Journal of Postharvest Technology
2020, **08**(4): 45-51
www.jpht.in

RESEARCHARTICLE

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

G. Singh*, N. Kaushal, B. Singh

Department of Agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab, India

Received: 15.07.2020 Accepted: 23.09.2020

ABSTRACT

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 () seed recovery content (2.57%), wastage 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.

Citation: G. Singh, N. Kaushaland B. Singh2020. Comparative qualitative analysis of unripe and ripe pumpkin (*Cucurbita moschata* L.). *Journal of Postharvest Technology*, **8** (4): 45-51.

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

* *For correspondence*: G. Singh (Email: gurpreetdho394@gmail.com)

ISSN: 2348-4330

(Bisognin, 2002). In India, the production of pumpkin is estimated to be 1664.0 thousand MT from an area of 74.0 thousand hectares (anonymous, 2017). The maturity of pumpkin fruit occurs in about 90-120 days and the fruits are often allowed to ripen on the vine to ensure good shelf life. The fruits are variable in size, shape (round or oval) and colour. The colour varies from green, white and blue grey or yellow, orange and red depending on species. Pumpkins are monoecious having both male and female flowers on the same plant (Kulkarni and Joshi, 2013).

Pumpkin can be profitably converted into a variety of value added products such as jam, jelly, marmalades, puree, sauces, chutney, pickle and halwa, cookies and weaning mix, pies and beverages (Bavita, 2013 and Islam et al., 2014). Pumpkin seeds can be processed into flour which can be used for biscuit making bread and cookies (Hamed et al., 2008). Fresh seeds of *Cucurbita moschata* contain moisture, 28.5 percent; protein, 37.7 percent; and ash, 4.4 percent; whereas, dried pumpkin seeds contain moisture content of 5.6 percent, protein content of 37.4 percent and ash content of 4.4 percent (Fedha et al., 2010). Pandya and Rao (2010) studied physiological and biochemical changes in the fruit of *Cucurbita moschata* during its growth and ripening in relation to its seed development. However, a perusal of literature indicated that there is scare information regarding the influence of maturity on nutritional properties of *Cucurbita moschata*. Therefore, the present study has been undertaken to elucidate the physico-chemical characteristics during its growth and ripening, which would provide better scope to enhance its utilization through assisted selection of fruit at appropriate stage of development.

MATERIALS AND METHODS

Collection and processing

Unripe and Ripe pumpkins was collected in 2017 from experimental field located at Fatehgarh sahib, Punjab. The selection of fruit samples was done on the basis of their morphological attributes such as size, weight and colour. After harvest the fruits were brought to the laboratory, washed thoroughly in tap water. Best quality fruits was selected by sorting and grading. Dust and foreign material was removed by washing the fruits with fresh water. After washing fruits peel pulp and seeds was extracted separately by cutting into halves. Seeds was washed and dried into oven at 60oc until constant weight. Seeds were grinded and packed into zip lock bag.

Determination of physical attributes

Individual fruit weight was measured with electronic weighing balance. Fruit length and diameter were recorded by digital The selection of fruit samples from was done on the basis of their morphological attributes such as size, weight and colour. After harvest the fruits were brought to the laboratory, washed thoroughly in tap water. The selection of fruit samples from was done on the basis of their morphological attributes such as size, weight and colour. After harvest the fruits were brought to the laboratory, washed thoroughly in tap water. vernier caliper. The data on volume of fruits was recorded by water displacement method. Specific gravity was calculated by dividing the average fruit weight by average fruit volume. Seed index was calculated by taking the weight of 100 seeds on electronic weighing balance after extracting from the fruit. Seed length, seed breadth and seed thickness was recorded by measuring with the help of digital vernier caliper.

Determination of peel content

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

$$\text{Peel percent} = \frac{\text{Peel weight (g)}}{\text{Fruit weight (g)}} \times 100$$

Determination of pulp content

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

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

Determination of seed content

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

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

Determination of wastage content

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

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

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.

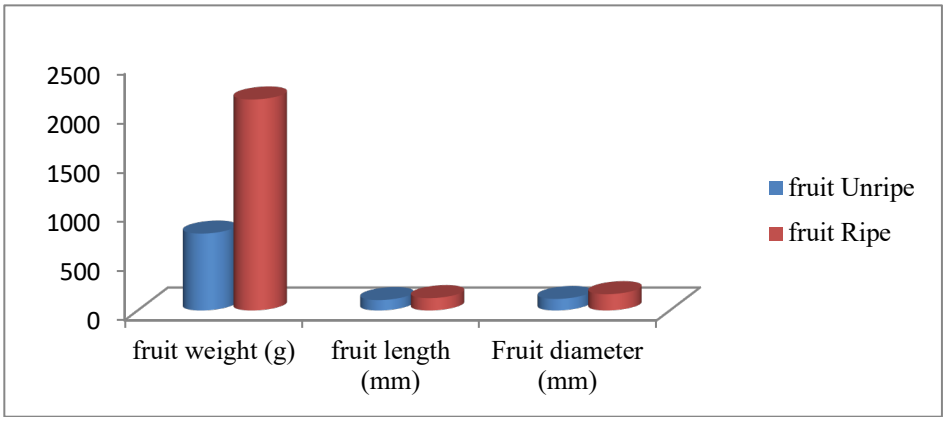

Figure 1: Variation in fruit weight, fruit length and fruit diameter

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).

