

INFLUENCE OF CULTIVAR AND PLANTING PERIOD ON SALAD CULTIVATED IN ECOLOGICAL SYSTEM

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Abstract: Garden lettuce is grown for head and leaves, which are mainly consumed as salads, simple or combined with other vegetables. It is important in nutrition due to its high content of vitamins and mineral salts. It is cultivated in the field, early spring and autumn, as well as in greenhouses and tunnels, to obtain production during the winter-spring or autumn-winter period. Being a species with a short period of vegetation is cultivated in the system of successive crops, before or after a main crop, as well as in associated crops. In temperate climate, salad culture is not practiced during the summer because in long day conditions associated with high temperatures, plants emit floral stems in most varieties. The experience was carried out in 2016, in the western part of Romania, in Husasău de Tinca village, in Bihor, where 14 salad varieties were grown in an ecological system.

Keywords: Garden lettuce, cultivar, planting period, production.

INTRODUCTION

Garden lettuce is grown for leaves and heads that are used in fresh or prepared form. It is demanded by consumers throughout the year, being cultivated both in the field and protected areas in successive or associated crops (Patron, 1992). Lettuce heads and leaves contain 4-8% SU, 2-3.5% carbohydrates, 1-1.6% protides, vitamins B1, B2, C (5-20 mg) P and E, carotene (1-3) and mineral salts: potassium-260 mg, iron 1,2-1,7 mg, calcium, phosphorus - 40 mg, magnesium - 24 mg, based on 100 g of fresh product. The leaves also contain latex, which prints the bitter taste (Gherghi et al., 2002).

It is a very digestible vegetable, low caloric share (16-20 calories/100 g), corresponding to a dietary regimen (Jolan Varga et al 2010). Salad that spends winter in the field, has a higher content in vitamins than in forced or spring crops (Apahidean and Maria Apahidean, 2004). Consumed fresh, lettuce contributes to the revitalization of muscle tissue, brain and nerves, maintains the fluidity of the blood, is a good diuretic, stimulates appetite, etc. (Rodica Soare, Adriana Duță, 2008). Salad consumption reduces the risk of heart disease, cancer, and cataracts. It is rich in plant fibers, which contribute to the reduction of cholesterol (Viorica Lagunovschi-Luchian, Vânătoru, 2016).

Lettuce with high nitrate content of over 2500 mg NO₃/kg is included in the group of vegetables with a high nitrate content (Stoleru, 2013). This level is influenced by both genetic and ecotoxic factors, so measures can be taken to obtain productions with lower nitrate and nitrite content (Rodica Soare, Adriana Duță, 2008). Lettuce is a long day plant, conditions in which it has a short period of vegetation and forms floral stems before forming the head (Jolan Varga, 2011). Sensitivity to the length of the day occurs between the end of May and the first half of June, during which the length of the day is over 14 hours (Still, 2007). Under short day conditions, it forms a rich foliar apparatus and large heads that do not pass into the floral stem phase (Ruxandra Ciofu et al., 2003, Posta, 2008). The optimal temperature for leaf growth and head formation is around 16°C, and for the formation of

floral stems and flowers, 20-22°C (Stan et al., 2003). There are 4 main types of salad: iceberg, thyme, leaves and maroula, each containing hundreds of varieties that differ from each other by the shape of the head and type and form of leaves (Draghici, 2002).

MATERIAL AND METHOD

The experience was carried out in 2016, in the western part of Romania, Husasau de Tinca village, Bihor county, where an early organic salad culture was carried out. Village is located in the Miersig Plain, which consists of higher strip plain with a slight slope and terraces located under the Hidișel hill and another lower, in the west, close to the Crisului Channel. The second strip is also called Gepiu Plain or Veljuri Plain. Northern and southern boundaries are given by Crișului Repede and Crișului Negru meadows. South-western boundaries are between Colector-Culiser and Crisul Negru channel, where a low-lying area, extending at 90-105 m, which extends to the low plain of Crișul Negru, the approximate limit passing south of the Tica- Tulca.

