Research on the quality of lettuce production grown in protected areas*

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Abstract

Vegetables are especially important in human nutrition. Rational nutrition is unimaginable without the daily use of various varieties of vegetables.
Green vegetable plants are important for every family that has a garden. This category includes several vegetables, such as: spinach, salad, green garlic, loboda, green onions, etc.
Perennial greens should be grown in a marginal area, so as not to create problems when preparing the soil for other crops. From the salad category, Lettuce is the most widespread, it is cultivated for its heads and leaves, which can be eaten in salads, it is also eaten raw, especially when other vegetables on the market are missing.
Lettuce is an annual plant with a main pivoting root, leaves full of fleshy and thin vitamins, but it is also a herbaceous plant. It is part of the Compositae family.
Following the completion of research on the behavior of eight lettuce varieties grown in solarium on different vegetation cycles, at the Ulmi Variety Testing Center we performed the determination of parameters that influence the quality of lettuce production from which the following measurements are derived: plant height; average weight of plants at harvest; leaf embossing; dry substance; leaf thickness; plant diameter; the shape of the head; variety color;
The present paper aims to determine some parameters that influence the quality of salad production. Eight lettuce varieties grown in the solarium were monitored at the Ulmi Variety Testing Center.
The parameters followed in the study were: plant diameter (cm); plant weight (g); leaf thickness (mm); embossing size (cm); height of flowering plants (cm); soluble dry matter.

Keywords

Salad, plant height, embossing, soluble dry matter, varieties, solarium, weight, color.

Introduction

Description of the area from a geographical and pedoclimatic point of view.
The Târgovişte Variety Testing Center is located within the commune of Ulmi between two national roads that connect the municipality of Târgovişte with the municipalities of Ploieşti and Bucharest. From the point of view of the geographical location, Ulmi commune is located in the central area of

Dâmboviţa County, approximately 5 km from Târgovişte municipality, with an area of 36.21 ha. Ulmi commune borders in the north with the municipality of Târgovişte, in the south and in the west with the locality of Văcăreşti, and in the east and partially in the southern part with the locality of Comişani.

Within the Târgovişte Variety Testing Center, a team of 10 people works and tests are carried out for straw autumn and spring cereals, corn, legumes for grains, oilseeds, potatoes, fiber and grass plants, fodder legumes but also for vegetables. From a physical-geographical point of view, Ulmi Commune is located within the Piedmont Plain of Târgoviște, at an altitude of 242 m, with numerous crevices that create problems in the range of excess moisture when it accumulates water.

Hydrology and hydrography.

Although the water table is at an appropriate depth (about 10 m), the precipitation and drought cause it to fluctuate. The important rivers for this area are Ialomiţa and Dâmboviţa.

Soils

The pedological study carried out by the specialists of the National Institute of Pedology and Agrochemistry in Bucharest presented and delimited a relatively large number of genetic soil types (5) for only 36 ha, within them, being delimited many genetic subtypes, soils formed under the influence environmental and geomorfological conditions. Among these types of soil, the largest share is held by the brown-luvic soil (luvisol albic), located in the Piedmont Plain of Târgoviște, this being the oldest relief unit and in which the pedogenetic process is in the most advanced stage of evolution.

This type of soil was formed on clay deposits, in the conditions of a forest climate and a high volume of precipitations that accelerated the podzolization process with the highlighting of clearly expressed horizons, with a short eluvial horizon, also well expressed, a transition E / B and a Bt clay flood horizon. In the conditions of the existence of the parental clay material, the flooding of the clay in the Bt horizon makes the internal drainage to be weak, the water from the precipitations stagnates for a longer period of time at the surface; In this way the phenomenon of pseudogleization appears and an aerohydric regime unfavorable to plant growth is found. Within the terrace relief, there are some microdepression areas in which the phreatic contribution of surface and depth is highlighted, by the appearance of the phenomenon of glazing on the soil profile; In contrast, in higher areas, with the appearance of flattened ridges, the glaze is weaker.

Climate:

The climate of Târgovişte Municipality is specified by the geographical and relief location. The 45° parallel that passes north of the territory of the municipality and that favors not only half of the distance between the pole and the equator, but also between the peaks of the Southern Carpathians and the Romanian Plain shows the temperate-continental climate of the city.

The annual thermal amplitude specific to this latitude is reduced by the location of the city in the intracoline area: Măgura Bucşanilor stops the frosts and strong winds in winter, and the hills and the Ialomiţa Valley temper the summer heat.

Târgovişte has the advantage of a pleasant climate, one of the best in the country. The climate of Târgovişte Municipality is achieved by an average annual temperature of 9.9°C and a thermal amplitude of 22°C (the average temperature of January being -1.2°C, and of July of + 20.8°C). The absolute maximum temperature recorded in Târgovişte was + 40.4°C in 1946, followed by 39.1°C in 2000. The absolute minimum was recorded on January 13, 2004 and was -25.8°C.

