Factors effect sensory properties of apricot

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Abstract

Apricot is a highly economical fruit because of its nutrition, attractive appearance, and typical flavor. This fruit has its short season and postharvest shelf-life, thus the marketability are limited. The ripening process of apricot is very rapid, therefore the fruit qualities decrease significantly including wrinked skin, flavor, and nutrition losses. Color, appearance, texture and flavor being sensory attributes of fruit affecting the acceptability of consumer. Among them, color and appearance are characteristics which consumers are consider to chose, whereas flavor and texture are important factors driving the consumer satisfactory. The ratio of sugars and acids and the concentration of voltatile compounds are main effects of flavors. The major factors affect the organoleptic of apricot are cultivar, harvesting time, conditions during transportation and storage. However, the scientific information about the chemical and volatile compositions and sensory attributes of apricot is limit. This work reviewed the sensory quality of apricot at different maturity stages, cultivars and storage conditions after harvest. Thus, proper maturity stage, and postharvest technologies are recommended for each cultivar to obtain the consumer preference.

Keywords: fruit, postharvest, organoleptic, quality, consumer

1.Introduction

Apricot is a high economical cultivar due to its attractive orange colour appearance, crisp, speciality flavor and nutrition (Karabulut et al., 2018; Ayour et al., 2020). However, this fruit has a short season and postharvest shelf-life, the transport and consumption are limited. The ripening process of apricot is very fast, therefore the qualities of fruit decrease significantly including wrinked skin, softening, juiceless and nutrition losses (Wu et al., 2014). Thus, understanding factors effecting the qualities of apricot after harvest is important. Application of postharvest technologies could maintain the fruit quality and extend the shelf life of apricot, therefore the market of this delicious fruit can be widen.

Infante et al. (2006) emphasized that fruit shape, colour, flavor, texture, and juiciness are all basic sensory descriptors for apricot. Among them, flavor and texture are important factors which effect acceptability of consumers (Infante et al., 2008; Baccichet et al., 2023). And ingredients such as: sugars, acids and volatile compounds are major drivers of flavor (Baldwin, 2002). Several points are focused below:

- Key aroma compounds of apricot.
- Correlation between sensory and chemical data of apricot.
- Effect of several factors (maturity stages, cultivars, modified atmosphere) on quality of apricot during storage.

2.Volatile compounds of apricot

Flavor plays an important role in assessing fruit quality, it effects remarkly on consumer preference (Defilippi et al., 2009). Volatile compounds of six apricot cultivars was determined by Guillot et al. (2006). Trained panel define aroma descriptors of apricot and evaluate the intensity of aroma on six-point sliding scale, where 0: no aroma and 5: intensity aroma.

Six apricot cultivars were classified according to intensity evaluation of panel. And then 10 key aroma compounds in apricot were determined. Lactones were related to apricot flavor while terpene alcohols, 2-phenylethanol, β-ionone, hexyl acetate and benzaldehyde were linked to flower and fruity notes of different apricot cultivars. Authors emphasised that it was possible to discriminate apricot cultivars on key aroma compounds.

Another study about aroma development of Castlebrite apricots at two maturity stages was also evaluated during 30 days of storage at 0°C by gas chromatography, electronic nose and sensory analysis (Defilippi et al., 2009).

No significant difference in aroma between two maturity stages was detected by panelists at harvest time and during storage. But instrument could discriminate two maturity stages. The highest aroma score of Castlebrite apricot was around 10. And the aroma change throughout storage was negligible. Castlebrite was considered as a low aromatic cultivar.

3.Correlation between sensory attributes and chemical parameters of apricot

Study about correlation between sensory attributes and chemical parameters of apricot purée was carried out by Parolari et al. (1992). Sensory attributes such as sweet, bitter, acid and whole taste were assessed by six trained panelist with scale from 0 to 10 for each attribute, where 0: no and 10: intensity.

Results showed that sweet taste and acid taste were best associated with both factors. Dry matter (such as sodium, refractive index, pH and potassium) had main effect on sweet taste, while carboxylic acid, inorganic ions and formol number linked positively to acid taste.

Another study about the relationship between instrument measurements and sensory attributes of apricot taste was also evaluated (Kantor et al., 2008). Effect of 1-MCP and controlled atmosphere on quality of apricot during storage was examined by electronic tongue, pH, Brix and sensory analysis. Sweet flavor, sour flavor and overall impression of three apricot cultivars were assessed by 10 untrained panelists on a 100 points scale. The results indicated that there was a moderate match between pH measurement and two sensory attributes (sweet flavor and sour flavor). Besides, there was a poor correlation between overall impression and electronic tongue. Differences in taste between treated and control samples were detected by panel but instrumental measurement was more sensitive to small changes than sensory.

4.Effect of several factors on sensory attributes of apricot during storage

The factors effect the quality of fruit during storage are cultivars, maturity stages, mechanical injuries, sanitizing, treatments, temperature and relative humidity during transportation and storage.

