

producing the widest seeds (1.70 cm) and Seedless the narrowest (1.04 cm). Seed weight varied between 1.20 and 4.29 g. China produced the heaviest seeds (4.29 g), whereas Seedless had the lightest seeds (1.20 g).

Total soluble solids ranged from 18.25 to 21.50 °Brix. Shahi recorded the highest TSS (21.50 °Brix), followed by China (19.75 °Brix), whereas Early Large Red and Calcuttia exhibited the lowest values (18.25 °Brix).

Table 4 Pericarp weight, aril weight, seed dimensions, seed weight, and total soluble solids (TSS) of seven litchi (*Litchi chinensis* Sonn.) cultivars evaluated in Sarlahi, Nepal

Varieties	Pericarp weight (g)	Aril weight (g)	Seed length (cm)	Seed width (cm)	Seed weight (g)	TSS (°Brix)
Shahi	1.38 ^d	11.40 ^b	2.38 ^b	1.62 ^a	3.82 ^{ab}	21.50 ^a
China	1.79 ^{cd}	13.17 ^{ab}	2.40 ^b	1.67 ^a	4.29 ^a	19.75 ^b
Seedless	1.86 ^c	15.14 ^a	1.85 ^c	1.04 ^b	1.2 ^c	18.75 ^{bc}
Early Large Red	1.68 ^{cd}	12.04 ^b	2.37 ^b	1.51 ^a	3.36 ^b	18.25 ^c
Calcuttia	2.57 ^b	13.24 ^{ab}	2.28 ^b	1.49 ^a	3.27 ^b	18.25 ^{bc}
Muzaffarpur	3.58 ^a	10.72 ^b	2.79 ^a	1.48 ^a	3.63 ^{ab}	19.25 ^{bc}
Bombai	2.68 ^b	12.56 ^{ab}	2.38 ^b	1.70 ^a	4.04 ^{ab}	19.25 ^{bc}
f-probability	***	*	***	**	***	**
CV%	13	13	6.9	12.3	16.5	4.7
Grand Mean	2.22	12.61	2.34	1.5	3.37	19.28

Note: *, **, *** represent significance at 5%, 1% and 0.1% respectively. Means followed by the same letter within a column are not significantly different according to Duncan's Multiple Range Test (DMRT) at $p \leq 0.05$

4 Discussion

The present study demonstrated significant variation in fruit morphological and quality characteristics among the seven evaluated litchi cultivars, indicating that fruit traits are largely governed by genetic differences among cultivars and their interaction with the growing environment. Fruit morphology, including colour, shape, and size, varied considerably across cultivars, reflecting differences in genetic makeup that determine fruit development and external appearance. Environmental factors such as temperature, solar radiation, soil fertility, and orchard management may further influence the expression of these traits, although cultivar genetics remain the primary determinant. Similar variation in fruit morphology among commercial litchi cultivars has been reported by Nacif et al. (2001) and Nath et al. (2022), who concluded that fruit appearance is predominantly cultivar dependent.

Significant differences were also observed in fruit length, fruit width, and fruit weight among the evaluated cultivars. Seedless produced the highest fruit weight, whereas Early Large Red and China recorded superior fruit dimensions. Fruit size is a complex quantitative trait regulated by cell division and cell expansion during fruit development and is influenced by the availability of carbohydrates and assimilates during the fruit growth period. Cultivars possessing greater sink strength generally accumulate more assimilates, resulting in larger and heavier fruits. Comparable variation in fruit size among litchi cultivars has been documented by Wang et al. (2017) and Chaudhary et al. (2023). Minor differences between the present findings and previous reports may be attributed to variations in environmental conditions, orchard management practices, tree age, and regional agroecological characteristics.

Seed characteristics showed marked differences among cultivars, with Seedless exhibiting significantly smaller and lighter seeds than the remaining cultivars. Small-seeded cultivars are highly desirable because reduced seed size increases the proportion of edible aril, thereby improving consumer acceptance and market value. The larger aril weight recorded in Seedless further supports this relationship, indicating that suppression of seed development allows greater allocation of assimilates toward aril growth. Similar observations have been reported by Singh et al. (2012), who described "chicken-tongue" seeded cultivars as commercially superior because of their higher edible portion. Nath et al. (2022) also emphasized that seed morphology is genetically controlled and serves as an important criterion in cultivar selection and breeding programmes.