

Research Report

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Evaluation of Fruit Characteristics of Major Varieties of Litchi in Sarlahi, Nepal

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Abstract Litchi (*Litchi chinensis* Sonn.) is an economically important subtropical fruit crop widely cultivated in the Terai region of Nepal. This study evaluated the fruit morphological and quality characteristics of seven major litchi cultivars (Shahi, China, Seedless, Early Large Red, Calcuttia, Muzaffarpur, and Bombai) grown at the Tropical Horticulture Center, Sarlahi, Nepal, during the 2024 fruiting season. The experiment was conducted using a Randomized Complete Block Design (RCBD) with four replications. Fruit morphology, physical characteristics, seed traits, and total soluble solids (TSS) were assessed using standard pomological methods. Significant differences were observed among cultivars for most evaluated traits. Seedless exhibited superior commercial attributes, characterized by larger fruits, higher aril proportion, and smaller seeds, indicating a greater edible portion and enhanced market potential. In contrast, Shahi recorded the highest total soluble solids, reflecting superior sweetness and eating quality. Considerable variation was also observed in fruit colour, shape, seed morphology, and other physical characteristics, demonstrating substantial genetic diversity among the evaluated cultivars. Overall, the findings indicate that Seedless is the most promising cultivar for commercial production because of its desirable fruit quality traits, while Shahi is particularly suitable for fresh consumption owing to its superior sweetness. These results provide valuable information for cultivar selection, orchard management, and future litchi improvement programmes in Nepal.

Keywords Litchi (*Litchi chinensis* Sonn.); Fruit quality; Pomology; Cultivar evaluation; Total soluble solids

1 Introduction

Litchi (*Litchi chinensis* Sonn.) is one of the most important subtropical fruit crops cultivated worldwide for its attractive appearance, pleasant aroma, excellent flavor, and high nutritional value. The fruit is rich in sugars, vitamin C, phenolic compounds, and antioxidants, making it highly valued for both fresh consumption and processing. South and Southeast Asia account for a major proportion of global litchi production, with Nepal being one of the important producing countries in the Himalayan region. In Nepal, litchi is predominantly cultivated in the Terai belt, where favorable climatic conditions support its commercial production. According to the Ministry of Agriculture and Livestock Development (MoALD, 2023), litchi occupies approximately 5,769 ha, with an annual production of 42,736 metric tons and an average productivity of 7.41 t/ha. Among the major production districts, Sarlahi has emerged as an important litchi-growing area because of its subtropical climate, fertile alluvial soils, and increasing commercial orchards, contributing substantially to local livelihoods and the regional fruit economy.

The commercial value of litchi is largely determined by fruit quality attributes rather than yield alone. Consumers generally prefer fruits with larger size, higher fruit weight, greater edible aril proportion, smaller seeds, attractive peel color, and higher total soluble solids (TSS), as these characteristics directly influence market acceptability, consumer preference, shelf value, and profitability (Menzel, 2005). Small-seeded or "chicken-tongue" seed cultivars are particularly desirable because they possess a greater edible portion and fetch premium market prices (Singh et al., 2012). Likewise, TSS is one of the most important quality indicators because it reflects sugar accumulation and sweetness, thereby influencing fruit taste and overall eating quality (Hussain et al., 2021). Therefore, systematic evaluation of fruit morphological and quality traits is essential for identifying superior cultivars suitable for commercial cultivation, breeding programs, and orchard improvement.