4.1 Maturity stage

The maturity stages of apricot significantly affect its sensory properties, including sweetness, acidity, aroma, texture, and overall acceptability. As immature stage becames to mature stage, soluble solids (mainly sugars) increase while titratable acidity decreases, resulting in a sweeter, less sour taste. The aroma profile also changes. At early stages, skin color is green, flavor is grassy from aldehydes and ripe fruit characterized by fruity, floral esters. Texture also changes, the firmness decreases due to cell wall breakdown.

Maturity stage influences on quality parameters particularly for eating quality. Infante et al. (2008) investigated the effect of maturity levels on sensory of 'Palsteyn' apricot at harvest and during 42 days of storage at 0^{o}C. Instrument and sensory evaluation were performed. Acceptability of apricot at different maturity stages and during storage at 0^{o}C was assessed by untrained panel. A hedonic scale from 0 to 15 was used, where 0 = dislike and 15 = like very much.

Soluble solids content (SSC), titratable acidity (TA), flesh firmness, and skin colour (Hue angle value) were evaluated when the apricot reached consumption firmness. 'Palsteyn' apricots were harvested with greenish skin (E1), light yellow (E2), or orange-yellow skin (E3)

There was an interaction between storage and maturity during storage. At harvest, E3 fruit had higher SSC:TA ratio than E2 and E1 and the SCC:TA ratio had an increase during storage. Thus, orange-yellow skin (E3) fruits obtained the highest acceptability score (9.98) with 78.8% percentage of acceptance. Light yellow (E2) and greenish (E1) fruits followed up respectively with 8.5 and 6.98. Unripe fruit (E1) was below the acceptance threshold (<7.5).

After 42 days of storage, TA decreased from 2.1% to 1.7% due to the degradation of organic acid throughout ripening. The skin of apricot lost its greenness and its yellowness increased during the 42 days period. E3 fruits were more yellow than that of others. At the end of measurement, E1 had higher values of hue angle compared to that of E2 and E3.

Apricot still kept high score in acceptability (9.18) after 14 days of storage. There was no difference in acceptibility between the initial time and 14 days of storage. The significant decrease in acceptibility was dectected only after 28 days of storage but still above the acceptance threshold (7.97). After 42 days of storage, apricots did not match the eating quality any more.

Besides, a quantitative descriptive analysis (QDA) was also carried out to evaluate the sensory attributes of apricot on a continuous scale for each attribute, ranging from 0-15 by trained panel (Infante et al., 2008). There were 6 descriptors including sweetness, aroma, juiceless, texture, sourness and flavor.

Sweetness, flavor, juiciness and aroma had positively effect on acceptibility. In contrast, sourness influenced negatively on acceptibility. And texture did not correlate to acceptibility. After 28 days and 42 days of storage, E3 linked to quality attributes, while E1 and E2 were shortage in quality attributes except texture. The results emphasised that maturity stage associated strongly with consumer satisfaction and orange-yellow skin Palsteyn apricot maintained the quality during 28 days of storage. Chilling injury and off-flavor were not detected in any fruits.

4.2 Modified atmosphere packaging

Atmosphere surrounding the commodity also contributes significantly in prolonging the postharvest life of fruits including O_2, CO_2 and C_2H_4 concentration (Kader et al., 1989). The benefits of modified atmosphere packaging (MAP) in extending the shelf-life of fruit were describle about many years ago. When increasing the concentration of CO_2 can control mold, reduce ethylene effects but also cause anaerobic respiration in some commodities. On the other hand, low levels of O_2 reduces respiration, and ethylene synthesis and action. However, it also stimulates anaerobic respiration and consequently accumulates ethanol, acetaldehyde causing off-flavors (Saltveit, 2003).

The effect of coating and modified atmosphere packaging on sensory quality of Kabaasi apricot during storage at 4°C was evaluated (Muftuoglu et al., 2012). Visual appearance, color, taste, texture and overall acceptability were assessed on a nine-point scale. (5: limit of marketability).

Results indicated that sensory characteristics of apricot decreased during storage. Control group was below limit of marketability (<5) at 7th of storage. Modified atmosphere packaging had efficiency in retaining the quality of apricot up to 28 days. Coating did not perform effectively in prolong the postharvest life of apricot. Authors found that active MAP films could be applied to extend the shelf-life of apricot.

4.3 Traditional and modern cultivar

Taiti et al. (2023) found that physicochemical parameters and volatile organic compounds of apricot change dramatically over the postharvest, effect consumer satisfaction and choice. Particularly fruit aroma and volatile organic compounds concentration are indicators for the fruit quality and consumer acceptance. The comparison of modern cultivar 'Lady Cot' and traditional one 'Portici' showed that how the modern cultivar 'Lady Cot' have more attractive attributes and firmness than the traditional cultivar, however the modern one 'Lady Cot' also lacks of many aromatic compounds that impact the consumer's liking of apricots. The results of the study indicated that there is an increase of consumers' need for high-quality apricots. There is also the demand to recover some of the traditional aromatic cultivars (like "Vesuvian Apricots group" with long shelf life and firm fruit.

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