape, texture, size, and color, as well as flower and stem coloration. All three cultivars were judged to flower within an appropriate time window and to exhibit desirable variation in color and brightness for landscape design, with the compact, globe-shaped 'Grecco a Palla' showing particular suitability for ornamental use in containers (França et al., 2017).

A highly recent and concrete example of this trend, originating from the horticultural trade rather than scientific research, is the basil cultivar 'Treviso', which received an All-America Selections (AAS) award in 2026 following trials at 80 U.S. sites. It was jointly recognized for its compact growth habit, disease resistance, and heat tolerance in the garden, as well as for ornamental-related traits such as delayed flowering and reduced attractiveness to Japanese beetles (Preen, 2026). This illustrates that industry recognition of dual-purpose basil cultivars is advancing at a faster pace than standardized, peer-reviewed ornamental assessment.

Like basil, other species are valued ornamentally primarily for their flowers or their overall architecture rather than for foliage or fruits alone. Okra (*Abelmoschus esculentus*) has hibiscus-like flowers that are yellow with a dark purple center and are about 5–8 cm long (NC State Extension, n.d.). Each individual flower lasts only one day, but the daily succession of open flowers produces a continuous visual effect throughout the season. With plant heights reaching 1.2–1.8 m, okra serves as a suitable vertical element in summer beds (Arkansas Extension, n.d.). Incorporating okra into landscape design requires selecting cultivars compatible with bed height, available space and harvest system, as its extended growth and fruiting cycle may demand additional cultural management compared to other ornamental annuals.

Artichoke (*Cynara cardunculus* var. *scolymus*) is distinguished by its large silvery leaves and purple flower heads, making it well-suited as a focal or background plant in landscape compositions (Lanteri et al., 2012). Vining cucurbits (family *cucurbitaceae*) provide vertical green

panels when trained on trellises and fences, bearing yellow flowers (in species such as cucurbita pepo) or white flowers (in species such as Lagenaria siceraria), along with ornamental fruits of diverse shapes and colors (UF/IFAS Gardening Solutions, n.d.)

The strategies outlined above intersect with an additional applied dimension pertaining to actual cultivation context. Species with relatively compact root systems and upright growth habits—such as ornamental pepper, the dwarf tomato cultivar 'Micro-Tom', basil, Swiss chard, and lettuce discussed earlier—are well-suited for cultivation in containers, pots, and balconies, a point specifically emphasized in extension documentation for ornamental pepper (Gilman et al., 2023). Vining cucurbits and runner beans (*Phaseolus coccineus*) can be used vertically on trellises and fences because they are climbing plants and their range of use extends beyond ground beds to walls and arbours.

This applied dimension namely, the role of visual deployment of the species (specimen, mass planting, screen, or vertical/walkway element) will be discussed in greater detail within the integrated evaluation framework proposed in the following section. This is based on field studies that have demonstrated the importance of this dimension in translating color and form traits into actual landscape compositions on the ground (Tik & Kaya, 2025).

Table 1. Classification of Vegetable Crops with Ornamental Value and Their Design and Functional Characteristics

Scientific Name	Family	Ornamental Plant Part	Functional Group	Primary Ornamental Trait	Design Use	Season	Sources
<i>Brassica oleracea</i> (Acephala and Capitata Groups)	Brassicaceae	Foliage	Leafy Vegetables	Colored rosettes (green, blue, white, pink, red, multicolored)	Edging, beds, containers, borders, mass plantings	Autumn-Winter-Spring	Graves et al., n.d.
<i>Beta vulgaris</i> subsp. <i>vulgaris</i>	Amaranthaceae	Foliage	Leafy Vegetables	Colored leaf stalks and veins (red, yellow, white)	Mid-border edging, containers	Autumn-Spring	Park et al., 2026
<i>Capsicum annuum</i>	Solanaceae	Fruits	Fruiting Vegetables	Multicolored fruits (red, yellow, purple)	Front edging, containers	Summer-Autumn	Gilman et al., 2023
<i>Abelmoschus esculentus</i>	Malvaceae	Flowers and External Appearance	Flowering/ Architectural Vegetables	Large hibiscus-like flowers, upright stems	Backgrounds, seasonal beds	Summer	NC State Extension, n.d.; Arkansas Extension, n.d.