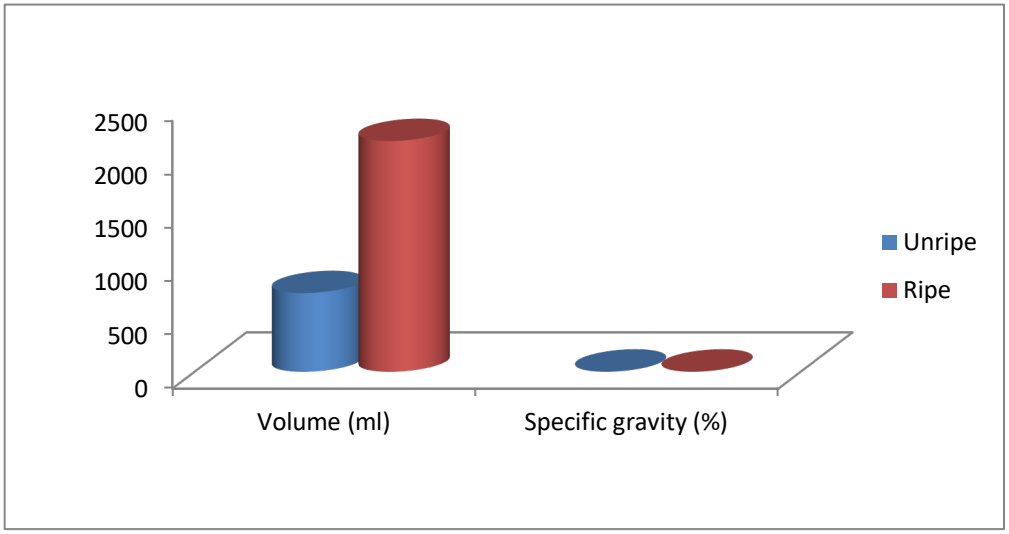

Figure 2: Variation in fruit volume and specific gravity

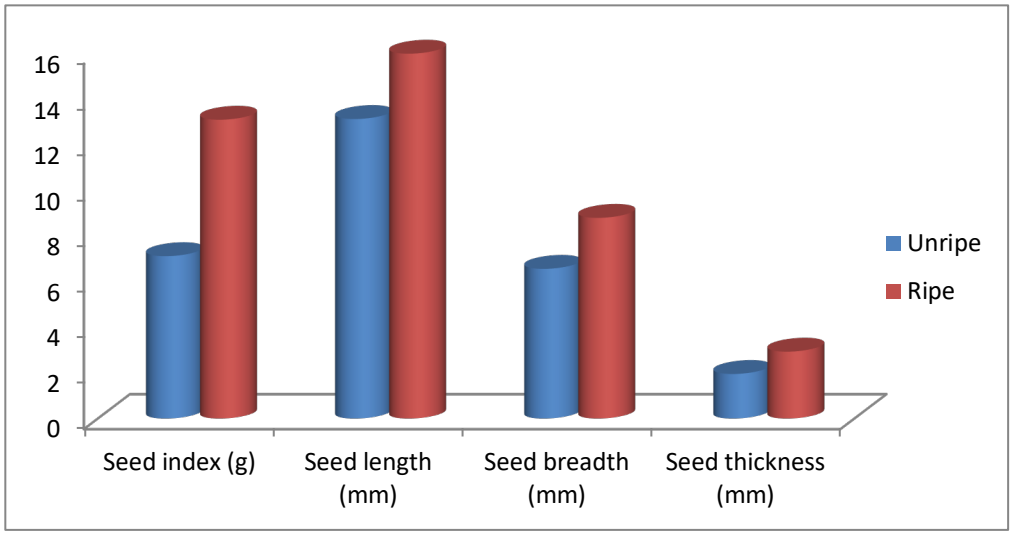

Figure 3: Variation in seed index, seed length, seed breadth and seed thickness

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).

