UDC 635.343:517.951

THE VARIABILITY OF MORPHOLOGICAL FEATURES IN SAVOY CABBAGE

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The results of the researches of morphological features variability in Savoy cabbage for the varieties and the hybrids which are prospective for growing in the Forest-Steppe of Ukraine, increasing the producing and the assortment of the vegetable crops and their conditioning are presented.

Keywords: *Savoy cabbage, variety, hybrid, morphological features, coefficient of variation, plant height, diameter of the crown, number of leaves.*

Vegetables play an important role in human food. They contain carbohydrates, proteins, fats, mineral substances, vitamins that are easily assimilated. According to the scientifically supported norms each person has to eat vegetables more than 400 grams per day[2]. They are the most useful when they are fresh. Among vegetables cabbage takes one of the leading places from the point of the structure of growing and consuming. In Ukraine it takes more than 20%. [1]

The homeland of all sorts of cabbage with the exception of cauliflower and Chinese cabbage is the European coast of the Mediterranean Sea. Among the variety of cabbages Savoy cabbage which is less popular deserves special attention. Savoy cabbage is spread in the countries of Western Europe. In Russia and Ukraine it has been grown since the 18^{th} century. [6]

Savoy cabbage in European cuisine is considered to be the best for cooking patties and holubtsi, tasty vegetarian soups. Summer salads must always contain it. [3]

Savoy cabbage is a valuable dieted product, which is easily assimilated. Thanks to the high content of dry substance (up to 10%) it is necessary especially for children and middle aged people.

By its nourishing features Savoy cabbage gives way only to Brussels sprouts and broccoli. Savoy cabbage is a valuable food product. It is characterized by high taste qualities. The value of it is in good combination of main irreplaceable nutritious substances such as nitrous substances and carbohydrates, mineral salts and vitamins. It contains 7,5-12,6% of dry substance, 3,6-4,5% of proteins, 3,0-5,6% of sugar, 31-88% of vitamin C (ascorbic acid) [5].

Many works are devoted to the studies of the variability of features of white cabbage. However, the variety of the variability of features of Savoy cabbage is not clear yet.

So the aim of these researches was to study the variability of morphological features and the level of their varying in the varieties and hybrids. It will give the

possibility to increase the equating and stability of assortment and hybrids of different groups of ripeness which will provide the synchronous ripening of heads and use of mechanized harvesting.

Research methods. Taking into consideration the fact that the morphological features and the level of their variability in Savoy cabbage was not fully studied, this problem was studied by the members of Vegetable Growing Department of National University of Life and Environmental Sciences of Ukraine. The experiment was carried out on podzolized heavy loamy black soil according to the 'Methodology of experimental work in vegetable and melon growing' at Kyiv research station of the Institute of vegetable and melon growing of Ukrainian Academy of Agricultural Science [7]. The content of humus is 2,23%, pH – 6,7-7,0. Seeds were sown in open soil in the third decade of April. The scheme of plants placement was 70x50 cm. The area of accounting plot was 20 m². There were three rows on the plot. The repetition of variants was triple. The objects of researches were varieties and hybrids of Savoy cabbage of different geographical origin.

The biometrical measurements and observations were done on ten plants in three repetitions of each variant. Such quantitative features as plant height at the level of the crown and the head, diameter of the crown, the number of leaves were studied.

The coefficient of variation was determined according to B.A. Dospekhov [4] and with the help of the computer program Statistica 6.

Research results. For evaluation the varieties and hybrids it is necessary to know the limits of the variability of the features and the level of their variation. On the basis of the given biometrical indices the coefficients of variation were calculated. It affirms the variability of features – the height of the plant at the level of crown and the head (Table1).

On the basis of calculations slight variation of height at the level of crown in all varieties and hybrids is stated. The less variation is determined in Savoy cabbage Vertyu 1340 – 37,5-42,1 and Teresa – 27,6-33,2 cm with the coefficient of varying – 7,0 and 7,1%. The largest variability of the plant height was observed in Savoy cabbage Forbote – 22,2-29,1 and Abervilers – 29,4-36,3 cm which were also characterized by the highest coefficient of variation – 8,0 and 7,9%. Other varieties and hybrids had coefficient of variation from 4,4 till 6,0%.

According to the coefficient of variation similar regularity was observed in the index – the plant height at the level of its head. The less variation was observed in Savoy cabbage Zolota rannya, Aubervil' and hybrids Saga F_1RS, Otello F_1 and Dafni F_1 – 4,4-4,9% respectively. A little higher it was in Savoy cabbage Abervelers – 9,4 and Forbote – 7,8%. Intermediate place take Chiftein savoy, Arkta, Vertus and D´asti S Glovanni – 5,2-6,1% respectively. In the whole according to the plant height of all varieties and hybrids a low level of this feature variation was determined.

By the results of the researches the variability by the diameter of the crown and the number of leaves of Savoy cabbage is determined.

