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Article

Quality and Yield of Edible Vegetables from Landscape Design

Ana-Maria-Roxana Istrate, Mirela Cojocariu, Gabriel-Ciprian Teliban, Alexandru Cojocaru and Vasile Stoleru *

Department of Horticulture, "Ion Ionescu de la Brad" Iasi University of Life Sciences, 3 M. Sadoveanu Alley, 700440 Iasi, Romania; roxanah@uaiasi.ro (A.-M.-R.I.); mirela_c@uaiasi.ro (M.C.); gabrielteliban@uaiasi.ro (G.-C.T.); acojocaru@uaiasi.ro (A.C.)
* Correspondence: vstoleru@uaiasi.ro

Abstract: This study evaluated the effects of raised beds on crop production and quality in home gardens. The crops were grown using optimal management techniques and crop rotation principles based on organic farming. Three experimental versions were compared: V_1 with 40-centimetre-high raised beds, V_2 with 20-centimetre-high raised beds, and V_3 with ground-level beds as the control. The results showed consistent dry weight and moisture content across all three versions for most vegetable varieties. The sweet pepper 'Barbara' stood out significantly, as V_3 had the highest dry weight percentage (10.28%) and V_2 had the highest moisture content percentage (93.40%). Nutrient analysis revealed no significant differences in lipid, ash, protein, nitrogen, or caloric value among the different versions of most vegetables. However, version V_3 of the tomato 'Tigerella' showed the highest crude fibre content. Variations were observed in lycopene, ß-carotene, and calcium content among different versions of specific vegetables. Anti-nutritive compounds and average yield varied among the experimental versions for certain plant species. These findings have implications for dietary choices and can guide sustainable food production. It is recommended to consider raised beds, particularly V_3, for cultivating sweet pepper 'Barbara', and further research is encouraged to explore the potential health benefits of version V_3 of tomato 'Tigerella'. These insights provide valuable vegetable science and nutrition information and can guide agricultural practices.

Keywords: nutritional edible vegetables; edible garden; landscape design; urban gardening

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1. Introduction

The need for this study arose from people's desire to have a vegetable garden for their consumption and a decorative garden. Meeting this need proves challenging, as urban properties tend to be small and the integration of a vegetable garden with an ornamental garden requires meticulous planning to satisfy all of the owners' desires.

Urban expansion has led to an agglomeration of housing with small lots and soils unsuitable for the growth of horticultural plants [1,2]. Compared to traditional farming, urban farming depends on different conditions. In the cities, according to the accessible space, the home gardens are distributed differently instead of following rational and agronomical aspects, such as potential pollution sources and access to light [3].

The primary concern faced by urban growers pertains to soil quality. Growing vegetables in raised beds in urban and peri-urban areas is an excellent way to avoid contamination from heavy metals or pesticides that may accumulate in the soil over time [4,5]. In order to ensure favourable soil conditions and minimise the risk of exposure to contaminants, it is recommended to employ raised beds with suitable growing substrates [6].

In many cities around the world, air pollution is a significant problem. The concentration of various trace elements in the atmosphere is considerably affected by human actions, and their quantification in atmospheric accumulation can be helpful to attribute to different sources of pollution [7].

Contaminants stored in soil, water, and air can affect the product quality and healthiness of the plants [8]. These accumulations also threaten people's health by entering human bodies through the stomach and lungs and contact with the skin [9].

A way to reduce contamination is by considering companion planting and using various plant species that can rapidly absorb soil contaminants or air particles [10].

The COVID-19 pandemic situation has led people to work from home, thus contributing to an increase in stress levels [11]. Home gardening is a perfect way to reduce stress and improve physical and mental health [12]. Palar et al. [13] conducted a study showing that gardening provides greater access to food, increased consumption of fresh produce, a shift to home cooking, and decreased fast food consumption.

The practical implementation of an urban edible landscape strategy can meet 15–20% of the global food demand [14]. Engaging in food planting allows urban residents to save on transportation costs, reduce food miles, and obtain safe food. Urban horticulture is the primary source of daily food and nutrition, especially for low-income residents in some developing countries [15,16]. It allows retired people and stay-at-home parents to integrate into society [17,18], which is significant for easing social conflicts and stabilising social relations [19]. Residents feel close to nature by participating in cultivation activities, which deepen their understanding of the urban ecosystem [20]. Integrating edible plants with ornamental ones increases species diversity in urban areas, helping maintain the ecosystem's stability and promoting sustainable urban development [21,22].

Vegetables are highly valuable in human nutrition, offering a range of food and therapeutic properties [23]. Their favourable effects stem from their high water content, which promotes body hydration, and their rich hydrocarbon content, which is crucial for muscular system activity [24]. Additionally, the abundant presence of cellulose fibres aids in facilitating intestinal transit, stimulating appetite, alkalizing blood plasma, and regulating metabolism through vitamin intake [25]. However, it is important to consume vegetables alongside animal products to meet our nutritional requirements and sustain our daily physical and cognitive abilities. Adults should aim to consume approximately 150–200 kg of vegetables annually to obtain vital vitamins, minerals, and other essential components for optimal bodily function [26,27].

While vegetables offer substantial benefits, it is crucial to consider the presence of anti-nutritive compounds in certain foods, as they can influence nutrient availability and digestion. These compounds, including phytic acid, tannins, oxalates, saponins, α-amylase, and trypsin inhibitors, influence the bioavailability of minerals such as iron, calcium, and zinc, as well as enzymes like α-amylase and trypsin, making them less absorbable in the intestine [28–30]. Iron deficiency caused by poor intestinal absorption is associated with various types of anaemia, affecting billions of individuals worldwide [28,31]. Tannins, found in varying concentrations among plant species, can hinder protein digestibility, amylase, lipase, and trypsin activities, as well as iron absorption, potentially impairing cellulose and intestinal digestion [32]. Excessive consumption of oxalate can lead to nutritional deficiencies and irritation of the intestinal mucosa, with calcium oxalate contributing to the formation of kidney stones [32,33]. Saponins, while offering potential benefits such as reducing heart disease risk and enhancing immunity, can also impede protein digestion and hinder the absorption of vitamins and minerals [28,34]. Additionally, α-amylase inhibitors in the diet can hinder carbohydrate digestion and contribute to various digestive disorders [35].

By acknowledging the diverse nutritional properties of vegetables and considering the effects of anti-nutritive compounds, individuals can make informed dietary choices to optimise nutrient intake and promote overall well-being.

Landscaping using edible plants and providing food can be a new style of gardening that offers decoration, a space for relaxation, meditation, and movement, and also a source of education for young generations [1,36]. Gardening might contribute to changing attitudes towards eating vegetables from a child's perspective; they will not only eat more vegetables but also advocate the consumption of vegetables at home [37–39].

This study aimed to determine the possibilities of using raised beds in terms of quantity and production quality for the purposes provided by home gardens.

2. Materials and Methods

2.1. Experimental Site

We conducted the research in the experimental field located at the "V. Adamachi" farm (47°10′43″ N and 27°37′14″ E) from IULS Iasi, Romania. In 2019, we implemented the experimental design, installed raised beds and an irrigation system. We carried out various measurements and analyses throughout 2020 and 2021.

2.2. Experimental Design

The research plot had an area of 168 m^2 and we divided it into three experimental versions of equal size and shape as follows (Figure 1):

- V_1—40-centimetre-high raised beds;
- V_2—20-centimetre-high raised beds;
- V_3—ground-level beds, which represent the control version.

Figure 1. Representation of experimental versions.

For each experimental version, we used the same plant species in equal amounts and planting layouts.

2.3. Biotechnical Materials

2.3.1. Raised Bed Design and Construction

When creating a plant list for a garden, it is essential to consider various factors, such as the ecological requirements of the plant, including its needs for light, water, and soil. The plant selection should also consider how plants associate with each other and the decorative elements they provide, such as the height, shape, and colour of leaves, flowers, and fruits [40,41]. Additionally, the list should include plants that can provide decoration throughout the year, as a garden's aesthetic appeal is not limited to a particular season. Therefore, the process of creating a plant list for a garden should be performed with careful consideration of all these factors to ensure a visually appealing and ecologically sustainable garden design [42].

Creating an efficient and productive vegetable garden requires careful planning and design to ensure optimal use of space, efficient utilisation of resources, and optimal yields. In line with this, the current study has proposed a well-thought-out vegetable garden design based on research findings that is both aesthetically pleasing and functional [43]. We have created a detailed plan to facilitate the visualisation of the proposed design. This plan is presented in Figure 2, which outlines the spatial organisation, planting patterns, and other critical features of the garden.

The design plan incorporates a variety of species, each identified by an abbreviation for ease of reference. The experimental version features a specific quantity of plants for each species, as outlined in Table 1.

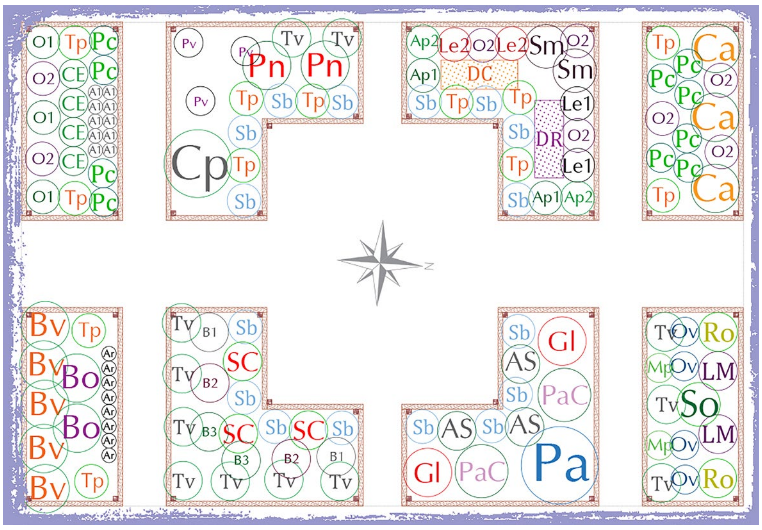

Figure 2. Proposed design plan.

Table 1. List of plants used in the design plan.