The biological material consisted of 14 salad varieties of several types, as follows:

- *Roman Lettuce* – represented by the following varieties: Dark Green, Blonde Maraichere, Blonde Lente a Monter;

- *Letuce type Batavia* – represented by the following varieties: Long Stading Batavian, Jester;

- *Leaf lettuce* – was represented by Lola Rosa and Lola Bionda;

- *Head forming lettuce* - Anueme, Gloire de Mantes, Merveille de 4 Saison, Grass Blonde Peresuble, Laituie Silvesta and Laituie Appia;

Dark Green - roman salad that forms a lax head of light green to dark green. Leaves are fleshy with a clear, crisp, and very savory main nervure. *Blond Maraichere* - roman salad, which forms a tall, elongated but rather large head. Outside leaves are light green. *Blonde lente a Monter* - roman salad that forms a compact head. Leaves have shape of a spatula, long petiolate pale green. It has a good headdress even in the warm summer conditions. *Long Standing Batavian* - Batavian salad with a bulky and high head. Leaves are very thick in light green color. It is one of the most resistant batavian salads in the issue of floral stems. *Jester* - is a Batavian salad with a very beautiful look. It forms a large rosette of very voluminous leaves. Leaves are large, half-embossed, toothed edges, bright green pigmented with reddish spots. leafs are crisp and tasty. *Anueme* - is a salad that has the ability to grow up in warm soil. Leaves are bright green. It is adapted to high temperatures. *Kwiek* - is a vigorous variety with green leaves with a slight reddish tinge. Forms a medium-sized head. *Gloire De Nantes* - forms a thick head with slightly light-colored leaves, light green. It resists well at high temperatures. *Merveille of 4 Seasons* - is a fast growing and vigorous variety. It forms an elongated colored ruby head to light red. It can be cultivated in all seasons, but it prefers more spring and summer. *Lollo Rossa* - is a salad with brown green leaves and the red hot tip. It's very tasty. It resists the heat. *Lollo Bionda* - forms a light curly green leaf rosette. *Grosse Blonde Paresseuse* - forms a large flattened head. Leaves are light green and the interior leaves are pale green. It resists the heat. *Laituie Sylvesta*- is a bright green rustic head salad. Leaves are crisp and very tasty. *Laituie Appia* - is a kind of salad of green head, with finely crispy, glossy, very tasty leaves. Resistant to the issue of floral stems.

Culture was established in spring in two different periods. For the first period, planting took place on March 10 and second planting period was established on March 30.

Culture was established by seedling produced in alveolar trays with 104 cells per tray. The soil mix for sowing was made of muck and fine peat (neutral pH). Planting was

done 35 days after sowing. Planting distances were 30 cm both between rows and between plants. 15 days after planting a nettle macerate treatment was performed. Harvesting took place between April and May, depending on variety.

RESULTS AND DISCUSSION

Planting seedlings at the beginning of March ensured yields ranging from 2.66 kg/m² to 3.59 kg/m² (Table 1). Average yield of the 14 salad cultivars was 3.07 kg/m². Compared with experience average Dark Green, Blonde Maraichère, Blonde Lente à Monter, Long Standing Batavian, and Jester achieved between 6.4-33.1% higher productions.

Dark Green variety recorded an average production of 3.59 kg/m², 33.1% more than experience average, with the difference in production being distinctly significant. A significant difference in production was also recorded in the Long Standing Batavian variety (Table 1). For seedlings planted at the end of March, production ranged from 2.23 kg/m² to 3.12 kg/m² (Table 2). The average production achieved by the 14 cultivars was 2.72 kg/m², which was exceeded by some varieties by 4.78% up to 14.7%. Highest yield of 3.12 kg/m² was obtained at Dark Green variety, 14.7% more than experience average, with the difference in production being distinctly significant. A significant difference in production was recorded also at Blonde Lente à Monter variety.

Analyzing the production obtained by 14 lettuce cultivars in spring culture, set up in two different planting periods, it can be noticed that in the 2nd planting period, yields were smaller by 0.10 kg/m² to 0.47 kg/m² (Table 3). Yields achieved during the 2nd planting period represented 83.74% to 93.69% of the production recorded in the 1st planting period. The varieties Merveille des 4 Saisons and Gloire de Nantes recorded the smallest production differences between the two planting periods (0.10-0.16 kg/m²).