Scientific Name	Family	Ornamental Plant Part	Functional Group	Primary Ornamental Trait	Design Use	Season	Sources
<i>Cynara cardunculus</i> var. <i>scolymus</i>	Asteraceae	Foliage and Inflorescences	Architectural Vegetables	Large silvery leaves, purple flower heads	Focal or background plant	Spring-Summer	Lanteri et al., 2012
<i>Solanum lycopersicum</i> 'Micro-Tom'	Solanaceae	Fruits	Fruiting Vegetables	Compact growth habit, abundant small fruits	Containers, pots, windowsills	Summer-Autumn	Scott & Harbaugh, 1989
<i>Solanum melongena</i>	Solanaceae	Flowers and Fruits	Flowering/Fruiting Vegetables	Purple flowers, glossy fruits	Mixed borders, containers	Summer-Autumn	Uddin et al., 2021; Hu et al., 2026
<i>Ocimum basilicum</i> L.	Lamiaceae	Foliage and Floral Inflorescences	Aromatic Vegetables	Aromatic green or purple leaves, pollinator-attracting inflorescences	Edging, aromatic beds, containers	Summer	França et al., 2017; Preen, 2026

3. Criteria for Evaluating the Ornamental Value of Vegetable Crops

Assessing vegetable crops for ornamental value requires a framework that integrates aesthetics with function and management. Characteristics like ornamental value ecological adaptability and ecosystem services have been used in multi-criteria evaluation systems with Analytic Hierarchy Process (AHP) and cluster analysis for urban tree selection (Wang et al., 2026). The logic can be adapted to assess vegetable crops, with the addition of criteria for productive value and seasonal management needs.

3.1 Color Value

The choice of vegetable crops with ornamental value depends on the combination of visual traits such as foliage, flower and fruit colour, growth habit, productivity and adaptability to site conditions. These traits can be utilised in the design of edible landscapes to balance visual appeal and food production with shared design objectives (food, colour and vegetation cover) (Marek et al., 2025). Colour is effective not only by its presence but also by its intensity, by contrast with neighbouring plants, and by its persistence through the season.

3.2 Architectural Form

Architectural form encompasses plant height, growth direction, branching density, leaf size, and capacity to serve as a focal point, background, or ground cover. Artichoke and okra provide upright elements with floral or architectural value, whereas flowering kale and Swiss chard offer low to medium masses, and vining vegetables add a vertical dimension when trained on supports. Edible-ornamental design principles emphasize the importance of defining the plant's function within the composition before selection, whether for borders, containers, or focal points (Marek et al., 2025).

3.3 Seasonal Continuity

Seasonal continuity refers to the period during which a plant retains its desirable aesthetic traits, whether colored foliage, flowers, or fruits. Edible landscape design guidelines recommend mixing evergreen ornamentals and flowering plants with short- and long-season edible crops to ensure a cohesive garden appearance throughout the year (Hansen, 2019). Winter leafy vegetables generally provide longer-lasting color effects in cool weather, whereas the ornamental appeal of pepper, tomato, and okra is determined by flowering and fruiting stages during the warm season. Accordingly successive planting and the integration of species with different seasons are recommended to ensure staggered visual interest and food production throughout the year.

3.4 Productive Value

In the evaluation of vegetables for use in landscaping, the productive value should not be underestimated, as this attribute distinguishes them from many traditional ornamental plants. This aspect is measured by the amount of edible portion, frequency of harvest, length of production, and safety and quality of crop. For edible landscapes the cultivars should be selected with a thoughtful balance of plant form and aesthetic appeal, and the potential for a useful harvest (Marek et al., 2025).

3.5 Resource Efficiency

Resource efficiency refers to the suitability of a crop for water-conserving irrigation systems, its performance under available soil and climate conditions, and its requirement for fertilizers or intensive inputs. Urban agriculture reviews indicate that sustainability assessment requires consideration of the water–energy–food nexus, rather than evaluating production in isolation from the resources required to achieve it (Mena-Barragán et al., 2026). In arid and semi-arid regions this criterion gains particular importance and necessitates selecting heat-tolerant cultivars, adopting drip irrigation and mulching, and improving soil with organic amendments

3.6 Ease of Maintenance

Aligning the crop with site conditions- including drainage, solar exposure, proximity to water sources, and soil characteristics – alongside regulating irrigation, fertilization, and pest monitoring according to the nine Florida-Friendly Landscaping principles, is essential for maintaining the vigor of vegetable plants and preserving the intended garden appearance (Saracino et al., 2020).

