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Efficacy of graded doses of polymers on processing quality of tomato Cv. Co.3

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Abstract : A study was undertaken at Horiticultural College & Research Institute, Coimbatore in tomato cv. Co.3 to optimize graded dose hydrophylic polymers and its effect on quality parameters. A total of three hydrophylic polymers viz., Terra Cottem, Polyvinyl alcohol and Polyacrylamide were selected for the study. The treatment included six levels each of Terra Cottem (T_1 to T_6 at 1.5, 3.0, 4.5, 6.0, 7.5 and 9.0 g per plant), Polyvinyl alcohol (T_7 to T_{12} at 3.0, 6.0, 12.0, 15.0 and 18.0 per plant), Polyacrylamide (T_{13} to T_{18} at 2.5, 5.0, 7.5, 10.0, 12.5 and 15.0 per plant) and control (T_{19} at one part red earth, one part sand and one part farmyard manure). The results stated that the graded doses of 4.5, 15.0 and 10.0 g per plant of Terra Cottem, Polyvinyl alcohol and Polyacrylamide enhanced the TSS, flesh thickness, ascorbic acid, acidity, lycopene and shelf life of the fruit, which were not influenced significantly with further increase in doses of respective polymers. *(Key words : Tomato, Efficacy of hydrophylic polymers, Processing quality.)*

Tomato is always in great demand to meet the requirement of kitchen and processing industry. It is valued for both fresh and processed forms. The amount and distribution of rainfall largely influence the success of rainfed tomato. An effective and planned utilization of available water or rainfall has therefore, becomes one of the most essential factors in Indian agriculture specific to vegetables such as tomato. Here aids the hydrophylic polymers which retains more moisture and nutrients with the potentiality of releasing themwould be advantages for proper plant establishment and help to obtain quality produce. In this view, studies were undertaken in tomato cv. Co.3 to optimise graded dose of hydrophylic polymers and its effect on quality parameters.

Materials and Methods

A total of three hydrophylic polymers viz., Terra Cottem, Polyvinyl alcohol and Polyacrylamide were selected for the study. The tomato variety Co.3, in general a drought tolerant one is henceforth chosen for this investigation. An experiment was conducted in pot culture during October '96 to January '97 in completely randomized design replicated thrice. The seedlings of about twenty five days old, were transplanted from seed pan to earthen pots, containing one part red earth, one part sand and one part farmyard manure. The polymers were applied at a depth of 15 cm to the individual pots just before planting. The treatment included six levels each of Terra Cottem (T_1 to T_6 at 1.5, 3.0, 4.5, 6.0, 7.5 and 9.0 g per plant), Polyvinyl alcohol (T_7 to T_{12} at 3.0, 6.0, 12.0, 15.0 and 18.0 per plant), Polyacrylamide (T_{13} to T_{18} at 2.5, 5.0, 7.5, 10.0, 12.5 and 15.0 per plant) and control (T_{19} at one part red earth, one part sand and one part farmyard manure). The doses of polymers were fixed on the basis of standard recommendations.

Results and Discussion

The efficacy of graded levels of polymers was studied by assessing the flesh thickness (cm), TSS (°Brix), pH of juice, titrable acidity (%), ascorbic acid (mg 100 g^{-1}), lycopene (mg 100 g^{-1}) and shelf life (days). The results (Table1) revealed that all these quality parametes were significantly influenced by the graded doses of polymers. The optimum dose of polymers based on the quality traits was found to be 4.5, 15.0 and 10.0 g of Terra Cottem, Polyvinyl aclohol and Polyacrylamide respectively and the results were on par. The results are in accordance with the earlier finding (Wallace 1986) on nutritional quality of tomato. This might be due to that the polymers would have facilitated the optimum supply of nutrients and translocation of metabolites to the developing fruits (Wallace 1986) as a result of improvement in physical properties of soil, which in turn resulted in the better quality of fruits (Wallace and Wallace 1986). The marked increase in flesh thickness, TSS, pH of juice, ascorbic acid and lycopene could be due to the proper uptake of phosphorus (Murugan, 1990) and potassium as from the polymer along with water (Wallace 1986) might be attributed to the enhanced photosynthetic and metabolic activities, which result in the synthesis of higher amounts of acids, metabolites and glucose. The reserves thus produced might have contributed to the synthesis of ascorbic acid, TSS and acidity. Similar views on the utilization of glucose for synthesis of ascorbic acid in cassava were reported (Ogundana *et al.* 1987).

The levels lower than the optimum dose of polymers failed to influence the quality parameters, possibly due to reduced availability of water and nutrients, which were insufficient for the proper

absorption and transportation of essential elements which in ultimate constitute for poor quality as supported by Wallace (1986). The higher doses of polymers also did not significantly influence the various traits. This could be because of spread of polymers beyond the rooting zone leading to the wastage of water and nutrients from such polymers. Still (1976) however, found that except for few cases, the quality parameters were increased with increased rate of application. In the present study, reduced utilisation of water from the gel forming polymers might be the reasons for non-significant results at higher doses as also observed by (Al-Harbi *et al.* 1996).

The efficiency of graded levels of three hydrophilic polymers revealed that the graded doses of 4.5, 15.0 and 10.0 g per plant of Terra Cottem, Polyvinyl alcohol and Polyacrylamide enhanced the TSS, flesh thickness, ascorbic acid, acidity, lycopene and shelf life of the fruit, which were not influenced significantly with further increase in doses of respective polymers.

Table 1. Effect of hydrophylic polymers on quality parameters in tomato cv. Co.3

Treatments	Flesh thickness (cm)	Total soluble Solids (°Brix)	Titrable acidity (%)	Ascorbic acid (mg 100g^{-1})	Lycopene (mg 100g^{-1})	Shelf life (days)
T_1	0.34^{c}	3.52^{cd}	0.47(3.92)^{bcd}	25.7^{abc}	4.44^{def}	9.3^{g}
T_2	0.33^{c}	3.35^{f}	0.46(3.89)^{cd}	25.0^{de}	4.25^{ef}	8.8^{gh}
T_3	0.32^{c}	3.33^{f}	0.45(3.86)^{d}	24.5^{e}	4.23^{f}	8.5^{h}
T_4	0.34^{c}	3.44^{def}	0.48(3.94)^{abc}	25.6^{a-d}	4.39^{def}	9.8^{fg}
T_5	0.42^{a}	3.67^{ab}	0.48(4.00)^{ab}	26.2^{a}	5.16^{ab}	13.2^{ab}
T_6	0.37^{b}	3.57^{bc}	0.47(3.94)^{abc}	26.1^{a}	4.65^{cd}	12.6^{bc}
T_7	0.33^{c}	3.51^{cde}	0.47(3.93)^{abc}	25.2^{cd}	4.37^{def}	11.4^{e}
T_8	0.36^{b}	3.55^{cd}	0.47(3.94)^{abc}	25.9^{ab}	4.55^{de}	10.1^{fg}
T_9	0.41^{a}	3.68^{a}	0.49(3.99)^{a}	26.2^{a}	5.21^{a}	13.2^{a}
T_{10}	0.38^{c}	3.58^{bc}	0.48(3.96)^{abc}	26.1^{a}	4.90^{bc}	12.9^{ab}
T_{11}	0.34^{c}	3.40^{ef}	0.48(3.97)^{ab}	25.7^{abc}	4.44^{def}	9.3^{g}
Mean 0.36	3.52	0.47(3.94)	25.6	4.59	11.3	

In a column, means followed by a common letter(s) are not significantly different at 5 per cent level by DMRT.

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