



UNIVERSITI PUTRA MALAYSIA

***DETERMINING DAYS TO RIPEN AND QUALITY CHARACTERISTICS OF
TOMATO (*Solanum lycopersicum* Mill.) FROM KUALA LUMPUR
WHOLESALE MARKET***

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SERDANG, SELANGOR DARUL EHSAN

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By

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A project report submitted to the Faculty of Agriculture, Universiti Putra Malaysia, in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of degree of Bachelor of Horticultural Science

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2014/2015

This project report entitled **Determining Days to Ripen and Quality Characteristics of Tomato (*Solanum lycopersicum* Mill.) from Kuala Lumpur Wholesale Market** is prepared by **Nur Anira Akmal binti Che Abd Aziz** and submitted to the Faculty of Agriculture in fulfillment of the requirement PPT4999 (Final Year Project) for the award of degree of Bachelor of Horticultural Science.

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ABSTRAK

Objektif kajian ini adalah untuk menentukan hari buah tomato untuk masak dan ciri-ciri kualiti tomato dari Pasar Borong Kuala Lumpur. Kajian ini dijalankan dalam rekabentuk rawak blok lengkap (RCBD) dengan lima replikasi. Buah tomato daripada setiap kotak diklasifikasikan kepada 4 indeks kematangan, indeks 2 (“breaker”), indeks 3 (“turning”), indeks 4 (“pink”), indeks 5 (“light red” /oren) . Buah dibenarkan masak ke peringkat sepenuh merah pada suhu ambien di dalam kotak. Tujuh parameter iaitu tempoh masak tomato ke peringkat sepenuh merah, warna kulit, kepejalan, kepekatan pepejal terlarut, keasidan tertitrat, vitamin C, dan kandungan karotenoid telah diukur selepas dibenarkan masak dalam keadaan ambien. Data yang dikumpulkan dianalisis dengan analisis varians (ANOVA) untuk mendapatkan perbandingan antara min rawatan. Min telah dipisahkan oleh perbezaan yang signifikan kurangnya (LSD) dengan aras signifikan $P \leq 0.05$.

Dalam kajian itu, indeks kematangan awal buah tomato memberi kesan kepada tempoh masak buah ke peringkat sepenuh merah . Warna kulit tomato, kepejalan buah, kepekatan pepejal terlarut, keasidan tertitrat, nisbah kepekatan pepejal terlarut : keasidan tertitrat, dan kandungan karotenoid daripada buah tomato masak juga dipengaruhi oleh tahap kematangan awal buah untuk masak ke peringkat merah penuh. Walau bagaimanapun, tidak terdapat perbezaan yang signifikan dalam kandungan vitamin C daripada buah masak dari indeks kematangan awal yang berbeza. Tempoh masak buah tomato masak dari indeks kematangan 2 adalah tempoh yang paling lama berbanding dengan buah dari indeks kematangan 3, 4, dan 5. Oleh itu, untuk kemasakan buah secara

komersial, penggunaan etilena adalah disyorkan untuk buah tomato dari indeks kematangan 2 untuk masak seragam dalam masa yang singkat.



ABSTRACT

The objectives of the study were to determine the days to ripen and quality characteristics of tomato from Kuala Lumpur Wholesale Market. This study was conducted in a randomized complete block design (RCBD) with five replications. Fruits from each box were classified into 4 maturity indices, index 2 (breaker), index 3 (turning), index 4 (pink), index 5 (light red/orange). The fruits were allowed to ripen to full-red stage at ambient temperature in the box. Seven parameters which are ripening period of tomato to full-red stage, skin colour, firmness, soluble solids concentration, titratable acidity, vitamin C, and carotenoid content were measured after fruits were allowed to ripen in an ambient condition. Collected data were analyzed with the analysis of variance (ANOVA) to obtain mean comparison between treatments. The means were separated by least significant difference (LSD) with significant level of $P \leq 0.05$.

