BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg

UDC 634.7:631.544

MORPHOLOGICAL AND BIOLOGICAL CHARACTERISTICS OF BLACKBERRY CULTIVARS

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https://doi.org/10.5281/zenodo.20541711

Abstract This article presents the results of studies on the cultivation of blackberry cultivars under greenhouse conditions. The Chester cultivar exhibited a tendency for upright shoot growth and stable accumulation of vegetative biomass, demonstrating relatively high resistance to environmental stress factors. The Triple Crown cultivar was characterized by vigorous vegetative growth, the formation of a large leaf area, and intensive shoot branching, which contributed to a high photosynthetic potential. The Loch Ness cultivar showed a relatively compact plant architecture and greater cane thickness, reflecting its adaptability to greenhouse growing conditions.

Keywords: blackberry, shoot, flower, fruit, yield, greenhouse, temperature, relative humidity.

IntroductionThe development of fruit production in agriculture, the provision of vitamin-rich products to the population, and the increase in export-oriented agricultural products are among the most important tasks today. In recent years, growing demand for berry crops has led to increased attention to the improvement of blackberry cultivation technologies. Blackberry fruits contain high levels of vitamin C, B-group vitamins, organic acids, minerals, and antioxidants, making them valuable for human health.

Under open-field conditions, blackberry cultivation is often negatively affected by climatic factors such as temperature fluctuations, wind, and precipitation, which can reduce productivity. Therefore, greenhouse cultivation technology provides an opportunity to obtain higher and better-quality yields. Through microclimate management in greenhouses, optimal conditions can be created for plant growth and development.

Blackberry is a thermophilic crop that grows best at temperatures ranging from 18 to 25°C. When relative humidity is maintained at 70–80%, photosynthetic activity proceeds efficiently. The use of drip irrigation technology ensures water conservation and improves the uptake efficiency of mineral fertilizers. Greenhouse cultivation also promotes earlier fruit ripening, higher productivity, and the production of marketable fruits.

Materials and Methods During the research, all agrotechnical practices were carried out in accordance with scientifically based recommendations. These practices included soil loosening, fertilization with mineral and organic fertilizers, sanitary pruning, and regular phytosanitary monitoring. Depending on the growth and developmental stages of the plants, nitrogen, phosphorus, and potassium fertilizers were applied at differentiated rates. This approach ensured the balanced development of both vegetative and generative organs.

Results and Discussion Our studies demonstrated that investigating the morphological and biological characteristics of blackberry cultivars under greenhouse conditions is important for evaluating their adaptability to local soil and climatic conditions, growth performance, and yield potential.

The biometric and biological characteristics of the cultivars Chester, Triple Crown, and Loch Ness were comparatively analyzed. The experimental results revealed significant differences among cultivars in terms of growth vigor, shoot formation, leaf area development, and fruit production. In particular, the Triple Crown cultivar was distinguished by its vigorous growth and

large fruits, while the Chester cultivar exhibited relatively high productivity and greater resistance to environmental factors (Table 1).

Table 1

Main Morphological Characteristics of Blackberry Cultivars Grown under Greenhouse Conditions

Cultivar	Plant height (cm)	Number of shoots	Shoot thickness (mm)	Leaf area (cm^2)
2024				
Triple Crown	186.4	7.2	14.8	84.6
Chester	204.7	8.6	16.2	91.3
Loch Ness	178.5	6.8	13.9	79.4
$LSD_{0.05}$	0.8	0.5	0.7	0.4
Sx	3.8	0.35	0.28	1.9
2025				
Triple Crown	192.1	7.8	15.3	88.2
Chester	212.8	9.1	16.9	95.4
Loch Ness	185.3	7.3	14.4	83.1
$LSD_{0.05}$	0.6	0.8	0.7	0.5
Sx	4.6	0.42	0.33	2.4
2026				
Triple Crown	183.5	7.0	14.5	86.5
Chester	201.6	8.4	16.0	89.8
Loch Ness	176.2	6.6	13.7	78.6
$LSD_{0.05}$	0.7	0.5	0.7	0.3
Sx	3.2	0.30	0.25	1.7

The results showed that the dynamics of growth, development, and morphological formation of the cultivars varied between years. Throughout the study period, the rate of vegetative growth, shoot formation intensity, plant height, leaf area, shoot thickness, and biomass accumulation were systematically monitored.

Analysis of the obtained data indicated that the growth dynamics of each cultivar were determined not only by their genetic potential but also by greenhouse microclimate conditions, including temperature, relative humidity, light intensity, and nutrient availability in the substrate. While differences among cultivars were relatively small during the early stages of vegetation, clear differentiation became evident during subsequent growth phases.

Year-to-year analysis revealed a stable increase in growth parameters across all cultivars between 2024 and 2025. This trend can be explained by the optimization of greenhouse microclimate parameters and the proper implementation of agrotechnical practices such as irrigation, fertilization, pruning, and plant training. Statistical analysis confirmed that the observed differences among cultivars were significant at the $P < 0.05$ level.

Overall, the findings demonstrate the high agrobiological potential of the Chester, Triple Crown, and Loch Ness cultivars under greenhouse conditions. Furthermore, each cultivar exhibited distinct morphogenetic strategies for adaptation to environmental factors.

It should be noted that observations conducted in 2024 established baseline morphobiological growth indicators for all studied cultivars. The data obtained under experimental conditions revealed different physiological responses of the cultivars to greenhouse microclimate conditions.

Among the studied cultivars, Triple Crown exhibited the highest growth potential. Its average plant height reached 204.7 cm, with an average of 8.6 shoots per plant and a leaf area of 91.3 cm². These indicators reflect the active development of the photosynthetic apparatus and the expansion of the assimilative surface. The consistently high number of shoots also indicates a strong generative potential.

ConclusionThe Chester cultivar was characterized by balanced and stable growth dynamics. Plant height reached 186.4 cm, while shoot thickness increased to 14.8 mm. These results indicate high mechanical strength of the shoots and optimal biomass distribution within the plant. The absence of sharp fluctuations in growth rates suggests that this cultivar is well adapted to greenhouse cultivation conditions and can be considered a stable and reliable cultivar for protected cultivation systems.

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