3.7 Site Suitability

Site suitability is determined by the compatibility of the plant with light, temperature, wind, soil, drainage, water quality, and site use patterns. Food safety must also be considered in public and school gardens. A controlled monitoring study of horticultural crops grown in urban gardens demonstrated that leafy and stem vegetables cultivated near roads can accumulate traffic-related heavy metals to a significantly greater extent than the same plants grown away from traffic (Vittori Antisari et al., 2015). This necessitates treating proximity to roads and soil testing status as filters for site suitability prior to planting.

4. Discussion

This section connects the evaluation criteria outlined above with the actual patterns observed across the plant species covered in this review drawing out their practical implications for design and regional applicability.

4.1 Comparison Between Leafy and Fruiting Vegetables

Specialized extension documentation records two temporally distinct mechanisms of color display between these groups. For leafy vegetables such as flowering kale and ornamental cabbage, the emergence of vibrant coloration (pink, purple, and creamy white) is specifically triggered by temperatures dropping below 60°F (approximately 15.5°C), making them cool-season crops (autumn, winter, spring) that are typically replaced by more heat-tolerant cultivars once they bolt (Graves et al., n.d.). In contrast, fruiting vegetables such as ornamental pepper produce colored fruits from May until the first frost, with multiple colors appearing simultaneously on the same plant as fruit ripening stages progress (Gilman et al., 2023). Thus, the choice between the two strategies is determined by the target season and the desired nature of the visual display: seasonally stable foliage coloration versus successive color variation linked to the fruiting cycle.

4.2 Ornamental Value Versus Productive Value

A consistent pattern recurs across the genetic and breeding literature reviewed in this article: studies available for these crops (such as genetic diversity studies in pepper and eggplant) were conducted primarily for breeding toward yield, not for explicit ornamental assessment compared with productivity. This means that the ornamental selection criteria (pigment intensity, rosette form regularity) and the productive selection criteria (yield, fruit size, disease resistance) are studied in relatively separated streams of research, not within a unified protocol that balances both. In practice, this distinction calls for careful selection of cultivars, balancing ornament and production, taking into account the specific purpose of the site, which can be purely ornamental, productive, educational or multifunctional (Marek et al., 2025).

4.3 Suitability of Vegetables for Sustainable Gardens

Whether a crop is suitable for a sustainable garden depends on its irrigation needs, heat tolerance, length of the production season and ease of pest management. The results of a field study in allotment gardens in Berlin support the idea that plant species richness, including cultivars that are classified as edible but also used as ornamentals, is associated with providing pollinator habitats and ecosystem services compared with less diverse monocultures (Haase & Gaeva, 2026).

An independent field study on urban home gardens in Glasgow supports this trend demonstrating how floral richness and abundance directly affect pollinator interactions and the structure of their interaction networks, regardless of the nature of the surrounding green space. This suggests that a greater diversity of flowering plant species in the garden could help in providing resources for pollinators, but the extent of this effect varies with plant diversity, flowering duration and local conditions (Plant et al., 2025).

4.4 Practical Applications in Iraq

There is a great potential for application of vegetables as ornamentals in Iraqi cities. Applications include home gardens in large urban areas, college and school gardens as educational spaces, public gardens as seasonal planting beds, and small spaces such as balconies, rooftops and containers. A field experience of incorporating edible plants into a university campus, specifically Iğdır University in Turkey, demonstrates the possibility of transforming campus green spaces into living educational laboratories for learning in horticulture and sustainability. If heat and drought tolerant species and cultivars are selected and efficient irrigation systems are adopted, this model should be investigated for applicability in Iraqi agricultural colleges. This is in line with the previous recommendation for the need to validate any suggested framework under the specific conditions of arid and semi-arid regions (Tik & Kaya, 2025).

5. Conclusion

Some vegetable crops have aesthetic and functional ornamental value and are suitable for incorporation into sustainable landscape design, as shown in this review. The variety in colours, foliage, fruits, flowers, growth habits and overall appearance make these plants useful for edging, beds, containers, trellises and educational or community gardens. The benefits of urban trees go beyond aesthetics, and include food production, support of plant diversity, connection to environmental learning and social well-being. However, their success is not just a matter of moving vegetables into the ornamental garden but instead involves thoughtful design including appropriate species selection for the site, efficient water management, seasonal maintenance and food safety assurance. This research is proposed locally to prepare the standardised evaluation indicators and planning lists according to arid and semi-arid climates.

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