The annual value of the radiative balance (annual intensity of solar heat) is 50 kcal / cm² - heat that can help the very good development of the vegetation. The wind regime is characterized by the predominance of northwest, northeast and west winds both in the cold periods of the year, but also in the warm ones. The average annual wind speeds, depending on the direction, vary between 2.1 and 3.2 m / s (from the NE and N direction, respectively), and the average monthly speeds between 0.9 m / s (from SE in January) and 4,2m / s (from NE to March).

The frequency of calm periods is higher in the cold period, over 40% between October and February (December and January over 45%). A large number of clear days are registered in July-October, the average for this interval being 7.9 clear days / month (25.5%). The annual average is expected to be 63.4 clear days / year.
The atmospheric precipitations reach in the area of the Municipality values between 450-780 mm annually, but extreme values of 368 mm (1992) or 1015 mm (1979) were also registered. The average annual amount, of 627 mm, expects that the area has good conditions for plant development, especially since the monthly values are recorded in June (monthly average 101 mm) and July (monthly average 84 mm).

Relief:

The territory of Ulmi commune is located, from a physical-geographical point of view, within the Piedmont Plain of Târgoviște. It shows a general inclination on the NW-SE direction preserved by the nearby Ialomiţa River.
The altitude is 242 m, which attests to the Piedmontese character of this plain. In fact, this large relief unit, which is the Piedmont Plain of Târgoviște, has a generally flat surface, sprinkled with numerous crows of different sizes, in which, during periods of excess moisture, water accumulates.

Vegetation:

The territory of Ulmi Commune is intended for agricultural crops, respectively cereals, technical plants, fodder crops and pastures, but in the not too distant past it was occupied with forests, similar to the nearby Iuda forest.
In these forests there are very common woody species such as pedunculate oak (*Quercus robur*), sky (*Quercus ceris*) and garnet (*Quercus fracineta*), and the grassy vegetation consists of associations of fescue (*Poa pratentis, Festuca solcata*), small clover (*Medicago lupulina*), ghizdei (*Lotus corniculatus*) etc. Currently, weeds are found on arable land such as: *Cirsium arvense*, creeper (*Agropirum repens*), plantain (*Plantago lanceolata*), newt (*Amaranthus retroflesus*), blackberry (*Setaria sp.*), hibiscus (*Hibiscus susculus*), *Sanchuss sp., Convolvulis arvensis*, poppy (*Papaver roies*), rapeseed (*Brassica olereceae*), knotweed (*Poligonum aviculare*) etc.

Material and methods

The purpose of this paper is: to determine some parameters that influence the quality of salad production. Eight lettuce varieties grown in solarium were monitored at the Ulmi Variety Testing Center.
The parameters followed in the study were:

- plant diameter (cm);
- plant weight (g);
- leaf thickness (mm);
- embossing size (cm);
- height of flowering plants (cm);
- soluble dry matter.

Variety description:

1. **Helmut variety**: it is a salad variety for spring, autumn and winter crops. It has medium-sized heads, the leaves are smooth with a light green color (figure 1). It is recommended for crops in the open field or with protected areas. The emission of flower stalks is very late. The roots are globose, dark red.

Species: head lettuce
Vegetation period: 60 days
Sown in the field: March, August-September
Harvest: March-June
Planting distance is: 40 cm between rows and 25-30 cm between plants.

Average density: 12-14 pl / sqm (30-35x40 cm).

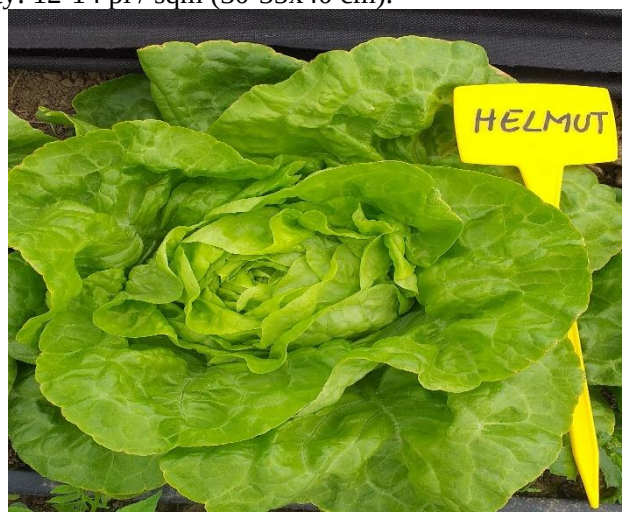

Figure 1 - Helmut variety (own photo)

2. **Attraction variety**:
Scientific name: *Lactuca sativa*
Popular name: head salad
The Attraktion variety is preferred by those who want an early crop (figure 2). Sowing is done in March because this variety can withstand low temperatures.
The germination temperature varies between 10-15 ^{0}C. The leaves are smooth and light green, and the weight of the head reaches 200-350 grams. It is useful for keeping a distance of 20 cm between rows. An advantage is that they can be grown all year round, they taste great. Productivity is high and risks are low due to the ability to adapt to the environment. It can be sown on any type of soil, taking care to keep it in optimal irrigation conditions.
The vegetation period is 45-55 days.
It is recommended for field and protected cultivation.
Cultivation mode: direct sowing
Sowing depth: 1-1.5 cm.
Attraktion lettuce seeds can be purchased in 3 and 50 g sachets.