Abbreviation	Unit	QTY.	Common Name and Cultivar
A1	pcs.	10	white onion 'Di Parma'
Ap1	pcs.	2	celeriac 'Giant Prague'
Ap2	pcs.	2	celery 'Gigante Dorato 2'
Ar	pcs.	8	leek 'Blue de Solaise'
AS	pcs.	3	New York aster 'Starshine'
B1	pcs.	2	kale 'Nero Di Toscana'
B2	pcs.	2	kale 'Scarlet'
B3	pcs.	2	kale 'Kadet'
Bo	pcs.	2	cauliflower 'Clapton F1'
Bv	pcs.	5	chard 'Bright Lights'
Ca	pcs.	3	sweet pepper 'Barbara'
CE	pcs.	4	cucumber 'Ekol'
Cp	pcs.	1	patty pan squash 'Óvári Fehér'
DC	m^2	0.5	carrot 'Cosmic Purple'
DR	m^2	0.5	carrot 'Royal Chantenay'
Gl	pcs.	2	butterfly bush 'Gaudi Red'
Le1	pcs.	2	tomato 'Black Cherry'
Le2	pcs.	2	tomato 'Tigerella'
LM	pcs.	2	lavender 'Munstead'
Mp	pcs.	2	mint 'Cinderella'
O1	pcs.	3	basil 'Italiano Classico Genovese'
O2	pcs.	8	basil 'Serafim'
Ov	pcs.	4	oregano 'Kreta'
Pa	pcs.	1	Russian sage 'Little Spire'
PaC	pcs.	2	fountain grass 'Cassian'
Pc	pcs.	10	parsley 'Triple Moss Curled'
Pn	nest	2	dwarf bean 'Nano Supernano Giallo'
Pv	nest	3	common bean 'Violeta de Iasi'
Ro	pcs.	2	rosemary 'Green Ginger'
Sb	pcs.	16	lamb's ear 'Silver Carpet'
SC	pcs.	3	woodland sage 'Caradonna'
Sm	pcs.	2	eggplant 'Black Beauty'
So	pcs.	1	common sage 'Chrestensen'
Tp	pcs.	12	French marigold 'Nana'
Tv	pcs.	12	thyme 'Di Provenza'

The crop technology applied was the basic one regarding the optimal management of the vegetation factors for the selected species to obtain healthy plants with nutritional value and an aesthetically pleasing appearance. Crop rotation has been considered for better management and ecological control of pests and diseases following the principles of organic farming [44,45].

The technical drawings in Figure 3 dictated the construction of the raised beds in versions V_1 and V_2 using fir wood cabinets. We set the heights at 40 cm and 20 cm and applied a water-based varnish to provide long-term protection. For the V_3 version, we used a plastic border to delimit it at ground level.

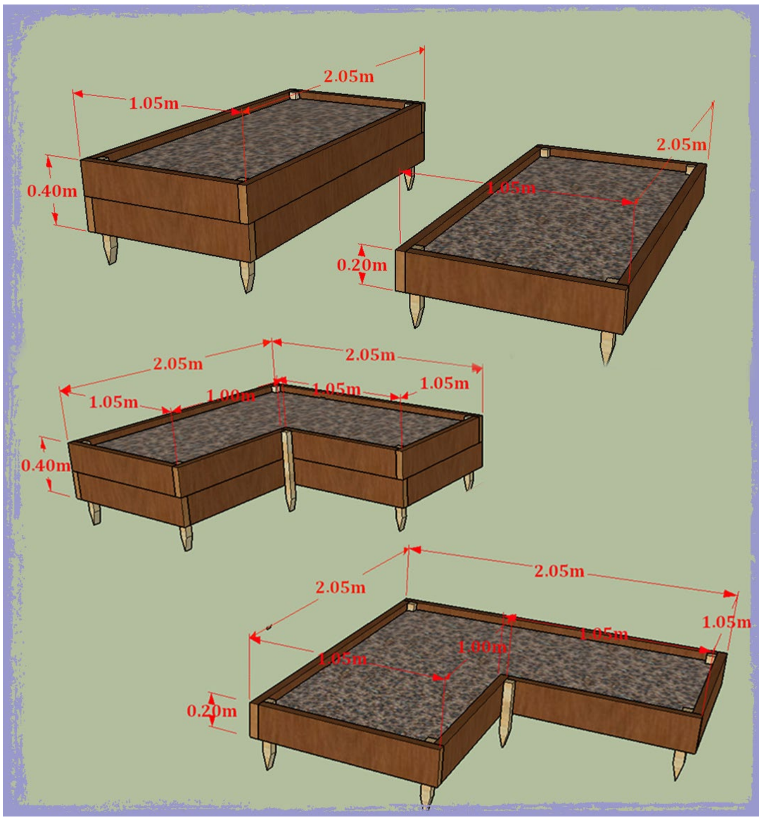

Figure 3. 3D modelling of rectangular and L-shaped beds for V_1 and V_2 versions.

We inserted 0.8 m^3 of substrate in the rectangular V_1 raised bed version, which had a height of 40 cm. For the L-shaped raised beds, we inserted 1.2 m^3 of substrate. In the rectangular V_2 raised bed version, which had a height of 20 cm, we inserted 0.4 m^3 of substrate, and for the L-shaped ones, we inserted 0.6 m^3 of substrate. Afterward, we shredded the substrate by hand.

After establishing the beds, we carried out the essential soil works to prepare the germination and planting beds. This involved deep mobilization of the soil, shredding, and leveling. For the V_3 version, we manually shaped the soil into raised furrows according to the dimensions established for the V_1 and V_2 versions.

The irrigation regime was assured by an Arctic automatic irrigation station, a solenoid valve, a main pipe with a diameter of 5 cm, taps, a watering hose with built-in drippers of 20 by 20 cm (with a flow rate of 1.6 l/dripper), and other necessary elements (elbows, connecting hose, connectors, end plugs, and clamps). We placed the main pipe from the solenoid valve on the long sides of the experiment, making it a total length of 55 m. The drip irrigation hose had a total length of 120 m and we divided it as follows: on the rectangular beds, it had a length of 4 m, and on the L-shaped beds, it had a length of 6 m.

2.3.2. Substrate and Irrigation

In V_1 and V_2 versions we used a substrate mixture of 50% garden soil, 25% peat moss, 15% peat, and 10% leaf compost. We improved the mixture yearly with 5 kg/m^3 of poultry manure (Orgevit® is a granular fertiliser with 65% OM, pH 7, 4% N, 3% P_2O_5, 2.5% K_2O, 1% MgO, 0.02% Fe, 0.01% Mn, 0.01% B, 0.01% Zn, 0.001% Cu, 0.001% Mo.) [46].

The soil in the experimental vegetable field was favourable for horticultural crops, showing good fertility due to the high organic matter content (3.45%). According to the Conrad probe, the soil pH is 6.5 in V_1 and 6.0 in V_2 and V_3. This content is specific to the medium-leached chernozem soil type formed on loessoid rocks [47].

We designed the substrate mixture used in variants V_1 and V_2 in such a way as to retain an optimal amount of water for the growth and development of the plants used in the arrangement.

We irrigated the crop using the automatic irrigation system. It consisted of an automatic watering station, the Arctic, a solenoid valve, a central pipe with a diameter of 5 cm, taps, a watering hose with built-in drippers 20 by 20 cm (with a flow rate of 1.6 l/dropper), and other necessary elements (elbows, connecting hose, connectors, end plugs, and clamps).

We programmed the automatic irrigation system according to the season. Watering was carried out in the first part of the day with a watering rate of 16 l/m^2/30 min/day. The planted area of an experimental variant is 20 m^2. Thus, the watering rate/variant was 320 l/30 min/day.

2.3.3. Soil Analysis

We collected four soil samples from each version using the sampling probe to a depth of 40 cm in V_1 and 20 cm in V_2. The macro and microelements from the substrate are presented in Tables 2 and 3.

Table 2. The content of macroelements in the substrate/soil.

Macroelements	V_1 and V_2 Substrate (d.w.)	V_3 Soil (d.w.)
N	0.39%	0.28%
P_2O_5	0.24%	0.32%
K_2O	2.05%	0.21%
CaO	3.12%	0.41%
MgO	0.60%	0.27%

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; d.w.—dry weight.

Table 3. The content of microelements in the substrate/soil.

Microelements	V_1 and V_2 Substrate (d.w.)	V_3 Soil (d.w.)
MnO	0.10%	0.02%
Fe_2O_3	0.36%	0.74%
Na_2O	0.58%	0.39%
Cd	0 ppm	1.2 ppm
Co	8 ppm	0 ppm
Cr	80 ppm	11 ppm
Cu	39 ppm	43 ppm
Mo	6 ppm	7 ppm
Ni	35 ppm	16 ppm
Pb	96 ppm	74 ppm
Zn	118 ppm	127 ppm

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; d.w.—dry weight.

We mixed the soil and substrate samples. We took one-fourth of the amount of soil and placed in the Sanyo oven for drying. The drying period was 72 h at a constant temperature of 70 °C. The dried soil sample was ground, and 70 g was kept for agrochemical analysis. The analyses were conducted at the Agricultural and Environmental Research Institute in Iasi, Romania. Seven grammes of soil were weighed using the UniBlocTM Technology precision scale, and 2 g of wax were added. The created mixture was transformed into a tablet using the Vaneox press at a pressure of 20 bar. The soil sample tablet was inserted into the WD-XRF S8 TIGER Sequential Spectrometer.

According to the analyses carried out on the soil by the Sequential Spectrometer WD-XRF S8 TIGER, the following values for the nutritional elements are presented in Tables 2 and 3.

According to the general limits of soil tests used to classify soils into different fertility classes, a classification made by FAO [48] based on works published by Tandon [49], both the substrate mixture used and the soil fall into the general class of average fertility.

2.3.4. Climatic Conditions

According to the data provided by the Moldova Iasi Regional Meteorological Centre (Table 4), the weather conditions from March to October 2020 and 2021 were favourable for the growth and development of plants. Thus, we established the crops from the end of April to the beginning of May.

Table 4. Meteorological data for Iasi Municipality 2020–2021.

