

**Orcid: [0009-0008-2379-898X](https://orcid.org/0009-0008-2379-898X)**

**ASSESSMENT OF GROWTH, DEVELOPMENT, AND YIELD PARAMETERS  
OF ROMANESCO CAULIFLOWER (BRASSICA OLERACEA VAR. BOTRYTIS)  
VARIETIES UNDER DIFFERENT SECONDARY PLANTING DATES**

Scientific Research Institute of Vegetable crops, Melons and Potatoes,

**Xushvaktov Nurbek Jumayevich<sup>1</sup>**

Dr.Agr.Sc., Senior Researcher,

**Abdulkhafizov Sayfullo<sup>2</sup>**

PhD candidate

Email: [nkhushvaktov@inbox.ru](mailto:nkhushvaktov@inbox.ru)

**Abstract.** This article examines the growth, development, and productivity indicators of Romanesco cauliflower (*Brassica oleracea* var. *botrytis*) cultivars under various secondary planting dates in the environmental conditions of the Andijan region. Experiments were conducted at 10-day intervals, incorporating systematic phenological observations and biometric measurements. The research findings indicate that seedlings transplanted between July 10 and July 20 exhibited superior performance in leaf count, leaf surface area, and head weight. Under optimal temperature (25–30°C) and relative humidity, the vegetative period of the plants progressed normally. The Veronica variety recorded an average head weight of 420 g, demonstrating significantly higher yields compared to other tested cultivars. These results hold practical significance for determining optimal planting windows and refining agrotechnological practices for the secondary cultivation of Romanesco cauliflower.

**Key words:** Romanesco cauliflower, planting date, secondary crop, vegetative period, biometric indicators, yield, morphological characteristics, agrotechnology

**Introduction.** Romanesco cauliflower is exceptionally rich in essential elements vital for human health, including minerals such as iron (Fe), manganese (Mn), and zinc (Zn). It contains high concentrations of vitamins (A, C, and K), antioxidants, dietary fibers, carotenoids, and flavonoids, specifically kaempferol. Furthermore, it is characterized by high bioavailability, being easily absorbed by the human body and yielding systemic health benefits. Notably, the consumption of dishes prepared with Romanesco is highly unlikely to trigger allergic reactions, making it a safe and nutritious dietary option. However, insufficient thermal processing of this

cabbage variety may lead to gastrointestinal discomfort, such as flatulence and diarrhea. Dietary restrictions regarding the consumption of Romanesco cauliflower are primarily indicated for individuals with cardiovascular conditions or thyroid disorders. Despite these considerations, the therapeutic properties of Romanesco are extensive; it serves as a dense source of vitamins and minerals essential for human physiology. The curd contains high concentrations of vitamins C, K, and the B-complex group, alongside vital minerals including potassium (K), iron (Fe), calcium (Ca), and magnesium (Mg). The presence of antioxidants aids in neutralizing free radicals, thereby providing cellular protection. Furthermore, the high dietary fiber content in Romanesco stimulates intestinal peristalsis, optimizing digestive processes and serving as an effective preventative measure against constipation. The synergy of Vitamin C and antioxidants provides potent immunomodulatory effects, fortifying the immune system against respiratory infections and systemic diseases. The high potassium content plays a critical role in regulating blood pressure, effectively lowering cholesterol levels and mitigating the risk of cardiovascular diseases. Due to its low caloric density and high dietary fiber content, Romanesco is an ideal component for weight management and therapeutic diets. Furthermore, Romanesco cauliflower significantly enhances blood composition; its high iron concentration serves as an effective preventative measure against anemia by increasing hemoglobin levels and supporting hematopoiesis. From a dermatological perspective, the antioxidants and vitamins within the curd maintain skin elasticity and assist in reducing the appearance of wrinkles. Crucially, contemporary research highlights the presence of sulforaphane in this vegetable, a bioactive compound recognized for its potent anticarcinogenic (anti-cancer) properties. The high concentrations of calcium (Ca) and Vitamin K enhance bone mineral density, serving as a primary defense against osteoporosis. Romanesco cauliflower can be consumed fresh, cooked, or pickled. Notably, fermented (pickled) Romanesco provides significant probiotic benefits, optimizing intestinal microflora and gut health. In regional agricultural practice, Romanesco cauliflower is cultivated across four distinct planting windows: 1) Early: Late February to early March; 2) Mid-season: The final decade of March; 3) Late (Secondary): June 15 to July 15; 4) Winter-preceding: Early November. Seedlings grown using the bare-root method (no pot) are transplanted to the open field upon reaching the 4–5 leaf stage, while containerized/pot-grown seedlings are transplanted at the 7–8 leaf stage. For summer (secondary) planting cycles, seedlings are established in specialized nurseries; seeds are sown in mid-June, with transplantation occurring between mid-July and the first days of August. While direct seeding into the open field is biologically viable, it is not economically recommended for large-scale

production due to high seed costs and excessive consumption rates. Consequently, the transplant method remains the standard agrotechnological practice for Romanesco cultivation.