Figure 2- Attraction variety (own photo)

3. **Lollo-Bionda variety:** it is an early variety of lettuce with curly leaves (type "LOLLO"). It is a salad that can be grown all year round, except in the very cold season, both in protected areas and in the field.

It is recommended for cultivation in the open field, it is easily recognizable by its curly leaves and have a light green color, they are good in taste; or they can be dark red-Lollo Rosa.
The appearance of the salad makes it to be sought after (figure 3), even if the taste may not be to everyone's liking, being slightly bitter. It is used more for decorative purposes.
It weighs between 150-300 g. It is consumed fresh.
Density: 110,000 plants / ha (30x30 cm).
The distance between plants is 40 cm between rows and 25-30 cm between plants, to allow the head to grow harmoniously.
It is sown in March; August-September and is harvested more in March-June.

Figure3- Lollo Bionda variety (own photo)

4. **Cosiri variety**: was created by BRN Saaten Quedlinburg, Germany.
Morphological characters:
The seed is white and the seedling has no anthocyanin coloration. The plant has a large diameter and the head is closed.
The shape of the head of the salad, in longitudinal section, is circular, the shape of the leaf is trans versely narrow elliptical (figure 4). The outer leaves have a yellowish tint, with medium intensity. The embossing is reduced, the degree of corrugation of the edge is missing or very weak.
Physiological features:
The maturity of the harvest period is medium. The vault, in the state of long day, is late.
Destination:
Lettuce heads are to be consumed fresh.

Figure 4. Cosiri variety (own photo).
5. **Incida variety:** was created by BRN Saaten Quedlinburg, Germany.
Morphological characters:

The seed is white and the seedling has no anthocyanin coloration. The plant has a large diameter and no head. The leaf has a medium thickness, and the bearing of the leaf at the harvest maturity of the salad is semi-straight.
The leaf has an obovate shape and the tip of the leaf is obtuse. The outside of the leaf does not have a yellowish tint, and the intensity of the green color is dark (figure 5). The embossing is reduced and the degree of corrugation of the edge is vigorous.
Physiological features:
harvest maturity period is medium. Vaulting, in long day conditions, is late.
Destination:
Lettuce heads are eaten fresh.

Figure 5. Incida variety (own photo)

6. **Doinița variety:**
Scientific name: *Lactuca sativa L*
Popular name: Head lettuce
Description: spring-autumn variety
Head weight: 200-250 g
Head color: raw green (figure 6).
Cultivation method: direct sowing
Culture type: field, protected

Figure 6. Doinița variety (own photo).

7. **Frauke variety:**
It is a light green salad variety (figure 7), very large, about 500 grams at Satimex.

It is very resistant to Bremia (lettuce hand) and tolerant to LMV (Salad Mosaic Virus). It is a good variety for marketing, but also for fresh consumption.

Figure 7. Frauke variety (own photo).

8. **Odagiu variety:**
Vegetation period: 67-70 days.
It is a salad of the type created with a medium-sized head and has a height of 15-20 cm.
The leaves are dark red (figure 8).
Recommended for spring and autumn crops.

Figure 8. Odagiu variety (own photo).

Results and discussion

At the Variety Testing Center in Ulmi Commune, we analyzed eight lettuce varieties from sowing to harvest (table 1) For each variety, 20 plants were analyzed.

Table 1- Framework data from sowing to harvesting

Variety	Date of sowing	Date of sprouting	Date of planting	Date of harvest	Variety type
Odagiu	09.03.2020	16.03.2020	07.04.2020	21.05.2020	Late
Helmut	09.03.2020	16.03.2020	07.04.2020	01.05.2020	Early
Frauke	09.03.2020	16.03.2020	07.04.2020	16.05.2020	mid-early
Attraction	09.03.2020	18.03.2020	07.04.2020	16.05.2020	mid-early
Doinița	09.03.2020	16.03.2020	07.04.2020	03.05.2020	Early
Cosiri	09.03.2020	16.03.2020	07.04.2020	14.05.2020	mid-early
Incida	09.03.2020	16.03.2020	07.04.2020	16.05.2020	mid-early
Lollo Bionda	09.03.2020	19.03.2020	07.04.2020	04.05.2020	Early

Plant: diameter (cm)

The lettuce leaves are colored in a green, red spectrum and reach a height of 6 to 12 cm. The color and height of the leaves distinguish the existing salad varieties (Figure 9).

Lettuce varieties are present in a different range of shapes and textures, with assortments such as iceberg lettuce, notched, lacy or scattered. All varieties have a root system that includes a main root and smaller secondary roots.

