Editorial

Berry Crops Production: Cultivation, Breeding and Health Benefits

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1. Introduction

Horticulture is among the most intensive agricultural systems [1]. The horticulture industry is undergoing rapid changes due to environmental, economic, and social constraints, and the berry industry is no exception [2]. Climate change, migration, economic instabilities, and public health concerns [3] have been significant challenges in recent years. The science is also changing rapidly, as new technologies such as genome sequencing, bioinformatics, automation, and sensing and imaging technologies have emerged [4]. These technologies have led to the creation of large amounts of data in different areas of research; therefore, the results must be commercialized and incorporated into the established breeding, production, handling, and storage practices. This Special Issue brings together information on genetic and environmental conditions affecting small fruit production and quality. New technologies that could be adapted to help us improve production quality have also been explored.

2. An Overview of Published Articles

This Special Issue captures the diversity of the studies focusing on genetic and environmental factors affecting small fruit production and quality and the new technologies that can be adopted. It contains ten articles, which I will describe briefly in the following paragraphs. It is also worth clarifying that the purpose of this editorial is not to elaborate upon each of the texts, but rather to encourage the reader to explore them.

Contribution 1 demonstrates that the soil incorporation of sunn hemp three weeks before strawberry planting did not benefit strawberry plant growth or fruit yield, and lowered the level of total soil N, leading to lower above-ground plant dry weight and a lower accumulation of N, P, and K by the end of strawberry season. However, no significant differences in the whole-season marketable fruit yield were observed due to the sunn hemp treatment compared to the control nutrient management treatment. This study confirmed the importance of long-term studies to understand the soil nutrient dynamics and plant nutrient uptake as affected by sunn hemp incorporation, which is also applicable to other green cover crops incorporated into the soil.

The second article, by Patel et al. (contribution 2), is focused on variations in fruit quality and anthocyanin content in ten strawberry cultivars grown in high tunnels and open fields during the harvest season. They also used an automatic titrator and a digital pocket acidity meter to compare the titratable acidity data. Genetic differences among cultivars were the primary variable and significantly affected total soluble solids (TSS), titratable acidity (TA), acidity, and total anthocyanin content. There was a weak correlation between TA and acidity, measured by the pocket acidity meter. The results emphasize the effect of genotype on fruit quality. The article also suggests using a pocket acidity meter for open-field strawberry production if a fast and less expensive method for acid assessment is desired.

The article by Marcellini et al. (contribution 3) studied the effect of three irrigation regimes (standard, 20% less, and 40% less) on three remontant strawberry cultivars (‘Albion’, ‘San Andreas’, and ‘Monterey’). ‘Monterey’ had the best fruit quality, folate, and...
antioxidant content at 20% less irrigation without significant yield reduction. Reducing the water by 20% did not significantly affect the yield, fruit quality, or nutrients. The data suggested that less than standard irrigation and more water management can save water by 226 m$^3$ per hectare per cultivation cycle.

The fourth article, by Čabilovski et al. (contribution 4), compared organic vs. mineral fertilization of strawberries. The highest yield was obtained from mineral NPK fertilizers across all three years of the study. Applying organic fertilizers (composts) improved fruit quality (TSS, antioxidants, and anthocyanins) in the second and third years of production. The results emphasize the importance of the time needed for organic fertilizers to affect strawberry fruit quality and the lack of a possible effect on strawberry yield in a short term.

The article by Mbarushimana et al. (contribution 5) tested the effect of a high tunnel structure on eight strawberry cultivars compared to open-field conditions and the economic feasibility (gross and net revenues) of both approaches over three marketing strategies. The open field had higher net revenues for all marketing strategies due to the higher yield and lower production costs. The authors suggested that growers should focus on open-field rather than high-tunnel production in the commonwealth of Virginia, US.

The sixth article, by Hosainpour et al. (contribution 6), developed a machine vision system for the quality grading of white mulberry fruits using a digital camera. Using artificial neural networks and support vector machine classifiers, they identified 23 features to classify the fruits in two grades (high and low). The model’s high accuracy confirms that it is a reliable, low-cost tool for monitoring the quality of dried white mulberries.

The article by Zydlik et al. (contribution 7) studied the effect of foliar fertilization with calcium and microelements on the yield and fruit quality of highbush blueberry. Yield, fruit firmness, and TSS increased. However, the foliar fertilization did not affect chlorophyll, fruit coloration, acids, and phenolic contents of highbush blueberries.

In the article by Rivero et al. (contribution 8), different temperatures and photoperiods were tested on the flowering and yield of everbearing strawberry cultivars. They discovered that long days at 15–21 °C enhanced flowering and short days at 27 °C decreased flowering. Runner formation was inversely related to flowering and was enhanced by short days. They concluded that the fruits are strong sinks for photosynthates, and significant fruiting flushes create long off periods and small second flushes. Therefore, the size of the first fruit flush must be compromised to optimize the fruit yield of the second flush or the season crop distribution.

The article by Zhang et al. (contribution 9) examined the influence of genotype and harvest date on strawberry quality. They showed that genotypes affected firmness, anthocyanin content, and antioxidant capacity, while harvest date contributed to the appearance, color, TSS, and TA, and their interactions affected total phenolic content.

The brief report by Hartman et al. (contribution 10) analyzed the effect of water and fertilizer on two Juneberry cultivars and seedling windbreak plantings. Natural conditions (no water or fertilizers) were compared with irrigation during flowering and medication plus fertilization during flowering and fruit ripening periods during a three-year experiment. Yield varied significantly among the treatments and years. Fertilization increased yield compared to irrigation. Seedlings were recommended for establishing new plantations, and irrigation and fertilization were suggested to increase the yield.

3. Conclusions

This compilation of articles demonstrates the significant effects of genotype and the environment on fruit production and quality. It emphasizes that more than one growing season is needed to see the beneficial effects of organic matter in improving the yield and fruit quality. It also emphasizes the importance of mineral fertilization, which may not be entirely replaced by organic fertilization without reducing yield. However, the fruit quality may be superior with organic fertilizers compared to that grown with mineral fertilization.
As humans prepare to feed a larger population, extreme climate events that are detrimental to agriculture production systems become more frequent and widespread, and humans start investing in the growing plants in outer space for extraterrestrial trips, we may need to invest in innovative technologies to grow high-quality and nutritious plants in controlled environments. The application of developing techniques and new technologies, such as machine learning, to help us identify defects is also emphasized. Emerging technologies, such as artificial intelligence, big data, the Internet of Things, and cloud computing, will play an important role in our mission to feed human populations, and need to be further investigated [5].

The other arena is via breeding plants that are more resistant to the extreme conditions they may be exposed to. The information in this Special Issue will help us to better understand small fruit production systems. It may contribute to the breeding of cultivars with attractive fruits of higher quality and nutritional value.

Conflicts of Interest: The author declares no conflicts of interest.

List of Contributions

References
2. Xu, X. Major challenges facing the commercial horticulture. *Front. Hortic.* **2022**, *1*, 980159. [CrossRef]


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