



THE EFFECT OF DIFFERENT PLANTING DATES ON THE BIOMETRIC CHARACTERISTICS OF THE PHOTOSYNTHETIC ORGANS OF BROCCOLI

Kakhkhorov Sirojiddin Kushokovich

PhD Student

<https://orcid.org/0009-0004-0209-188X>

Samarkand Agroinnovations and Research University

<https://doi.org/10.5281/zenodo.21473559>

ARTICLE INFO

Received: 26st June 2026

Accepted: 28th June 2026

Online: 30th June 2026

KEYWORDS

broccoli, main crop,
photosynthetic organ, leaf width,
leaf length.

ABSTRACT

The article presents data on the average biometric characteristics of the photosynthetic organs of the broccoli hybrids Fiesta F1 and Nahos F1 grown as the main crop under different planting dates. The average leaf weight ranged from 698.2 to 1048.7 g, leaf width from 10.7 to 17.2 cm, leaf length from 12.1 to 23.7 cm, and the leaf area per plant ranged from 0.30 to 0.41 m².

Introduction. Leaves are the principal photosynthetic organs responsible for plant growth and development. Biometric characteristics of leaves, such as weight, width, and length, directly influence the formation of leaf area. An increase in leaf area promotes more efficient utilization of solar radiation, enhances the synthesis of organic compounds, and facilitates their translocation to generative organs, thereby improving plant productivity [1].

In broccoli, leaf biometric characteristics vary depending on cultivar or hybrid characteristics, planting date, environmental conditions, and applied agronomic practices. Therefore, evaluating leaf biometric traits under different planting dates in the main cropping season and determining leaf area per unit of land are of considerable scientific and practical importance [5].

Materials and Methods. Biometric measurements were carried out according to the methodologies described in *Methodology of Field Experiments in Vegetable and Melon Crops* [2], *Methodology of Field Experiments* [3], and *Methods of Conducting Experiments in Vegetable, Melon, and Potato Crops* [4].

In the present study, seedlings of the broccoli hybrids Fiesta F₁ and Nahos F₁ were transplanted on four different planting dates (23-25 February, 5-10 March (control), 15-20 March, and 25-30 March). Leaf weight, leaf width, leaf length, and leaf area per plant were evaluated separately for each hybrid.

Results and Discussion. The results demonstrated that leaf weight was directly influenced by planting date. Averaged across the experimental years, leaf weight in the control treatment (5-10 March) ranged from 852.7 to 978.7 g in the Fiesta F₁ and Nahos F₁ hybrids.

The greatest leaf weight was recorded in plants transplanted during 23-25 February, reaching 992.4-1048.7 g, which exceeded the control treatment by 70.0-139.7 g or 7.2-16.4%. When transplanting was delayed until 15-20 March, leaf weight decreased to 775.8-814.3 g.

The lowest values were observed in the latest planting period (25-30 March), where leaf weight ranged from 698.2 to 748.7 g, representing a reduction of 154.5-230.0 g or 18.1-23.5% compared with the control.

The highest values of leaf width and leaf length for both Fiesta F1 and Nahos F1 hybrids were also recorded in the earliest planting period (23-25 February). Under these conditions, the average leaf width reached 16.4-17.2 cm, while leaf length ranged from 21.5 to 23.7 cm.

In the control treatment (5-10 March), leaf width ranged from 14.8 to 15.0 cm, whereas leaf length varied between 18.0 and 20.2 cm. Delaying transplanting until 15-20 March reduced leaf width to 12.5-12.9 cm and leaf length to 14.1-16.4 cm.

The smallest leaves were recorded in the latest planting period (25-30 March), where leaf width measured 10.7-10.8 cm, and leaf length ranged from 12.2 to 13.7 cm.

The results further indicated that leaf area was significantly affected by planting date. In both hybrids, the maximum leaf area was observed in the earliest planting period (23-25 February). Specifically, the Nahos F1 hybrid produced a leaf area of 0.41 m² per plant, which was 0.02 m² or 5.1% greater than that of the control treatment. Similarly, the Fiesta F1 hybrid developed an average leaf area of 0.40 m² per plant, exceeding the control by 0.02 m² or 5.3%. A delay in planting significantly reduced leaf area. In the Nahos F1 hybrid, leaf area decreased to 0.37 m² and 0.32 m² in the 15-20 March and 25-30 March planting dates, representing reductions of 5.1% and 18.0%, respectively, compared with the control. Likewise, in the Fiesta F1 hybrid, leaf area declined to 0.35 m² and 0.30 m², corresponding to decreases of 7.9% and 21.1%, respectively, relative to the control treatment.



Figure 1. Effect of different planting dates on the biometric characteristics of the photosynthetic organs of broccoli.

Conclusions. In conclusion, the results of the study demonstrated that the early planting date (**23-25 February**) provided the most favorable conditions for the growth and development of the **Fiesta F1** and **Nahos F1** broccoli hybrids. The longer growing period and more efficient utilization of favorable temperature conditions resulted in the highest leaf weight (**992.4-1048.7 g**), leaf width (**16.4-17.2 cm**), leaf length (**21.5-23.7 cm**), and leaf area per plant (**0.40-0.41 m²**). Conversely, delaying the planting date led to increased air temperatures and a shortened growing period, which significantly reduced leaf development and consequently decreased the leaf area.

References:

1. Boltayev, M.A., & Asatov, Sh.I. (2019). Recommendations on the Technology of Broccoli Cultivation as a Second Crop. Tashkent, pp. 3–9.
2. Belik, V.F. (1992). Methodology of Experimental Research in Vegetable and Melon Crop Production. Moscow: Agropromizdat, p. 319.
3. Dospekhov, B.A. (1985). Methodology of Field Experiments. Moscow: Agropromizdat, 351 p.
4. Nizomov, R.A., et al. (2023). Methods of Conducting Experiments in Vegetable, Melon, and Potato Crops. Tashkent: Baktriya Press, pp. 47–48.
5. Razumkov, G.A. (2009). Variety evaluation of broccoli cabbage. Potato and Vegetables, 9, 10.