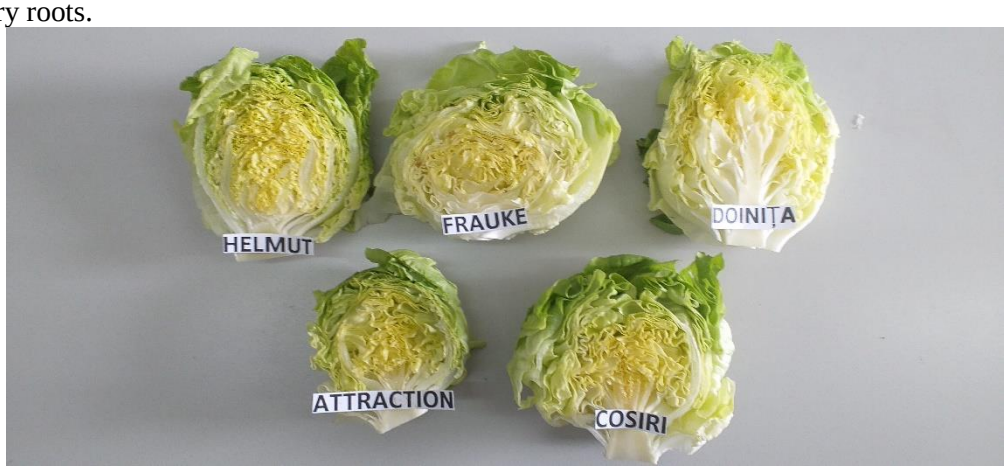

Figure 9. Section - shape of lettuce varieties (own photo).

These varieties of lettuce are annual, herbaceous plants with vitamin-rich leaves, with a thin, fleshy pivoting root. It belongs to the *Compositae* family.

At the beginning, the plant grows in the form of a rosette, reaching different sizes in diameter for each variety (table 2), and in some varieties the dimensions may be larger.

Regarding the diameter of the head, we measured 20 plants for each variety.

Following the centralization of the data, it is observed that the diameter by varieties varied as follows:

- for the Odagiu variety: between 23 cm and 28.5 cm;
- for the Helmut variety: between 29.5 cm and 33.5 cm;
- for the Frauke variety: between 27 cm and 35 cm;
- for the Attraction variety: between 26.5 and 31.5 cm;
- for the Doinita variety: between 24 cm and 29.5 cm;
- for the Cosiri variety: between 26 cm and 34.5 cm;
- for the Incida variety: between 29.5 cm and 36.5 cm;
- for the Lollo Bionda variety: between 27 cm and 33 cm.

Regarding the average diameter per variety, we notice that the minimum diameter is 25.8 cm (Odagiu), and the maximum diameter for the Incida variety (32.9 cm).

Table2- Diameter of lettuce plants.

Plant Nr.	Odagiu	Helmut	Frauke	Attraction	Doinița	Cosiri	Incida	Lollo Bionda
1	28,5	29,5	28,0	29,5	25,0	30,0	30,5	28,5
2	26,0	30,0	**35,0**	29,0	27,0	28,0	32,0	29,0
3	24,0	29,5	31,5	27,5	25,5	27,0	32,5	27,5
4	**23,0**	31,5	28,0	27,5	27,5	29,5	33,5	27,0
5	27,0	32,0	29,5	28,0	26,0	28,0	33,0	**33,0**
6	25,5	31,0	31,5	27,5	25,0	**26,0**	32,5	30,0
7	27,0	32,5	29,5	**31,5**	27,5	28,0	34,5	30,0
8	27,0	33,0	28,5	27,5	26,0	30,0	34,0	28,5
9	25,0	31,5	29,5	**26,5**	**29,5**	32,0	31,5	**27,0**
10	24,0	**33,5**	31,0	30,5	26,5	30,0	34,5	33,0
11	23,5	33,5	29,0	26,5	**24,0**	30,5	34,5	30,5
12	25,5	29,5	29,5	28,0	25,0	32,0	31,5	27,5
13	23,0	30,5	30,5	28,5	27,5	30,5	32,5	29,0
14	**28,5**	**29,5**	30,0	28,5	28,5	**34,5**	37,5	27,0
15	28,0	29,5	31,0	29,0	23,5	32,5	31,5	30,5
16	24,0	31,0	30,5	29,0	25,5	33,5	31,0	28,0
17	27,5	33,5	**27,0**	28,5	26,0	33,5	**29,5**	33,0
18	27,5	30,5	27,5	30,5	28,0	34,0	33,5	27,5
19	25,5	32,0	30,5	29,5	28,5	31,5	**36,5**	27,5
20	26,0	31,5	29,0	26,5	25,5	29,0	31,5	28,0
Average	**25,8**	31,25	29,8	28,4	26,37	30	**32,9**	29,1

Plant: weight (g)

For early varieties (Doinița and Helmut) that offer harvests 45-60 days after sowing: it has less dense heads, with a large diameter, weighing 150-300 g. The weight varies depending on the plant.

For the semi-early varieties (Frauke, Attraction, Cosiri and Incida) it has thicker leaves, a large green-yellow head and is more resistant to cold (figures 10, 11). They express various weights, but are slightly smaller than the early varieties. The weight differs depending on the plant (Table 3.).