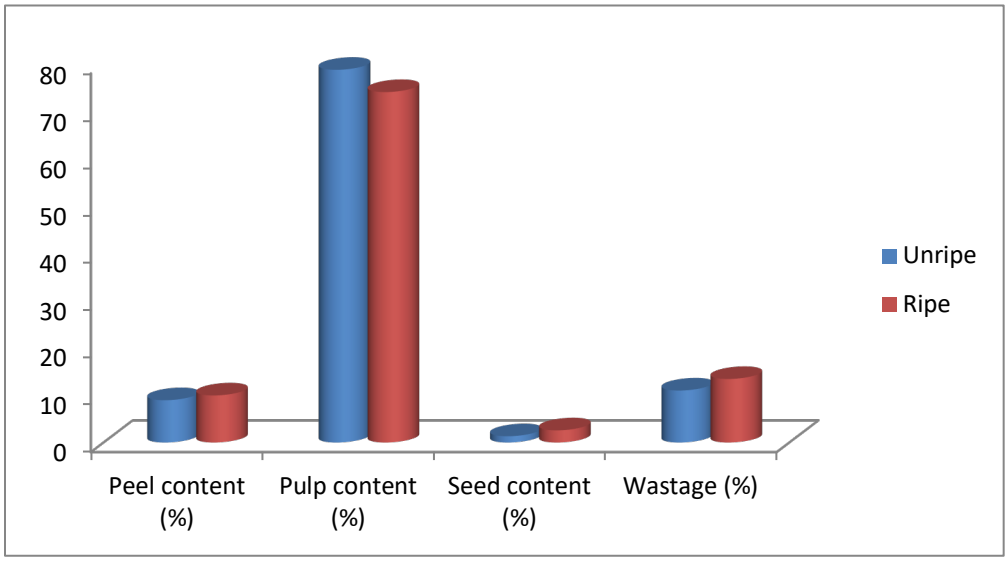

Figure 4: Variation in peel content, pulp content, seed content and wastage

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.

REFERENCES

Bavita K. 2013. Utilization of dehydrated pumpkin (Cucurbita moschata Duch ex Poir) and its seeds for development of value added products. M.Sc Thesis. Department of Food Science & Technolgy, Dr Y S Parmar UHF Nauni.

Bisognin DL. 2002. Origin and evolution of cultivated cucurbits. Ciencia Rural 32(5): 715723.

Bollard, E. G. 1970. The physiology and nutrition of developing fruits. In: A.C. Hulme (Ed.) "The biochemistry of fruits and their products". International Academic Press, London. 387-425.

Bollard, E. G. 1970. The physiology and nutrition of developing fruits. In: A.C. Hulme (Ed.) "The biochemistry of fruits and their products". International Academic Press, London. 387-425.

Caili F U, Huan S H and Quanhong L I. 2006. A review on pharmacological activities and utilization technologies of pumpkin. Plant Foods Human Nutrition 61(2): 70-77.

De Jong M, Mariani C, Vriezen WH (2009) The role of auxin and gibberellin in tomato fruit set. J Exp Bot 60: 1523-1532 http://jxb.oxfordjournals.org/content/60/5/1523.full

Fedha M S, Mwasaru M A, Njoroge C K, Ojijo N O and Ouma G O. 2010. Effect of drying on selected proximate composition of fresh and processed fruits and seeds of two pumpkin species. Agriculture and Biology Journal of North America 1(6): 1299-1302.

Hamed S Y, Nafisa M El H, Amro B H,Mohamed M E and Elfadil E B. 2008. Nutritional evaluation and physiochemical properties of processed pumpkin (Telfairia occidentalis Hook) seed flour. Pakistan Journal of Nutrition 7(2): 330-334.

Harvey W J, Grant D G. and Lammerink J P. 1997. Physical and sensory changes during the development and storage of buttercup squash. New Zealand Journal of Crop and Horticultural Science 25(4): 341-351.

Islam M Jothi JS, Habib MR and Iqbal A. 2014. Evaluation of nutritional and sensory quality characteristics of pumpkin pies. International Journal of Emerging Trends in Science and Technology 1(7): 1091-1097.

Kortse P A, Oladiran A J and Kolo M G M 2012. Changes in'egusi' melon (Citrullus lanatus (Thunb). Matsum and Nakai) seed quality during development and maturation in different seasons. Advances in Applied Science Research 3(6):3558-68.

Kulakarni AC and Joshi DC. 2013. Studies on physico-chemical properties of pumpkin. Asian Journal of Dairy and Food Research 32(2): 126-129.

Kumar P A. 2017. Study on yield attributing traits and profitability in pumpkin. (Cucurbita moschata Duch. ex Poir.). M.Sc Thesis. Dr. Yashwant Singh Parmar University of Horticulture & Forestry (Nauni) Solan (H P).

Lee Y K, Chung W I and Ezura H. 2003. Efficient Plant Regeneration via Organogenesis in Winter Squash (Cucurbita maxima Duch.). Plant Science 164: 413 -418.

Naik M L and Prasad V M. 2015. Studies on genetic divergence in pumpkin. An International Quarterly of Life Sciences 10(4): 2085-2088.

Pandya J B and Rao T V R. 2010. Analysis of certain biochemical changes associated with growth and ripening of Cucurbita moschata Duch. fruit in relation to its seed development. Prajna-Journal of Pure and Applied Science 18: 34-39.

Shama S and Rao R. 2013. Nutritional quality characteristic of pumpkin fruit as revealed by its biochemical analysis. International Food Research Journal 20(5): 2309-2316.

Srivastava S S, Asti K P, Patel M P, Tiwary B, and Bhaduriya U P S. 1988. Evaluation of mango. Varieties in Madhya Pradesh.

Zaltzman A, Verma B P. and Schmilovitch Z. 1987. Potential of quality sorting of fruits and vegetables using fluidized bed medium. Transactions of the American Society of Agricultural and Biological Engineers 30(3): 823-831.