**Research Methodology.** The studies were conducted in accordance with standardized manuals established by B.J. Azimov and B.B. Azimov in "Methodology of conducting experiments in vegetable, melon, and potato growing" (2002), as well as V.F. Belik's "Methodology of experimental work in vegetable and melon growing" (1992). Additionally, the "Methodological guidelines for ecological testing of vegetable crops" (1987) were utilized to ensure scientific rigor.

Determining the optimal planting dates is critical for aligning the plant's developmental phases and vital physiological processes with favorable environmental conditions. This alignment ensures that temperature, humidity, and ultraviolet (UV) radiation levels remain within beneficial thresholds, avoiding abiotic stress that could hinder crop maturation. The core objective of this dissertation research is the development and optimization of cultivation technologies for Romanesco cauliflower varieties specifically within the context of secondary (double-cropping) planting windows. Research was conducted to identify the optimal secondary planting dates by analyzing the critical pedoclimatic (soil and climate) requirements throughout the growth and development phases of Romanesco cauliflower. Key parameters evaluated included ambient air temperature, relative humidity, and the effective temperature sum (thermal heat units) necessary for the vegetative period. Five different planting dates with 10-day intervals were selected to identify suitable varieties for secondary production. During each period, seedling transplantation, branching, growth patterns, and biometric indicators were recorded. Additionally, relative humidity, field capacity, and air temperature were measured for each planting date.

According to the findings, the optimal secondary planting dates that ensured the correct progression of the vegetative period and timely harvesting—while maintaining favorable temperature and humidity levels for the crops—were July 10, 2025, and July 20, 2025. During these periods, the air temperature from seedling transplantation to head formation remained within the range of 15–30°C. The relative humidity during this time was recorded between 20% and 45%. To prepare for these secondary planting dates, Romanesco cauliflower seeds were sown in polyethylene cell trays starting from early May 2025. Seeds were sown at a depth of 0.5 cm in 72-cell trays (size 6x12). The substrate used in the trays consisted of a mixture of peat, vermiculite, perlite, and humus. Following sowing, the trays were moistened daily and covered with polyethylene film. Germination began after 2–3 days. Once a 75% germination

rate was achieved across all trays, the film was removed, and the trays were transferred to a protected area covered with agrofibre (agroweb).

Throughout the development of the seedlings, nutrients and chemical treatments were administered to protect against viral diseases. Various pests common to cabbage, particularly the cabbage looper, were managed using insecticides. Due to the high moisture requirements of the seedlings, they were irrigated every two days using a sprinkler system.

Table-1

**Determination of leaf count, petiole length, and weight of Romanesco cauliflower cultivars under various planting dates**

Planting date	Number of leaves		Petiole length		Leaf weight	
	pcs	relative to the control, %	cm	relative to the control, %	g	relative to the control, %
Veronika						
20 Jun	22	88	10	70	580	95
1 July the control	25		13		606	
10 July	28	110	15	120	736	120
20 July	26	104	14	107	700	115
Shennon						
20 June	20	86	9	81	620	97
1 July the control	23		11		630	
10 July	24	105	12	109	760	120
20 July	22	95	11	100	755	119
Jemchujina						
20 June	20	90	10	83	550	93
1 July the control	22		12		586	
10 July	23	105	14	117	630	107
20 July	24	110	15	125	650	111

Zelyonaya grozd						
20 June	23	92	11	84	600	96
1 July the control	25		13		625	
10 July	25	100	14	107	680	108
20 July	26	104	15	115	700	112
Natalino						
20 June	21	90	8	80	590	95
1 July the control	23		10		620	
10 July	24	105	11	110	655	105
20 July	26	115	13	130	690	111
Compediglio						
20 June	18	90	9	75	616	95
1 July the control	20		12		640	
10 July	22	110	12	100	670	104
20 July	23	115	13	108	710	110

In selecting suitable Romanesco cauliflower varieties for secondary planting, parameters such as plant height, leaf count, and leaf dimensions (length and width) were measured across different planting dates. For the June 20, 2025, planting date, temperatures rose to 40°C during seedling development; this heat stress inhibited growth and extended the vegetative period by 20 days compared to normal durations. Conversely, for the seedlings transplanted on July 20, 2025, air temperatures remained between 25–30°C. This proved to be the optimal temperature range for Romanesco development, facilitating the progression of growth phases according to established physiological norms.