Figure 10 and 11. Weight of salads (own photo).

For the late variety (Odagiu), it does not form a head, but they have an obovate shape, the intensity of the color of the outer leaves is dark, weighing 119-269 g.

Table 3- Plant weight.

Plant Nr.	Odagiu	Helmut	Frauke	Attraction	Doinița	Cosiri	Incida	Lollo Bionda
1	199,0	**406,0**	345,0	306,0	**258,0**	373,0	279,0	195,0
2	231,0	354,0	373,0	288,0	291,0	379,0	296,0	223,0
3	**119,0**	391,0	357,0	**386,0**	303,0	351,0	292,0	206,0
4	147,0	338,0	375,0	334,0	**325,0**	352,0	303,0	224,0
5	143,0	322,0	400,0	372,0	258,0	404,0	274,0	248,0
6	208,0	329,0	403,0	279,0	314,0	**334,0**	263,0	251,0
7	217,0	380,0	**418,0**	315,0	316,0	407,0	264,0	**265,0**
8	197,0	325,0	368,0	243,0	268,0	349,0	258,0	215,0
9	178,0	304,0	340,0	**230,0**	305,0	386,0	245,0	186,0
10	213,0	359,0	**338,0**	379,0	278,0	356,0	282,0	184,0
11	189,0	336,0	362,0	316,0	293,0	399,0	256,0	207,0
12	191,0	317,0	327,0	292,0	305,0	408,0	271,0	172,0
13	219,0	**302,0**	346,0	319,0	254,0	383,0	274,0	190,0
14	**269,0**	298,0	366,0	302,0	302,0	355,0	294,0	210,0
15	254,0	363,0	357,0	362,0	284,0	396,0	295,0	200,0
16	251,0	355,0	392,0	288,0	299,0	373,0	274,0	135,0
17	226,0	322,0	399,0	277,0	271,0	351,0	298,0	**138,0**
18	208,0	318,0	368,0	261,0	288,0	**439,0**	**307,0**	210,0
19	224,0	309,0	380,0	339,0	260,0	389,0	**221,0**	213,0
20	196,0	369,0	358,0	326,0	270,0	351,0	277,0	209,0
Average	**203,95**	339,85	368,6	310,7	287,1	**376,75**	276,15	204,55

Regarding the weight of the varieties, we measured 20 plants for each variety.
Following the centralization of the data, it is observed that the weight of the varieties varied as follows:
● for the Odagiu variety: between 119 g and 269 g;

● for the Helmut variety: between 302 g and 406 g;
● for the Frauke variety: between 338 g and 418 g;
● for the Attraction variety: between 230 g and 386 g;
● for the Doinița variety: between 258 g and 325 g;
● for the Cosiri variety: between 334 g and 439 g;
● for the Incida variety: between 221 g and 307 g;
● for the Lollo Bionda variety: 138 g and 265 g.

Regarding the average weight of the varieties, we notice that the minimum weight is 203.95 g (Odagiu), and the maximum weight for the Cosiri variety (376.75 g).

Leaf: thickness (mm)

For early varieties, the leaves have a semi-erect port (at stage 10-12). The leaves have a rounded tip, specific to each variety.

The tongue of the leaf has a different degree of edge curl: in Odagiu, Incida and Lollo-bionda the degree of edge curl is strong; at Attraction and Frauke the degree of corrugation of the edge is weak (figure 12); and in Helmut and Doinița the degree of undulation is medium. The leaves have different sizes depending on the variety (Table 4.).

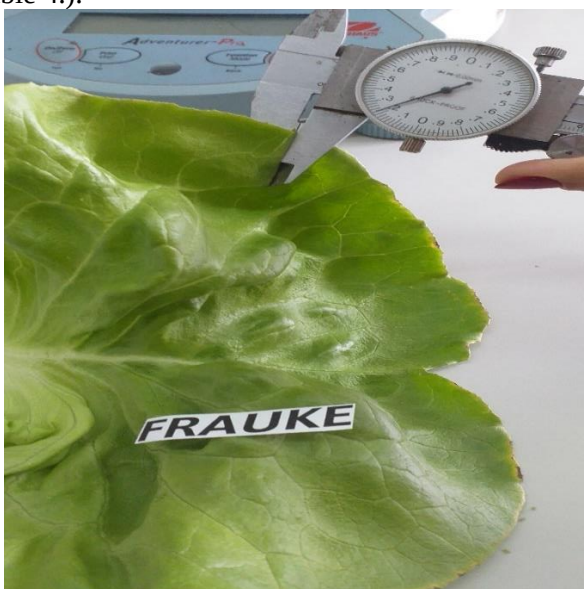

Figure 12. Leaf thickness (own photo).

Regarding the thickness of the leaf of the varieties, we measured 20 plants for each variety.

