

## Relationship between phytochemical changes and colour development in Tomato (*Solanum lycopersicum* L.) fruit during ripening

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### Abstract

Tomato (*Solanum lycopersicum* L.) is major dietary source of antioxidant such as lycopene, total carotene and ascorbic acid. Lycopene is a bright red carotenoid pigment and most potent antioxidant among dietary carotenoids. This study was to (a) investigate the change of phytochemical content in tomato fruit during ripening, and (b) find the relationship of colour changes and lycopene content in tomato fruit. Physicochemical properties investigation carried out on, pH, total soluble solid (TSS), ascorbic acid, lycopene and total carotene content, Total Phenolic (TPC) and Total Flavonoid content (TFC). Fruit colour which is important physical characteristic to assess ripening of tomato fruit were assess using chroma meter as  $L^*a^*b^*$  values. The  $a^*$  value was considerably increase with fruit colour development of tomato. The significantly highest pH was recorded in dark red stage ( $4.96 \pm 0.0829$ ) and followed by the lowest pH was recorded in green stage ( $3.81 \pm 0.0505$ ). The significantly highest TSS was recorded in dark red stage ( $5 \pm 0.1333\%$ ) and the lowest pH was recorded in green stage ( $3.9 \pm 0.4243\%$ ). The significantly highest lycopene content revealed in dark red stage ( $205.469 \pm 10.84\text{mg/kg}$ ) and followed by the lowest resulted in green stage ( $6.379 \pm 0.4268 \text{ mg/kg}$ ). The highest total carotene content resulted in dark red stage ( $0.4165 \pm 0.0278 \text{ mg/kg}$ ) and the lowest resulted in green stage ( $0.0291 \pm 0.00225 \text{ mg/kg}$ ). The highest ascorbic acid revealed in dark red stage ( $14.432 \pm 1.797\%$ ) and the lowest revealed in green stage ( $0.76763 \pm 0.4320\%$ ). The Folin Ciocalteu method was resulted significantly highest TPC in dark red stage ( $0.5569 \pm 0.041 \text{mg Gallic acid equivalent/g}$ ) while lowest resulted in green stage ( $0.0969 \pm 0.051 \text{ GAE/g}$ ). The significantly highest TFC was resulted in dark red stage ( $0.5569 \pm 0.0020 \text{ Quercetin equivalent/g}$ ) while lowest resulted in green stage ( $0.0969 \pm 0.0067 \text{ Quercetin equivalent/g}$ ) of fruit. There was a better fit linear correlation between lycopene and ( $a^*/b^*$ ) value and same as total carotene and ( $a^*/b^*$ ) value. ( $R^2=0.8572$  and  $R^2=0.7337$  respectively). The result shows the phytochemical content of tomato fruit increase with fruit color development. The  $a^*$  value is the best physical parameter to measure the colour of the tomato fruit to detect the colour development during ripening. There is a positive correlation between colour development and lycopene content of tomato fruit and also with the total carotene.

**Keywords:** Antioxidant, Carotene, Lycopene, TFC, Tomato, TPC

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