Month and Year	**Temperature (°C)**			**Sunshine Duration (hours)**	**Rainfall (mm)**	**Relative Humidity (%)**
	Monthly Average	**Monthly Maximum**	**Monthly Minimum**			
Mar. 2020	7.2	20.8	−5.9	191.0	15.6	63.1
Apr. 2020	11.1	26.9	−5.9	279.8	1.6	42.0
May. 2020	14.4	30.1	3.5	178.2	130.5	67.0
Jun. 2020	21.3	33.3	6.1	235.7	99.0	71.0
Jul. 2020	22.1	33.9	10.6	187.4	7.9	61.4
Aug. 2020	23.6	32.3	14.9	289.6	8.8	54.1
Sept. 2020	19.5	31.4	8.5	264.1	24.2	59.9
Oct. 2020	14.1	24.4	1.7	129.5	75.4	82.6
Mar. 2021	3.5	18.1	−6.4	163.4	48.4	72.9
Apr. 2021	8.4	24.6	−3.2	183.7	40.4	68.2
May. 2021	15.5	27.7	3.0	212.8	62.7	69.9
Jun. 2021	20.3	33.8	10.1	218.0	104.4	75.7
Jul. 2021	23.3	35.9	13.4	283.7	50.3	72.8
Aug. 2021	21.0	34.5	11.7	265.1	132.4	73.8
Sept. 2021	14.6	27.3	2.7	188.3	6.6	73.7
Oct. 2021	12.3	22.6	−1.4	134.5	15.8	71.2
TOTAL	15.8	28.6	4.0	3404.8	824.0	67.5

Data collected from Moldova's Iasi Regional Meteorological Centre.

2.4. Biological Material

This study's biological material comprises seeds, seedlings, and potted plants. We established the crops by direct sowing in the field and by planting seedlings and potted plants as follows:

- Seedlings—kale 'Kadet', 'Scarlet', and 'Nero di Toscana'; chard 'Bright Lights'; leek 'Blue de Solaise'; white onion 'Di Parma'; cucumber 'Ekol'; eggplant 'Black Beauty'; tomato 'Tigerella'; tomato 'Black Cherry'; sweet pepper 'Barbara'; parsley 'Triple Moss Curled'; celeriac 'Giant Prague'; carrot 'Cosmic Purple'; carrot 'Royal Chantenay';

basil ‘Italiano Classico Genovese’; basil ‘Serafim’; oregano ‘Kreta’; medicinal sage ‘Chrestensen’; mint ‘Cinderella’, thyme ‘Di Provenza’; French marigold ‘Nana’; silver ragwort ‘Silverdust’;
- Direct sowing in the field—patty pan squash ‘Óvári Fehér’; dwarf bean ‘Nano Supernano Giallo’; common bean ’Violeta de Iasi’;
- Potted plants—fountain grass ‘Cassian’; butterfly bush ‘Gaudi Red’; Russian sage ‘Little Spire’; New York aster ‘Starshine’; lavender ‘Munstead’; rosemary ‘Green Ginger’; lamb’s ear ‘Silver Carpet’; woodland sage ‘Caradonna’.

2.5. Determinations and Analyses Performed

The samples’ dry weight and moisture content were determined using the reliable AOAC 2005 method [50]. To assess the proximate composition, including crude lipid, ash, crude protein, crude fibre, dietary fibre, nitrogen, and caloric value, the well-established AOAC, 2000 [51] and AOAC, 2005 [50] methods were employed. Lycopene content was quantified following the procedure outlined by Davis et al. [52], while ß-carotene content was determined using the method described by Cadoni et al. [53], ensuring accurate and consistent measurements.

Caruso et al.’s atomic absorption spectrophotometry method [54] was employed to analyse macro and microelements, providing precise and reliable results.

To evaluate the anti-nutritive composition, including phytate, tannins, oxalates, saponins, trypsin inhibitors, and α-amylase inhibitors, the established methods described by Gheorghitoaie et al. [55] were followed. These methods have been widely accepted and used in the scientific community, ensuring the validity and accuracy of the obtained data.

By employing these rigorous analytical techniques, the study obtained robust and reliable measurements of various nutritional parameters, providing valuable insights into the composition and quality of the studied crops. These findings are a solid foundation for drawing meaningful conclusions and making informed recommendations for future research and agricultural practices.

2.6. Statistical Analysis

The results were processed by statistical-mathematical methods using variation analysis with the help of SPSS version 21.

The Tukey test was performed to estimate the significant differences between the results obtained in the experimental versions. Differences between groups were considered statistically significant when $p \leq 0.05$.

3. Results and Discussions

3.1. Results on Dry Weight and Moisture Content

The findings from Table 5 regarding the dry weight and moisture content of various vegetable species when their generative organs are consumed are presented below. Furthermore, Table 6 contains additional information that may be of interest.

The dry weight differences among the three experimental versions are nonsignificant for tomato ‘Tigerella’ and ‘Black Cherry’, eggplant ‘Black Beauty’, and cucumber ‘Ekol’, as well as dwarf bean ‘Nano Supernano Gialo’ and common bean ‘Violeta de Iasi’. Meanwhile, sweet pepper ‘Barbara’ shows the highest dry weight percentage in version V_3 (10.28%), significantly different from V_2 (6.60%) but not significantly different from V_1 (8.41%). Moisture differences among the experimental versions are also nonsignificant for tomato, eggplant, cucumber, dwarf bean, and common bean. The highest moisture percentage for sweet pepper ‘Barbara’ is found in version V_2 (93.40%), with a significant difference from V_3 (89.72%) but nonsignificantly different from V_1 (91.59%).

Table 5. Dry weight and moisture content of vegetable species for the consumption of generative organs.

Cultivar	Dry Weight (%)			Moisture (%)		
	V_1	V_2	V_3	V_1	V_2	V_3
tomato 'Tigerella '	5.99 ± 0.53 ns	8.75 ± 0.78 ns	6.34 ± 0.56 ns	94.01 ± 0.53 ns	91.25 ± 0.78 ns	93.66 ± 0.56 ns
tomato 'Black Cherry'	8.96 ± 0.80 ns	9.10 ± 0.81 ns	9.20 ± 0.82 ns	91.04 ± 0.80 ns	90.90 ± 0.81 ns	90.80 ± 0.82 ns
eggplant 'Black Beauty'	7.99 ± 0.71 ns	7.27 ± 0.65 ns	7.34 ± 0.66 ns	92.01 ± 0.71 ns	92.73 ± 0.65 ns	92.66 ± 0.66 ns
sweet pepper 'Barbara'	8.41 ± 0.75 ab	6.60 ± 0.59 b	10.28 ± 0.92 a	91.59 ± 0.75 ab	93.40 ± 0.59 a	89.72 ± 0.92 b
cucumber 'Ekol'	4.04 ± 0.36 ns	3.57 ± 0.32 ns	4.40 ± 0.39 ns	95.96 ± 0.36 ns	96.43 ± 0.32 ns	95.60 ± 0.39 ns
dwarf bean 'Nano Supernano Gialo'	10.08 ± 0.90 ns	11.3 ± 1.01 ns	11.80 ± 1.05 ns	89.92 ± 0.90 ns	88.7 ± 1.01 ns	88.2 ± 1.05 ns
common bean 'Violeta de Iasi'	10.05 ± 0.89 ns	10.86 ± 0.97 ns	11.05 ± 0.98 ns	89.95 ± 0.89 ns	89.14 ± 0.97 ns	88.95 ± 0.98 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; b—lowest value; ns—nonsignificant).

Table 6. Dry weight and moisture content of vegetable species for the consumption of vegetative organs.

Cultivar	Dry Weight %)			Moisture (%)		
	V_1	V_2	V_3	V_1	V_2	V_3
kale 'Nero Di Toscana'	13.42 ± 1.20 ns	13.22 ± 1.18 ns	12.35 ± 1.10 ns	86.58 ± 1.20 ns	86.78 ± 1.18 ns	87.65 ± 1.10 ns
chard 'Bright Lights'	6.53 ± 0.58 ns	7.21 ± 0.64 ns	6.96 ± 0.62 ns	93.47 ± 0.58 ns	92.79 ± 0.64 ns	93.04 ± 0.62 ns
leek 'Blue de Solaise'	9.97 ± 0.89 ns	10.87 ± 0.97 ns	9.26 ± 0.83 ns	90.03 ± 0.89 ns	89.13 ± 0.97 ns	90.74 ± 0.83 ns
parsley 'Triple Moss Curled'	15.53 ± 1.39 ns	17.34 ± 1.55 ns	20.12 ± 1.8 ns	84.47 ± 1.39 ns	82.66 ± 1.55 ns	79.88 ± 1.80 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; lowercase letters represent Tukey's test results for $p \leq 0.05$ (ns—nonsignificant).

Dry weight differences are nonsignificant for kale 'Nero di Toscana', chard 'Bright Lights', leek 'Blue de Solaise', and parsley 'Triple Moss Curled', as well as moisture differences among the three experimental versions.

3.2. Results on Yield Quality

Table 7 presents the results of the primary compound analysis for generative organ consumption species. The evaluation of crude lipid, ash, crude protein, nitrogen, and caloric value in tomato 'Tigerella' and 'Black Cherry', eggplant 'Black Beauty', sweet pepper 'Barbara', cucumber 'Ekol', and Violeta de Iasi beans revealed nonsignificant differences among the three experimental versions.

Notably, regarding crude fibre content, the tomato 'Tigerella' exhibited a remarkable finding. Version V_3 demonstrated the highest value at 22.98 g/100 g, displaying a significant difference compared to both V_1 (14.82 g/100 g) and V_2 (13.38 g/100 g). These results emphasise the potential benefits of V_3 in terms of dietary fibre.

Table 7. Primary compounds from species for the consumption of generative organs.

