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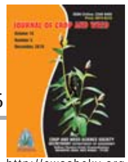

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Antioxidative properties of cherry tomato

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ABSTRACT

In an effort to select the most promising line(s) out of eight advanced breeding lines of cherry tomato (Solanum lycopersicum var. cerasiforme) in terms of antioxidative properties, the content of antioxidant constituents and activity of antioxidative enzymes were analyzed from the fruit samples at 'red ripe' stage of harvest in an experiment conducted during November, 2018. The content of lycopene, ascorbic acid and phenol were found to range between 1.89 and 3.31 mg 100 $^{-1}$g, 21.15 and 39.77 mg 100 $^{-1}$g and 6.94 and 12.97 mg TE g^{-1}, respectively whereas antioxidant activity under three different systems of assay (DPPHRAC, FRAP and LP) yielded values from 8.16-15.69 mg TE g^{-1}, 2.06-3.82 mg TE g^{-1} and 7.85-55.29 ì mol MDA g^{-1} of fresh sample respectively. The activity of antioxidative enzymes (SOD, CAT and POD) varied from 2.11 to 3.28 mg ml^{-1} (IC_{50}), 0.038 to 0.140 ì mol H_2O_2 destroyed g^{-1}min^{-1} and 0.0008 to 0.0044 ì mol guaiacol oxidized g^{-1}min^{-1}. The observed activity of PAL, the key enzyme in phenyl propanoid pathway, was found in the range of 33.70-43.17 ì molt-cinnamate produced g^{-1}hr^{-1} in fresh harvested sample tissues. On the basis of PCA and average values of all the parameters contributing to antioxidative property, 'Cherry round yellow' was selected as the most promising advanced breeding line followed by 'Cherry round red (big fruit)', '2016 Cherry 4' and '2016 Cherry 3', with better scavenging of ROS and can be used as improved materials for breeding of cherry tomato in future.

***Keywords*:** Antioxidant activity, ascorbic acid, CAT, cherry tomato, phenol, POD and SOD

[**Abbreviations:** CAT: Catalase; DPPH:2,2-diphenyl-1-picrylhydrazyl; FRAP: Ferric reducing antioxidant power; LP: Lipid Peroxidation; PAL: Phenylalanine ammonia lyase; PCA: Principal component analysis; POD: Peroxidase; SOD: Superoxide dismutase; TP: Total phenol; Trolox: 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid]

Tomato (*Solanum lycopersicum*) is one of the most important staple vegetables cultivated widely across the world. India produced 18.73 million tons of tomatoes sharing 10.44% of the world production in 2016 (Anon., 2018). Tomatoes are enriched with important bioactive principles and attribute that help to designate tomatoes as an important member of the group of so called 'functional foods'. Tomato is consumed both cooked and raw as salad dressings and in various processed and preserved forms as well. Its lustrous, brilliant red colour of lycopene, an antioxidant carotenoid pigment principle, attracts consumers overwhelmingly, being an inherent instinct of them endowed by nature. The protective role of tomato carotenoids and polyphenols have been established well by Campbell *et al*. (2004) as important phytochemicals to be useful in the etiology of prostate cancer. In an overall sense, tomato usually possesses arsenal of protective compounds e.g., phenolics (phenolic acids and flavonoids), carotenoids (lycopene, á-and â-carotenes), vitamins (ascorbic acid and vitamin A) and glycoalkaloids (tomatine) that fight with stressful conditions leading to various cancers, cardiovascular and neurodegenerative diseases. Besides, the bioavailability of tomato phytochemicals are usually unaffected by routine cooking processes (Chaudhary *et al*., 2018). It is *esp.* the raw mode of consumption that additionally increases its importance to the researchers to investigate on the scope for its improvement in terms of possessing properties apart from providing nutrition.

Normal aerobic metabolism possesses a mechanism to detoxify the harmful chemical species called reactive oxygen species (ROS) that are constantly generated as an inevitable consequence. A situation termed 'oxidative stress' is arrived when such ROS including superoxide radical anion, hydrogen peroxide and various peroxyl radicals, hydroxyl radical, singlet oxygen etc. are formed at an elevated level following exposure to extreme adversities of the environment. To fight with the situation, the adversity is recognized by the cell that consequently alters the expression of certain genes leading to triggering of biochemical pathways for biosynthesis of a group of important phytochemicals like carotenoids, ascorbic acid, phenolics and enzymes such as superoxide dismutases (SOD), catalases (CAT) and a family of peroxidases (POD) etc. specialized for defense function, from a housekeeping mode to production at higher levels.

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