Comparative qualitative analysis of unripe and ripe pumpkin (Cucurbita moschata L.)

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A B S T R A C T

The present investigation was carried out in department of agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab, India. The experimental design selected was CRD (Completely Randomized Design) consisting of pumpkin variety as fruit and seed are treatments which were replicated four times. A good quality fresh and healthy pumpkin variety, the Punjab Samrat was collected from the Experimental Field of Mata Gujri College, Fatehgarh Sahib. The healthy disease free, unripe and ripe fruits were selected and washed with water in order to remove dust, dirt and any other foreign material. The highest fruit weight (2141.25g), fruit length (125.34mm), fruit diameter (165.25mm), fruit volume (2155.25ml), seed index (13.08g), seed length (15.97mm), seed breadth (8.78mm), seed thickness (2.93mm), peel recovery content (9.95%), pulp recovery content (2.57%), seed recovery content (13.42%), was reported maximum at ripe stage of pumpkin. The highest specific gravity There were distinct variations among the two different stages of pumpkin for nutritional and physico-chemical characters of fruit under study and it can concluded that the ripe stage of pumpkin was superior to unripe stage in most of characteristics.

Keywords: Cucurbita moschata, physico-chemical, peel, pulp, seed, unripe, ripe.

INTRODUCTION

Consumption of fruits and vegetables has been increased rapidly by people due to awareness regarding their health benefits. Such increased demand can only be fulfilled by either using the technology to prevent the deterioration of commodity after harvest and/or to introduce underutilized fruits or vegetables for their commercial utilization. "Underutilized species" are plants whose nutritional values are either unknown or unexplored by researchers. They always had an elite status among the health foods.

Pumpkin is commonly known as ‘Kashiphal’ or ‘Lal kaddu’ and belongs to the family Cucurbitaceae and the genus Cucurbita. Worldwide, there are three main types of pumpkin, namely Cucurbita maxima, C. moschata and C. pepo (Lee et al., 2003). The name pumpkin originated from a Greek word Pepon which means large melon. The genus Cucurbita is comprised of five domesticated species viz Cucurbita moschata, Cucurbita pepo, Cucurbita maxima, Cucurbita faciola and Telfairia occidentalis (Caili et al., 2006). Pumpkin (Cucurbita sp.) due to its unusual and extravagant characters is considered as the marvels of vegetable world. It is one of the important vegetables widely grown all over the world. Pumpkin is a vegetable coming from tropical and subtropical zones such as Mexico and South America with high consumption in the local market

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Determination of pulp content

The pulp percent was calculated using the formula given below and was expressed in percentage.

\[
Pulp\ percent = \frac{\text{Pulp weight (g)}}{\text{Fruit weight (g)}} \times 100
\]

Determination of seed content

The seed percent was calculated using the formula given below and was expressed in percentage.

\[
Seed\ percent = \frac{\text{seed weight (g)}}{\text{Fruit weight (g)}} \times 100
\]

Determination of wastage content

The wastage percent was calculated using the formula given below and was expressed in percentage.

\[
Wastage\ percent = \frac{\text{wastage weight (g)}}{\text{Fruit weight (g)}} \times 100
\]

Statistical Analysis

The experimental data from 2 treatments, 4 replications pertaining to physical quality of unripe and ripe pumpkin were subjected to statistical analysis by Completely Randomized Design (CRD). Analysis of variance (ANOVA) was conducted to determine whether significant difference existed between different treatments on physical composition of pumpkin.

RESULTS AND DISCUSSION

Changes in physical characteristics

The results show that ripe fruit contain significantly \((p<0.05)\) maximum fruit weight, fruit length and fruit diameter than unripe fruit. In the present study (Fig. 1) the fruits of pumpkin were approximately 105.57 mm length, 117.01 mm diameter and weighing 780.25 gm its unripe stage, reached to the their maximum values with 125.34 mm long, 165.25 mm diameter and weighing 2141.25 gm at its ripened stage. The increase in fruit weight, fruit length and fruit diameter could be attributed to an increase in the size of the cells and accumulation of food substances in the intercellular spaces in fruit (Bollard, 1970). This variation in fruit weight probably may be due to the absorption and translocation pattern of photosynthate, genetic composition and environmental factors. Sharma and Rao (2013) reported pumpkin fruit weight, fruit length and fruit diameter at premature stage and ripened stage, which was similar to present study.