Primary Compounds	T.	Tomato 'Tigerella'	Tomato 'Black Cherry'	Eggplant 'Black Beauty'	Sweet Pepper 'Barbara'	Cucumber 'Ekol'	Dwarf Bean 'Nano Supernano Gialo'	Common Bean 'Violeta de Iasi'
Crude lipid (g/100 g d.w.)	V_1	11.29 ± 0.98 ns	11.22 ± 1.00 ns	11.68 ± 1.23 ns	11.51 ± 0.91 ns	9.96 ± 0.95 ns	12.39 ± 0.99 ns	12.37 ± 0.67 ns
	V_2	11.36 ± 1.02 ns	11.24 ± 1.00 ns	11.2 ± 1.00 ns	11.85 ± 1.06 ns	10.03 ± 0.99 ns	12.46 ± 1.03 ns	13.68 ± 1.22 ns
	V_3	11.85 ± 1.07 ns	11.36 ± 1.02 ns	11.24 ± 1.01 ns	11.2 ± 1.01 ns	10.52 ± 1.04 ns	12.95 ± 1.08 ns	9.99 ± 0.90 ns
Ash (g/100 g d.w.)	V_1	4.39 ± 0.51 ns	4.38 ± 0.35 ns	4.68 ± 0.56 ns	4.30 ± 0.22 ns	4.09 ± 0.48 ns	4.74 ± 0.54 ns	5.03 ± 0.27 ns
	V_2	4.10 ± 0.37 ns	4.50 ± 0.40 ns	4.33 ± 0.39 ns	4.82 ± 0.43 ns	4.80 ± 0.34 ns	4.45 ± 0.41 ns	5.56 ± 0.50 ns
	V_3	4.81 ± 0.43 ns	4.10 ± 0.37 ns	4.49 ± 0.40 ns	4.33 ± 0.39 ns	4.51 ± 0.40 ns	5.16 ± 0.46 ns	4.06 ± 0.36 ns
Crude protein (g/100 g d.w.)	V_1	28.48 ± 2.42 ns	28.37 ± 2.57 ns	29.54 ± 4.29 ns	35.26 ± 4.77 ns	27.97 ± 3.32 ns	32.92 ± 3.37 ns	32.52 ± 1.77 ns
	V_2	28.84 ± 2.58 ns	28.31 ± 2.53 ns	25.37 ± 2.27 ns	31.15 ± 2.79 ns	26.81 ± 2.79 ns	31.84 ± 2.85 ns	35.95 ± 3.22 ns
	V_3	31.14 ± 2,80 ns	28,83 ± 2,59 ns	31,3 ± 2,81 ns	29,36 ± 2,64 ns	26,16 ± 2,75 ns	31,14 ± 2,80 ns	26,25 ± 2,36 ns
Crude fibre (g/100 g d.w.)	V_1	14.82 ± 1.89 b	18.66 ± 2.98 ns	22.14 ± 2.85 ns	16.09 ± 1.76 ns	24.82 ± 2.79 ns	22.80 ± 1.97 b	24.00 ± 1.31 ns
	V_2	13.38 ± 1.02 b	15.37 ± 1.38 ns	19.94 ± 1.78 ns	22.98 ± 2.06 ns	23.37 ± 2.09 ns	21.36 ± 1.28 b	26.52 ± 2.38 ns
	V_3	22.98 ± 2.06 a	13.38 ± 1.20 ns	15.37 ± 1.38 ns	19.93 ± 1.79 ns	22.98 ± 2.06 ns	30.97 ± 2.14 a	19.37 ± 1.74 ns
Dietary fibrfiber 100 g d.w.)	V_1	8.71 ± 1.58 ns	8.19 ± 0.36 ab	8.10 ± 0.89 ns	7.16 ± 0.32 ns	6.55 ± 0.53 ns	9.71 ± 1.59 ns	8.63 ± 0.47 ns
	V_2	6.71 ± 0.60 ns	9.48 ± 0.85 a	7.67 ± 0.69 ns	8.26 ± 0.74 ns	6.71 ± 0.60 ns	7.71 ± 0.61 ns	9.53 ± 0.85 ns
	V_3	8.26 ± 0.74 ns	6.71 ± 0.60 b	9.48 ± 0.85 ns	7.67 ± 0.69 ns	6.27 ± 0.56 ns	9.26 ± 0.75 ns	6.97 ± 0.63 ns
Nitrogen (g/100 g d.w.)	V_1	37.17 ± 4.16 ns	43.77 ± 6.21 ns	48.91 ± 5.50 ns	39.27 ± 2.16 ns	32.17 ± 4.11 ns	42.36 ± 4.24 ns	52.20 ± 2.84 ns
	V_2	35.04 ± 3.14 ns	37.96 ± 3.40 ns	46.01 ± 4.12 ns	50.00 ± 4.47 ns	30.04 ± 3.09 ns	40.18 ± 3.19 ns	57.70 ± 5.17 ns
	V_3	49.98 ± 4.49 ns	35.03 ± 3.15 ns	37.95 ± 3.41 ns	45.99 ± 4.13 ns	44.98 ± 4.44 ns	55.12 ± 4.54 ns	42.13 ± 3.79 ns
Caloric value kJ/g (kcal/100 g d.w.)	V_1	438.98 ± 41.03 ns	425.56 ± 36.48 ns	423.28 ± 38.37 ns	431.78 ± 42.00 ns	138.98 ± 14.02 ns	448.96 ± 42.03 ns	440.85 ± 24.02 ns
	V_2	434.72 ± 38.93 ns	430.24 ± 38.53 ns	422.33 ± 37.82 ns	423.26 ± 37.90 ns	134.92 ± 12.08 ns	444.78 ± 39.93 ns	487.28 ± 43.64 ns
	V_3	432.11 ± 38.83 ns	434.57 ± 39.06 ns	430.1 ± 38.65 ns	432.18 ± 38.84 ns	122.42 ± 11.00 ns	422.12 ± 37.94 ns	355.85 ± 31.98 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; T—treatment; d.w.—dry weight; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; b—lowest value; ns—nonsignificant).

Additionally, significant differences in dietary fibre content were observed in tomato 'Black Cherry' between V_2 and V_3. Remarkably, V_2 exhibited the highest amount of dietary fibre, measuring 9.48 g/100 g. However, the differences between V_1 and V_2, as well as V_1 and V_3, were found to be nonsignificant, suggesting comparable fibre content among these variants.

Similarly, regarding crude fibre quantity in 'Nano Supernano Gialo' dwarf bean, version V_3 showcased the highest value at 30.97 g/100 g, demonstrating a significant difference compared to V_1 (22.80 g/100 g) and V_2 (21.36 g/100 g). However, the differences between V_1 and V_2 were not found to be significant.

It is worth noting that previous literature reports a range of crude fibre content in cucumber fruits, spanning from 32 g/100 g for semi-ripe fruits to 58 g/100 g for ripe fruits [56]. These findings highlight the nutritional variability of cucumber fruits at different stages of ripeness and provide valuable context for further investigation.

Table 8 presents the results of the primary compound analysis for species intended for vegetative organ consumption. Evaluation of lipid, ash, protein, fibre, digestive components, nitrogen, and caloric value in kale 'Nero di Toscana', chard 'Bright Lights', leek 'Blue de Solaise', and parsley 'Triple Moss Curled' revealed nonsignificant differences among the three experimental versions. These findings suggest similar nutritional profiles across the variants studied.

Table 8. Primary compounds from species for the consumption of vegetative organs.

Primary Compounds	T.	Kale 'Nero Di Toscana'	Chard 'Bright Lights'	Leek 'Blue de Solaise'	Parsley 'Triple Moss Curled'
Crude lipid (g/100 g d.w.)	V_1	13.65 ± 1.25 ns	13.51 ± 0.93 ns	9.68 ± 1.21 ns	9.51 ± 0.89 ns
	V_2	13.21 ± 1.02 ns	13.85 ± 1.08 ns	9.20 ± 0.98 ns	9.85 ± 1.04 ns
	V_3	13.23 ± 1.03 ns	13.20 ± 1.03 ns	9.24 ± 0.99 ns	9.20 ± 0.99 ns
Ash (g/100 g d.w.)	V_1	4.68 ± 0.56 ns	4.30 ± 0.22 ns	6.67 ± 0.58 ns	6.31 ± 0.24 ns
	V_2	4.33 ± 0.39 ns	4.82 ± 0.43 ns	6.32 ± 0.41 ns	6.83 ± 0.45 ns
	V_3	4.49 ± 0.40 ns	4.33 ± 0.39 ns	6.48 ± 0.42 ns	6.34 ± 0.41 ns
Crude protein (g/100 g d.w.)	V_1	32.67 ± 3.27 ns	32.67 ± 3.02 ns	30.65 ± 3.25 ns	31.62 ± 3.04 ns
	V_2	31.37 ± 2.65 ns	29.15 ± 2.77 ns	29.34 ± 2.63 ns	31.12 ± 2.79 ns
	V_3	33.30 ± 2.99 ns	29.36 ± 2.64 ns	31.30 ± 2.81 ns	25.36 ± 2.28 ns
Crude fibre (g/100 g d.w.)	V_1	20.12 ± 2.83 ns	14.08 ± 1.74 ns	24.14 ± 2.87 ns	18.09 ± 1.78 ns
	V_2	17.93 ± 1.76 ns	20.97 ± 2.04 ns	21.94 ± 1.80 ns	24.98 ± 2.08 ns
	V_3	13.36 ± 1.36 ns	16.91 ± 1.77 ns	17.37 ± 1.40 ns	21.93 ± 1.81 ns
Dietary fibre (g/100 g d.w.)	V_1	6.09 ± 0.87 ns	5.15 ± 0.30 ns	10.10 ± 0.91 ns	9.16 ± 0.34 ns
	V_2	5.66 ± 0.67 ns	6.24 ± 0.72 ns	9.67 ± 0.71 ns	10.26 ± 0.76 ns
	V_3	7.46 ± 0.83 ns	5.65 ± 0.67 ns	11.48 ± 0.87 ns	9.67 ± 0.71 ns
Nitrogen (g/100 g d.w.)	V_1	50.93 ± 5.52 ns	41.29 ± 2.18 ns	46.91 ± 5.48 ns	37.27 ± 2.14 ns
	V_2	48.03 ± 4.14 ns	52.02 ± 4.49 ns	44.01 ± 4.10 ns	48.00 ± 4.45 ns
	V_3	39.97 ± 3.43 ns	47.99 ± 4.15 ns	35.95 ± 3.39 ns	43.99 ± 4.11 ns
Caloric value kJ/g (kcal/100 g d.w.)	V_1	420.54 ± 38.02 ns	429.48 ± 42.24 ns	424.56 ± 38.06 ns	433.50 ± 42.28 ns
	V_2	420.31 ± 37.80 ns	420.24 ± 37.79 ns	424.33 ± 37.84 ns	425.26 ± 37.83 ns
	V_3	438.07 ± 39.53 ns	420.17 ± 37.92 ns	442.09 ± 39.57 ns	425.19 ± 37.96 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; T—treatment; d.w.—dry weight; lowercase letters represent Tukey's test results for $p \leq 0.05$ (ns—nonsignificant).