Table 1
Influence of cultivar on lettuce production, planted in the field, in the spring at the first planting period

No.	Variant	Average production		Difference to culture average (kg/m ²)	Significance of the difference
		kg/m ²	%		
1	Dark Green	3.59	133.1	0.52	**
2	Blonde Maraichère	3.23	110.2	0.16	-
3	Blonde Lente à Monter	3.17	106.4	0.10	-
4	Long Standing Batavian	3.40	121.0	0.33	*
5	Jester	3.26	112.1	0.19	-
6	Anuene	2.93	91.1	-0.14	-
7	Kwiek	2.66	73.9	-0.41	0
8	Lollo Rossa	2.93	91.1	-0.14	-
9	Lollo Bionda	2.85	85.9	-0.22	-
10	Gloire de Nantes	3.02	96.8	-0.05	-
11	Merveille des 4 Saisons	2.87	87.3	-0.20	-
12	Grosse Blonde Paresseuse	2.96	92.9	-0.11	-
13	Laitue Silvesta	3.07	100.0	-	-
14	Laitue Pomme Appia	3.09	101.3	0.02	-
	Media	3.07	100.0	-	-
DL P5%	0.28; DL P1%	0.50; DL P 0.1%	0.92		

Table 2

Influence of cultivar on lettuce production, planted in the field, in the spring at the second planting period

No	Variant	Average production		Difference to culture average (kg/m ²)	Significance of the difference
		kg/m ²	%		
1	Dark Green	3.12	114.70	0.40	**
2	Blonde Maraichère	2.91	106.98	0.19	-
3	Blonde Lente à Monter	2.97	109.19	0.25	*
4	Long Standing Batavian	2.85	104.78	0.13	-
5	Jester	2.73	100.36	0.01	-
6	Anuenue	2.71	99.63	-0.01	-
7	Kwiek	2.23	81.98	-0.49	00
8	Lollo Rossa	2.58	94.85	-0.14	-
9	Lollo Bionda	2.45	90.07	-0.27	0
10	Gloire de Nantes	2.86	105.14	0.14	-
11	Merveille des 4 Saisons	2.77	101.83	0.05	-
12	Grosse Blonde Paresseuse	2.58	94.85	-0.14	-
13	Laitue Silvesta	2.65	97.42	-0.07	-
14	Laitue Pomme Appia	2.73	100.36	0.01	-
	Media (Mt.)	2.72	100.0	-	-
DL P5%	0.22; DL P1%	0.39; DL P 0.1%	0.65		

Table 3

Cultivar influence on lettuce production, cultivated in the field in different epochs

No	Variant	Average production		Difference to culture average (kg/m ²)	Significance of the difference
		Planting period I	Planting period II		
1	Dark Green	3.59	3.12	0.47	86.91
2	Blonde Maraichère	3.23	2.91	0.32	90.09
3	Blonde Lente à Monter	3.17	2.97	0.20	93.69
4	Long Standing Batavian	3.40	2.85	0.55	83.82
5	Jester	3.26	2.73	0.53	83.74
6	Anuenue	2.93	2.71	0.22	92.49
7	Kwiek	2.66	2.23	0.43	83.83
8	Lollo Rossa	2.93	2.58	0.35	88.05
9	Lollo Bionda	2.85	2.45	0.40	85.96
10	Gloire de Nantes	3.02	2.86	0.16	94.70
11	Merveille des 4 Saisons	2.87	2.77	0.10	96.51
12	Grosse Blonde Paresseuse	2.96	2.58	0.38	87.16
13	Laitue Silvesta	3.07	2.65	0.42	86.31
14	Laitue Pomme Appia	3.09	2.73	0.36	88.34

CONCLUSIONS

Based on the results obtained from the lettuce field growing research, under the specific conditions in the western part of Romania, using 14 cultivars planted in two spring planting periods, the following conclusions were drawn:

- Planting seedlings at the beginning of March ensured yields ranging from 2.66 kg/m² to 3.59 kg/m²;
- For seedlings planting at the end of March, production ranged from 2.23 kg/m² to 3.12 kg / m²;
- In both planting periods the maximum yield was obtained by growing Dark Green variety (3.12 kg/m² in the first planting period and 3.12 kg/m² respectively in the second planting period);
- Varieties Merveille des 4 Saisons and Gloire de Nantes recorded the smallest production differences between the two cropping periods (0,10-0,16 kg / m²).

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