Following the centralization of the data, it is observed that the leaf thickness varied as follows:

● for the Odagiu variety: between 0.04 mm and 0.06 mm;
● for the Helmut variety: between 0.03 mm and 0.05 mm;
● for the Frauke variety: between 0.03 mm and 0.06 mm;
● for the Attraction variety: between 0.03 mm and 0.06 mm;
● for the Doinita variety: between 0.02 mm and 0.05 mm;
● for the Cosiri variety: between 0.03 mm and 0.06 mm;
●for the Incida variety: between 0.03 mm and 0.05 mm;
●for the Lollo Bionda variety: 0.03 mm and 0.04 mm.

Regarding the average thickness of the varieties, we notice that the minimum thickness is 0.034 mm (Lollo Bionda), and the maximum thickness is 0.045 mm for the varieties (Odagiu and Cosiri).

Table 4- Leaf thickness.

Plant Nr.	Odagiu	Helmut	Frauke	Attraction	Doinița	Cosiri	Incida	Lollo Bionda
1	0,04	0,05	0,05	0,04	0,04	0,04	0,04	0,03
2	0,05	0,04	0,05	0,05	**0,02**	0,06	0,03	0,03
3	0,04	0,05	**0,06**	0,04	0,04	0,04	**0,03**	0,03
4	0,04	0,05	0,05	**0,06**	0,04	0,05	0,04	0,03
5	0,05	**0,03**	0,04	0,05	0,03	0,04	0,04	0,03
6	0,04	0,04	0,05	0,05	0,03	0,03	0,03	**0,03**
7	**0,04**	0,05	**0,03**	0,04	0,02	0,04	0,03	0,03
8	0,04	0,03	0,04	0,04	0,04	0,06	0,03	0,04
9	0,06	0,03	0,04	0,04	0,05	0,05	0,04	0,04
10	0,04	0,04	0,05	**0,03**	**0,05**	0,05	**0,05**	0,03
11	0,04	0,04	0,05	0,04	0,03	0,06	0,03	0,03
12	0,05	0,05	0,04	0,05	0,04	0,05	0,04	0,04
13	0,06	0,03	0,04	0,04	0,04	**0,03**	0,04	0,04
14	0,04	**0,05**	0,04	0,04	0,03	0,04	0,03	0,04
15	0,04	0,04	0,05	0,04	0,03	0,04	0,04	0,03
16	**0,06**	0,04	0,04	0,03	0,05	**0,06**	0,04	0,04
17	0,04	0,04	0,04	0,04	0,02	0,05	0,04	0,03
18	0,04	0,04	0,03	0,04	0,04	0,04	0,04	**0,04**
19	0,05	0,03	0,05	0,04	0,04	0,05	0,03	0,04
20	0,05	0,04	0,05	0,04	0,03	0,03	0,04	0,04
Average	**0,045**	0,040	0,044	0,042	0,035	**0,045**	0,036	**0,034**

Leaf: embossing size (cm)

Leaf embossing is different depending on the variety: Odagiu-weak; Helmut, Doinița and Lollo-Bionda leaf embossing is strong (figure 13); Frauke and Cosiri- the leaf embossing is medium (table 5), and at Incida the embossing size is absent or very weak (figure 13).

Figure 13. Leaf embossing (own photo).

Table 5- Leaf embossing.

Plant Nr.	Odagiu	Helmut	Frauke	Attraction	Doinița	Cosiri	Incida	Lollo Bionda
1	0,4	1,8	0,9	**0,8**	**0,69**	0,8	0,3	0,3
2	**0,3**	1,9	**1,2**	0,9	1,1	0,9	0,4	0,2
3	0,6	1,2	0,9	0,9	0,8	1,3	0,3	0,2
4	0,6	1,2	1,1	1,1	0,7	**0,7**	**0,5**	0,3
5	0,6	1,1	0,8	0,9	0,9	0,9	0,5	0,2
6	0,3	1,6	0,6	0,8	1,1	0,9	0,3	0,3
7	0,5	1,6	0,9	**1,6**	0,9	1,2	**0,2**	0,3
8	0,6	**1,9**	0,8	1,2	0,8	0,9	0,2	0,2
9	0,6	1,9	0,8	0,9	1,2	0,8	0,3	0,2
10	0,5	1,4	0,9	1,1	1,1	1,2	0,3	0,2
11	0,6	1,3	0,7	0,9	1,2	0,8	0,3	**0,2**
12	0,6	1,8	1,1	0,9	1,1	1,1	0,3	0,2
13	0,4	0,9	0,9	0,8	0,9	**1,3**	0,3	0,3
14	0,6	1,2	0,8	0,9	0,8	1,1	0,2	0,2
15	0,4	1,2	**0,6**	0,8	0,9	0,9	0,3	0,3
16	**0,6**	1,1	0,6	0,9	**1,2**	1,2	0,3	**0,3**
17	0,4	0,9	0,8	0,9	0,9	0,9	0,3	0,2
18	0,4	1,8	0,7	0,9	0,8	1,2	0,2	0,2
19	0,4	**0,8**	0,9	1,1	0,9	1,3	0,2	0,2
20	0,4	1,1	1,1	0,8	1,1	0,8	0,2	0,3
Average	0,5	**1,3**	0,8	0,9	0,9	1	**0,2**	**0,2**

Regarding the embossing of the leaf of the varieties, we measured 20 plants for each variety.