In the case of ash content, existing literature indicates variations ranging from 0.58 g/100 g in fresh leek stems to 6.29 g/100 g in dried leek stems [57]. This data underscores the influence of processing and preparation methods on the ash content of leek stems.

Table 9 presents the results for lycopene and ß-carotene content. Statistical analysis reveals notable findings regarding lycopene levels in the tomato 'Tigerella'. Version V_3 exhibits the highest lycopene content at 9.74 µg/mg dry weight, followed closely by V_2

at 9.54 µg/mg dry weight. Notably, the two experimental versions exhibit nonsignificant differences in lycopene content. In contrast, tomato 'Tigerella' from V_1 demonstrates a significantly lower lycopene amount at 8.62 µg/mg dry weight compared to V_2 and V_3. These results emphasise the potential benefits of V_2 and V_3 in terms of lycopene content.

Table 9. The quantity of lycopene and ß-carotene.

Carotenoids	T.	Tomato 'Tigerella'	Tomato 'Black Cherry'	Eggplant 'Black Beauty'	Sweet Pepper 'Barbara'
Lycopene (µg/mg d.w.)	V_1	8.62 ± 0.16 b	8.77 ± 0.08 a	2.46 ± 0.09 ns	3.78 ± 0.11 c
	V_2	9.54 ± 0.06 a	5.60 ± 0.14 b	2.46 ± 0.12 ns	4.83 ± 0.05 a
	V_3	9.74 ± 0.09 a	8.93 ± 0.01 a	2.55 ± 0.14 ns	4.56 ± 0.01 b
ß-carotene (µg/mg d.w.)	V_1	7.57 ± 0.06 ns	7.55 ± 0.09 ns	2.32 ± 0.04 b	6.51 ± 0.00 b
	V_2	7.51 ± 0.03 ns	7.52 ± 0.03 ns	2.54 ± 0.04 a	6.59 ± 0.02 a
	V_3	7.61 ± 0.02 ns	7.46 ± 0.06 ns	2.57 ± 0.05 a	6.64 ± 0.03 a

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; T—treatment; d.w.—dry weight; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; c—lowest value; ns—nonsignificant).

Similarly, tomato 'Black Cherry', V_3, displays the highest lycopene content at 8.93 µg/mg dry weight, followed by V_1 at 8.77 µg/mg dry weight. Notably, there is a nonsignificant difference between the lycopene content of V_1 and V_3. However, V_2 exhibits the lowest lycopene content at 5.60 µg/mg dry weight, demonstrating a significant difference from V_1 and V_3. These findings highlight the variations in lycopene content among different experimental versions of the tomato 'Black Cherry'.

These significant results provide valuable insights into the variations in lycopene content within different tomato varieties, emphasising the potential health benefits of specific experimental versions.

The lycopene content in eggplant 'Black Beauty' did not show any significant differences among the three experimental versions, indicating a consistent lycopene presence across the variants studied.

In contrast, the lycopene content in sweet pepper 'Barbara' fruit exhibited significant differences among the three experimental versions. The highest amount was found in the sweet pepper fruits of V_2, with a value of 4.83 µg/mg d.w., while the lowest amount was observed in V_1, with a value of 3.78 µg/mg d.w.

Regarding ß-carotene, there were nonsignificant differences in the amount in tomato 'Tigerella' and 'Black Cherry' fruits across the three experimental versions.

Eggplant 'Black Beauty' displayed the highest ß-carotene amounts in V_3 and V_2, with values of 2.57 µg/mg d.w. and 2.54 µg/mg d.w., respectively. However, these differences were not statistically significant between the two experimental versions. The lowest ß-carotene content was observed in V_1, with a value of 2.32 µg/mg dry weight, showing a significant difference compared to both V_2 and V_3.

For sweet pepper 'Barbara', the highest lycopene amount was found in V_2, with a value of 4.83 µg/mg d.w., showing a significant difference compared to the other experimental versions. The lowest value was observed in V_1, with 3.78 µg/mg d.w., exhibiting significant differences between V_2 and V_3 (4.56 µg/mg d.w.). Regarding ß-carotene, sweet pepper displayed the highest amounts in V_3 and V_2, with values of 6.64 µg/mg d.w. and 6.59 µg/mg d.w., respectively. These differences, however, were not statistically significant between the two experimental versions. At the same time, the lowest ß-carotene content was recorded in V_1, with a value of 6.51 µg/mg d.w., showing a significant difference compared to both V_2 and V_3.

According to existing literature, lycopene variations in tomato fruit range from 8.83 µg/mg d.w. for 200 m^3/ha irrigation to 10.38 µg/mg d.w. for 300 m^3/ha irrigation [58]. In a study investigating the influence of two different irrigation regimes and four cultivars on tomato fruit lycopene content, a wide range was observed, varying from 9.01 µg/mg for Siriana F1 irrigated at 200 m^3/ha to 13.12 µg/mg for 'Inima de Bou' irrigated at 300 m^3/ha [59].

Regarding ß-carotene, the content in sweet pepper fruit ranged from 11.02 µg/mg d.w. with organic fertilisation to 12.96 µg/mg d.w. with microorganism fertilisation [54].

Goldbohm et al. [60] assert that lycopene intake in the Netherlands is 1.0 mg/day/person for men and 1.3 mg/day/person for women. Pelz et al. [61] report a lycopene intake of 1.28 mg/day/person in Germany. In the United States of America, lycopene intake varies between 0.593 and 1.615 mg/day/person [62]. Notably, Canada's lycopene intake surpasses that of the countries mentioned above, reaching 25.2 mg/day/person [63]. These data highlight the significant variation in lycopene intake across different countries, with Canada demonstrating notably higher levels than the others mentioned. This emphasises the importance of considering regional and cultural factors when studying dietary patterns and nutrient intake.

In conclusion, the lycopene content in eggplant 'Black Beauty' did not show significant differences among the experimental versions, while sweet pepper 'Barbara' exhibited significant variations. Additionally, there were no significant differences in the ß-carotene content of tomato 'Tigerella' and 'Black Cherry' fruits among the experimental versions. These findings contribute to understanding the variation in lycopene and ß-carotene levels in different plant varieties, providing insights into their nutritional profiles. Furthermore, comparing lycopene intake across countries emphasises the impact of cultural and dietary factors on nutrient consumption. Further research and exploration in this field are warranted to deepen our knowledge of these compounds' health benefits and promote informed nutritional choices.

Table 10 presents macroelement and microelement content results in generative organ consumption species. Statistical analysis reveals no significant differences in macroelements and trace elements among the three experimental versions of tomato 'Tigerella' and 'Black Cherry' and eggplant 'Black Beauty'.

However, significant differences are observed in the sweet pepper 'Barbara' regarding the amount of Ca between V_2 and V_3. V_2 exhibits the highest Ca content at 57.05 g/100 g, while the differences between V_1 and V_2, and V_1 and V_3 are nonsignificant. Similarly, for cucumber 'Ekol', significant differences in Ca content are found between V_2 and V_3, with V_2 having the highest amount at 48.12 g/100 g.

In the case of dwarf beans, Ca content is highest in V_2 at 80.70 g/100 g, significantly differing from V_3 (58.93 g/100 g). The V_2 version exhibits the highest calcium content for common beans at 68.03 g/100 g, with a nonsignificant difference from the V_1 version (61.55 g/100 g). The V_3 version, on the other hand, significantly differs from the two different versions, with a value of 49.68 g/100 g.

In a 2020 experiment conducted on the tomato 'Podmoskovny Ranny', zinc content in the fruit ranged from 0.62 ppm for plants grown in the solarium to 0.87 ppm for those cultivated in the open field [64]. Another study exploring the influence of diurnal temperature fluctuations on mineral concentration in different eggplant organs reported calcium content in the fruit varying from 41 ppm at a maximum temperature of 31.3 °C during the day and 19.1 °C at night to 149 ppm at a maximum temperature of 15 °C during the day and 25 °C at night [65]. Additionally, in a study on the influence of different rootstocks on the mineral content of cucumber fruit, magnesium ranged from 27 ppm in pumpkin grafting to 42 ppm in zucchini grafting [66].

Literature data demonstrate the sodium content of cucumber fruits across different fertilisation versions, ranging from 1.08 ppm to 1.50 ppm [67]. Additionally, the zinc content of cucumber fruit exhibits wide variation, ranging from 0.20 ppm in mesocarp analyses to 0.43 ppm in exocarp analyses [68].

Table 10. Macroelements and microelements from species for the consumption of generative organs.