In the study, the initial maturity indices of the tomato fruits affected the ripening period to full-red stage. The tomato skin colour, pulp firmness, soluble solids concentration, titratable acidity, SSC:TA ratio and carotenoid content of the ripened tomato fruits were also significantly affected by the initial maturity stages as fruits ripen to full red-stage. However, there was no significant difference in vitamin C content of fruits ripened from different maturity indices. The ripening periods of tomato fruits ripened from maturity index 2 was the longest period compared to fruits from the maturity indices 3, 4, and 5. Therefore, for commercial ripening, the application of ethylene is recommended for tomato fruits from maturity index 2 to ripen uniformly in short period of time.

CHAPTER 1

INTRODUCTION

Tomato (*Solanum lycopersicum*) is globally cultivated for its fleshy fruits. It could be eaten fresh or in the processed form. Tomato belongs to the family Solanaceae and also known as the night shade family (Bergouxnoux, 2014). The tomato originated from the Andes Mountains in South America.

As a dicotyledonous plant, it can grow vines up to 6 m in the natural habitat but typically grown to 1-3 m tall in the greenhouse. The tomato is a short-lived perennial plant and grown as an annual plant for commercial purposes. In commercial planting, the seed could germinate in 6 days and the first flowering can be 35-49 days after transplanting. Tomato could be harvested according to their commercial maturity. Most of the fruits are harvested when they are mature and allowed to ripen subsequently during transit, storage or when displayed in retail shops. Immature fruits are prone to shriveling and mechanical damage and are inferior in quality when ripe. Any fruit picked either too early or too late in its maturity stage is more susceptible to physiological disorders and has a shorter life than a fruit picked at proper maturity (Kader, 1994).

Maturity stage at harvest was found to be the most important determinant of storage life and final fruit quality (Alam *et al.*, 2006). The Malaysian standards (2004) for fresh tomatoes classified tomatoes into six maturity stages, based on the percentage of the external colour. These are mature green (no external red colouration), breaker (<10% red colour at blossom end), turning (10-30% of fruit surface having red colour),

pink (30-60% of fruit surface having red shade), light-red or orange (60-90% of fruit surface having red colour), and red (at least 90-95% of fruit surface having red colour). The change in the colour of the tomato fruit results from the degradation of chlorophyll into chloroplasts and chromoplasts, as well from the accumulation of pigments such as carotenes and lycopenes, which are responsible for the orange and red colour of the fruit (Gray *et al.*, 1992). Finally, the accumulation of sugars, such as glucose and fructose, and organic acids and the production of complex volatile compounds are responsible for the aroma and flavor of the fruit (Seymour *et al.*, 1993).

The appearance of fruits and vegetables is an important factor that determines the consumer's preference (Kays, 1999). Produce appearance is characterized by size, shape, form, colour, surface condition, and absences of defects. Tomatoes with high sugar and relatively high acid contents are better in flavour and low sugars with low acid contents give poor flavored tomatoes (Cantwell, 1994).

At the Kuala Lumpur Wholesale Market, tomatoes are available in different maturity indices, from green to light pink stage. Some of the fruits at the green stage or mature green stage could ripen to an acceptable quality. Unfortunately, many fruits harvested green are not fully mature, and this contributes to increase losses and reduced quality. Different maturity stages also give different fruit quality characteristics when ripen. Different harvesting stages give different period of ripening. Therefore, when displayed at retail stores such produce will represent poor quality with non-uniform colour of fresh tomatoes.

A tomato fruit at full red stage gives a good indication of a good tomato quality to a consumer. Thus, harvesting the fruits at suitable stage of maturity would provide fruits of better physical and chemical quality characteristics in the market. The objectives of this study were to determine the maturity stages, days to ripen and the quality characteristics of tomato fruits bought from the Kuala Lumpur Wholesale Market. The study was conducted to proof the wide range of maturity indices of tomato fruits present at the Wholesale Market; as such fruits contribute to non-uniform external colour of tomato.

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