Following the centralization of the data, it is observed that the leaf embossing varied as follows:

- for the Odagiu variety: between 0.3 cm and 0.6 cm;
- for the Helmut variety: between 0.8 cm and 1.9 cm;
- for the Frauke variety: between 0.6 cm and 1.2 cm;
- for the Attraction variety: between 0.8 cm and 1.6 cm;
- for the Doinita variety: between 0.69 cm and 1.2 cm;
- for the Cosiri variety: between 0.7 cm and 1.3 cm;
- for the Incida variety: between 0.2 cm and 0.5 cm;
- for the Lollo Bionda variety: 0.2 cm and 0.3 cm.

Regarding the average leaf embossing for varieties, we notice that the minimum leaf embossing is 0.2 cm (Incida and Lollo Bionda), and the maximum leaf embossing is 1.3 cm for the variety (Helmut).

Plant: height (flowering plant) (cm)

The salad is harvested before the plant matures completely. If the plant blooms (figure 14, 15), the taste of the leaves becomes bitter and can no longer be consumed at all.

The lettuce flower matures very quickly at warm temperatures (Table 6), and if the temperatures reach the freezing point, the plant grows slowly and damage can occur to the outer leaves.

Figure 14 and 15. Doinița and Incida variety flower (own photo).

Table 6- Height of flowering plants

Plant Nr.	Odagiu	Helmut	Frauke	Attraction	Doinița	Cosiri	Incida	Lollo Bionda
1	101,0	79,0	91,0	**84,0**	80,0	96,0	102,0	103,0
2	**100,0**	71,0	81,0	91,0	85,0	**84,0**	99,0	104,0
3	119,0	**69,0**	83,0	97,0	78,0	88,0	97,0	110,0
4	112,0	79,0	84,0	85,0	83,0	95,0	**91,0**	105,0
5	113,0	81,0	85,0	**99,0**	**73,0**	95,0	99,0	**114,0**
6	108,0	**87,0**	79,0	93,0	85,0	96,0	100,0	111,0
7	102,0	82,0	80,0	89,0	89,0	96,0	103,0	102,0
8	101,0	81,0	78,0	95,0	80,0	94,0	103,0	103,0
9	120,0	83,0	**76,0**	96,0	86,0	**98,0**	96,0	109,0
10	113,0	84,0	85,0	97,0	79,0	97,0	95,0	104,0
11	114,0	82,0	85,0	91,0	81,0	89,0	97,0	103,0
12	109,0	85,0	78,0	89,0	87,0	93,0	105,0	110,0
13	103,0	86,0	85,0	87,0	83,0	88,0	**108,0**	101,0
14	102,0	79,0	81,0	89,0	79,0	97,0	107,0	102,0
15	**121,0**	81,0	80,0	91,0	85,0	96,0	101,0	108,0
16	114,0	80,0	95,0	96,0	**92,0**	89,0	103,0	103,0
17	115,0	83,0	89,0	92,0	87,0	91,0	103,0	102,0
18	110,0	86,0	87,0	86,0	81,0	91,0	97,0	109,0
19	104,0	82,0	**98,0**	97,0	83,0	93,0	105,0	**100,0**
20	103,0	78,0	91,0	92,0	88,0	95,0	106,0	101,0
Average	**109,2**	**80,9**	84,5	91,8	83,2	93	100,8	105,2

In terms of plant height, we measured 20 plants for each variety.
Following the centralization of the data, it is observed that the height of the plants varied as follows:

- for the Odagiu variety: between 100 cm and 121 cm;

- for the Helmut variety: between 69 cm and 87 cm;
- for the Frauke variety: between 76 cm and 98 cm;
- for the Attraction variety: between 84 cm and 99 cm;
- for the Doinita variety: between 73 cm and 92 cm;
- for the Cosiri variety: between 84 cm and 98 cm;
- for the Incida variety: between 91 cm and 108 cm;
- for the Lollo Bionda variety: 100 cm and 114 cm.

Regarding the average height for the eight varieties, we notice that the minimum height is 80.9 (Helmut), and the maximum height for the Odagiu variety (109.2 cm).

Dry matter (D.M.)

The dry matter has different values depending on the salad variety (Table 7).
The following table shows some values that show how much dry matter is in each plant:

Table 7- Soluble dry matter.