Macroelements and Microelements	T.	Tomato 'Tigerella'	Tomato 'Black Cherry'	Eggplant 'Black Beauty'	Sweet Pepper 'Barbara'	Cucumber 'Ekol'	Dwarf Bean 'Nano Supernano Gialo'	Common Bean 'Violeta de Iasi'
Fe (ppm)	V_1	1.81 ± 0.23 ns	1.65 ± 0.09 ns	1.39 ± 0.08 ns	1.17 ± 0.07 ns	0.99 ± 0.05 ns	3.00 ± 0.16 ns	2.53 ± 0.14 ns
	V_2	1.62 ± 0.14 ns	1.82 ± 0.16 ns	1.54 ± 0.14 ns	1.30 ± 0.12 ns	1.09 ± 0.10 ns	3.31 ± 0.29 ns	2.79 ± 0.25 ns
	V_3	1.58 ± 0.14 ns	1.33 ± 0.12 ns	1.12 ± 0.10 ns	0.95 ± 0.08 ns	0.80 ± 0.07 ns	2.42 ± 0.22 ns	2.04 ± 0.18 ns
Ca (ppm)	V_1	62.68 ± 4.67 ns	72.67 ± 3.96 ns	61.26 ± 3.34 ns	51.64 ± 2.81 ab	43.53 ± 2.37 ab	73.01 ± 3.98 ab	61.55 ± 3.35 a
	V_2	65.31 ± 5.85 ns	80.32 ± 7.19 ns	67.71 ± 6.06 ns	57.08 ± 5.11 a	48.12 ± 4.31 a	80.70 ± 7.23 a	68.03 ± 6.09 a
	V_3	69.58 ± 6.26 ns	58.66 ± 5.27 ns	49.45 ± 4.44 ns	41.68 ± 3.75 b	35.14 ± 3.16 b	58.93 ± 5.30 b	49.68 ± 4.47 b
Mg (ppm)	V_1	28.12 ± 4.41 ns	22.28 ± 1.21 ns	18.79 ± 1.02 ns	15.84 ± 0.86 ns	13.35 ± 0.73 ns	26.78 ± 1.46 ns	22.58 ± 1.23 ns
	V_2	23.35 ± 2.09 ns	24.63 ± 2.21 ns	20.77 ± 1.86 ns	17.50 ± 1.57 ns	14.76 ± 1.32 ns	29.60 ± 2.65 ns	24.96 ± 2.23 ns
	V_3	21.34 ± 1.92 ns	17.99 ± 1.62 ns	15.17 ± 1.36 ns	12.79 ± 1.15 ns	10.78 ± 0.97 ns	21.62 ± 1.94 ns	18.22 ± 1.64 ns
Zn (ppm)	V_1	0.52 ± 0.12 ns	0.55 ± 0.03 ns	0.47 ± 0.03 ns	0.40 ± 0.02 ns	0.33 ± 0.02 ns	0.59 ± 0.03 ns	0.49 ± 0.03 ns
	V_2	0.33 ± 0.03 ns	0.61 ± 0.05 ns	0.52 ± 0.04 ns	0.43 ± 0.04 ns	0.37 ± 0.03 ns	0.65 ± 0.06 ns	0.54 ± 0.05 ns
	V_3	0.53 ± 0.05 ns	0.45 ± 0.04 ns	0.38 ± 0.03 ns	0.32 ± 0.03 ns	0.27 ± 0.02 ns	0.47 ± 0.04 ns	0.40 ± 0.03 ns
K (ppm)	V_1	1.88 ± 0.23 ns	1.21 ± 0.07 ns	1.02 ± 0.06 ns	0.86 ± 0.05 ns	0.72 ± 0.04 ns	1.60 ± 0.09 ns	1.35 ± 0.07 ns
	V_2	1.72 ± 0.15 ns	1.34 ± 0.12 ns	1.13 ± 0.10 ns	0.95 ± 0.09 ns	0.80 ± 0.07 ns	1.77 ± 0.16 ns	1.49 ± 0.13 ns
	V_3	1.16 ± 0.10 ns	0.98 ± 0.09 ns	0.82 ± 0.08 ns	0.69 ± 0.06 ns	0.59 ± 0.05 ns	1.29 ± 0.12 ns	1.09 ± 0.10 ns
Na (ppm)	V_1	1.33 ± 0.11 ns	1.41 ± 0.08 ns	1.19 ± 0.07 ns	1.00 ± 0.06 ns	0.84 ± 0.04 ns	1.43 ± 0.08 ns	1.20 ± 0.07 ns
	V_2	1.35 ± 0.12 ns	1.56 ± 0.14 ns	1.31 ± 0.12 ns	1.11 ± 0.10 ns	0.93 ± 0.08 ns	1.58 ± 0.14 ns	1.33 ± 0.12 ns
	V_3	1.35 ± 0.12 ns	1.14 ± 0.10 ns	0.96 ± 0.09 ns	0.81 ± 0.07 ns	0.68 ± 0.06 ns	1.15 ± 0.10 ns	0.97 ± 0.09 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; T—treatment; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; b—lowest value; ns—nonsignificant).

These findings provide valuable insights into the macroelement and microelement compositions of various generative organ consumption species. Understanding the variations in nutrient content contributes to our knowledge of the nutritional profiles of these plant varieties and can inform dietary choices for optimal health. Further research in this area is warranted to explore additional factors that may influence macroelement and microelement concentrations in these species.

Table 11 presents the results on macro and microelements in various species intended for vegetative organ consumption.

Table 11. Macroelements and microelements from species for the consumption of vegetative organs.

Macroelements and Microelements	T.	Kale 'Nero Di Toscana'	Chard 'Bright Lights'	Leek 'Blue de Solaise'	Parsley 'Triple Moss Curled'
Fe (ppm)	V_1	0.70 ± 0.04 ns	1.61 ± 0.16 b	2.13 ± 0.12 ns	1.79 ± 0.10 ns
	V_2	0.78 ± 0.07 ns	1.58 ± 0.14 b	2.35 ± 0.21 ns	1.98 ± 0.18 ns
	V_3	0.57 ± 0.05 ns	2.87 ± 0.26 a	1.72 ± 0.15 ns	1.45 ± 0.13 ns
Ca (ppm)	V_1	30.94 ± 1.69 ns	66.56 ± 4.88 ns	51.89 ± 2.83 ns	43.74 ± 2.38 a
	V_2	34.20 ± 3.06 ns	69.60 ± 6.24 ns	57.35 ± 5.14 ns	48.35 ± 4.33 a
	V_3	24.97 ± 2.25 ns	69.91 ± 6.28 ns	41.88 ± 3.76 ns	35.30 ± 3.17 b
Mg (ppm)	V_1	9.49 ± 0.52 ns	22.80 ± 2.60 ns	19.03 ± 1.04 ab	16.05 ± 0.87 ns
	V_2	10.49 ± 0.94 ns	21.35 ± 1.91 ns	21.04 ± 1.88 a	17.74 ± 1.59 ns
	V_3	7.66 ± 0.69 ns	25.64 ± 2.30 ns	15.36 ± 1.38 b	12.95 ± 1.16 ns
Zn (ppm)	V_1	0.24 ± 0.01 ns	0.37 ± 0.04 ns	0.42 ± 0.02 ns	0.35 ± 0.02 ns
	V_2	0.26 ± 0.02 ns	0.53 ± 0.05 ns	0.46 ± 0.04 ns	0.39 ± 0.03 ns
	V_3	0.19 ± 0.02 ns	0.56 ± 0.05 ns	0.34 ± 0.03 ns	0.28 ± 0.03 ns
K (ppm)	V_1	0.51 ± 0.03 ns	1.56 ± 0.30 ns	1.14 ± 0.06 ns	0.96 ± 0.05 ns
	V_2	0.57 ± 0.05 ns	1.16 ± 0.10 ns	1.25 ± 0.11 ns	1.06 ± 0.10 ns
	V_3	0.42 ± 0.04 ns	1.53 ± 0.14 ns	0.92 ± 0.08 ns	0.77 ± 0.07 ns
Na (ppm)	V_1	0.60 ± 0.03 ns	1.35 ± 0.12 ns	1.02 ± 0.06 ns	0.86 ± 0.05 ns
	V_2	0.66 ± 0.06 ns	1.35 ± 0.12 ns	1.12 ± 0.10 ns	0.95 ± 0.08 ns
	V_3	0.48 ± 0.04 ns	1.37 ± 0.12 ns	0.82 ± 0.08 ns	0.69 ± 0.06 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; T—treatment; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; b—lowest value; ns—nonsignificant).

Starting with kale 'Nero di Toscana', our analysis revealed nonsignificant differences among the three experimental versions. This suggests a consistent macroelement and microelement composition, regardless of the version tested.

Moving on to chard, leek, and parsley, we observed Fe, Mg, and Ca variations across the three experimental versions. Notably, chard exhibited the highest Fe content in the V_3 version (2.87 ppm), highlighting a significant difference compared to the other two versions. However, no significant differences were observed between V_1 (1.61 ppm) and V_2 (1.58 ppm).

Analysing leek, we found that the V_1 version had the highest Mg content (21.04 ppm), with a significant difference compared to V_3 (15.36 ppm). Notably, there was no significant difference between V_1 (19.03 ppm) and V3.

In the case of parsley, both V_1 (43.74 ppm) and V_2 (48.35 ppm) exhibited the highest Mg values, with no significant difference between them. However, a significant difference was observed in V_3 (35.30 ppm).

To provide further context, a study examining 18 organically grown kale cultivars found a wide iron content range, from 0.6 ppm in 'Ripbor' to 2.5 ppm in 'Frizzy Lizzy'. Potassium content in cabbage leaves varied from 0.67 ppm in 'Dazzling Blue' to 1.87 ppm in 'Ripbor'. Additionally, leaf magnesium content ranged from 22 ppm in 'Frizzy Lizzy' to 50 ppm in the 'Redbor' F1 hybrid [69].

Furthermore, a study conducted by Rossini-Oliva and López-Núñez [70] explored iron content in chard petioles, revealing a range from 0.654 ppm for petioles harvested from rural gardens to 1.076 ppm for those gathered near mining operations. The same study observed a wide range of zinc content, from 0.25 ppm for petioles harvested from urban gardens to 1.02 ppm for those harvested from rural gardens.

In another study by Golubkina et al. [71], which investigated the influence of organic and conventional fertilisation on mineral composition in nine leek cultivars, iron content varied from 0.77 ppm in the 'Kalambus' cultivar to 2.35 ppm in the 'Camus' variety. Calcium content ranged from 28.1 ppm in 'Summer Breeze' to 113.2 ppm in 'Premier'.

Lastly, an analysis of the mineral composition of 11 leek samples from different locations in the city of Samsun, Turkey, revealed a zinc range of 17.65 ppm to 52.52 ppm [72]. Another study exploring the effect of fertilisers on leeks' mineral composition found that sodium levels ranged from 1.11 ppm to 2.81 ppm [73].

These findings highlight the significant differences in macroelement and microelement composition across different versions and species, providing valuable insights for individuals interested in optimising their dietary choices.

Table 12 presents the analysis results on anti-nutritive compounds in generative organ consumption species. Phytate content in tomato 'Tigerella' showed no significant differences among the three experimental versions. Similarly, nonsignificant differences were observed in the tomato 'Black Cherry', eggplant 'Black Beauty', sweet pepper 'Barbara', and both bean cultivars.

Table 12. Anti-nutritive compounds from species for the consumption of generative organs.