The highest indicators for leaf length were observed in the R. Campediglio variety. In specimens planted during favorable temperature periods, the leaf length reached 57 cm. The lowest indicators for leaf length were recorded in the Jemchujina variety, with a measurement of 45 cm in specimens planted during optimal temperature windows.

Table-2

**Influence of various planting dates on the morphological indicators of  
Romanesco cauliflower plants**

Planting dates	Leaf length		Leaf width		Leaf surface	
	cm	relative to the control, %	cm	relative to the control, %	dm <sup>2</sup>	relative to the control, %
Veronika						
20 June	50	106	15	97	60	80
1 July the control	53		17		75	
10 July	55	110	18	103	79	105
20 July	52	98	16	97	75	100
Shennon						
20 June	45	93	11	84	55	98
1 July the control	48		13		56	
10 July	50	108	13	100	58	105
20 July	55	115	14	107	58	105
Jemchujina						
20 June	40	95	10	90	50	80
1 July the control	42		11		54	
10 July	43	102	10	90	58	105
20 July	45	108	12	109	58	100
Zelyonaya grozd						
20 June	48	96	12	92	56	96
1 July the control	50		13		58	
10 July	51	102	12	92	58	100
20 July	51	102	14	108	62	106

Natalino						
20 June	45	95	14	93	54	96
1 July the control	47		15		56	
10 July	50	106	14	93	60	105
20 July	52	110	17	115	60	105
Compediglio						
20 June	55	98	14	100	58	96
1 July the control	56		14		60	
10 July	56	100	15	107	62	104
20 July	57	103	17	120	63	109

The 10-day interval between secondary planting dates played a crucial role in how effectively the seedlings adapted to the soil, established themselves, and absorbed soil moisture. In the conditions of the Andijan region, the secondary planting period occurs after the winter wheat harvest, typically falling in July. Throughout July, air temperatures ranged from a minimum of 24°C to a maximum of 40 °C. Due to the scarcity of rainfall, and to maintain adequate soil moisture, the crops were irrigated every 3–4 days at a rate of 500–600 m<sup>3</sup> per hectare. This irrigation schedule ensured the seedlings maintained turgidity and achieved uniform development. To accelerate plant growth, urea (carbamide) mineral fertilizer was applied at the specified rates per hectare.

Throughout the secondary planting periods, air temperature and field capacity were continuously monitored, with irrigation schedules determined based on soil moisture levels. To determine head weight, five plants were selected from each control plot. These were weighed, and the average value was calculated to represent the sample for each specific variant.

Among the tested varieties, the Veronica cultivar demonstrated higher productivity compared to the other variants, with an average head weight of 420 g. The lowest yield was recorded in the R. Campediglio variety, which yielded an average head weight of 350 g.

### Conclusions

1. It was determined that secondary planting dates significantly influence the growth and development of Romanesco cauliflower cultivars under the pedoclimatic conditions of the Andijan region.
2. Experimental results indicate that seedlings transplanted between July 10 and July 20 experienced a normal vegetative process under optimal temperature 25–30°C and relative humidity, resulting in the superior formation of biometric indicators.
3. 20.06 muddatida ekilgan variantlarda yuqori harorat (40°C gacha) ta'sirida o'simliklarning rivojlanishi susaydi va vegetatsiya davri 18–20 kunga uzaydi. In variants planted on June 20, high-temperature stress (up to 40°C) inhibited plant development and extended the vegetative period by 18–20 days.
4. Among the evaluated cultivars, the highest productivity was observed in the Veronica variety, with an average head weight of 420 g. The lowest performance was recorded in the Compediglio variety (350 g).
5. The period between July 10 and July 20 is recommended as the optimal window for the secondary cultivation of Romanesco cauliflower to ensure maximum yield and quality.

#### References

1. Azimov B.A., Teshaboyev N.T. Foundations of Vegetable Growing. – Tashkent: Mehnat, 2018. – 256 p.
2. Rubatzky V.E., Yamaguchi M. World Vegetables: Principles, Production and Nutritive Values. – 2nd ed. – New York: Chapman & Hall, 1997. – 843 p.
3. Maynard D.N., Hochmuth G.J. Knott's Handbook for Vegetable Growers. – 5th ed. – Hoboken: John Wiley & Sons, 2007. – 621 p.
4. Dixon G.R. Vegetable Brassicas and Related Crucifers. – Wallingford: CABI Publishing, 2007. – 327 p.
5. FAO. Production and protection of vegetables. – Rome: Food and Agriculture Organization of the United Nations, 2020.
6. Bose T.K., Som M.G. Vegetable Crops in India. – Kolkata: Naya Prokash, 2010. – 711 p.