By the crown size the difference between the minimum and maximum levels

of index in varieties D´asti S Gilovanni, Chiftein savoy and Forbote was 8,8, 8,4 and 8,2 cm. The less limits of features were observed in hybrids Otello F_1 and Saga F_1 RS – 1,7 and 2,0 cm. The coefficient of variation in all varieties and hybrids showed the low level of variability of this feature regardless of varieties – 4,2-7,9%.

1. The variability of plant height in savoy cabbage varieties

Variety, hybrid	The duration of vegetative period (days)	Plant height at crown level, cm			Plant height at head level, cm		
		limits	average	V, %±Sx, %	limits	average	V, %±Sx, %
Zolota rannya	106	22,8-23,8	23,4	4,9±1,3	20,6-21,8	21,2	4,6±1,6
Arkta	111	25,4-28,0	26,7	6,0±2,1	22,9-24,5	23,7	5,3±1,3
Forbote	104	22,2-29,1	25,7	8,0±2,2	22,7-27,1	24,9	7,8±2,0
Dafni F_1	103	27,4-28,7	28,1	3,5±0,9	24,9-25,6	25,3	4,4±2,1
D´asti S Gilovanni	138	27,4-28,8	27,9	4,1±1,3	21,7-24,7	23,1	6,1±2,6
Chiftein Savoy	136	25,7-26,5	26,1	5,1±1,8	22,8-24,6	23,1	5,2±2,4
Auberbille	139	22,9-25,1	24,1	4,4±0,8	21,4-22,6	21,9	4,9±1,5
Vertyu 1340 – control	152	37,5-42,1	39,7	7,0±1,6	33,7-38,2	36,02	7,2±1,8
Vertus	149	24,8-27,8	26,1	4,3±1,0	22,8-25,1	23,7	5,5±1,0
Abervilers	150	29,4-36,3	32,8	7,9±1,5	28,9-34,4	31,2	9,4±2,3
Saga F_1 RS	165	27,6-31,5	29,5	5,3±1,0	23,2-25,8	24,6	4,6±1,3
Otello F_1	167	25,8-27,5	26,6	5,8±1,1	23,8-25,1	24,5	4,7±1,1
Teresa	162	27,6-33,2	30,8	7,1±1,3	25,5-30,3	28,2	6,5±1,4

The difference between the number of leaves in all variants was within 2 – 5 pcs. The coefficient of variation according to this feature regardless of the variety features had low indices and was at the level of 5,9% – 9,6%.

One of the main indices which influences the variability of the features is the duration of vegetative period. It directly correlates with the variability of the diameter of the crown. So the coefficient of the correlation between the period of the plant sprouts and the period of heads formation and the coefficient of variation of the diameter of the crown was r= 0,56. It was similar to the size of the leave crown and the duration of period until the technical ripeness (r=0,54). Very interesting inverse correlation was observed between the variability of the crown and the variability of the number of leaves. The increase of the variation

coefficients of the crown diameter decreases the variability of the number of leaves (r=-0,60).

2. The variability of the crown diameter and the number of leaves in savoy cabbage assortment

Variety, hybrid	Crown diameter, cm			Number of leaves, cm		
	limits	average	V, %±Sx, %	limits	average	V, %±Sx, %
Zolota rannya	44,6-51,9	48,2	5,9±1,4	16-18	17	8,3±2,3
Arkta	45,6-47,2	46,4	5,4±1,6	15-17	16	7,1±2,4
Forbote	42,2-50,4	46,3	4,2±1,2	14-17	16	6,9±2,9
Dafni F_1	49,2-54,3	52,0	4,2±1,1	17-19	18	7,7±2,1
D´asti S Gilovanni	44,6-53,4	49,5	4,4±1,9	16-22	19	9,6±1,6
Chiftein savoy	52,2-60,6	56,4	6,5±1,5	18-23	21	6,6±1,3
Aubervil’	53,9-57,4	55,8	5,5±1,0	16-18	17	6,3±1,7
Vertyu 1340 – control	66,9-70,4	68,6	5,9±1,4	18-20	19	7,3±2,5
Vertus	54,4-58,7	56,5	4,6±1,2	20-24	22	8,0±3,0
Abervilers	51,8-55,8	53,8	5,8±1,8	21-25	23	8,2±3,2
Saga F_1 RS	54,2-56,2	56,6	7,9±1,0	20-22	21	5,9±2,4
Otello F_1	57,6-59,3	58,1	7,1±1,2	21-23	22	6,2±2,2
Teresa	48,0-51,8	49,8	4,9±1,6	19-21	20	7,4±2,5

Thus, considering the limits of studied morphological features, we should point out that their variability was expressed by low indices in spite of the variety, hybrid and their early ripening.

Conclusion. The variational features of plants of Savoy cabbage varieties and hybrids have been studied for the years of researches. It is determined that the variability of morphological features is expressed by low indices of the coefficient of variation in spite of the variety and heterosis hybrid and early ripeness.

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