Anti-Nutritive Compounds	T.	Tomato 'Tigerella'	Tomato 'Black Cherry'	Eggplant 'Black Beauty'	Sweet Pepper 'Barbara'	Cucumber 'Ekol'	Dwarf Bean 'Nano Supernano Gialo'	Common Bean 'Violeta de Iasi'
Phytate (g/100 g d.w.)	V_1	3.69 ± 0.38 ns	3.40 ± 0.19 ns	3.15 ± 0.17 ns	4.70 ± 0.47 ns	4.61 ± 0.25 ab	3.39 ± 0.19 ns	3.27 ± 0.29 ns
	V_2	3.58 ± 0.32 ns	3.74 ± 0.33 ns	3.48 ± 0.31 ns	4.58 ± 0.41 ns	5.10 ± 0.46 a	3.72 ± 0.33 ns	3.75 ± 0.33 ns
	V_3	3.42 ± 0.31 ns	3.58 ± 0.32 ns	2.54 ± 0.23 ns	4.42 ± 0.4 ns	3.72 ± 0.33 b	3.54 ± 0.32 ns	3.59 ± 0.31 ns
Tannin (g/100 g d.w.)	V_1	3.53 ± 0.75 a	1.96 ± 0.69 b	2.16 ± 0.12 ns	0.81 ± 0.22 ns	0.50 ± 0.03 ns	1.76 ± 0.67 b	1.18 ± 0.10 c
	V_2	2.45 ± 0.22 ab	3.95 ± 0.36 a	2.38 ± 0.21 ns	0.45 ± 0.04 ns	0.55 ± 0.05 ns	3.94 ± 0.36 a	3.96 ± 0.34 a
	V_3	1.48 ± 0.13 b	2.45 ± 0.22 ab	1.74 ± 0.16 ns	0.48 ± 0.04 ns	0.40 ± 0.04 ns	2.43 ± 0.22 ab	2.46 ± 0.21 b
Oxalate (g/100 g d.w.)	V_1	1.91 ± 0.39 b	3.47 ± 0.85 a	1.20 ± 0.07 ns	3.2 ± 0.23 ns	4.00 ± 0.22 ns	3.57 ± 0.86 a	4.00 ± 0.35 a
	V_2	1.36 ± 0.12 b	2.13 ± 0.19 ab	1.32 ± 0.12 ns	3.36 ± 0.30 ns	4.42 ± 0.40 ns	2.11 ± 0.19 ab	2.14 ± 0.18 b
	V_3	3.83 ± 0.34 a	1.36 ± 0.12 b	0.97 ± 0.09 ns	3.83 ± 0.34 ns	3.23 ± 0.29 ns	1.34 ± 0.12 b	1.36 ± 0.12 b
Saponin (g/100 g d.w.)	V_1	2.35 ± 0.49 b	3.06 ± 0.45 a	1.45 ± 0.08 ns	0.63 ± 0.05 b	0.97 ± 0.05 ns	3.04 ± 0.45 a	3.24 ± 0.28 a
	V_2	1.65 ± 0.15 b	2.62 ± 0.23 ab	1.6 ± 0.14 ns	0.65 ± 0.06 ab	1.07 ± 0.10 ns	2.61 ± 0.23 ab	2.63 ± 0.23 ab
	V_3	3.93 ± 0.36 a	1.65 ± 0.15 b	1.17 ± 0.10 ns	0.93 ± 0.08 a	0.78 ± 0.07 ns	1.64 ± 0.15 b	1.66 ± 0.14 b
Trypsin Inhibitors (TUI/mg d.w.)	V_1	9.42 ± 0.67 ns	9.34 ± 0.88 ns	8.72 ± 0.48 ns	6.42 ± 0.40 ns	7.01 ± 0.38 a	9.32 ± 0.88 ns	9.42 ± 0.82 ns
	V_2	9.91 ± 0.89 ns	9.22 ± 0.83 ns	9.64 ± 0.87 ns	6.92 ± 0.62 ns	7.75 ± 0.69 a	9.25 ± 0.83 ns	9.25 ± 0.80 ns
	V_3	9.71 ± 0.87 ns	9.91 ± 0.89 ns	7.04 ± 0.64 ns	6.71 ± 0.6 ns	5.66 ± 0.51 b	9.94 ± 0.89 ns	9.95 ± 0.87 ns
α-Amylase Inhibitors IC50 (mg/mL d.w.)	V_1	0.67 ± 0.16 ns	0.60 ± 0.03 ab	0.38 ± 0.02 ns	0.67 ± 0.16 a	0.36 ± 0.02 ns	0.62 ± 0.03 ab	0.54 ± 0.05 b
	V_2	0.43 ± 0.04 ns	0.77 ± 0.07 a	0.42 ± 0.04 ns	0.43 ± 0.04 ab	0.40 ± 0.04 ns	0.75 ± 0.07 a	0.77 ± 0.07 a
	V_3	0.35 ± 0.03 ns	0.43 ± 0.04 b	0.31 ± 0.03 ns	0.35 ± 0.03 b	0.30 ± 0.03 ns	0.44 ± 0.04 b	0.43 ± 0.04 b

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; T—treatment; d.w.—dry weight; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; b—lowest value; ns—nonsignificant).

However, noteworthy differences were found in cucumber 'Ekol', where there was a significant disparity between V_2 (5.10 g/100 g d.w.) and V_1 (3.72 g/100 g d.w.), while V_1 showed a nonsignificant difference.

Concerning tannin quantity, there were no significant differences for the three experimental versions of eggplant 'Black Beauty', sweet pepper 'Barbara', cucumber 'Ekol', and common bean 'Violeta de Iasi'. However, significant differences were observed in tomato 'Tigerella' between V_1 (3.53 g/100 g d.w.) and V_3 (1.48 g/100 g d.w.), as well as in dwarf bean between V_1 (1.76 g/100 g d.w.) and V_2 (3.94 g/100 g d.w.). Furthermore, the highest tannin content in 'Violeta de Iasi' was recorded in V_2 (3.96 g/100 g d.w.), with a significant difference from both V_1 (1.18 g/100 g d.w.) and V_3 (2.46 g/100 g d.w.).

Regarding oxalate content, tomato 'Tigerella' exhibited significant differences between V_1 (1.91 g/100 g d.w.) and V3 (3.83 g/100 g d.w.), with nonsignificant differences between V_1 and V_2. Tomato 'Black Cherry', dwarf beans, and common bean 'Violeta de Iasi' also displayed significant differences in oxalate content between various versions.

Saponin content varied significantly among the three experimental versions of tomato 'Tigerella', with V_3 (3.93 g/100 g d.w.) having the highest amount, followed by V_1 (2.35 g/100 g d.w.) and V_2 (1.65 g/100 g d.w.). The 'Black Cherry' cultivar showed nonsignificant differences between V_1 and V_2, but significant differences were found between V_1 and V_3. Significant differences in saponin content were also observed in the sweet pepper 'Barbara', while the dwarf and common beans exhibited significant differences between V_1 and V_3.

In a separate study conducted in the Aegean region of Turkey, leguminous plants from the *Apiaceae* family consumed as vegetables demonstrated varying saponin content. Dill (*Anethum graveolens* L.) had a saponin content of 1.93 g/100 g, *Opopanax hispidus* Friv. had the highest content of 4.59 g/100 g, and parsley (*Petroselinum crispum* L.) contained 2.17 g/100 g of saponins [74].

These findings emphasise the significant differences in anti-nutritive compounds among different versions of generative organ consumption species. Understanding these variations optimises dietary choices and promotes healthier food consumption practises. Moreover, the study conducted in the Aegean region of Turkey highlights the potential of leguminous plants from the *Apiaceae* family as available food sources due to their saponin content.

Further research will deepen our understanding of the nutritional composition and potential health benefits or concerns associated with these anti-nutritive compounds in generative organ consumption species.

Table 13 presents the results of anti-nutritive compounds in species consumed for their vegetative organs. Significant findings are highlighted, while nonsignificant differences have been omitted for conciseness.

Phytate, tannin, and α-amylase inhibitors did not differ significantly among the three experimental versions across the analysed plants.

In terms of oxalate content, parsley showed noteworthy variations. The V_3 version exhibited a significant quantity of 3.98 g/100 g d.w., which differed significantly from V_1 (2.05 g/100 g d.w.) but nonsignificantly from V_2 (3.83 g/100 g d.w.). There were nonsignificant differences observed between V_2 and V_3.

Significant differences were observed in the saponin quantity of parsley between the V_1 and V_2 versions. The V_2 version (3.93 g/100 g d.w.) had a significantly higher amount compared to V_1 (2.29 g/100 g d.w.), but a nonsignificant difference was observed when compared to V_3 (3.23 g/100 g d.w.). There were nonsignificant differences found between the V_1 and V_2 versions.

Regarding trypsin inhibitors, variations were observed between chard 'Bright Lights' and leek. Chard demonstrated the highest trypsin inhibitor content in V_2 (8.97 TUI/mg d.w.) and V_1 (8.12 TUI/mg d.w.), but the difference between these two versions was nonsignificant. The V_3 version exhibited the lowest quantity (6.55 TUI/mg d.w.) with significant differences when compared to the other two versions.

Table 13. Anti-nutritive compounds from species for the consumption of vegetative organs.

Anti-Nutritive Compounds	**T.**	**Kale 'Nero Di Toscana'**	**Chard 'Bright Lights'**	**Leek 'Blue de Solaise'**	**Parsley 'Triple Moss Curled'**
Phytate (g/100 g d.w.)	V1	3.90 ± 0.21 ns	3.29 ± 0.18 ns	3.74 ± 0.20 ns	3.54 ± 0.36 ns
	V2	4.31 ± 0.39 ns	3.64 ± 0.33 ns	4.13 ± 0.37 ns	3.42 ± 0.31 ns
	V3	3.15 ± 0.28 ns	2.66 ± 0.24 ns	3.01 ± 0.27 ns	3.26 ± 0.29 ns
Tannin (g/100 g d.w.)	V1	4.12 ± 0.23 ns	3.47 ± 0.19 ns	2.56 ± 0.14 ns	2.18 ± 0.48 ns
	V2	4.56 ± 0.41 ns	3.84 ± 0.34 ns	2.83 ± 0.25 ns	1.48 ± 0.13 ns
	V3	3.33 ± 0.30 ns	2.81 ± 0.25 ns	2.06 ± 0.18 ns	1.18 ± 0.11 ns
Oxalate (g/100 g d.w.)	V1	2.22 ± 0.12 ns	1.88 ± 0.10 ns	1.42 ± 0.08 ns	2.05 ± 0.59 b
	V2	2.46 ± 0.22 ns	2.07 ± 0.18 ns	1.57 ± 0.14 ns	3.83 ± 0.34 a
	V3	1.79 ± 0.16 ns	1.51 ± 0.14 ns	1.15 ± 0.10 ns	3.98 ± 0.36 a
Saponin (g/100 g d.w.)	V1	2.73 ± 0.15 ns	2.30 ± 0.12 ns	1.72 ± 0.09 ns	2.29 ± 0.52 b
	V2	3.02 ± 0.27 ns	2.55 ± 0.23 ns	1.90 ± 0.17 ns	3.93 ± 0.35 a
	V3	2.21 ± 0.20 ns	1.86 ± 0.17 ns	1.39 ± 0.13 ns	3.23 ± 0.29 ab
Trypsin Inhibitors (TUI/mg d.w.)	V1	9.63 ± 0.52 ns	8.12 ± 0.44 a	10.35 ± 0.57 ab	9.86 ± 0.94 ns
	V2	10.64 ± 0.95 ns	8.97 ± 0.80 a	11.44 ± 1.02 a	9.71 ± 0.87 ns
	V3	7.77 ± 0.70 ns	6.55 ± 0.59 b	8.35 ± 0.75 b	9.38 ± 0.84 ns
α-Amylase Inhibitors IC50 (mg/mL d.w.)	V1	0.80 ± 0.04 ns	0.68 ± 0.04 ns	0.45 ± 0.03 ns	0.41 ± 0.06 ns
	V2	0.89 ± 0.08 ns	0.75 ± 0.07 ns	0.50 ± 0.04 ns	0.35 ± 0.03 ns
	V3	0.65 ± 0.06 ns	0.55 ± 0.05 ns	0.36 ± 0.03 ns	0.54 ± 0.05 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; T—treatment; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; b—lowest value; ns—nonsignificant).