![Figure 1: Variation in fruit weight, fruit length and fruit diameter](image-url)
In the present study (Fig. 2) significant variation in average fruit volume and specific gravity was recorded among two stages of pumpkin. At unripe stage fruit volume was recorded 734.50 ml and specific gravity 1.09% at ripened stage fruit volume was recorded 2155.25 ml and specific gravity 0.97%. Shama and Rao (2013) reported that the developmental process is characterized by irreversible increase in volume as consequences of cell division and cell elongation. Specific gravity of fruit is generally correlated with chemical compositions such as starch content, dry matter, cell size and intercellular spaces and has been used as maturity and/or quality index in several fresh horticultural commodities, (Zaltzman et al., 1987; McGlone et al., 2007). Specific gravity decrease during fruit development. Maturity stage was correlated with the size of internal cavity of the pumpkin fruit during fruit development (Harvey et al., 1997).

![Figure 2: Variation in fruit volume and specific gravity](image)

![Figure 3: Variation in seed index, seed length, seed breadth and seed thickness](image)

The seed index, seed length, seed breadth and seed thickness of pumpkin under study is presented in Fig. 3. The results show that ripe fruit contain significantly (p<0.05) higher seed index, seed length, seed breadth and seed thickness than unripe
fruit. In the present study (Table 2) Seed index 7.11 g, seed length 13.11 mm, Seed breadth 6.55 mm and seed thickness 1.95 mm was found minimum at unripe stage and reached to their maximum value with Seed index 13.08 g, seed length 15.97 mm, Seed breadth 8.78 mm and seed thickness 2.93 mm (Table 2). Similar results was observed by Kumar (2017) and Naik (2015) in several varieties of pumpkin. As cell size increases during development, other accompanying characteristics also change, production of hormones by the endosperm and developing embryo promotes pericarp growth. Indeed, there is usually a positive correlation between the number of seeds in the fruit and final fruit size (de Jong et al., 2009). During early growth, embryo and endosperm develop and seeds start to form. A second phase begins where the pericarp resumes growth and continues to enlarge until slowing for a second time as fruit mature. Total number of seeds, percentage of developed seeds, seed weight per fruit and 100-seed weight increase with increase in maturity. In cucurbits, there is a progressive increase in accumulation of assimilates during fruit/ seed maturation (Johnson and Kortse, 2012). Likewise, in Citrullus lanatus both dry weights per fruit and 100-seed weight increased with fruit age (Kortse et al., 2012).

The present study shows (Fig. 4) significant variation in peel content, pulp content, seed content and wastage content among different stages of pumpkin. Maximum Peel content 9.95 % seed content 2.57 % and wastage content 13.42% was found at ripe stage. Whereas maximum Pulp content 78.74 % was found at unripe stage. Similar results was observed by Vidya (2015) and Bavita (2013). There are some overall consistencies in patterns of cell division and enlargement, as well as tissue differentiation and fruit enlargement. This variation in peel, pulp seed and wastage content might be due difference in fruit and seed size, genetic makeup, rate of photosynthate accumulation and translocation of different growth hormones. Change in peel, pulp, seed and wastage weight in pumpkin may be due to rapid seed development and cell enlargement Srivastava et al. (1988).

CONCLUSION

From the study carried out on different stages of pumpkin peel, pulp and seeds. It can be concluded that there were distinct variations among the unripe and ripe stage of pumpkin in physical characters of fruit. The ripe stage of pumpkin was superior to unripe stage of pumpkin in most of characteristics.
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