Plant Nr.	Odagiu	Helmut	Frauke	Attraction	Doinița	Cosiri	Incida	Lollo Bionda
1	4,3	5,6	4,4	4,0	2,5	4,0	4,3	3,6
2	4,3	5,4	3,8	4,3	2,4	4,4	4,5	3,3
3	4,5	5,8	3,7	4,2	2,9	4,5	4,3	3,8
4	4,5	5,5	4,3	4,5	3,0	3,6	4,7	3,1
5	4,5	5,2	4,0	4,5	2,9	4,8	4,0	2,9
6	4,1	5,5	4,0	3,8	2,7	4,0	4,5	3,2
7	4,7	5,7	4,0	4,1	3,0	4,7	4,3	2,9
8	4,4	5,7	3,8	4,3	2,7	4,1	4,8	3,3
9	4,7	5,5	3,9	4,4	2,2	4,4	4,1	3,1
10	4,2	5,7	4,2	4,0	2,7	4,8	4,6	3,0
11	4,0	5,8	4,0	4,3	2,5	4,3	4,8	3,6
12	4,4	5,3	3,6	4,0	2,7	4,0	4,5	3,2
13	4,1	5,4	3,5	4,0	2,7	3,9	4,6	3,2
14	3,8	5,0	3,8	4,5	2,9	4,2	4,4	3,2
15	4,4	5,0	4,0	3,6	2,7	3,8	4,5	3,5
16	3,7	5,6	4,2	3,9	3,0	3,7	4,8	3,5
17	3,8	5,4	4,0	4,4	2,7	4,5	4,5	3,2
18	4,0	5,6	3,9	4,3	3,0	4,0	4,3	3,4
19	3,7	5,8	3,7	3,8	2,7	3,6	4,0	3,6
20	3,7	5,8	4,0	3,8	2,1	4,1	4,7	3,9
Average	4,19	5,51	3,94	4,13	2,7	4,17	4,46	3,32

Regarding the soluble dry matter, we took samples from 20 plants of each variety.
Following the centralization of the data, it is observed that the soluble dry matter varied as follows:

- for the Odagiu variety: between 3.7 and 4.7;
- for the Helmut variety: between 5 and 5.8;
- for the Frauke variety: between 3.5 and 4.4;
- for the Attraction variety: between 3.6 and 4.5;
- for the Doinita variety: between 2.1 and 3;
- for the Cosiri variety: between 3.6 and 4.8;
- for the Incida variety: between 4 and 4.8;
- for the Lollo Bionda variety: 2.9 and 3.9.

Regarding the average dry matter soluble in the eight varieties, we note that the minimum dry matter is 2.7 (Doinița) and the maximum dry matter in the Helmut variety (5.51).

Conclusions

Vegetables are especially important in human nutrition. Rational nutrition is unimaginable without the daily use of various varieties of vegetables. The notion of "vegetable" must be known in a broad sense. This determines the parts of the plants that are used in food.

Vegetables are important for the health of the human body:

- hydration of the body through the water content found in fresh vegetables;
- supply of amino acids for the body;
- stimulates the muscular system due to the simple hydrocarbons contained in vegetables;
- regulates metabolism through the content of vitamins;
- stimulates the activity of internal organs.

Vegetables are high in vitamins. Fruits and vegetables provide 90-95% of the intake of vitamin C, of vitamin A provide 60-80%. And 20-30% of the vitamin B complex and part of the vitamin K and E. Green vegetable plants are important for every family that has a garden. This category includes several vegetables, such as: spinach, salad, green onions, etc. Some of them are represented by the stage of short vegetation, necessary to acquire a harvest shortly after the establishment of the culture, others are perennial plants that give productions every year.

Annual green vegetables are very suitable to be sown with other vegetables, ie associated. For this reason they always take advantage of land preparation in basic crops. Perennial greens should be grown in a marginal area, so as not to create problems when preparing the soil for other crops.

From the salad category, Lettuce is the most widespread, it is cultivated for its heads and leaves, which can be eaten in salads, it is also eaten raw, especially when other vegetables on the market are missing. Lettuce is an annual plant with a main pivoting root, leaves full of fleshy and thin vitamins, but it is also a herbaceous plant. It is part of the Compositae family.

Following the completion of the research on the behavior of eight lettuce varieties grown in solarium on different vegetation cycles, the Ulmi Variety Testing Center determined some parameters that influence the quality of lettuce production from which the following measurements are derived:

- plant height;
- average weight of plants at harvest;
- leaf embossing;
- dry matter;
- leaf thickness;
- plant diameter;
- the shape of the head;
- variety color;

The diameter of the lettuce plants was between 23 cm (Odagiu) and 36.5 cm (Incida).

The heads of lettuce plants have different shapes, depending on the variety.

The average weight of lettuce plants is different: the highest weight is 439 g (Mowing), respectively the lowest 119 g (Odagiu).

The thickness of the leaves for the eight salad varieties is: between 0.06 mm maximum thickness (Odagiu, Frauke, Attraction, Cosiri) and 0.02 mm minimum thickness (Doinița).

The embossing of the leaves for lettuce varieties is between 1.9 cm (Helmut) and 0.2 cm (Incida, Lollo Bionda).

The height of flowering plants in the eight varieties is between 69 cm (Helmut) and 121 cm (Odagiu).

The dry matter soluble in lettuce varieties is between 2.1 (Doinița) and 5.8 (Helmut).

The color of salad varieties differs depending on the variety. There are 3 colors of seeds: white, yellow and black.

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