For leek, the highest trypsin inhibitor value was observed in the V_2 version (11.44 TUI/mg d.w.), significantly different from V_3 (8.35 TUI/mg d.w.) and nonsignificantly different from V_1 (10.35 TUI/mg d.w.). There were nonsignificant differences found between the V_1 and V_2 versions.

3.3. Average Yield Results

Table 14 presents the results of the average yield for generative organ consumption species in 2020 and 2021. The total number of plants in each experimental version was considered to calculate the yield.

Table 14. The average yield for 2020 and 2021 for species for the consumption of generative organs.

Cultivar	**Average Yield (g)**		
	V_1	**V_2**	**V_3**
tomato 'Tigerella'	1313 ± 118 ns	1389 ± 462 ns	1229 ± 422 ns
tomato 'Black Cherry'	1068 ± 96 a	923 ± 83 ab	685 ± 62 b
sweet pepper 'Barbara'	2116 ± 191 a	1329 ± 120 b	692 ± 108 c
cucumber 'Ekol'	1928 ± 174 a	1166 ± 105 b	1003 ± 90 b
common bean 'Violeta de Iasi'	4000 ± 374 a	3673 ± 316 b	3202 ± 286 c
dwarf bean 'Nano Supernano Giallo'	1097 ± 116 ns	1015 ± 98 ns	866 ± 74 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; b—lowest value; ns—nonsignificant).

For the tomato 'Tigerella', nonsignificant differences were observed among the three experimental versions regarding average yield over the two years.

In the case of the tomato 'Black Cherry', significant differences were found in the average yield between V_1 (1068 g), which had the highest value, and V_3 (685 g). In comparison, a nonsignificant difference was observed between V_1 and V_2 (923 g). There were nonsignificant differences between V_2 and V_3.

Significant differences were observed in the average sweet pepper 'Barbara' yield among the three experimental versions. The highest average yield was recorded in V_1 (2116 g), followed by V_2 (1329 g) and V_3 (692 g).

Cucumber 'Ekol' exhibited the highest average yield over the two years in V_1 (1928 g), which was significantly higher compared to V_2 (1166 g) and V_3 (1003 g) at a significance level of $p \leq 0.05$. There were nonsignificant differences between V_2 and V_3.

Regarding the common bean 'Violeta de Iasi', significant differences were observed in the average yield among the three experimental versions. V_1 obtained the highest average yield (4000 g), followed by V_2 (3676 g) and V_3 (3202 g).

The cultivar 'Nano Supernano Giallo' did not differ significantly from the three experimental versions. However, the highest average yield was observed in V_1 (1027 g).

Table 15 presents the results of the average yield for species consumed for their vegetative organs during the years 2020 and 2021.

Table 15. The average yield for 2020 and 2021 for species for the consumption of vegetative organs.

Cultivar	Average Yield (g)		
	V_1	V_2	V_3
white onion 'Di Parma'	1208 ± 109 ns	939 ± 85 ns	852 ± 77 ns
leek 'Blue de Solaise'	4562 ± 413 a	3792 ± 343 ab	2813 ± 254 b
celery 'Gigante Dorato 2'	1551 ± 140 ns	1559 ± 141 ns	1194 ± 108 ns
celeriac 'Giant Prague'	1782 ± 161 b	1589 ± 143 b	4065 ± 368 a
chard 'Bright Lights'	13026 ± 1179 a	9261 ± 838 ab	6630 ± 600 b
carrot 'Cosmic Purple'	440 ± 39 ns	365 ± 33 ns	491 ± 77 ns
carrot 'Royal Chantenay'	2183 ± 197 ns	1748 ± 274 ns	1896 ± 297 ns
kale 'Kadet'	3356 ± 304 a	1145 ± 103 b	1210 ± 109 b
kale 'Nero Di Toscana'	2295 ± 207 a	1745 ± 158 ab	1458 ± 132 b
kale 'Scarlet'	2671 ± 241 a	1338 ± 121 b	1410 ± 127 b
mint 'Cinderella'	1491 ± 135 ab	955 ± 86 b	1963 ± 177 a
oregano 'Kreta'	1023 ± 92 ns	955 ± 86 ns	915 ± 82 ns
parsley 'Triple Moss Curled'	2454 ± 222 ns	2299 ± 208 ns	2063 ± 186 ns
thyme 'Di Provenza'	1130 ± 102 ns	934 ± 84 ns	813 ± 73 ns

Legend: V_1—40-centimetre-high raised beds; V_2—20-centimetre-high raised beds; V_3—ground-level beds; lowercase letters represent Tukey's test results for $p \leq 0.05$ (a—highest value; b—lowest value; ns—nonsignificant).

Significantly, no noteworthy differences were observed among the three experimental versions of the 'Di Parma' onion regarding average yield.

Turning our attention to leek, specifically the 'Blue de Solaise' variety, it is noteworthy that the average yield for 2020 and 2021 was significantly higher in V_1 (4562 g) compared to V_3 (2813 g). However, a nonsignificant difference was observed between V_1 and V_2 (3792 g), indicating a comparable yield.

In the case of celeriac, the highest average yield was observed in V_3 (4065 g), demonstrating a significant difference from V_1 and V_2. However, the disparity between V_1 (1782 g) and V_2 (1589 g) was not statistically significant.

Next, focusing on chard, the average yield for 2020–2021 peaked in V_1 (13026 g). This outcome significantly differed from V_3 (6630 g), while a nonsignificant difference was found when comparing V_1 to V_2 (9261 g). Nonsignificant differences were observed between V_2 and V_3.

Interestingly, the average yield for the two carrot cultivars did not display any statistically significant variations across the three experimental versions.

In the case of kale 'Kadet', V_1 (3356 g) showcased the highest average yield during the 2020–2021 period, displaying a significant difference from both V_2 and V_3. Nonsignificant differences were observed between V_2 and V_3.

Moving on to the 'Nero di Toscana', the highest average yield was observed in V_1 (2295 g) during 2020–2021. A significant difference was noted between V_1 and V_3 (1458 g), while a nonsignificant difference was found when comparing V_1 to V_2 (1745 g). Nonsignificant differences were identified between V_2 and V_3.

Similarly, the 'Scarlet' variety of kale achieved the highest average yield in V_1 (2671 g) during 2020–2021, displaying a significant difference from V_2 and V_3. Nonsignificant differences were observed between V_2 and V_3.

Lastly, nonsignificant differences were found among the three experimental versions regarding the average yield for oregano 'Kreta', parsley 'Triple Moss Curled', and thyme 'Di Provenza' during 2020–2021.

These findings shed light on the variations in average yield for different species consumed for their vegetative organs, highlighting significant differences in some instances and acknowledging the absence of significant differences in others.

4. Conclusions and Recommendations

The dry weight and moisture content were consistent across different versions of most plant species, except for the sweet pepper 'Barbara', which showed significant differences. V_3 had the highest dry weight percentage (10.28%), while V_2 had the highest moisture content (93.40%).

Nutrient composition (lipid, ash, protein, nitrogen, and caloric value) did not significantly differ among versions for most vegetables. However, version V_3 of tomato 'Tigerella' had the highest crude fibre content, and there were variations in lycopene and ß-carotene content among different versions of tomatoes, eggplants, and sweet peppers.

Macro and microelement content did not differ significantly among versions for most plant species, except for sweet pepper 'Barbara' and cucumber 'Ekol' in calcium content. Other vegetables, such as chard, leek, and parsley, showed variations in Fe, Mg, and Ca content across versions.

Anti-nutritive compounds varied among versions, with differences observed in phytate, tannin, oxalate, and saponin content among different plant species.

Average yield varied among versions for different plant varieties, highlighting significant differences in tomato 'Black Cherry', sweet pepper 'Barbara', cucumber 'Ekol', common bean 'Violeta de Iasi', chard 'Bright Lights', kale 'Kadet', and kale 'Nero di Toscana'.

For further research, we recommend the following:

- Further research is needed to explore the compositional attributes and potential benefits of sweet pepper 'Barbara' in dry weight, moisture content, calcium content, and anti-nutritive compounds.
- Conduct additional studies to investigate the dietary fibre benefits of version V_3 of tomato 'Tigerella' and its potential implications for nutrition and health.
- Investigate the effects of different raised bed heights (40 cm and 20 cm) on various plant species' growth, yield, and nutrient content to optimise the benefits of raised bed gardening.

For gardeners, we recommend the following:

- Consider using raised beds (at a height of 40 cm or 20 cm) for cultivating plants, as they do not significantly affect most plants' dry weight and moisture content compared to ground-level beds.
- Select plant varieties based on their average yield and specific growth requirements. For example, consider cucumber 'Ekol' for higher average yields and common bean 'Violeta de Iasi' for better yields in V_1 or V_2.

By following these recommendations, researchers and gardeners can gain insights into optimising crop production, nutritional value, and sustainable gardening practices.

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